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POLYCHAETE FAUNA OF THE NORTHERN PART OF THE SUEZ CANAL (PORT-SAID – TOUSSOUM)

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ABSTACT

The opening of the Suez Canal has led to the introduction of hundreds of Lessepsian migrants in both directions (Mediterranean and Red Seas), especially in the Levant Basin. As a result, many of the Red Sea-Indo-Pacific species has been detected in this area. Therefore, Studying the Suez Canal biota is strongly needed. The present study was focused on polychaete fauna inhabiting the Canal. Sediment samples and fouling aggregations were collected from the northern part of the Suez Canal in April, 2007. Analysis of 3459 of polychaete individuals embraced 79 species belonging to 23 families. Forty new records were reported from the studied area. Generally, bottom samples harbored lower number of both species and individuals. The best represented families were: Syllidae, Nereididae, Serpulidae, Sabellidae, Spionidae and Cirratulidae. The leader species was *Hydroides elegans*. Analysis of the biogeographic distribution of the recorded species had been emerged 14 groups. The main groups were: Cosmopolitan (19 species), Circumtropical (15 species), Atlantic-Mediterranean (10 species), Atlantic-Mediterranean-Red Sea and Disjunct (5 species).

1. INTRODUCTION

Opening of the Suez Canal in 1869 put into motion what has been called a mammoth ecological experiment (Por, 1978). It joins the two seas belonging to different biogeographic provinces. The Canal provided a major pathway for migration of hundreds of marine fauna between the Atlantic-Mediterranean and Red Sea-Indo-Pacific origin. The marine fauna have been also transported across the oceans by ship fouling or by ballast water. All these are considered the major factors for the globalization of marine biota. Por (1978&1990) is the first author who interested in the migration of marine fauna through the Suez Canal.

The first report of the Suez Canal polychaetes was carried out by the Cambridge expedition of 1924 (Fauvel, 1927b and Potts, 1928). More recently, Ben-Eliahu (1972) studied the errant polychaetes of the Suez Canal. Serpulids inhabiting the Lake Timsah was studied by Shalla (1985), while the whole polychaete fauna was investigated by Mostafa (1992). The fouling community of the Suez Canal was followed by Ramadan (1986) and Ghobashy *et al.* (1990). As the migration phenomenon through the Canal is ongoing, the number of migrant species increased in both directions.

Ben-Eliahu (1970) mentioned that the migrant species most likely do settle and reproduce in the Canal. Therefore, studying the Suez Canal fauna is so essential. The present study is an attempt to elucidate the polychaete fauna inhabiting the northern part of the Suez Canal, as well as measure the different biogeographic groups of polychaete

fauna penetrating the Canal from both Red and Mediterranean Seas.

2. MATERIALS AND METHODS

Quantitative samples were taken at 6 sites during April 2007. At each site two samples were collected, one from bottom sediments and the other from fouling aggregations. Sediment samples were collected, using a small grab sampler (20cm x 20cm), while fouling communities were obtained by scraping from hard substrates. Three replicate samples were taken from each site, each replicate corresponding to a total surface of 0.04 m^2. The samples were washed and sieved through 0.5 mesh, then preserved in neutralized formalin (10%).The retained polychaetes were identified to species level by using stereo and compound microscopes.

3. RESULTS

Analysis of 3459 polychaete individuals cleared the presence of 79 species belonging to 23 families. This study added 40 new records to inventory of the polychaete fauna inhabiting the Suez Canal. The best represented families were: Syllidae followed by Nereididae, Serpulidae, Sabellidae, Spionidae and Cirratulidae (Table 1 & Fig. 2a). Only 7 species appeared to be more or less common in the Canal (Table 1) namely: *Leocrates claparedii, Syllidia armata, Pseudonereis anomala, Janua (Dexiospira)* sp, *Hydroides elegans, Spirobranchus tetraceros* and *Dipolydora caeca*. All these species were reported from both fouling and sediment samples; except *Pseudonereis anomala* which was found among fouling aggregations only. It should be mentioned that the appearance of *Janua (Dexiospira)* sp. was always associated with specific mollusk that act as the preferable substrate to settle on it. The most frequent species in terms of number of individuals were: *Hydroides elegans*, followed by *Spirobranchus tetraceros, Janua (Dexiospira)* sp. and *S. giganteus* (Table 1 & Fig. 2b). The number of polychaete species per site ranged from 1 to 30 (Table 1). The Polychaete inhabiting fouling aggregations exhibited a modrately broad range of species number (8-30 species) the higher number of species located at Site 6 (F6) followed by Site 2 (F2). Those inhabiting bottom sediments showed relatively lower number of species (1-22). Site 2 (S2) and Site 4 (S4) showed higher number of species (21 &15 respectively). As well, the number of polychaete individuals was always low among bottom sediments (21-154 ind./replicate). The lowest individual number was estimated at Site 6 (S6). On contrast, higher number of individuals was reported from the fouling collections. The increase in the total number of individuals at fouling sites was masked by the increase of the individuals of *Hydroides elegans*. It was apparent that the number of individuals decreased southward. Site 1 (F1) exhibited the highest number of individuals followed by Site 2 (F2) and Site 4 (F4) (Table 1 & Fig. 2c). This increase in the individuals may be attributed to the increase in the leader serpulid species *Hydroides elegans*.

The present study revealed that 40 species were recently entered the Canal. Table 1 surveys the occurrence of the recorded polychaete species in the studied area, while Table 2 presents the geographical distribution of them, associated with relevant literatures. Analysis of the Tables emerged different biogeographic groups. The so called cosmopolitan, circumtropical and disjunct group were derived from the literatures (Fauchald, 1977 San Martim, 2005, Musco &, Giangrande, 2005). The remaining nomenclatures were suggested by the author according to the corresponding localities.

Analysis of the biogeographic distribution of the recorded species had been emerged different patterns of biogeographic groups (Table 2 & Fig 2d). The main groups were:

1. Cosmopolitan species are reported from both cold and warm seas. The

cosmopolitan component of Suez Canal polychaete fauna emerged 19 species.

2. Circumtropical species are found in warm water in the three main oceans (Atlantic, Indian and Pacific). The distribution of this component is centered in the tropical regions this group included 15 species.
3. Atlantic-Mediterranean species include forms that have been reported from both Atlantic and Mediterranean waters. The present study reported 12 species.
4. Atlantic-Mediterranean-Red Sea species. The present study estimated 10 species.
5. Disjunct species are those distributed discontinuously, having been reported from two or more locations far a part from each other. This group included 5 species.

It is worth to note that the remaining groups were represented by few species (1 – 2 species). It was strange that the 3 species; *Syllis luquei, Syllis mediterranea* and *Protdrilus chaetifer*;of Mediterranean group (M) were not encountered in the northern part of the studied area (Table 1 & 2), but found at site 6 (far from the connection with the Mediterranean Sea).

Table (1) showed that 16 of the newly recorded species in the Canal succeeded to reach Lake Timsah which is nearly situated in the middle of the Canal. On contrast, many species were reported near the northern entrance of the Canal, estimated 22 species. The remaining species were widely dispersed along the studied area.

The present study reported 43 species of errant polychaetes from the northern part of the Canal. The data obtained by the Cambridge expedition (Fauvel, 1927b & Potts, 1928) is so far from that given during the present study because the investigated sites were differed. The expedition reported a total of 54 polychaete species, of which only 9 of errant species and 2 of sedentary ones were also documented in the present study.

Ben-Eliahu (1972) reported 55 species of errant polychaetes from El-Qantar to Bitter Lakes, while the present study found 43 species from Port-Said to Toussoum, 16 of which were previously recorded by Ben-Eliahu (1972). She reported only 3 faunal groups (cosmopolitan, Red Sea or Mediterranean components) were found throughout the Canal, with the Red Sea component decreasing from Deversoir northwards.

Table (1): Distribution of the recorded species in the studied Area.

Species	Site 1		Site 2		Site 3		Site 4		Site 5		Site 6		Sum
	F1	S1	F2	S2	F3	S3	F4	S4	F5	S5	F6	S6	
Capitellidae 1													
Capitella capitata				5					3		70	1	79
Capitella giardi											5		5
Opheliidae 2													
Armandia cirrhosa								1					1
Orbiniidae 3													
Protoaricia oerstedi											3		3
Paraonidae 4													

Table (1) continue													
Aricidea (Acmira) simplex		**4**											**4**
Cirrophorus branchiatus		**3**											**3**
Dorvilleidae 5													
Protodorvillea kefersteini.											**1**		**1**
Eunicidae 6													
Lysidice ninetta											**7**		**7**
Nematonereis unicornis											**1**		**1**
Lumbrineridae 7													
Lumbrineris coccinea				**1**			**2**						**3**
Lumbrineris funchalensis												**1**	**1**
Goniadidae 8													
Goniada maculate				**3**									**3**
Hesionidae 9													
Gyptis propinqua			**6**										**6**
Leocrates claparedii			**12**	**1**	**1**		**15**	**2**			**1**		**32**
Ophiodromus pallidus			**12**	**5**									**17**
Syllidia armata	**1**	**1**	**30**	**3**	**1**		**1**	**3**			**2**		**42**
Nephtyididae 10													
Micronephtys sphaerocirrata				**1**									**1**
Nereididae 11													
Ceratonereis costae			**3**	**5**	**1**								**9**
Neanthes caudata					**1**								**1**
Nereis falsa			**3**										**3**
Perinereis floridana										**3**	**9**		**12**
Perinereis heterodonta											**1**		**1**
Perinereis nuntia brevicirris										**2**	**1**		**3**
Perinereis typica											**2**		**2**
Platynereis dumerilii			**3**				**2**						**5**
Platynereis pulchella			**24**				**18**						**42**
Pseudonereis anomala	**2**		**3**		**3**		**6**				**5**		**19**
Pholoidae 12													
Pholoe minuta								**1**					**1**
Phyllodocidae 13													
Eulalia bilineata											**1**		**1**
Eumida sanguinea	**1**	**3**		**1**				**1**					**6**
Phyllodoce mucosa	**1**												**1**

Table (1) continue													
Polynoidae 14													
Lepidonotus squamatus				**2**	**1**								**3**
Syllidae 15													
Autolytus prolifer	**1**												**1**
Branchiosyllis exilis			**30**				**18**				**1**		**49**
Exogone (Exogone) verugera											**1**		**1**
Haplosyllis spongicola			**5**										**5**
Salvatoria limbata				**2**									**2**
Salvatoria vieitezi			**1**										**1**
Syllis armillaris								**1**					**1**
Syllis gracilis													
Syllis hyalina		**1**											**1**
Syllis kabilika	**1**												**1**
Syllis krohni								**1**			**2**		**3**
Syllis luquei	**4**												**4**
Syllis mediterranea											**1**		**1**
Syllis prolifera											**1**		**1**
Syllis variegata					**1**		**12**	**8**			**15**		**36**
Trypanosyllis zebra	**1**				**1**		**4**	**1**					**7**
Spirorbidae 16													
***Janua (Dexiospira)* sp.**	**25**		**30**			**50**	**15**			**20**	**10**	**10**	**160**
Sabellidae 17													
Branchiomma lucullana				**3**			**12**						**15**
Demonax brachychona			**2**										**2**
Demonax microphthalmus			**2**								**3**		**5**
Euchone southerni								**1**					**1**
Oriopsis armandi				**1**				**1**					**2**
Pseudoptamilla reniformis			**5**										**5**
Serpulidae 18													
Hydroides dianthus	**2**								**2**				**4**
Hydroides dirampha	**1**	**2**		**6**	**3**		**4**						**16**
Hydroides elegans	**1000**	**15**	**600**	**20**	**80**		**400**	**5**	**80**	**120**	**2**	**1**	**2323**
Pomatoloeis kraussii													
Serpula concharum			**4**										**4**
Serpula vermicularis			**2**										**2**
Spirobranchus giganteus									**100**				**100**

Table (1) continue

Spirobranchus tetraceros	**20**		**100**	**10**	**40**		**10**	**1**			**30**		**211**
Spionidae 19													
Boccardia polybranchia											**5**		**5**
Dipolydora caeca	**1**	**1**		**1**					**1**		**1**	**1**	**6**
Polydora ciliata									**5**		**40**		**45**
Prionospio aucklandica								**1**					**1**
pseudopolydora antennata											**20**		**20**
Pseudopolydora pausibranchiata				**2**									**2**
Cirratulidae 20													
Calleriella zetlandicus								**1**					**1**
Cirratulus cirratus							**1**						**1**
Cirratulus filiformis				**1**									**1**
Cirriformia filigera			**30**	**5**	**4**						**10**		**49**
Cirriformia tentaculata					**2**				**12**		**10**		**24**
Dodecaceria concharum				**6**									**6**
Ctenodrilidae 21													
Ctenodrilus serratus									**3**			**5**	**8**
Terebellidae 22													
Amphitrite affinis							**1**						**1**
Thelepus Cincinnatus			**5**										**5**
Protodriloididae23													
Protodrilus chaetifer												**2**	**2**
Species No	**14**	**8**	**22**	**21**	**13**	**1**	**16**	**15**	**8**	**4**	**30**	**7**	
Individual No	**1061**	**30**	**912**	**84**	**139**	**50**	**521**	**29**	**206**	**145**	**261**	**21**	**3459**

F: Fouling samples S: Sediment samples

Table (2): Biogeographic groups within the studied area and the relevant literature available.

Species and families	Atlantic	Indian	Pacific	Mediterranean	Red Sea	References	Groups
Capitellidae1							
Capitella capitata	+	+	+	+	+	Fauvel, 1927a;Bellan, 1964; Day, 1967b; Warren,1976;Ben-Eliahu, 1976b; Appy *et al*, 1980; Mostafa, 1992; Castelli *et al*, 1995; Simboura & Nicolaidou, 2001; Wehe&Fiege, 2002; Surugiu, 2005	**C**
Capitella giardi	+			+		Fauvel, 1927a; Warren,1976; Abd-Elnaby, 2005	
Opheliidae 2							
Armandia cirrhosa	+			+	+	Fauvel, 1927a; Hartman, 1959; Bellan, 1964; Arvanitidis, 2000; Simboura & Nicolaidou, 2001; Wehe & Fiege, 2002	**AMR**
Orbiniidae 3							
Protoaricia oerstedi	+			+	+	Fauvel, 1927a; Hartman-Schröder,1960; Ben-Eliahu, 1976b; Wehe &Fiege, 2002	**AMR**
Paraonidae 4							
Aricidea (Acmira) simplex	+		+	+		Day, 1963; Hartman, 1965; Blake, 1996; Simboura & Nicolaidou, 2001; Selim, 2007	**D**
Cirrophorus branchiatus	+		+	+	+	Day, 1963; Gaston, 1984, Blake;1996;Castelli *et al*,1995; Simboura & Nicolaidou, 2001; Wehe & Fiege, 2002; Selim,2007	**D**
Dorvilleidae 5							
Protodorvillea kefersteini.	+			+	+	Fauvel, 1923; Hartman, 1959; Bellan, 1964; Castelli *et al*,1995; Simboura & Nicolaidou, 2001	**AMR**
Eunicidae 6							
Lysidice ninetta	+	+	+	+	+	Fauvel, 1923; Bellan, 1964; Day, 1967a; Fauchald, 1977; Castelli *et al*,1995; Simboura & Nicolaidou, 2001;Wehe&Fiege, 2002; Abd-Elnaby, 2005	**CT**
Nematonereis unicornis	+	+	+	+	+	Fauvel, 1923; 1927b; Bellan, 1964; Mohammad, 1971; Ben-Eliahu, 1972, 1976c, Fauchald; 1977; Castelli et al,1995; Simboura & Nicolaidou, 2001; Wehe & Fiege, 2002; Abd-Elnaby, 2005	**CT**
Lumbrineridae 7							
Lumbrineris coccinea	+	+	+	+	+	Fauvel, 1923, 1937; Hartman, 1959; Bellan, 1964; Day, 1967a; Ben-Eliahu, 1972; Castelli *et al*,1995; Simboura & Nicolaidou, 2001; Wehe & Fiege, 2002; Abd-Elnaby, 2005	**AMR**
Lumbrineris funchalensis	+			+		Fauvel, 1923; Hartman, 1959; Bellan, 1964; Ben-Eliahu, 1972; Selim, 1978; Abd-Elnaby, 2005; Belal, 2001	**AM**

Table (2) continue

Goniadidae 8							
Goniada maculate	+		+		+	Bellan, 1964; Day, 1967a; Appy *et al;* 1980; Castelli *et a*l,1995; Simboura & Nicolaidou, 2001; Wehe & Fiege, 2002	**D**
Hesionidae 9							
Leocrates claparedii	+	+	+	+	+	Fauvel, 1927b, 1933; Bellan, 1964; Day, 1967a; Ben-Eliahu; 1972; Simboura & Nicolaidou, 2001; Belal, 2001; Wehe & Fiege, 2002	**CT**
Gyptis propinqua	+			+		Fauvel, 1923; Bellan, 1964	**AM**
Ophiodromus pallidus	+			+		Fauvel, 1923; Castelli *et al*,1995; Simboura&Nicolaidou, 2001; Abd-Elnaby, 2005	**AM**
Syllidia armata	+	+	+	+	+	Fauvel, 1923; Hartman, 1959; Bellan, 1964; Day, 1967a; Ben-Eliahu, 1972; Castelli *et al.*,1995; Simboura&Nicolaidou, 2001; Wehe & Fiege, 2002	**AMR**
Nephtyididae 10							
Micronephtys sphaerocirrata	+			+	+	Hartman, 1959; Day, 1967a; Castelli *et al*,1995; Simboura & Nicolaidou, 2001; Wehe&Fiege, 2002	**AMR**
Nereididae 11							
Ceratonereis costae	+	+	+	+	+	Fauvel, 1923, 1927b, 1933, 1937; Hartman, 1959; Bellan, 1964; Day, 1967; Ben-Eliahu, 1972; Mostafa, 1992; Simboura & Nicolaidou, 2001; Wehe & Fiege, 2002	**CT**
Neanthes caudata	+		+	+		Fauvel, 1923; Hartman, 1959; Bellan, 1964; Day, 1967a; Ben-Eliahu, 1972, 1991; Selim, 1978; Heaba, 1987; Mostafa, 1992; Castelli *et al*,1995; Simboura & Nicolaidou, 2001; Belal, 2001; Wehe & Fiege, 2002	**D**
Nereis falsa	+		+	+		Fauvel, 1923; selim, 1978; Castelli *et al*,1995; Abd-Elnaby 2005; Simboura & Nicolaidou, 2001	**D**
Perinereis floridana	+	+		+		Mohmmad,1971; Mostafa, 1992, Heaba, 1987; Belal, 2001; Wehe&Fiege, 2002	**AIP**
Perinereis heterodonta				+	+	Fauvel, 1919; Mostafa, 1992; Belal, 2001; Abd-Elnaby, 2005	**MR**
Perinereis nuntia brevicirris		+	+	+	+	Fauvel, 1933; Mohammad, 1971; Mostafa, 1992; Belal, 2001	**CT**
Perinereis typica		+	+		+	Ben-Eliahu, 1972; Mostafa, 1992; Belal, 2001	**IPMR**
Platynereis dumerilii	+	+	+	+	+	Fauvel, 1933, 1937; Day, 1967a; Bellan, 1964; Ben-Eliahu, 1972, 1975b; Fauchald, 1977; Selim, 1978; Arvanitidis, 2000; Simboura &Nicolaidou, 2001; Abd-Elnaby, 2005	**CT**
Platynereis pulchella		+		+	+	Hartman, 1959; Ben-Eliahu, 1975b; Wehe&Fiege, 2002	**CT**
Pseudonereis anomala		+	+	+	+	Fauvel,1937; Mohammad, 1971; Ben-Eliahu, 1972, 1975b; Selim, 1978; Heaba, 1987; Mostafa, 1992	**AIPR**

Table (2) continue

Pholoidae 12							
Pholoe minuta	+	+		+	+	Day, 1967a; Simboura&Nicolaidou, 2001; Wehe & Fiege, 2002	**AIMR**
Phyllodocidae 13							
Eulalia bilineata	+		+	+		Bellan, 1964; Day, 1967a, Appy *et al*., 1980; Simboura &Nicolaidou, 2001; Wehe & Fiege, 2002	**D**
Eumida sanguinea	+	+	+	+	+	Fauvel, 1933; Hartman-Schröder,1960; Day, 1967a; Mohammad, 1971; Ben-Eliahu, 1972; Simboura &Nicolaidou, 2001; wehe & fiege,2002	**C**
Phyllodoce mucosa	+			+		Fauvel, 1923, 1937; Bellan, 1964; Selim, 1978; Appy *et al*., 1980; Heaba, 1987; Simboura&Nicolaidou, 2001; Abd-Elnaby, 2005	**AM**
Polynoidae 14							
Lepidonotus squamatus	+		+	+		Fauvel, 1923, 1937; Bellan, 1964; Selim, 1978; Heaba, 1987	**D**
Syllidae 15							
Autolytus prolifer	+	+		+	+	Fauvel, 1923; Day, 1967a; San Martin, 1984; Abd -Elnaby, 2005	**AIMR**
Branchiosyllis exilis	+	+	+	+	+	Fauvel,1927b, 1933; Ben-Eliahu, 1972, 1977a ; San Martin, 1984; Castelli *et al*,1995; Selim, 1996a; Simboura & Zenetos,2005; Abd-Elnaby, 2005	**CT**
Exogone (Exogone) verugera	+			+		Bellan, 1964; Day, 1967a; San Martin,1984 &1991; Wehe &Fiege, 2002	**C**
Haplosyllis spongicola	+	+	+	+	+	Day, 1967a; Fauvel, 1923, 1927b,1933, 1937; Hartman, 1959; Hartman-Schröder,1960; Bellan, 1964; San Martin,1984	**C**
Salvatoria limbata	+	+	+	+	+	Hartman, 1959; Hartman-Schröder, 1960, Bellan, 1964; San Martin, 1984; Wehe &Fiege,2002	**CT**
Salvatoria vieitezi				+		San Martin, 1984	**AM**
Syllis armillaris	+	+	+	+	+	Fauvel, 1923; Hartman, 1959; Hartman-Schröder, 1960, Bellan, 1964; Day, 1967a; Ben - Eliahu, 1972, 1977a; San Martin, 1984	**C**
Syllis gracilis	+	+	+	+	+	Fauvel, 1923, 1927b, 1933; Bellan, 1964; Day, 1967a; Mohammad, 1971; Ben-Eliahu, 1972, 1977a; Fauchald, 1977; Arvanitidis, 2000; Simboura & Nicolaidou, 2001;	**CT**
Syllis hyalina		+		+		Fauvel, 1927a, 1937; Hartman, 1959; Bellan, 1964; Day, 1967a; Ben-Eliahu, 1977a; Selim, 1996a; Arvanitidis, 2000; Simboura &Nicolaidou, 2001; Wehe&Fiege, 2002	**IM**
Syllis kabilika	+	+	+	+	+	Ben-Eliahu, 1977a; San Martin, 1984	**C**
Syllis krohni	+	+	+	+	+	Fauvel, 1923; Hartman, 1959; Bellan, 1964; San Martin, 1984; Wehe&Fiege, 2002; Abd-Elnaby, 2005	**C**

Table (2) continue

Syllis luquei	+	+	+	+	+	San Martin, 1984; Abd-Elnaby, 2005	**C**
Syllis mediterranea				+		Ben-Eliahu, 1972, 1977a; San Martin, 1984; Selim, 1996a; Abd-Elnaby, 2005	**M**
Syllis prolifera				+		Fauvel, 1923,1927b Ben-Eliahu, 1972, 1977a; Fauchald, 1977; San Martin, 1984, 1991; Selim, 1996a; Abd-Elnaby, 2005; Wehe&Fiege, 2002	**M**
Syllis variegata	+	+	+	+	+	Fauvel, 1923, 1927b, 1933; Hatrman, 1959; Bellan, 1964; Mohammad, 1971; Ben-Eliahu, 1972, 1977a; Fauchald, 1977; Selim, 1978; San Martin, 1984; Heaba, 1987; Mostafa, 1992; Belal, 2001; Abd-Elnaby, 2005	**CT**
Trypanosyllis zebra	+	+	+	+	+	Fauvel, 1927a, 1933, 1937; Bellan, 1964; Day, 1967; Ben-Eliahu, 1972; Selim, 1978; San Martin, 1984; Mostafa, 1992; Belal, 2001; Wehe & Fiege, 2002; Abd-Elnaby, 2005	**C**
Spirorbidae 16							
***Janua (Dexiospira)* sp.**							
Sabellidae 17							
Branchiomma lucullana				+	+	Fauvel, 1927a, 1937; Potts, 1928; Hartman, 1959; Bellan, 1964;Selim, 1978, Heaba, 1987; Belal, 2001; Wehe & Fiege, 2002	**AMR**
Demonax brachychona	+			+		Fauvel, 1927a; Knight-Jones, 1983; Giangrande, 1994; Simboura & Nicolaidou, 2001; Selim, 2008a	**AM**
Demonax microphthalmus	+					Uebelacker, 1984; Perkins, 1984; Selim, 2008a	**A**
Euchone southerni	+			+		Banse, 1970; Fitzhugh,2002; Selim, 2008a	**AM**
Oriopsis armandi	+		+	+	+	Fauvel, 1927a; Banse, 1957; Bellan, 1964; Ben-Eliahu, 1975a; Wehe&Fiege, 2002; Selim, 2008a	**D**
Pseudoptamilla reniformis	+		+	+		Fauvel, 1927a; Hartman, 1959; Bellan, 1964; Ben-Eliahu, 1975a; Fauchald, 1977; Appy *et al*, 1980	**C**
Serpulidae 18							
Hydroides dianthus	+			+		Fauvel, 1927a; Hartman, 1959; Bellan, 1964; Zibrowius, 1968; Ben-Eliahu, 1976a; Selim, 1978, 1997	**AM**
Hydroides dirampha	+	+	+	+		Fauvel, 1927a; Potts, 1928; Zibrowius, 1968, Shalla, 1985	**AIPM**
Hydroides elegans	+	+	+	+	+	Fauvel, 1927a, 1933; Potts, 1928; Bellan, 1964; Zibrowius, 1968; Selim, 1978, 1997; Shalla, 1985; Mostafa, 1992	**C**
Pomatoloeis kraussii		+	+	+	+	Day, 1967b; Mohammad, 1971; Shalla, 1985, Heaba, 1987; Belal, 2001; Selim, 1997;	**CT**
Serpula concharum	+			+	+	Hartman, 1959; Bellan, 1964; Ben-Eliahu, 1976a, Zibrowius, 1972, Wehe&Fiege, 2002	**AMR**
Serpula vermicularis	+			+	+	Fauvel, 1927a; Bellan, 1964; Mohammad, 1971;	**C**

Table (2) continue

Spirobranchus giganteus		+	+	+	+	Fauvel, 1933; Hove, 1970	**C**
Spirobranchus tetraceros	+	+	+	+	+	Potts, 1928; Hove, 1970; Shalla, 1985; Ghobashy *et al*, 1990; Ben-Eliahu, 1991; Mostafa, 1992; Selim, 1997.	**CT**
Spionidae 19							
Boccardia polybranchia	+	+	+	+	+	Fauvel, 1927a; Ben-Eliahu, 1976b; Fauchald, 1977; Blake & Kudenov, 1978; Selim, 2006.	**C**
Dipolydora caeca	+			+	+	Fauvel, 1927a; Bellan, 1964; Day, 1967b; Selim, 1978, 2006; Wehe&Fiege, 2002	**AMR**
Polydora ciliata	+			+		Fauvel, 1927a; Bellan, 1964; Heaba, 1987; Belal, 2001; Castelli *et al*,1995; Simboura&Nicolaidou, 2001	**C**
Prionospio aucklandica	+	+	+	+		Blake &Kudenov, 1978; Leon-Gonzalez,1998, Selim, 2006	**AIPM**
pseudopolydora antennata	+	+	+	+	+	Fauvel, 1927a; Day, 1967b; Mohammad,1971; Ben-Eliahu, 1976b; Ramberg & schram, 1982; Radashevsky, 1993; Blake, 1996; Selim, 2006; Wehe &Fiege, 2002	**C**
Pseudopolydora pausibranchiata			+	+		Blake & Kudenov, 1978; Ramberg&schram, 1982; Radashevsky, 1993; Selim, 2006	**D**
Cirratulidae 20							
Cirriformia tentaculata	+	+	+	+	+	Fauvel, 1927a; Day, 1967b; Fauchald,1977; Wehe & Fiege, 2002; Abd-Elnaby, 2005	**CT**
Calleriella zetlandicus	+			+		Fauvel, 1927a; Hartman, 1959; Bellan, 1964; Abd-Elnaby, 2005	**AM**
Cirratulus cirratus	+	+	+	+	+	Fauvel, 1927a, b ; Bellan, 1964; Fauchald, 1977; Selim, 1978; Appy *et al*, 1980; Heaba, 1987; Mostafa, 1992; Wehe&Fiege, 2002; Abd-Elnaby, 2005	**C**
Cirratulus filiformis	+			+		Fauvel, 1927a; 1937	**AM**
Cirriformia filigera	+	+	+	+	+	Fauvel, 1927a; Day, 1967b; Mohammad, 1971; Abd-Elnaby, 2005	**CT**
Dodecaceria concharum	+		+	+	+	Fauvel, 1927a, 1937; Bellan, 1964; Fauchald, 1977; Appy *et al*, 1980; Wehe&Fiege, 2002	**C**
Ctenodrilidae 21							
Ctenodrilus serratus	+			+	+	Fauvel, 1927a; Bellan, 1964; Ben-Eliahu, 1976b; Wehe & Fiege, 2002; Surugiu, 2005	**AMR**
Terebellidae 22							
Amphitrite affinis	+			+		Fauvel, 1927b; Belal, 2001	**AM**
Thelepus Cincinnata	+			+		Fauvel, 1927a; Day, 1967b	**C**
Protodriloididae23							
Protodrilus chaetifer				+		Fauvel, 1927a, Bellan, 1964; Castelli *et al*,1995	**M**

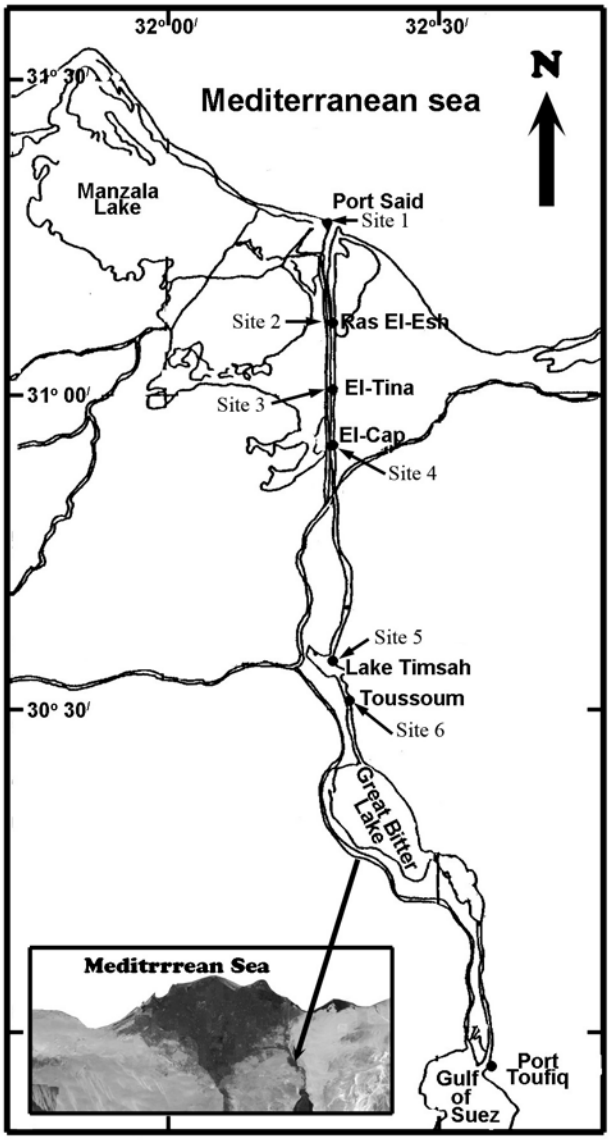

Fig. (1): Map showing sampling locations.

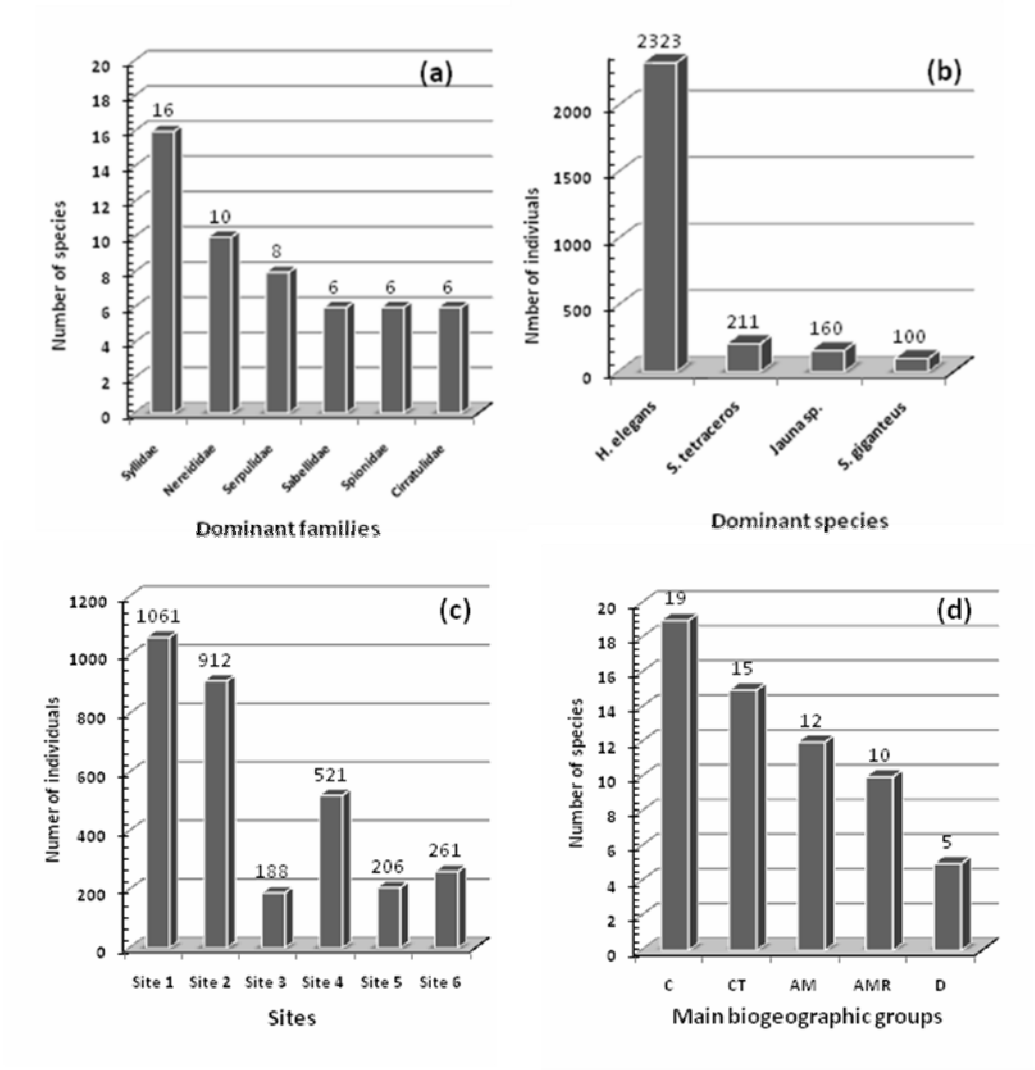

Fig. (2): (a) Total number of species of dominant families, (b) Total number of individuals of dominant species, (c) Total number of individuals at sampling sits, (d) Main biogeographic groups at sampling sites.

4. DISCUSSION

Faunistic analysis of polychaetes inhabiting northern part of Suez Canal showed that the area was biodiverse, harboring a total of 79 species, of which 40 were new records. Generally, bottom samples yielded lower number of both species and individuals than those reported from fouling aggregations. This result may be attributed to widen and deepen the Canal to 66 feet, with the aim of receiving super-oil tankers and container ships by the end of the year 2006. The first work conducted in the Suez Canal was so old. It was carried out by the Cambridge Expedition (Potts, 1928 and Fauvel, 1927b). More recently, Ben-Eliahu (1972) studied the errant polychaetes of Suez Canal. Lake Timsah investigated by Shalla (1985) and Mostafa (1992). Ramadan (1986) and Ghobashy *et al.* (1990) studied the fouling communities of Suez Canal. The present study added many new records to the inventory of polychaetes inhabiting Suez Canal. Therefore; the Canal provided a pathway for migration of marine fauna between Atlantic-Mediterranean and Red Sea-Indo-Pacific origin species traversing the Canal encounter the salinity barrier within the Canal that characterized by the abrupt changes in salinity, especially in Bitter lakes, followed by Abrupt drop in salinity to brackish-marine condition in lake Timsah to the north. Therefore the first migrate delay in onset of migration as a result of the previous condition, much weakened today (Por, 1978). The invasion species should have an ability to withstand the new habitat, so as to establish a foothold and can survive under such new complex conditions. This may explain the prevalence of Cosmopolitan and Circumtropical species in the Canal (Table2 & Fig. 2d). The relatively dominance of Atlantic-Mediterranean species may be attributed to a slight differences in both temperature and salinity between the south east Mediterranean and the northern part of the Canal (Ben-Eliahu & Fiege, 1996). Many of the invasion species succeeded to attain the Levant Basin (Egypt, Israel, Lebanon, and Turkey) and successfully survived in it. The phenomenon is well ascertained among the two fouler serpulid species: *Pomatoleios kraussii* and *Spirobranchus tetraceros.* The last species has the greatest Levant range extension, having reached as far west as Rhodos (Ben-Eliahu & Fiege, 1996). As well, the previous two species were sporadically found among fouler of Alexandria coast, Egypt (Selim, 1997 a, b Selim *et al*, 2005 and Abd-El Naby, 2005). *Hydroides dirampha* and *H. elegans* are questionably of Tropical-American-Atlantic and are of uncertain derivation (Zibrowius, 1991). These two species are found in the Egyptian waters. The later species is widely distributed in harbour and polluted shallow waters in the Egyptian Mediterranean (Selim, 1978, 1996b & Abd-Elnaby, 2005). On the other hand, *Hydroides dianthus* presumed to be native of North America (Zibrowius, 1991) had been found in Alexandria with moderate occurrence (Selim, 1978). This species was rarely recorded in the Canal in the present study. Selim (1997a) had not been detected this species at all in the Canal, but found it in Port-Said. Therefore, delay and rarity of *Hydroides dianthus* in the Egyptian Mediterranean and Canal may be attributed to low ranges of tolerance of this species to new habitat. On the other hand, the Red Sea nereidid species *Pseudonereis anomala* was first recorded in the Mediterranean Sea by Fauvel (1937) in Egypt. Nowadays, it succeeds to establish a foothold along the Egyptian Mediterranean (Selim, 1978, 1996b, 2008b & Abd-Elnaby, 2005). Recent studies showed wide occurrence of this species outside the Lessepsian province (Por, 1990 and Kambouroglou & Nicolaidou, 2006). Cinar and Ergen (2005) suggested that the occurrence of Lessepsian species outside the Levant Basin could be attributed to passive transport of larvae in ballast water or of

adults on hulls of ships. It is worth to note that the alien spionid worm *Pseudopolydora paucibranchiata* (Indo-Pacific species) was firstly recorded in the Mediterranean Sea in Egypt (Selim, 2006). Now, it forms dense population in Izmir bay and Aegean Sea (Dagli & Cinar, 2008). It is worth to note that *Branchiosyllis exilis* was considered as high probability lessepsian migrant by Por (1978). Recently, the probability of this species being a Lessepsian migrant is very low due to its extended geographical distributions (Simboura and Zenetos, 2005).

The presence of the Mediterranean species; *Syllis luquei, Syllis mediterranea* and *Protdrilus chaetifer*; south of the Lake Timsah may best be explained by shipping foulers or by ballast water being the main vector of dispersal. .

It could be concluded that the migration phenomenon is ongoing. Consequently the number and importance of the Lessepsian species is qualified to increase in the future, especially in the Levant Basin. The Suez Canal could be considered as a unique model for evaluating the consequences of creating an irreversible change.

ABBREVIATIONS

C	Cosmopolitan	AIPM	Atlantic-Indian-Pacific-Mediterranean
CT	Circumtropical	MR	Mediterranean-Red Sea
AM	Atlantic-Mediterranean	IPMR	Indian-Pacific-Mediterranean-Red Sea
AMR	Atlantic-Mediterranean-Red Sea	AIPR	Atlantic-Indian-Pacific-Red Sea
D	Disjunct	IM	Indian-Pacific
M	Mediterranean	A	Atlantic
AIMR	Atlantic-Indian-Mediterranean-Red Sea	AIP	Atlantic-Indian-Pacific

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