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A PRELIMINARY LIST OF THE SUMMER MACRO BENTHOS IN THE INTERTIDAL ZONE OF THE WESTERN GULF OF SUEZ.

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Key Words: Macro benthos, intertidal zone, Western Gulf of Suez.

ABSTRACT

The study covered the spatial distribution of the macro benthic species of the shallow intertidal benthic communities in an area extending from Ain Sukhna (Gulf of Suez) to the South of Hurghada City (Red Sea) during July and September 1991. The distribution of the plant and animal species in the different sites showed a great distinction along the intertidal zone. This was related mainly to nature of the bottom. The dominated groups of bottom dwellers in area included 159 species. The calcareous red, brown and green Algae ***Laurencia, Sargassum, Turbinaria, Halimeda*** and ***Caulerpa*** *were the main algal genera associated with coral reefs assemblages. On the other hand, the common coral assemblages included: Anthozoan,* ***Radianthus*** *(Actiniidae),* ***Xenia, Heteroxenia,*** *(Alcyonaria), and* ***Stylophora, Acropora*** *(Scleractinia), in addition to the Hydrozoan order (Milliporina)* ***Millepora****. Molluscan* ***Achanthopleura, Chiton*** *(Polyplacophora),* ***Cellana, Cerithium, Trochus*** *(Gastropoda),* ***Brachiodontes, Chama, Tridacna*** *(Bivalvia) were more abundant on hard substrata. The Cirripedes* ***Tetraclita*** *and* ***Chthamalus*** *and Echinoderms,* ***Ophicoma, Echinometra,*** *and* ***Diadema*** *were common on the fringing reef and in particular on the south region of the Red Sea. Several aged oil patches were found on the beaches and shoreline of the middle part due to the oil production and oil spills from the off shore oil wells.*

INTRODUCTION

Little attention had been paid to the study of marine benthos in the shallow intertidal benthic communities in the area extending from Ain Sukhna (Gulf of Suez) to the South of Hurghada City (Red Sea) since the ``Mabahith`` expedition (December 1934 - February 1935) for the exploration of Red Sea. Naser (1939), studied the seaweed, Crossland (1939) studied some coral formation and Mortenson (1939) studied deep sea echinoderms. A number of works has been recently published on the ecology and distribution of benthic fauna in the shallow waters (Fishelson 1971); impacts of the coastal development of the marine life in the Jordanian Coast of the Gulf of Aqaba (Mahasneh and Meinesz 1984), on the impacts of the human activities on giant clams, ***Tridacna maxima***, near Jeddah, Red Sea (Bodoy 1984) and corals on the fringing reefs near Jeddah (Antonius 1984). The distribution of macro benthos has been studied in relation to the effect of the coastal development on the Eastern Region of the Gulf of Suez (El-Komi 1996).

The present study deals the spatial distribution of macro benthic fauna and flora in the shallow intertidal waters of northern west coast of the Red Sea and the western coast of the Gulf of Suez.

MATERIAL AND METHODS

The area of investigation extended from south of Hurghada, Red Sea (27° 02`E, 33° 54`N) to Ain Sukhna, along the western side of Gulf of Suez (29° 33`E, 32° 22`N). The distribution of macro benthos, fauna and flora, was surveyed during July and September 1991. Sample were collected from 71 stations along the intertidal zone of the study area (Fig.1).

At each station a complete description was recorded including the state of pollution by oil, the respective habitat of different bottom assemblages and the nature of the substrata.The relative occurrence of macro benthos in the intertidal zone was determined for four random points by estimating the area covered by organisms among one square meter frame. Whereas, the degree of pollution by oil, on the back shore, was assessed by recording the relative covered area by oil patches, tar balls and litters near-by the coastal constructions.

Representative samples of bottom fauna and flora were collected from the shallow intertidal zone at each site and preserved in 10 % formalin solution. The samples were sorted to the species or the genera levels.

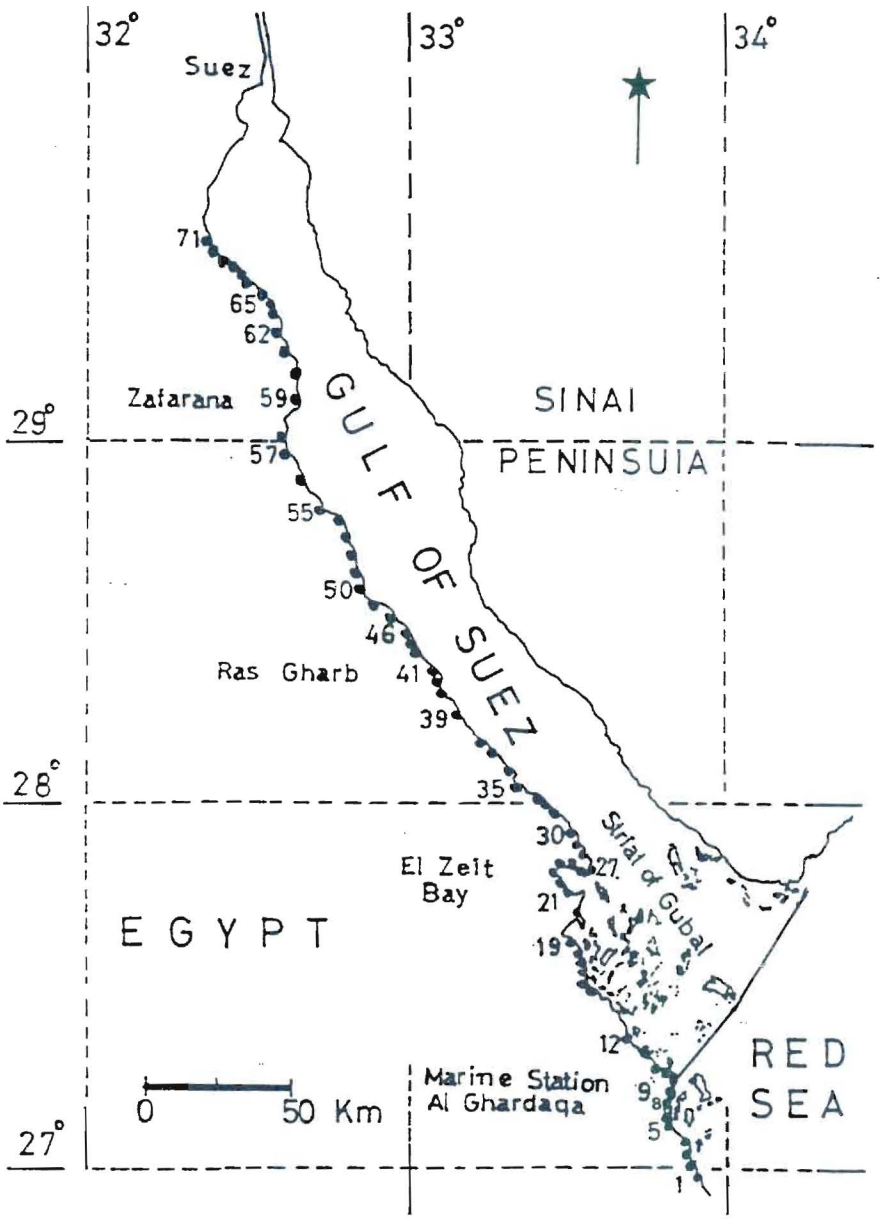

Fig. (1): Map of sampling stations at the shallow intertidal waters along the western coast of the Gulf of Suez and the north coast of the Red Sea, Egypt.

RESULTS

Some characteristics of the study area:

Temperature and salinity:

Along the western part of the Gulf of Suez the water temperature fluctuated from a low of 18°C in winter to a high of 30°C in summer. The salinity of sea water varied from 39‰ in winter to 41‰ in summer due to high evaporation rate.

Degree of pollution:

The degree of pollution by oil along the shoreline at the different stations was classified according to the type of oil (patchy, thin films, tar balls), the degree of oiling (light, moderate, heavy) and the age of oiling (fresh, aged). Fig. 2 shows the cover percentage of pollution by oil. Stations 30-33, 35 and 44 showed heavy accumulation of oiling layers either fresh or aged. The shoreline area was completely covered with oil patches spilled from the surrounding oil wells and petroleum constructions. On the other hand, light pollution was noticed along the southern region (Hurghada) and the northern region (Zafrana).

Bottom topography

The coast of the study area is characterized by irregular shoreline. This provides different habitats such as intertidal flats that are present in most sites (stations 5, 9, 57, 58 and 59), lagoons that are found at (stations 20 and 43), salt marshes at Station 17 and cliff-edge sites exposed to surf actions (stations 19, 32-50, 56 and 60-67). The type of substratum could be identified into four categories; hard, hard with moved cobbles, sand and sand with moved cobbles (Fig. 3).

Species composition and distribution of benthos

The macro benthos assemblages in the intertidal zone of the southern region were rich in number of species (Figs. 4 and 5). They composed mainly of many coral patches, algal vegetation, echinoderms and molluscs. The macro fauna was nearly absent from the stations 11, 28-34, 37, 40-43, 46, 47, 49, 51, 53, 59, 61, 62, and 67-71. Macro benthic algae were not recorded at stations 43, 46, 47 and 66-71.

The occurrence of the macro fauna and flora on the intertidal zone according to the above mentioned categories were as follows:

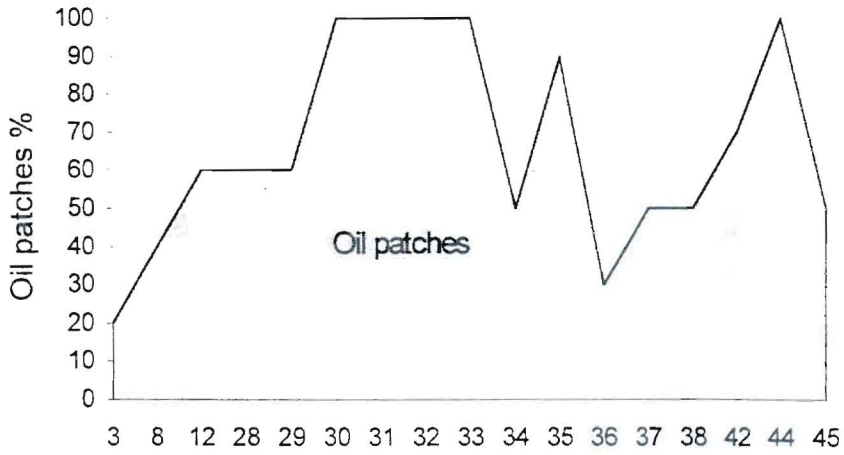

Figure 2. Relative percentage of oil patches estimated at the different stations off the shoreline, Red Sea.

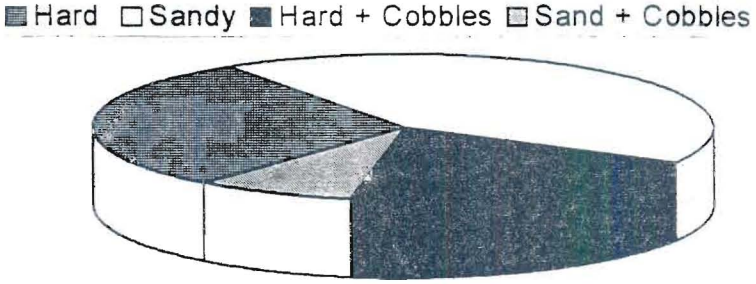

Figure 3. Nature of the bottom at the different stations in the shallow intertidal waters, Red Sea.

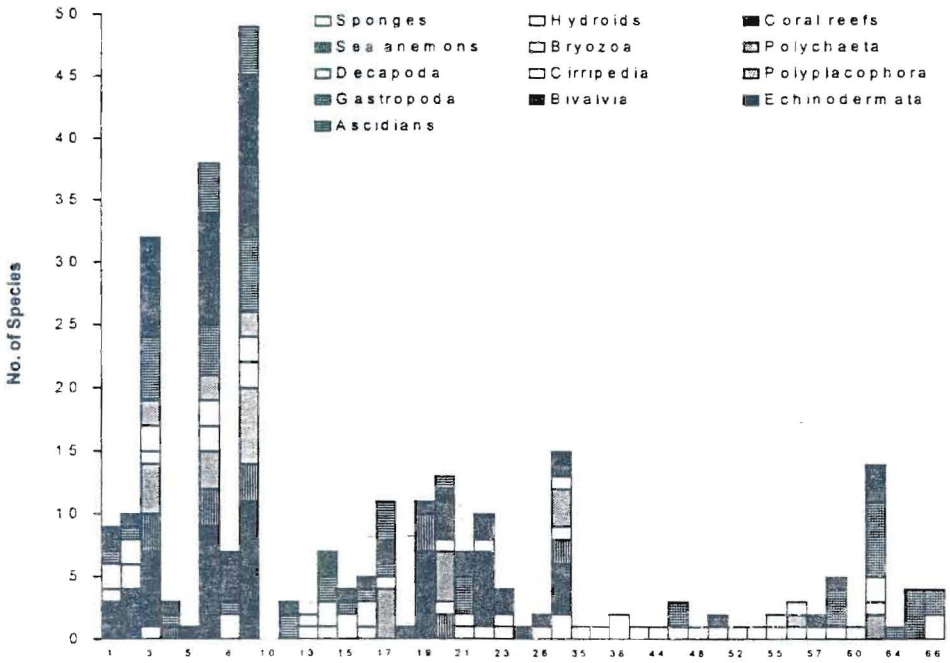

Fig. 4: Regional variations in the number of macro benthic fauna recorded at the different stations in the shallow intertidal waters, Red Sea.

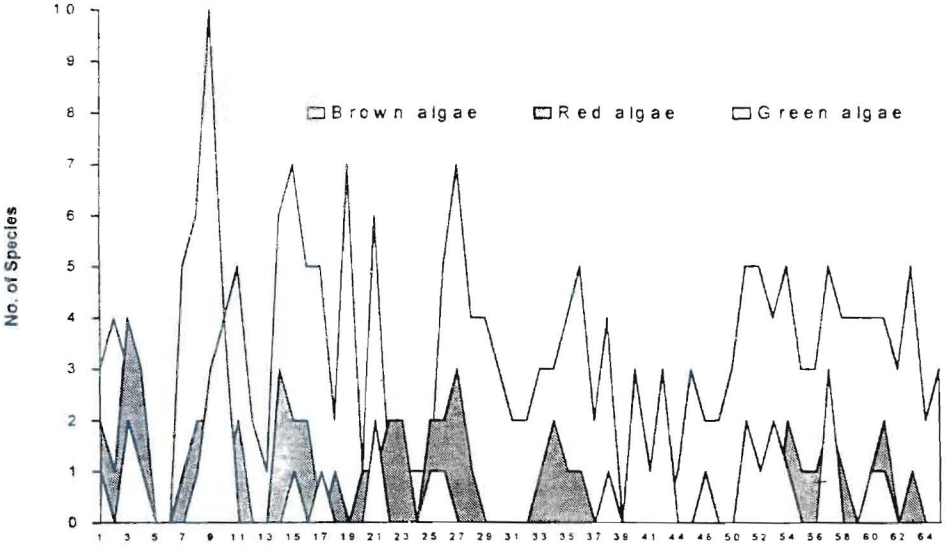

Fig. 5: Regional variations in the number of macro benthic algae recorded at the different stations in the shallow intertidal waters, Red Sea.

1) Hard sites

These are mainly located along the southern and the northern parts of the study area. They are characterized by the presence of the following communities:

a) Algae: The identified species of marine macro benthic algae were 29 species listed in Table (1). Brown algae were the most frequent among algal vegetation (Fig. 5) and are represented by 14 species. On the other hand; algal cover of the hard substrates was associated with different groups of animals. It was noticed that ***Sargassum,*** ***Cystoseira*** and ***Padina*** showed wide distribution. They were observed in greater density at stations 15 and 22 for (***Sargassum***); stations 17,19 and 23 for (***Cystoseira***) and stations 1, 9 and 17 for (***Padina***), Figure (6).

Occurrence of red algae, ***Laurencia*** was less frequent than the brown forms, while green algae, ***Caulerpa*** were the least frequent forms. ***Laurencia*** flourished at station 23 and ***Caulerpa*** was common at station 17. The others algal vegetation were recorded in few amounts scattered in small areas. The species diversities of algal cover were relatively high at the southern stations. Also, algal populations were dense among coral reef association (at stations 1, 2, 3, 7, 8, 9, 19, 23 and 27), where ***Caulerpa***, ***Halimeda*** and ***Turbinaria*** were more common forming dense beds on the reef patches in the intertidal zone.

b) Mollusca: Three main classes of Phylum Mollusca were recorded during the study. They are namely:

1- Polyplacophora included two species, ***Acanthopleura haddoni*** and ***Chiton squamosa*** were observed in great numbers at stations 7, 9 and 63 (Fig. 7).

2- Gastropoda embraced mainly of ***Cellana, Tectus, Cerithium***, and ***Nerita*** at stations 3, 9, 21, 58 and 65. Besides; 39 species were recorded as empty shells (Table 2).

3- Lamellibranchia composed mainly of ***Brachiodontes, Modiolus Circe, Tridacna*** and ***Chama.*** They were found at stations 3, 7, 9 and 27 (Fig. 8). Besides; 24 species were found as empty shells as listed in (Table 2).

c) Corals: The coral communities are the most common benthos on hard sites where many patches of corals are scattered in the shallow waters

Table(1):. Species composition of macro-benthic flora in the intertidal shallow waters of the Red Sea.

Algae: **Chlorophyceae** *Enteromorpha intestinalis* (Linnaeus) Link. *Chaetomorpha linum* (Muller) Kutzing *Ulva fasciata* Delile *Caulerpa racemosa* (Turner) Weber-Van Bosse *Codium tomentosum* (Hudson) Stackhouse *Codium bursa* (Linnaeus) Kutzing *Halimeda tuna* (Ellis et Sol.) Lamouroux *Valonia macrophysa* J. Ag. **Phaeophyceae** *Sargassum latifolium* (Turn.) Ag. *Sargassum denticulatum* (Forsskal) Borgesem *Sargassum crispum* (Forsskal) Ag. *Sargassum salicifolium* (Bertoloni) J. Agardh *Padina pavonica* (Linnaeus) Thivy *Zonaria variegata* Lamx.) Mert. *Harmophyse triqueter* (C. Agardh) Kutzing *Dictyota dichotoma* (Hudsen) Lamouroux	*Cystoseira trinodis* (Forsskal) C. Agardh *Cystoseira myrica* (Gmelin) C. Agardh *Turbinaria decurrens* Bory. *Colpomenia sinuosa* (Roth) Derbes et Solier *Hydroclathrus clathratus* (C. Agardh) Howe *Ectocarpus* sp. **Rhodophyceae** *Laurencia obtusa* (Hudson) Lamouroux *Laurencia papillosa* (Forsskal) Greville *Ceramium gracillimum* Griff. et Harv. *Jania rubens* (Linnaeus) Lamouroux *Amphiroa* sp. **Sea grasses** *Halophila stipulacea* (Forsskal) Ascherson **Mangrove** *Avicennia marina* (Forsk.) Vierh. *Rhizophora mucronata* Lamrk.

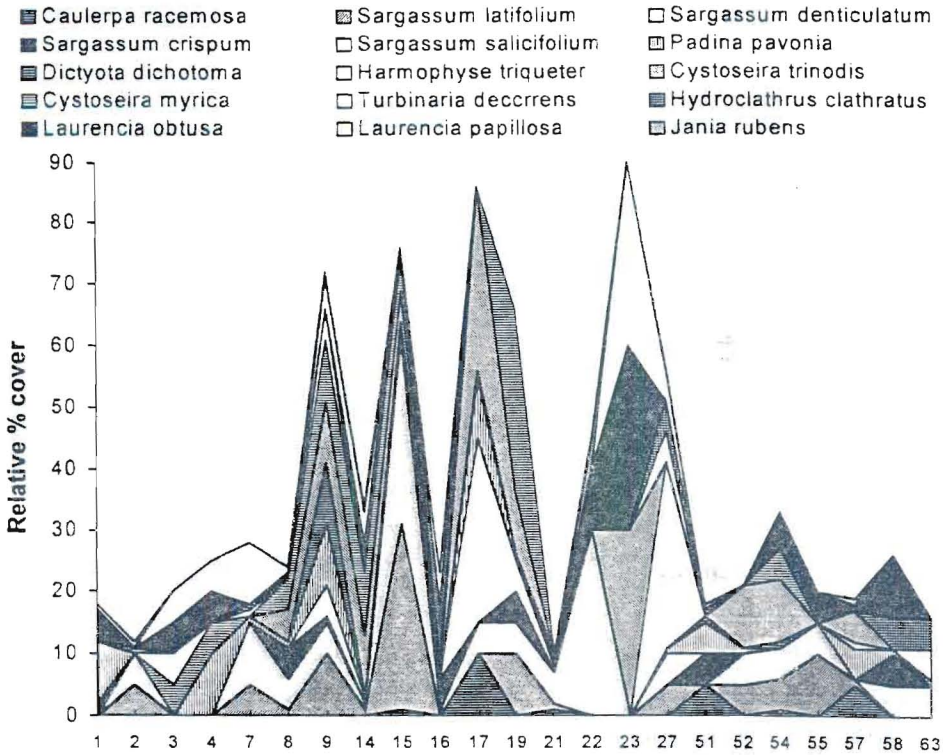

Fig. (6): Relative percentage cover of macro benthic algae species estimated at the different stations in the shallow intertidal waters, Red Sea.

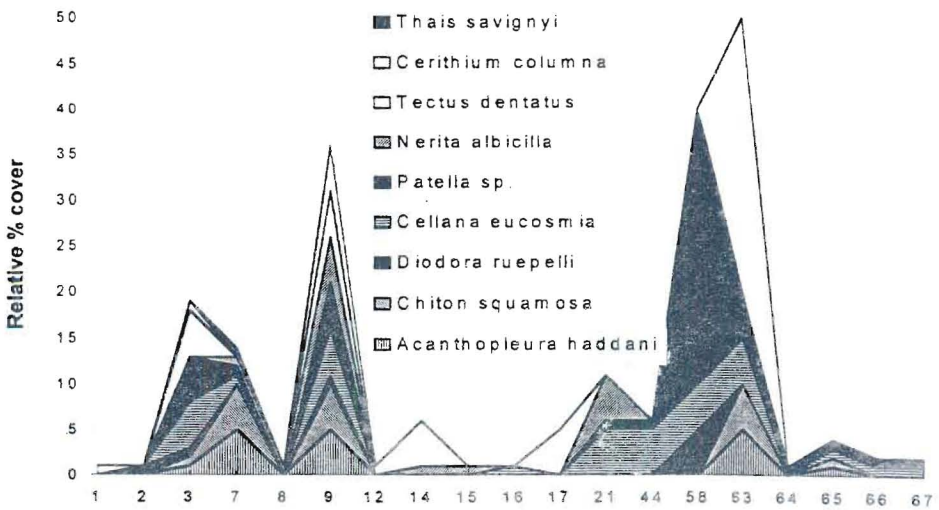

Fig. (7): Relative percentage cover of macro benthic Polyplacophora and astropoda species estimated at the different stations in the shallow ntertidal waters, Red Sea.

Table (2): Species composition of macrobenthic fauna in the shallow intertidal waters, Red Sea.

Phylum : Mollusca	**Family : Cerithiidae**	*Conus arenatus* Hwass in Bruguiere
Class : Polyplacophora	*Cerithium erythraeonese* (Lamarck)	*Conus tessulatus* Born
Order : Neoloricata	*Cerithium caeruleum* Sowerby	**Family : Fasciolariidae**
Suborder : Ischnochitonina	*Cerithium columna* (Sowerby)	*Latirus polygonus* (Gmelin)
Family : Chotonidae	*Cerithium* sp.	*Fusus polygonoides* Lamarck
Acanthopleura haddoni Winchworth	*Rhinoclavis kochi* (Philippi)	*Fusinus leptorhynchus* (Tapp.-Canefri)
Chiton squamosa Linnaeus	**Family : Cypraeidae**	**Family : Melongenidae**
Class : Gastropoda	*Cyprea caurica* Linnaeus	*Volema pyrum* nodosa (Lamarck)
Subclass : Prosobranchia Order: Archaeogastropoda	*Cyprea turdus* Lamarck	**Family : Muricidae**
Family : Stomatellidae	**Family : Littorinidae**	*Murex tribulus* Linnaeus
Stomatia phymotis Helbling	*Littorina scabra* (Linnaeus)	*Chicoreus ramosus* (Linnaeus)
Family : Fissurellidae	*Nodilittorina millegrana* (Philippi)	**Family : Nassariidae**
Diodora rueppelli Sowerby	**Family : Planaxisae**	*Nassarius arcularis plicatus* Roding
Family : Patellidae	*Planaxis sulcatus* (Born)	*Nassarius protrusidens* Melvill
Cellana eucosmia (Pilsbry)	**Family : Strombidae**	**Family : Thaididae**
Patella sp.	*Strombus erythrinus* (Dillwyn)	*Thais savignyi* Deshayes
Family : Neritidae	*Strombus fasciatus* Born	*Morula granulata* (Duclos)
Nerita albicilla (Linnaeus)	*Strombus gibberulus albus* (Morch)	**Family : Turridae**
Nerita undata Linnaeus	*Strombus tricornis* Humphrey	*Xenoturris cingulifera erythraea* (Weinkauff)
Family : Trochidae	*Strombus fusiformis* Sowerby	**Family : Terebridae**
Clanculus pharaonius (Linnaeus)	*Strombus* sp.	Terebra maculata (Linnaeus)
Tectus dentatus (Korskal)	**Family : Naticidae**	*Terebra consobrina* Deshayes
Trochus erythraeus (Brocchi)	*Natica gualteriana* Recluz	
Family : Turbinidae	**Family : Cassidae**	**Subclass : Opithobranchia**
Turbo radiatus Gmelin	*Casmaria ponderosa* Gmelin	**Order: Cephalaspidae**
Order Mesogastropoda	**Order : Neogastropoda**	**Family : Atyidae**
Family : Turritellidae	**Family : Conidae**	*Atys cylindricus* (Hinds)
Turritella sp.	*Conus taeniatus* Hwass in Bruguiere	**Family : Bullidae**
Family : Archichtectonicidae		*Bulla ampulla* (Linnaues)
Heliacus variegatus Gmelin		

Table (2): (Continued)

Class : Lamellibranchia **Subclass : Pteriomorpha** **Order : Arcoida** **Family :Arcoidae** *Arca avellana* Lamarck *Anadara diluvii* Lamarck *Anadara antiquata* Linnaeus *Barbatia fusca* (Bruguiere) **Family : Glycymeridae** *Glycymeris pectunculus* (Linnaues) **Order : Mytiloida** **Family : Mytilidae** *Modiolus auriculatus* (Krauss) *Brachiodontes variabilis* (Krauss) **Family : Pinnidae** *Pinna muricata* Linnaeus **Order : Pterioda** **Family : Pectinidae** *Pinctada margaritifera* (Linnaues) *Pinctada radiata* (Leach)	Chlamys squamosa (Gmelin) *Mirapecten rastellum* (Lamarck) **Family : Spondylidae** *Spondylus aurantius* Lamarck **Subclass : Heterodonta** **Order : Venerioda** **Family : Chamidae** *Chama crenulata* (Lamarck) *Chama corbierei* Jonas **Family : Tridacnidae** *Tridacna maxima* (Roding) *Tridacna squamosa* Lamarck **Family : Carditidae** *Cardita variegata* Bruguiere **Family : Cardiidae** *Fragum (Lunulicardia) auricula* (Forskal)	**Family : Veneridae** *Circe calipyga* Born *Dosinia radiata* (Reeve) *Marcia hiantina* (Lamarck) *Gafrarium pectinatum* (Linn.) **Family : Lucinidae** Anodontia eduntula (Linnaeus) *Codakia tigerina* (Linnaeus) **Family : Tellinidae** *Tellina virgata* Linnaeus *Tellina scobinata* Linnaeus *Tellinella pharaonis* Hanley **Family : Psammobidae** *Hiatula rupelliana* (Reeve) *Asaphis violascens* Forskal **Family : Mactridae** *Mactra glauca* Born *Mactra corallina* (Linnaeus) **Order : Myoida** **Family : Malleidae** *Vulsella vulsella* (Linnaeus)

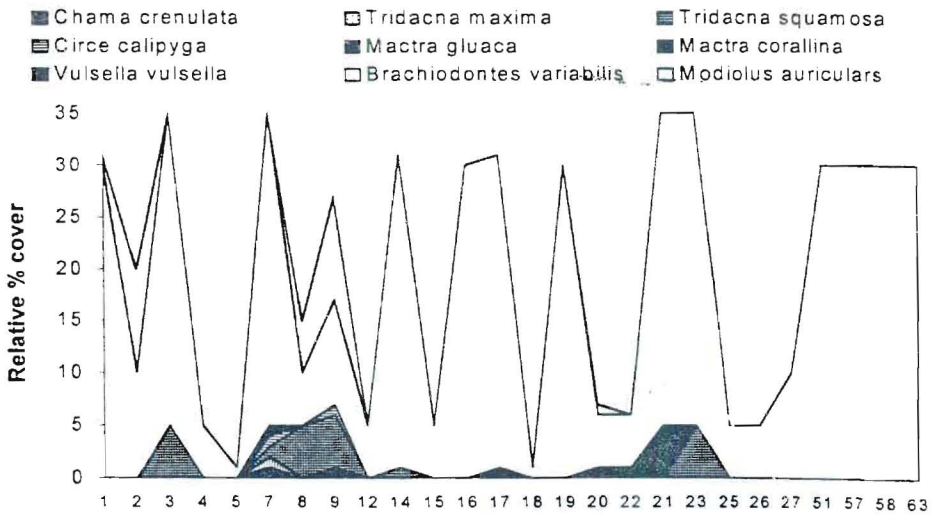

Fig. (8): Relative percentage cover of macro benthic Bivalvia species estimated at the different stations in the shallow ntertidal waters, Red Sea.

especially at stations 1, 2, 3, 7, 8, 9, 19, 23, and 27 (Fig. 9). It was noticed that in this protected areas the fringing reefs were rich and diversified and are embraced mainly of the Scleractinian (***Madreporaria***). In general; many anthozoa species were identified. They include anemones (***Radianthus, Thallassianthus, Calliactis***), soft coral (***Heteroxenia, Xenia***), horny coral (***Acabaria***) and stony corals (***Stylophora, Acropore, Montipora, Millepora***) as listed in Table (3). Besides; many species could not be identified nor listed in this work.

d) Cirripedia: ***Chthamalus stellatus*** was settling in great amount in the supra-littoral zone at most of the stations (Fig. 10), while ***Tetraclita squamosa*** was recorded on rocks subject to surf water at stations 7, 9, 15 and 16. On the other hand, ***Balanus amphitrite*** was observed in small number at only stations 63 and 66.

e) Echinodermata: As shown in (Fig. 11) ***Echinometra*** was more frequent at stations 9 and 63, while ***Ophicoma*** was recorded in great numbers at stations 3 and 9.

2) Sandy sites:

Sandy shoreline was encountered at stations: 4-6, 11, 12, 18, 31-37, 41-50, 66, 70 and 71. As a result; both fauna and flora are very poor in these stations. Also this area extends for a distance of about 200 km long in the middle region which represents 42 % of the total number of stations. In these site's coral reefs' assemblages are completely absent.

3) Hard sites with moved cobble:

The shoreline and the shallow intertidal waters are covered by moved cobbles that represented 20 % of the number of stations. The marine fauna and flora were relatively rare at stations 61, 64, 65, 67, 68 and 69. Also, the living organisms are found on and among the spread moved cobbles. These associations composed mainly of algal cover, ***Patella, Cellana***, echinoids, crabs, ***Brachiodontes*** and barnacles.

4) Sand sites with moved cobbles:

The presence of sand with moved cobbles is usual in these areas where the diversities of macro-benthic community are low and are represented by the Barnacle ***Chthamalus*** and the Bivalve ***Brachiodontes*** attached to moved cobbles and stones were recorded in little numbers at stations 38, 41, 42 and 44.

Table (3): Species composition of macro-benthic fauna in the shallow intertidal waters, Red Sea

Phylum : Porifera	**Family : Acroporidae**	**Family : Cidaroidae**
Class : Calcarea	*Acropora scandens*	*Prionocidris baculosa*
Subclass : Calcinea	*Montipora erythraea*	**Family : Loveniidae**
Order : Clathrinida	**Family : Fungiidae**	*Lovenia elongata*
Family: Clathrinidae	*Fungia fungites*	**Family : Diadematidae**
Clathrina coriacea	**Family : Faviicae**	*Diadema setosum*
Class : Demospongiae	*Diplostrea haliopora*	**Family : Tripneustes gratilla**
Subclass : Tetractinomorpha	*Leptoria phrygia*	Class : Holothurioidea
Order : Haromida	**Family : Oculinidae**	Order : Actinopoda
Family : Clionidae	*Galaxea fascicularis*	**Family : Holothuriidae**
Cliona vastifica	**Phylum : Annelida**	*Holothuria leucospilata*
Phylum : Cnidaria	Class : Polycheata	**Phylum : Tentaculata**
Class : Hydrozoa	*Hydroides elegans*	Class : Bryozoa (Ectoprocta)
Order : Hydroidea	*Serpula vermicularis*	Order : Cheilostomata
Family : Campanulariidae	*Eulalia viridis*	Suborder : Anasca
Obelia dichotom	*Nereis* sp.	**Family : Membraniporidae**
Family : Sertulariidae	Eunice antennata	Membranipora membranacea
Dynamena cornicina	**Phylum : Arthropoda**	Suborder : Ascophora
Order : Milleporina	SubPhylum : Crustacea	**Family : Escharellidae**
Family : Milleporidae	Class : Decapoda	*Schizoporella errata*
Millepora dichotoma	*Clibanarius longitarus*	Order : Ctenostomata
Class : Anthozoa	*Calcinus nitidas*	*Watersipora subovoidae*
Subclass : Hexacorallia	Class : Cirripeda	**Phylum : Tunicata**
Order : Actiniaria	*Balanus amphitrite* var. *denticulata*	Class : Ascidiacea
Family : Actiniidae	*Teteraclita squamosa rufotincta*	Order : Phlebobranchiata
Radianthus koseirensis	*Chthamalus stellatus*	**Family : Ascidiidae**
Thallassianthus aster	**Phylum : Ecinodermata**	*Ascidia nigra*
Calliactis polypus	Class : Ophiutoidea	Order : Stolidobranchiata
Order : Alcyonaria	Order : Ophiuroidae	**Family : Stvelinae**
Family : Xeniidae	**Family : Ophiocomidae**	*Styela* sp.
Xenia umbellata	*Ophicoma scolopodrina*	**Family : Botryllinae**
Heteroxenia fuccescens	**Family : Echinometridae**	Botrylloides niger
Heteroxenia ghardagensis	*Echinometra mathaei*	Order : Aplousobranchia
Order : Scleractinia	Class : Echinoidea	**Family : Didemnidae**
Family : Pocilloporidae		*Didemnum moseleyi*
Stylophora pistillata		

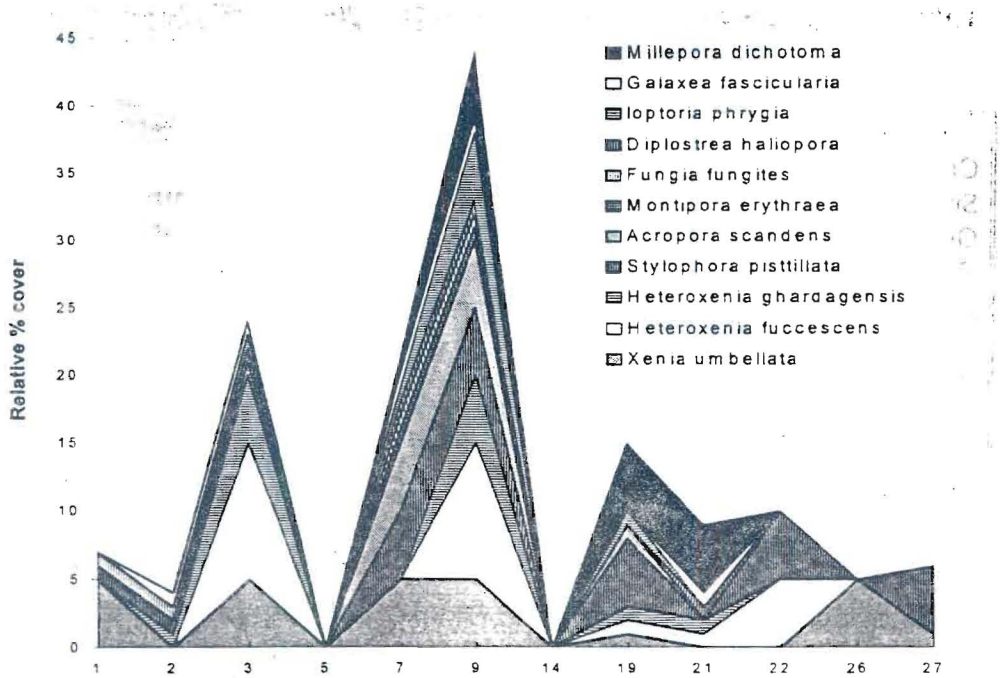

Fig. (9): Relative percentage cover of macro benthic Cnidarian species estimated at the different stations in the shallow ntertidal waters, Red Sea.

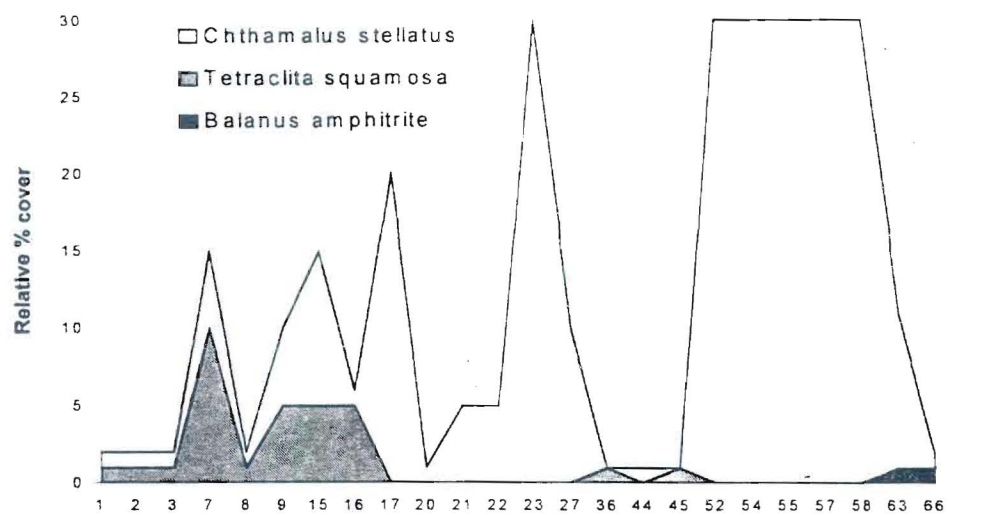

Fig. (10): Relative percentage cover of macro benthic Cirripedia (Barnacles) species estimated at the different stations in the shallow ntertidal waters, Red Sea.

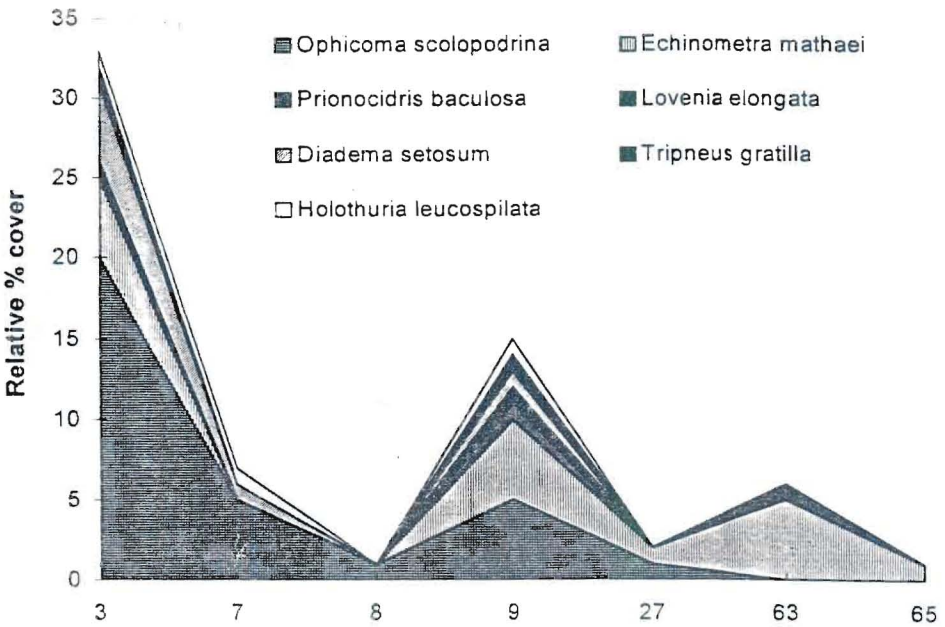

Fig. (11): Relative percentage cover of macro benthic echinodermes species estimated at the different stations in the shallow ntertidal waters, Red Sea.

Regional distribution of macro benthos

The spatial distribution patterns of macro benthos in the intertidal zone can be summarized according to various environmental conditions in different regions as follows:

Hurghada, in front Sheraton Hotel (St. 7); This area is located south of *Hurghada* city, where the shoreline is rocky in most parts and it is rich in living communities. Also, in front the shoreline outside the tidal zone a large diversity in reef associations was observed.

Hurghada, Public beach (St.8); It is located in the south part of Hurghada city and it represents a major resort area. The fauna and flora in the intertidal zone were scarce; but outside the tidal zone in front the shoreline is rich.

Hurghada Marine Station (St. 9); Great diversity and high density of benthos communities were found in this area. Class, Anthozoa, (order Scleractinia) predominated near the area of the Marine Station. They were found among the living corals on the fringing reefs near the shoreline, & on the reef flats and in some coral patches spread at the shallow intertidal zone.

Also, family Alcyonaria (Xeniidae) is common among reef communities on the fringing reef. It was found that ***Acropora*** and ***Stylophora*** were the dominant two genera of corals and ***Millepora*** was found in great density.

Abu Sha`r (St. 12); Abu Sha'r is located north of Al Hurghada where outside the tidal zone, there is a large fringing reef association.

El Ziet Bay (Sts. 21-27); In this area the shoreline is completely sandy with a wide intertidal flat in addition to increased oil production. Hence, the distribution, diversity and occurrence of macro benthos are affected. However, the brown algae ***Sargassum, Cystoseira, Harmophyse***; the bivalve ***Brachiodontes*** and the barnacles ***Chthamalus*** were recorded in the shallow intertidal waters that can tolerate the increase of oil pollution.

Ras Shukheir (St. 35); This area is characterized by the presence of large oil production from the Gulf of Suez and macro benthos infauna are very rare.

South Ras Ghareb (St. 40); It is located close to the pier south of Ras Ghareb City (150 km to the north of Al Hurghada). It is an intensive area of petroleum producing companies. This area is characterized by the presence of large amount of spilled oil that cover the beach. In this area the occurrence of living organisms is scarce along coastline. However, some species of algae such as ***Ulva, Enteromorpha, Colpomenia, Hydrocluthrus, Padina, Laurencia*** and ***Sargussum*** are more frequent.

Ras Ghareb (St. 41); This area is located in front of Ghareb City and it is similar to the previous one, where a great amount of oil patches are spread on the beach.

Abu Darag (St. 63); In this area the shoreline is rocky and it is rich in living communities. Algal vegetation and animal populations were dense.

South of Ain Sukhna (St. 67); It is situated south of Ain Sukhna where the living organisms are found in low amount; settled on the submerged artificial concrete blocks and among the spread moved cobbles. These associations are composed mainly of the algal cover, ***Patella, Chiton,*** echinoids, crabs, and barnacles.

South of Ain Sukhna (St. 69); The shoreline is covered by moved cobbles and marine fauna and flora are very rare.

Ain Sukhna (St. 71); This station is located at 45 km south of Suez City and it is a major resort region. In this area sandy beach is usual and living organisms are very rare.

DISCUSSION

Many studies were conducted on the coral reefs associations in front of the Marine Biological Station at Hurghada. These studies stressed on the systematic and some biological aspects for a short period of time and for a limited area. Pearse (1969) collected several species from the Echinodermata, echinoid from both the Suez Gulf and the western coast of the Red Sea. ***Echinometra mathaei*** (de Blainville) and the other species are scarce in this area because it is a major resort region. Echinoid and Holothuroid species were recorded in localities along the Red Sea and the Gulf of Suez. Pearse (1983) reported that the species composition of most fauna and flora in the Red Sea and both Gulfs of Suez and Aqaba are typical members of the tropical Indo-pacific assemblages. El-Wakeel ***et al.*** (1984) studied the trace elements and carbonate in 14 species of scleractinia and one species of Milleporidae corals dominated by ***Acropora*** and ***Stylophora.***

According to the present study, the distribution and abundance of macro benthos varied due to the nature of the bottom and the distance from both the sources of pollution and man-made coastal activity. The varying degree of faunal affinity is related to the effect of current, land and sea barrier, temperature of inshore water, the duration and period of spawning, the duration of the planktonic larval stages (Abott 1966). Connell (1961) reported that the distribution of animals and their species composition depend upon the nature of substrata that effects the degree of competition for space. Thorson (1960) also suggested that substratum proved to be the ``Master Factor`` responsible for the settling of bottom invertebrates larvae. Another factor is the presence of bottom invertebrate predators affecting the composition of bottom fauna. Besides; the effect of prevailing environmental conditions which influence the timing and duration of planktonic larval stages.

Scleractinian forms besides the hydrozoans Millepora (stringing coral) compose the main bulk of corals in the Red Sea. It is known that the growth of corals increases markedly in the north of the Red Sea and declines in the south as reviewed by Behary ***et al.*** (1992). This was related to the water cooling in winter and for high sedimentation. These species showed a great

density along the north western coast of the Red Sea and along the eastern coast of the Gulf of Suez. El-Komi (1996) reviewed a preliminary mapping for the distribution of macro benthos assemblages for the study area over about 241 km from Ras Mohammed to Ras Suder including 35 stations. He found a great variability in the density and diversity of benthos species due to the type of bottom sediments, the degree of pollution (mainly the concentration of aged oil on the beach and shoreline) in combination with the prevailing physical and chemical factors in the study areas. The same conclusion can be cited for the present work in the north western coast of the Red Sea.

Widdows *et al.* (1982) mentioned that oil pollution is not affecting on the distribution of algae because the hydrocarbon is not essential to be found in soluble forms in water. Mergner and Svoboda (1977) detected seasonal changes in the marine macro-algae and associated fauna in selected reef areas in the Gulf of Aqaba. Khalil (1991) reported that some brown sea weeds (***Sargassum***) can tolerate pollutant and represent an indicator factor of pollution. In this work a number of algal cover was recorded in areas polluted by oil spills (aged oil patches on the shoreline is highly concentrated) such as ***Sargassum, Cystoseira, Padina, Laurencia*** and ***Ulva.***

The calcareous red and brown algae are generally growing rapidly where ***Halimeda, Caulerpa, Sargassum, Turbinaria*** and ***Laurencia*** are the main genera predominated the coral reef assemblages. On the other hand, sea anemones, Alcyonaria (***Xeniidae***), Pocilloporidae (***Stylophora***), Polyplacophora (***Acanthopleura, Chiton***), Gastropoda (***Cellana, Cerithium, Trochus***), Bivalvia (***Brachiodontes, Chama, Tridacna***), Cirripedia (***Tetraclita, Chthamalus***), Echinodermata (***Ophicoma, Echinometra, Diadema***) are common among reef communities on the fringing reef and in particular on the northern west coast of the Red Sea. The calcareous marine organisms mostly prevailed are namely: encrusting bryozoans, surpulides, barnacles, and molluscs. Farther quantitative sampling and statistical analysis are necessary to demonstrate the biological mapping for the spatial distribution patterns of different marine organisms.

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