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SOME POLYCHAETE SPECIES FROM THE SOFT BOTTOM OF THE EASTERN HARBOUR OF ALEXANDRIA, EGYPT, WITH SPECIAL REFERENCE TO ORBINIIDS AND PARAONIDS HABITATS

FAIZA A. ABD-ELNABY

National Institute of Oceanography and Fisheries, Alexandria, Egypt.

Key words: Polychaeta, Orbiniidae, Paraonidae, Hesionidae, Saccocirridae.

ABSTRACT

In the present study six polychaete species were reported, five of them are considered as new records to the Mediterranean marine waters of the Egyptian Coasts. They were collected from the soft bottom in the Eastern Harbour of Alexandria. They had not been previously recorded in the Egyptian Mediterranean Coastal waters. These species are: *Scoloplos* (*Leodamas*) *rubra* , *Scoloplos* (*Leodamas*) *dendrobranchus, Paradoneis lyra, Ophiodromus pallidus* and *Saccocirrus papillocercus*. While *Scolaricia typica* was previously reported by Fauvel (1937) in Alexandria. The recorded species are belonging to four families: Orbiniidae, Paraonidae, Hesionidae and Saccocirridae.The families Paraonidae and Saccocirridae and the genera: *Scoloplos, Saccocirrus and Paradoneis* are recoded for the first time in the Eygptian Mediterranean waters. The relation between the surrounding habitat, pointed prostomium and sac-like or dentritic branching eversible pharynx and burrowing activity of the recorded Orbiniidae and Paraonidae species, was discussed.

1. INTRODUCTION

Polychaete worms represent an important group in soft bottom communities and their spatial structure is always closely related to grain size and other factors such as organic content (Brasil and Da Silva, 2000).

The organisms show a large variety of feeding types and strategies, at many levels of the marine food web (Fauchald and Jumars, 1979).

Orbiniids and Paraonids are intermediate between the errantiate and sedentariate groups of polychaetes, they do not make permanent tubes, but rather are active burrowers in sand to sandy mud substrata. Most authors consider the orbiniids to be non- selective deposit feeders which ingest particulate organic matter, as well as sand (Uebelacker and Johnson, 1984). Also Paraonids are found in many habitats feeding on Foraminifera, diatoms (Fauchald and Jumars, 1979).

Hesionids are active, non-tubicolous worms common in shallow water and on hard substrata (Fauchald, 1977), as well as in soft sediments and deep water. The larger hesionids are carnivorous, feeding on polychaetes and other small invertebrates; some may be surface deposit-feeders, ingesting detritus (Day, 1967). The interstitial species feed on diatoms, bacteria-rich detritus, copepods and foraminiferans.

Saccocirrids are small annelids, live in marine sediments at the bottom of the intertidal zone (Brown, 1981). Feed on bacteria, diatoms and algae from shell gravel.

The polychaete fauna of Alexandria especially in the Eastern Harbour is well known. The most extensive papers were by Fauvel (1937), Selim (1978 and 1997), Selim

et al. (2006a and 2006b) and Abd-Elnaby (1999 and 2005).

This study has been mainly focused on the description of new recorded polychaete species sampled from bottom sediments of the Eastern Harbour of Alexandria. The relation between the surrounding habitat, such as pointed prostomium and sac-like or dentritic branching eversible pharynx and burrowing activity of the recorded Orbiniidae and Paraonidae species, were discussed. All the recorded species are fully described and illustrated. This paper may be considered a step to add new record species to the list of Egyptian polychaetes.

2. MATERIALS AND METHODS

Sampling of polychaete fauna from bottom sediments were carried out during three seasons (autumn, 2006 to spring, 2007) at low tide, from the Eastern Harbour of Alexandria (E.H.).

Sediment samples were collected from seven stations (Fig. 1) using a grab sampler (20x20 cm). Two samples were taken at each station. The depths of the E. H. are ranged from 3 to 11 meters; bottom differs between coarse, medium, fine sand, muddy-sand mixed with stones, dead shells of molluscs and broken tube worms.

The sediment was screened through 0.5 mm sieve and fixed in 10% formalin solution, and then the organisms were washed, sorted and preserved in 70% ethyl alcohol. The specimens were examined using stereo and compound microscopes. Drawings were made by using camera lucida and photos were taken by scientific digital camera attached to the compound microscope. For taxonomic identification of species, the following references were consulted: Fauvel, 1923 and 1927; Hartman, 1957; Day, 1967; Fauchald, 1977 and Uebelacker and Johnson, 1984.

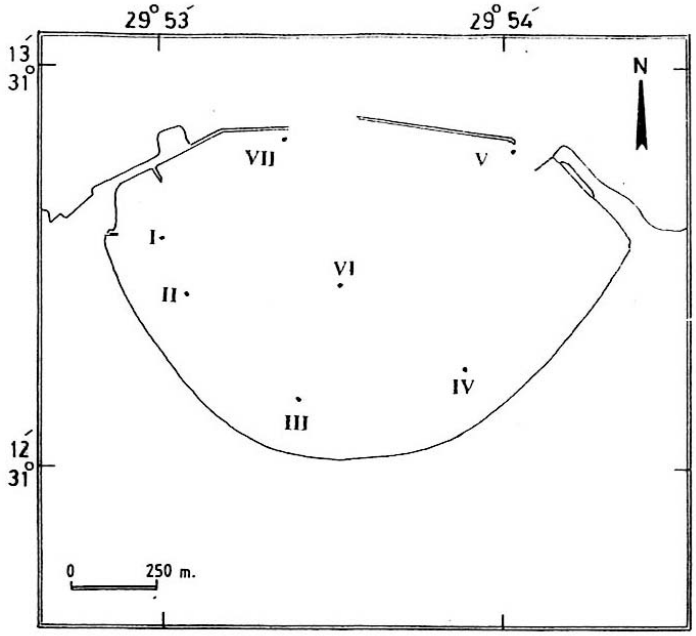


Fig. (1): Eastern Harbour of Alexandria. Position of sampling sites

3. RESULTS

The harvest of the present collection yielded six polychaete species, five of them are considered as new records to the Mediterranean marine waters of Egypt Coasts. The new recorded species are: *Scoloplos* (*Leodamas*) *rubra, Scoloplos* (*Leodamas*) *dendrobranchus, Paradoneis lyra, Ophiodromus pallidus* and *Saccocirrus papillocercu*s. The sixth one *Scolaricia typica* was previously reported by Fauvel (1937) in Egypt at Alexandria region. They are belonging to four families: Orbiniidae, Paraonidae, Hesionidae and Saccocirridae. The Families Paraonidae and Saccocirridae and the genera: *Scoloplos, Scolaricia, Saccocirrus* and *Paradoneis* are recoded for the first time in the Eygptian waters. The following is a synopsis of the species recorded including notes on the description and ecology of each species.

Family Orbiniidae Hartman, 1942

Genus *Scoloplos* (*Leodamas*) kinberg, 1866

1- *Scoloplos* (*Leodamas*) *rubra* (Webster, 1879)

(Fig.2 a- g; Pl.1, 1-3)

Scoloplos rubra Uebelacker and Johnson, 1984: p.1-29, figs. 1-27, 28 a-f

Scoloplos (*Leodamas*) *rubra* Hartman, 1957: p. 291, plate 32, figs. 1-6; Leo´n-Gonzalez and Rodriguez, 1996: p. 137.

Description: Two complete specimens are measured up to18 mm with 45-48 segments. Prostomium acutely pointed, and longer than wide, eyes absent. First segment achaetous and apodous (Fig. 2-a, pl. 1-1). Branchiae first present from the sixth and continue on all other segments. They are simple, small, lingulate throughout and conspicuously fimbriated (Fig. 2-a)

Thoracic region consisting of 22-23 setigers. Thoracic notopodia as small conical ridge with finely crenulate capillaries (Fig. 2-e). Thoracic neuropodia consisting of a fleshy postsetal ridge, often bearing a single papilla on last few segments (Fig. 2- b, pl. 1-2). They have crenulate setae beside three to four transverse rows of uncini, most of which are distally curved and have transverse rows of ridges (Fig. 2-f). Transition from thorax to abdomen is at segment 23-24 and more or less abrupt.

Abdominal parapodia have a long tapering notopodial postsetal lobe and a similar, though smaller, neuropodial unequal postsetal lobe (Fig. 2-c). Abdominal notopodia have crenulate setae beside two furcate setae (Fig.2-d), neuropodia with lips have one or two projecting, yellow distally hooked acicula (Fig. 2-g, pl. 1-3). Body ending with four cirri.

Remarks: The described specimens are closely related to Hartman's specimens (1957) and Taylor's (1966), but differ in the number of thoracic segments 24-25 and 23-28 respectively, while the present specimens have 22-23 segments. This may be due to the length of the worm.

Habitat: *Scoloplos* (*Leodamas*) *rubra* was collected from sandy- mud bottom with broken shells of molluscs (site VI).

Distribution: Eastern and southern shores of united states (Hartman, 1957); Mediterranean Sea (Daniel and Simon, 1976); Western coast of Baja California peninsula, Mexico (Leo´n- Conzalez and Rodriguez, 1996).

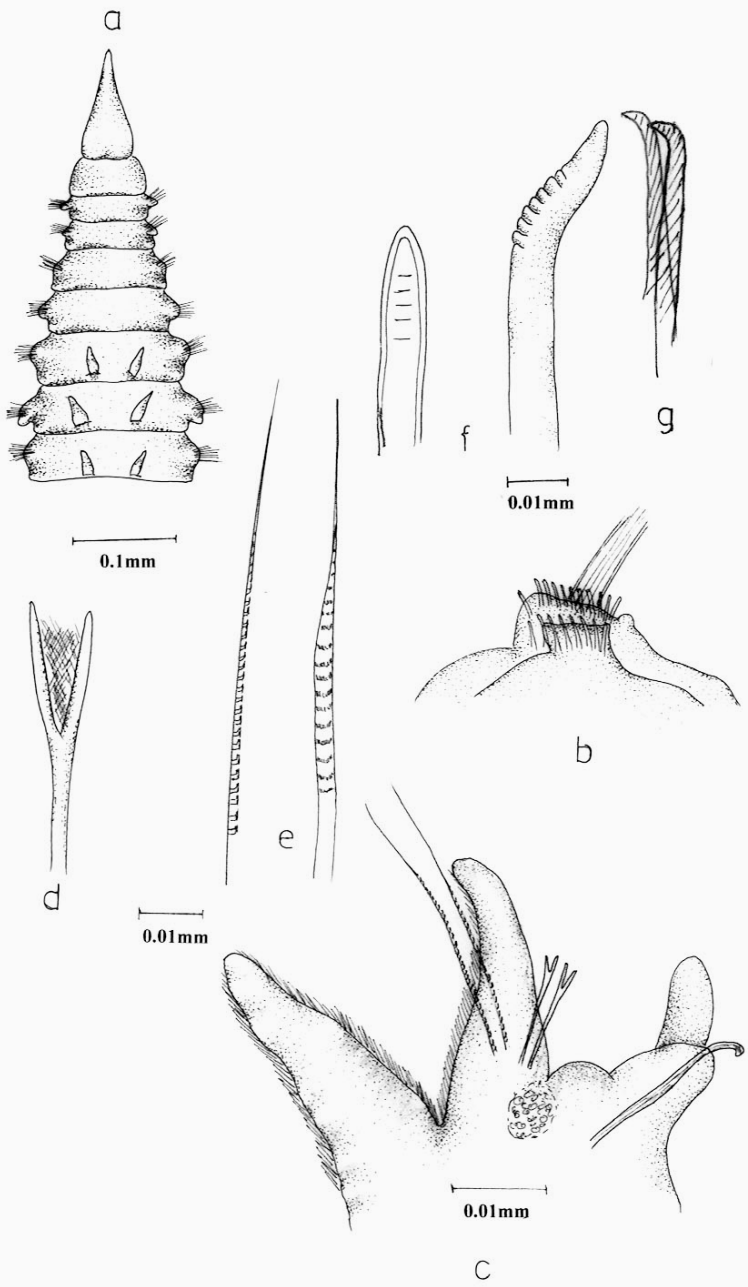


Fig.(2): ***Scoloplos (Leodamas) rubra****:* a, anterior end; b, anterior parapodium; c, posterior parapodium; d, furcate seta; e, crenulate capillaries; f, thoracic neuropodial uncini; g, acicula.

2- *Scoloplos* (*Leodamas*) *dendrobranchus* Hartman, 1957

(Fig.3 a-g; Pl.1, 4)

Scoloplos (*Scoloplos*) *cylindrifer* Ehlers, 1904

Scoloplos (*Leodamas*) *dendrobranchus* Hartman, 1957: 291, Figs. 1-3, plate 33.

Description: One specimen, body long 38 mm, with about 210 segments, broad, greatly depressed thorax. Prostomium acutely pointed and narrow cylindrical abdomen, no visible eyes. First segment simple, smooth ring. Thorax with 18 segments (pl. 1-4). Parapodia of the first 12 segments are lateral (Figs. 3- a,b,c), thereafter they shift upward and become dorsal in abdomen. Branchiae are first present on the eighteenth setigerous segment, firstly slender, digitate simple lobes, located at the dorsal base of the notopodium. They are visibly fimbriated at their lateral margins. In the posterior part of the body the branchiae rapidly divide dichotomously, they are branched into 6 terminal filaments; together they form a dense mass over the dorsum of the body (Fig. 3-d).

Thoracic notopodium long, triangular; in middle thoracic segments they are foliaceous with 12 pointed setae, neuropodia have short postsetal lobe, the neuropodial setae are shorter, in addition there are 12-14 uncini, distally blunt, slightly curved and have no hood, at their outer curved region (Fig. 3-e).

Abdominal parapodia have longer postsetal lobes, than those in front, they are provided with long pointed setae, embedded acicula and furcate setae are present posteriorly (Fig. 3- g). Neuropodia have selender facicles of long pointed setae (Fig. 3- f), supported by a single projecting yellow acicula, sharply curved near its distal end.

Remarks: The present specimen agrees with the specimens described by Hartman (1957), who reported 15-18 thoracic segments, furcated setae are absent and branchiae with 2-6 terminal filaments.

Habitat: *Scoloplos* (*Leodamas*) *dendrobranchus* was found in sandy-mud bottom mixed with empty shells and broken tube worms (site III).

Distribution: New Zealand, Chatham Islands (Day, 1977); Australia (Hartman, 1957; Hatchings and Murray, 1984).

Genus *Scolaricia* Eisig, 1914

3- *Scolaricia typica* Eisig, 1914

(Fig.3 h-k; Pl. 1,5)

Scolaricia typica Fauvel, 1927: 19-20, Fig. 6, a-i; 1937: p. 5; Hartman, 1957: 259.

Description: This genus differs from *Scoloplos* in that abdominal neuropodia have modified setae called flails (Soies en fle'au Fauvel, 1927), in addition to typical pointed setae.

Five specimens were collected, body long up to 325 mm, 68-102 segments. Prostomium conical pointed, without eyes, first segment achaetous and apodous. Branchia first present on the eighteenth segment and continue.

Thoracic region consisting of 18-21 setigers, thoracic notopodia with capillary setae (crenulate setae) (pl. 1-5), thoracic neuropodia with 4-5 rows of uncini (Fig. 3- i, k). Abdominal notopodia have crenulate setae, one or two of them curved slightly near their tips forming (Flails setae) (Fig. 3- h, k), beside furcate seta (Fig. 3- j), abdominal neuropodia with crenulate setae and a single of projecting yellow distally hooked acicula, in some segments it sharply curved near its distal end.

Remarks: This description agrees with that reported by Fauvel (1927) but differs in the number of thoracic segments (19-20).

Habitat: This species was also found in sandy mud soft bottom substratum (site V, IV, and VI).

Distribution: Western and Southern Europe and Northern Africa (Hartman, 1957); Tyrrhenian Sea (Italy) (Gambi, *et al*., 1998), Greece (Simboura and Zenetos, 2002).

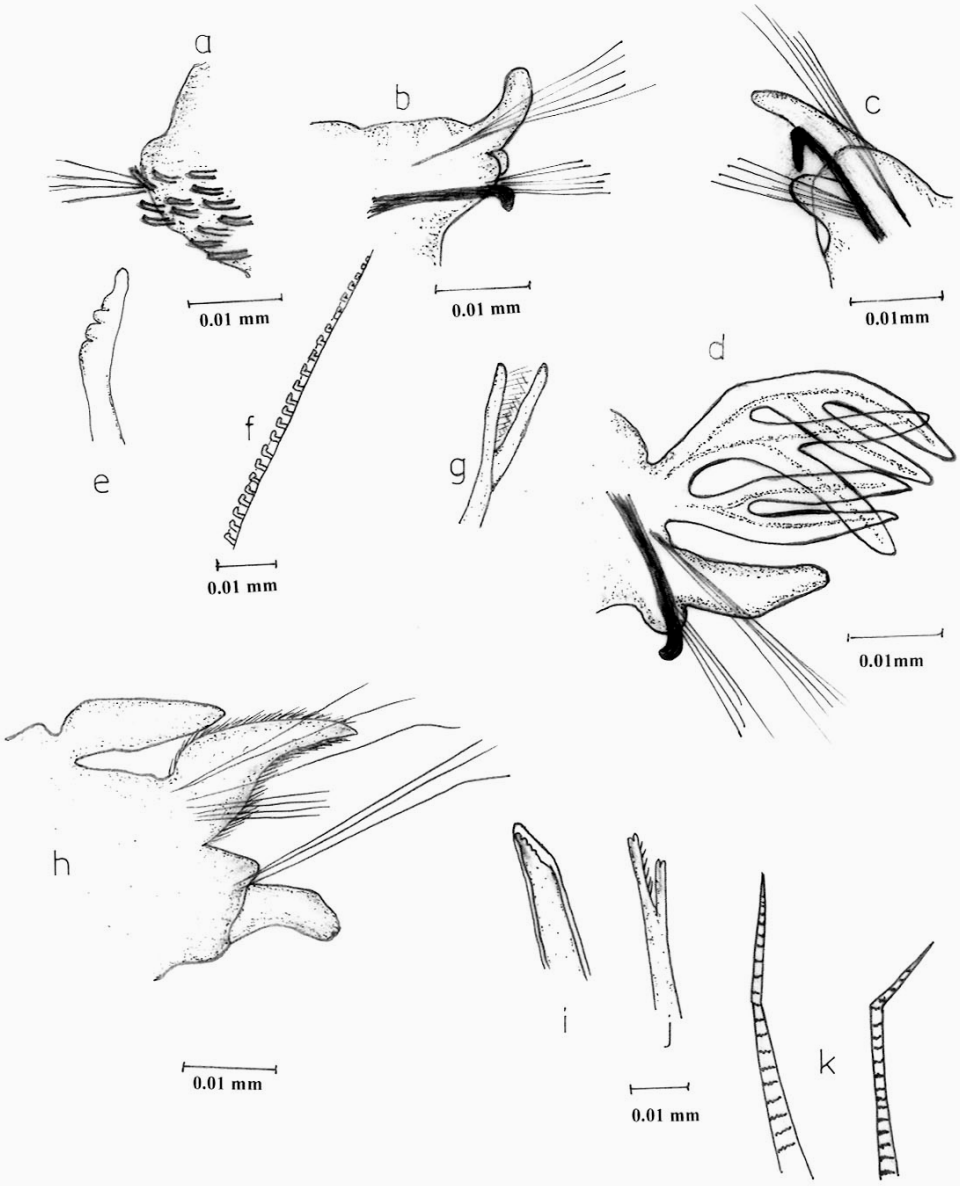
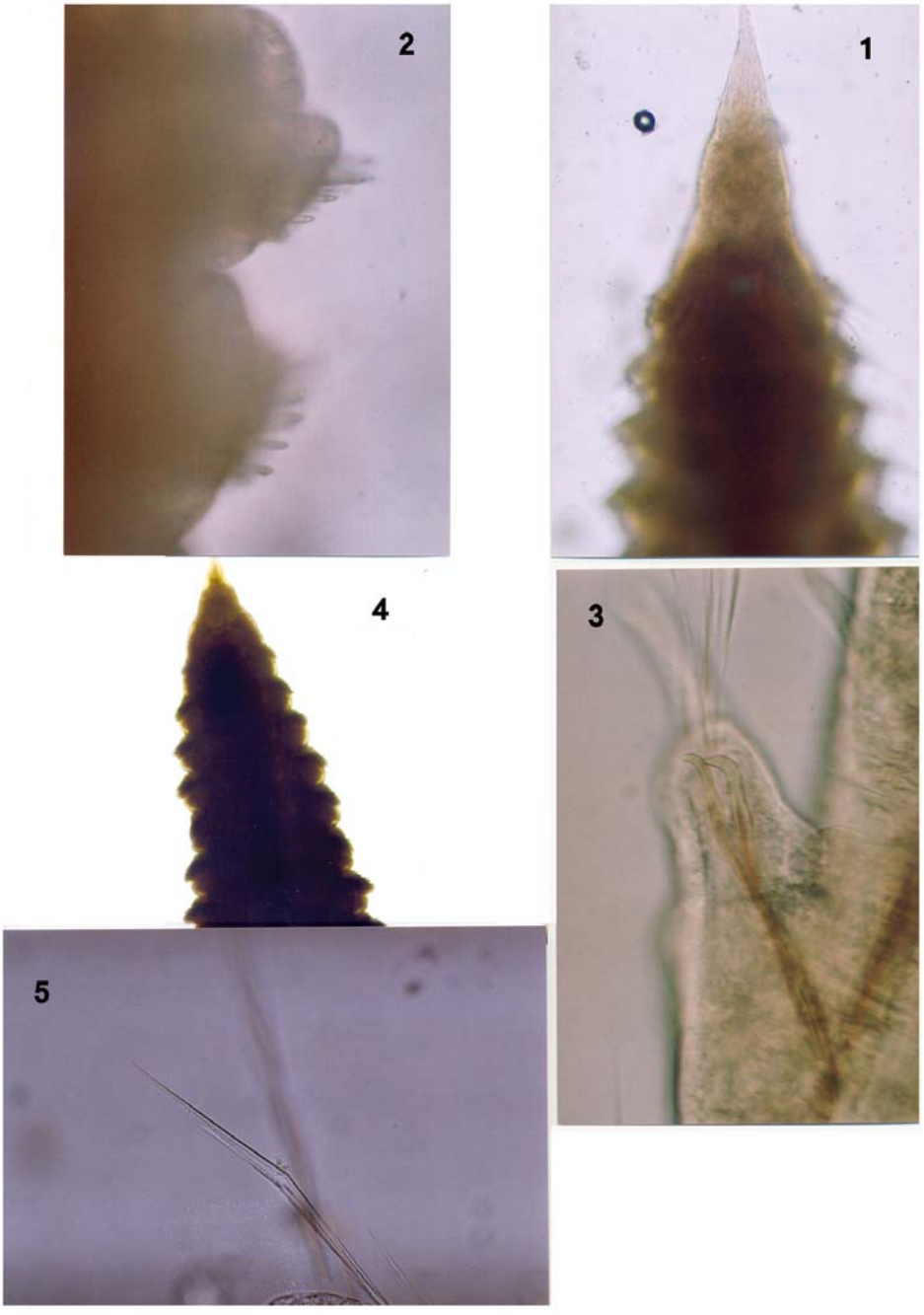


Fig. (3): *Scoloplos* (*Leodamas*) *dendrobranchus*: a, b, c, thoracic parapodia; d, far posterior parapodium; e, uncinus; f, capillary seta; g, furcate seta. ***Scolaricia typica* :** h, parapodium; i, uncini; j, furcated seta; k, capillary setae.

plate 1



Family Paraonidae Cerruti, 1909
Genus *Paraonides* Cerruti, 1909,
(*Paradoneis* Southern, 1914)
4- *Paradoneis lyra* (Southern, 1914)
(Fig. 4 a-f; Pl.2, 6-7)

Paraonis (Paraonides) lyra Fauvel, 1927: 72-73, figs. 24 a-f and Hartman, 1957: 334.

Paraonides lyra lyra Day, 1967: 568, figs. 24.4 c-g

Paradoneis lyra Dauvin and Cabioch, 1988: 215- 219; Simboura and Nicolaidou, 2001: 91 and Quijon and Snelgrove, 2005:125-136.

Description: Nine specimens were collected from two sites (VI and IV) during the three seasons. Body thread- like, length of 12-24 mm, 45-53 segments. Prostomium broadly triangular, without antenna or eyes. Branchiae first present from the fourth setigerous segment, 8 pairs each digitiform lobe (Fig. 4-a). Thoracic notopodial lobes minute anteriorly then become about a third as long as its accompanying branchia but slenderer posteriorly (Fig. 4-c,d).

Both rami of all parapodia contain fin capillary setae (Fig. 4-f), except on posterior notopodia from the last few branchiferous segments onward contain one or two lyre setae and accompanied by capillary setae (Fig. 4-e, pl. 2-6). The posterior end terminates in a pygidium with three cirriform processes (Fig. 4-b, pl.2-7).

Remarks: The individuals from the Eastern Harbour of Alexandria, agree with those described by Hartman (1957), from San Pedro Basin, California and those described by Day (1967), from South Africa.

Habitat: *Paradoneis lyra* was found in two sandy mud sites VI and IV.

Distribution:

France (Fauvel, 1927; Dauvin and Cabioch, 1988); California (Hartman, 1957); South Africa (Day, 1967); Greece (Simboura and Nicolaidou, 2001) and North Atlantic (Quijon and Snelgrove, 2005).

Family Hesionidae Sars, 1862.
Genus *Ophiodromus* Sars 1862 (Podarke Ehler, 1864).

5- *Ophiodromus pallidus* (Clapare'de, 1864)
(Fig. 5 a-d; Pl. 2,8-9)

Podarke pallida Fauvel , 1923 : 244 – 245 fig. 91 a-d

Ophiodromus pallidus Simboura and Nicolaidou, 2001 : p. 91.

Description: Five specimens were collected from two sites (I and VII) in autumn and winter, three of them incomplete. Body small about 4-6 mm long, 38-43 segments. Prostomum rectangular with two pairs of eyes. Antennae clavate. Median antenna much smaller than lateral antennae. Two long palps, proboscis muscular and eversible, without jaws extending from setigers five to seven, but with fine numerous marginal papillae. Six paires of subulate tentacular cirri (Fig.5-a, pl. 2- 8&9). Colour greenish to brown.

Parapodia subbiramous, notopodia small, neuropodia well-developed, with conical presetal lobes (Fig. 5-b). Dorsal cirri cirriform longer than body width, pseudoarticulate (Figs. 5-a&b). Ventral cirri short clavate tapered. Notopodia include compound setae as well as furcate setae (Fig. 5-d). Neurosetae with long shaft, blades long to short, minutely serrated (Fig. 5-c, pl. 2-10).

Remarks: The present specimens agree with that described by Fauvel (1923).

Habitat: This species was found in sandy bottom (site I and VII).

Distribution: France, Italy, Greece (Fauvel, 1923; Simboura and Nicolaidou, 2001 and Simboura and Zenetos, 2002 respectively).

Family Saccocirridae (Zerniavsky,1881)
Genus *Saccocirrus* Bobretzky, 1872
6- *Saccocirrus papillocercus* Bobretzky, 1872
(Fig. 5 d-f; pl. 2, 11)

Saccocirrus papillocercus Fauvel, 1927: 430-431, figs. 145, a-g and Fauchald, 1977: 155.

Description: Three specimens were collected. The worm is white in colour, small 3-5 mm. 70 – 85 setigers, prostomium rounded, with two eyes, two long tentacles, extending to setiger six, well developed

nuchal organs consisting of ciliated cells. Parapodia cylindrical, small, uniramous, with simple, chisel shaped setae. Seven to ten posterior segments without parapodia (pl. 2-11).

Setae in bundle in each group, one unequally bifid setae, longer arm angled at base, shorter arm curving away from setal axis beside 5-6 short and long tridentate bifid setae (Fig. 5-f) Pygidium with two lobes strongly recurved dorsally, with 5 big papillae present in the ventral side (Fig. 5-e, pl. 2-11).

Remarks: This description agrees with Fauvel's specimens (1927).

Habitat: *Saccocirrus papillocercus* was collected from sandy bottom (site VII).

Distribution: France (Fauvel, 1927**)**; Na Trang, Vietnam (Daydoff, 1952) and California, USA (Hartman, 1955**).**

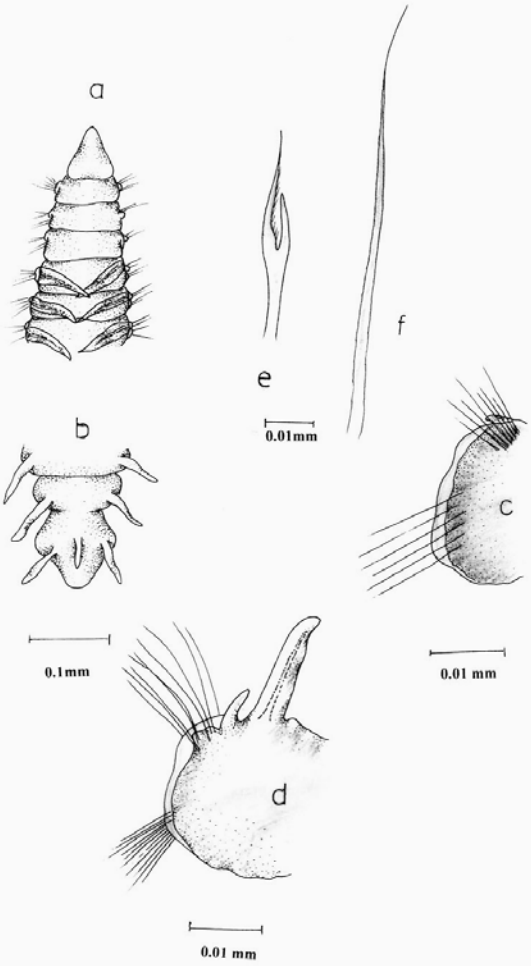


Fig.(4): ***Paradoneis lyra:*** a, anterior end; b, pygidium; c, anterior parapodium; d, parapodium with branchia; e, notopodial lyra seta; f, notopodial capillaies seta.

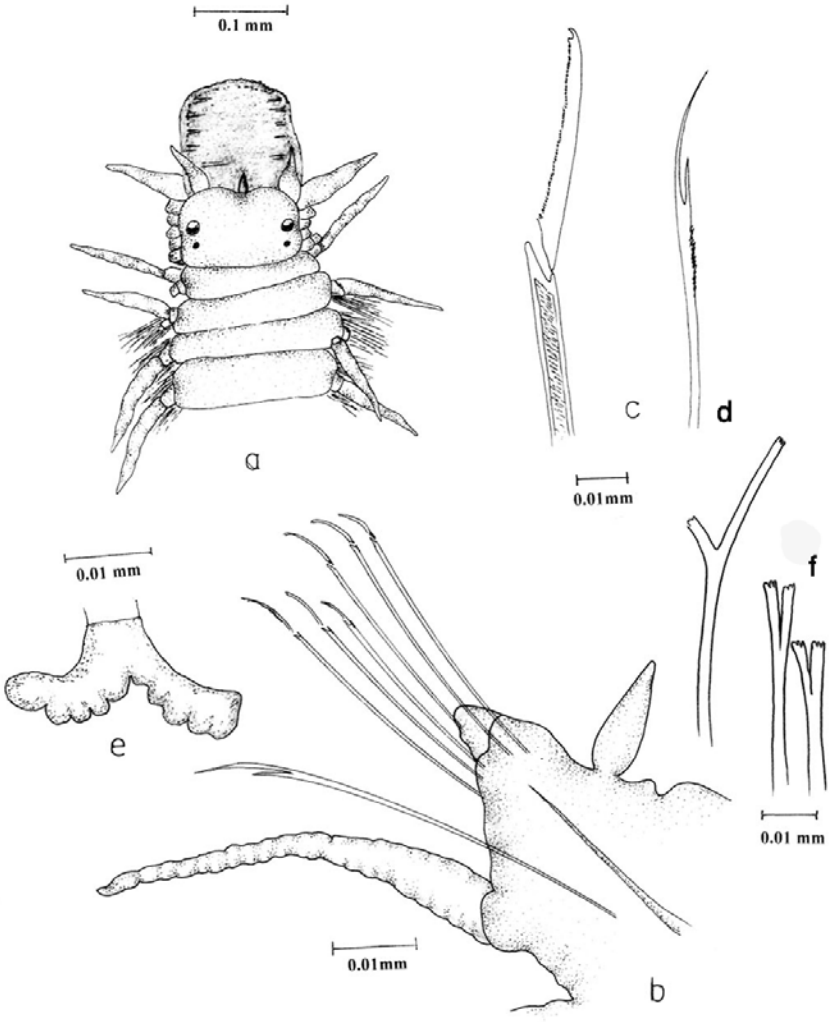
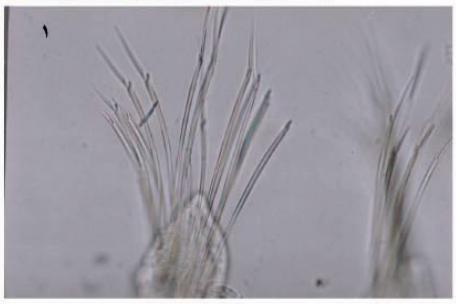


Fig.(5): ***Ophiodromus pallidus*****:** a, anterior end; b, parapodium; c, neurosetae ; d, furcated setae. ***Saccocirrus papillocercus***; e : posterior end; f: setae.

plate 2



4. DISCUSSION

During this study on the bottom sediment in the Eastern Harbour of Alexandria, six polychaete species were recorded, belonging to 5 genera and 4 families namely; *Scoloplos* (*Leodamas*) *rubra, Scoloplos* (*Leodamas*) *dendrobranchus, Scolaricia typica, Paradoneis lyra, Ophiodromus pallidus* and *Saccocirrus papillocercus*.

The habitat of Orbiniidae and Paraonidae species in relation with their pointed prostomium and their sac-like or dentritic branching eversible pharynx present in many species could probably help in the burrowing activity.

Fauchald and Jumars (1979) and Leon-Conzalez and Rodrigues (1996), confirmed that Orbiniids are burrowing freely through sediment using their pointed prostomium and their eversible pharynx supported by crenulate and furcate setae as well as for feeding, also Hartman (1959), mentioned that, in burrowing forms the proboscis is strong eversible so as to help the worm burrow in mud or sand.

Orbiniids are non-selective deposit-feeders, common in sandy-mud bottom and are found from salt marshes to abyssal depths.

While Paraonids use their posterior end buried in a cork-screw fashion in the sediment, projecting the anterior end up into water searching in the surf zone plant debris and dead animals (Fauchald and Jumars, 1979). Day (1967) mentioned that Paraonids are non-selective, burrowing deposite-feeder or surface feeder and their structures are suitable for feeding and burrowing pattern, as a series of horizontal spiraling patterns connected from one level to another in sediment by short, oblique or vertical burrows. Dorgan *et al*. (2005 and 2006) added that the whole body work as one or more hydrostatic skeletons used for locomotion in worms burrowing in muddy sediments also setae used to prevent back word slip during parapodial locomotion. This behavior and this habitat are well represented in *Scoloplos* (*Leodamas*) *rubra , Scoloplos* (*Leodamas*) *dendrobranchus, Scolaricia typica* and *Paradoneis lyra* where they were collected in the present study from sandy-mud bottom.

Gills used in respiration and in the case of low oxygen, they are increased in number. Hourdez and Jouin-Toulmond (1998) and Hourdez *et al*. (2002) mentioned that Orbiniidae polychaetes adapted themselves to low oxygen environment, by increasing the number of branchiae in muddy bottom.

Westheide (1982) mentioned that larger Hesionids are carnivorous, feeding on polychaetes and other small invertebrates. Some species may be surface deposit-feeders, ingesting detritus (Day, 1967). The interstitial species feed on diatoms, bacteria-rich detritus, copepods and foraminiferans using their papillated eversible muscular pharynx as in *Ophiodromus pallidu*s. Also this agrees with that mentioned by Lardicci *et al.* (1993) and Dewarumez *et al*. (1992) about *Ophiodromus pallidus* which are found in sediments among algal fronts, saprobic indicating organic enrichment, common in coastal Lagoons and sheltered environments such as caves and harbours.

The role of setae in the movement of Hesionidae is very important. Merz and Edwards (1998) assessed the role of setal structures in the Hesionid polychaete, *Ophiodromus*, by examining speed and step length in worms with and without setae, they found that no change in speed of animal with setae but with removed setae, both changed gaits at slower speed and showed a significant decrease in maximum swimming speeds and stride distance. This indicates that setae may be important both in allowing a worm to better control setal contact and traction with the sand substrata as well as in altering the effectiveness of its swimming stroke. These results can also be applied on

Ophiodromus pallidus which appears to prefer sand habitats.

On the other hand, *Saccocirrus papillocercus* were captured also from sandy bottom. Brown (1981) found that Saccocirridae inhabits coarse-grained substrata in the Intertidal zones. They feed on diatoms, copepods and detritus by using their muscular pad of proboscis and attach themselves to the sand grains by using glutinous secretions from the anal lobes, body wall and tentacles have cilia of ventral tract which set up a water current, drawing bacteria, diatoms and algae from shell gravel into the mouth. Therefore, there is a great correlation between the structure and the mode of feeding, type of food, movement and others.

The geographic distribution of five new taxa recorded indicated that *Scoloplos* (*Leodamas*) *rubra*, *Paradoneis lyra, Ophiodromus pallidus* and *Saccocirrus papillocercu*s were previously reported from the Mediterranean Sea, except *Scoloplos* (*Leodamas*) *dendrobranchus* which appeared for the first time in the Mediterranean Sea. It is of indo-pacific origin and migrated through Suez Canal.While *Scolaricia typica* was previously reported by Fauvel (1937) in Alexandria.

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Plate (1)

Scoloplos (Leodamas) rubra
1- Anterior end. 10x10

2-Anterior parapodium. 10x10

3- Acicula. 10x40

Scoloplos (Leodamas) dendrobranchus

4- Anterior end.10x10

Scolaricia typical

5- Capillary setae (flails setae).10x40

Plate (2)

Paradoneis lyra

6- Lyre seta.10x40

7- The end of the body.10x10

Ophiodromus pallidus

8- Anterior end dorsal view. 10x10

9- Anterior end ventral view with eversible proboscis. 10x10

10- Setae. 10x40

Saccocirrus papillocercus

11- The end of the body. 10x10