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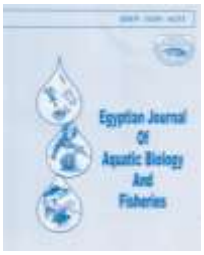

Recent changes in polychaete community along the Alexandria coast, Egypt.

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ABSTRACT

The polychaete community was studied monthly along the Alexandria coast during the period from October 2014 to October 2015. The results indicated the occurrence of 56 polychaetes species, including four species recorded for the first time in the study area, namely *Kirkegaardia annulosua, Dipolydora armata, Neogyptis* cf. *mediterranea*, and *Notomastus profundus*.

The recorded species belong to 42 genera and 19 families, with the dominance of family Syllidae. The numerical density of polychaete individuals displayed wide variation on the spatial and temporal scales, fluctuating among the sampling sites between a minimum of 233±305 ind/m^2 and a maximum of 3901±2597 ind/m^2. A few species were responsible of the bulk of polychaete abundance.

Comparing with the previous works, the present study revealed pronounced decrease in species richness and marked drop in the abundance of polychaete community along the Alexandria coast, mainly due to marked decrease in the abundance of several dominant species during the past decade. The changes in the community structure and abundance of polychaetes could be attributed to the engineering processes of the coastal road, variations in the topography of the coast line and modification of the sewer system of Alexandria City.

INTRODUCTION

Polychaetes show remarkable abundance, species richness and functional diversity in marine benthic communities of both soft and hard bottoms (Knox, 1977; Çinar *et al.*, 2006; Musco, 2012). They play key role in ecosystem functioning and in the estimation of diversity and dynamics of benthic communities (Olsgard *et al*., 2003; Giangrande *et al*., 2004; 2005; Papageorgiou *et al*., 2006). assessing environmental health, as a biological criterion for water quality and in biomonitoring studies (e.g. Pocklington and Wells, 1992; Warwick, 1993; Olsgard *et al*., 2003; Giangrande *et al*., 2005; Ergen *et al*., 2006; Musco *et al*., 2009; 2011; Del-Pilar-Ruso *et al*., 2010; Mikac *et al.*, 2011).

Polychaetes are important group of the coastal benthic communities on loose and hard substrates. The community structure and abundance of polychaetes is largely affected by sediment texture and the algal cover (e.g. Mikac and Musco, 2010; Musco, 2012), as well as by physical factors which influence on the composition of the sessile macrobenthos forming the polychaete habitat (Giangrande, 1990).

Polychaetes are the most abundant benthic animals along the Alexandria coast (Abd El-Naby, 2005 and Hamdy 2008). During the last decade, great attention has been drawn to the polychaetes in the Eastern Mediterranean area (Dorgham *et al*., 2014), mainly along the Alexandria coast (e.g. Abd El-Naby, 1999; Hamdy, 2008; El Komi, 2011a, b; 2012 a, b; El Gendy *et al*., 2012; Dorgham *et al*., 2013; Dorgham and Hamdy, 2015).

The present study traces the spatial and temporal variation in the structure and numerical abundance of the polychaete community in shallow intertidal zone of the Alexandria coast. It also highlights the changes in the abundance and distribution of polychaete assemblages relative to the fundamental changes in the environmental characteristics Alexandria shore area.

MATERIALS AND METHODS

The polychaete community was studied at four ecologically different sites along Alexandria coast, namely, Abu Qir (AQ) at the east, Gleem (GL), El Kashafa (EK) and El-Mex (MX) at the west (Fig. 1). Abu Qir represents an area under the effect of strong waves dominated by sandy bottom intermitted by with large natural rocky patches. Gleem has sandy bottom with beach protected by aggregation of large number of scattered rocky pieces and surrounded by high cement wall El Kashafa is approximately similar to Gleem in the nature of bottom and the occurrence of rocky pieces, but it could be considered as a sheltered area inside the Eastern Harbour. Also, El-Mex is approximately similar to Abu Qir, but it has a large rocky area higher than the sea surface and surrounded by sandy bottom. This rock is permanently exposed to the wave effect, particularly during autumn and winter. In addition, this area is strongly stressed by a mixture of discharged agricultural, industrial, and sewage wastes from Lake Mariut.

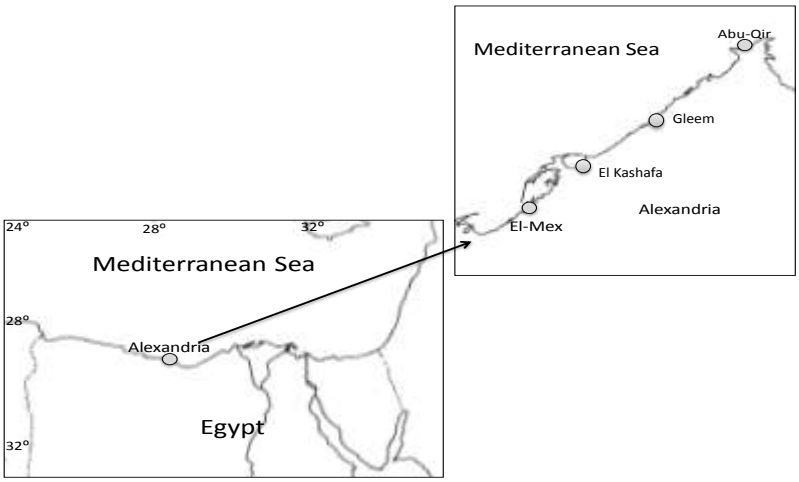

Fig. 1: Alexandria Coast including the sampling sites.

Sampling

The benthic communities were collected monthly from hard substrates within the depth range of 0.5-1m during the period from October 2014 to October 2015. Three random replicates of benthic biota inside a metallic quadrate with an area of 0.1 m^2 were removed at each sampling site, and transferred into plastic bags containing a few drops of neutralized formalin. Polychaetes were separated,

preserved in 10% formalin solution, identified and counted. The identification of polychaetes was carried out following Fauvel (1923, 1927), Day (1967), Ben-Eliahu (1972, 1975a,b, 1976a,b,c, 1977a,b), Fauchald (1977), Amoureux *et al.* (1978), Appy *et al.* (1980), Çinar & Ergen (2003) and Çinar *et al.* (2003). The collected specimens of all the newly recorded species were deposited at the Laboratory of Marine Biology, Oceanography Department, Faculty of Science, Alexandria University, Egypt.

RESULTS

The present study identified 56 polychaete species, belonging to 19 families, with the dominance of family Syllidae, forming 28.5% of the total number of polychaete species in the study area (Table 1) The species composition of the polychaete community displayed little differences throughout the study area, whereas 37 species were found at AQ, 31 species at GL, 30 species at EK and 35 species at MX. However, the number of species displayed wide monthly variation at the sampling sites fluctuating between 5-22 at AQ, 5-19 at GL, 5-17 at EK, and 5-21 at MX. As shown in Figure 2A**,** the number of species at AQ was the highest in December and January (15 and 22), and less so in April (16), but it was low during the rest of the year (8 -12). At Gleem, the number of species was high from December to April (13 – 19) and during July August (11 and 17), while low number of species (5 – 8) occurred from September to November and in June (Fig. 2B). The number of species at EK was low most of the year (5-10), except the comparatively high number (13 -17) in February, March and July (Fig. 2C). El-Mex community comprised the highest number of species (14 -21) during intermittent months (November, December, February, April, and August), while during the rest of the year the number of species was lower than 10 (Fig. 2D).

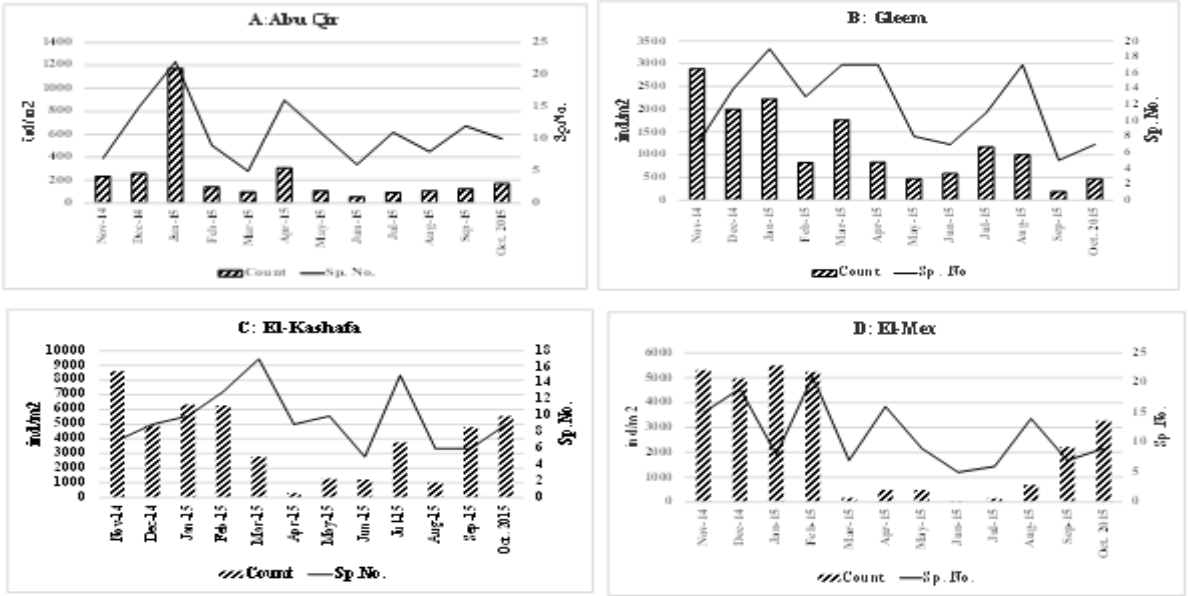

Fig. 2: Monthly individual count and species number of polychaetes at the sampling sites along the Alexandria coast.

The individuals count experienced wide spatial and temporal fluctuation throughout the study area. Abu Qir site hosted the lowest count (233±305 ind/m^2), as compared to GL (1198 ±833 ind/m^2), EK (3901±2597 ind/m^2), and MX (2381±2319

ind/m^2. The main bulk of the polychaetes count was attributed to a few species. This pattern caused different relationship between the number of polychaete species and their total count at the sampling sites. For example, significant correlation was observed at AQ ($p < 0.05$, $r = 0.8103$) and at MX ($p < 0.1$, $r = 0.534$), while no correlation was observed between the two parameters at both GL and EK. The monthly abundance of polychaetes displayed different patterns throughout the study area. At AQ, the polychaetes displayed one distinguished peak in January (1173 ind/m2), as compared to pronouncedly low values (50 – 257 ind/m^2) over the year (Fig. 2b). At GL, the highest count was recorded from November to January, followed by two other high counts with lower value in March and in July and August (Fig. 2b). The serpulid *Spirobranchus triqueter* appeared the main constituent of polychaete population, forming 70.5% of the total count. Other species played relatively active roles in the plychaet count, like the nereidid *Pseudonereis anomala* (9.1%), the syllids *Syllis schulzi* (8.2%), *Syllis prolifera* (2.4%) and *Syllis variegata* (2.3%). However, these species displayed considerably variable contribution among the sampling sites. For example, *S. triqueter* formed 90.6% at EK, 64.6% at MX, 30.5 % at GL, and displayed very small role at AQ (1.3%). *Pseudonereis anomala* had comparatively higher contribution (27.7% and 20.1%) at GL and EK respectively, than at AQ and MX (7% and 11.3% respectively). Moreover, *S. schulzi* revealed its highest contribution (21.4%) at GL, against 12.9% at AQ, 9.3% at MX and 3.2% at EK. In addition, some species displayed active contribution at certain sites, like *Salvatoria limbata* (14.7%), *Chrysopetalum debile* (10.5%), and *Branchiosyllis exilis* (9.3%) at AQ, beside *S. prolifera* (6.3%) at MX.

The frequency of occurrence of the recorded species (Table 1) revealed that *P. anomala* and *S. schulzi* were persistent (occurred 12 months) over the whole area of study, *S. triquater* and *S. variegata* were persistent at GL and EK and semi-persistent (occurred 6-8 months) at AQ and MX.

Table 1: Numerical abundance of polychaete species (ind/m^2) along the Alexandria Coast (AQ= Abu Qir, GL = Gleem, K = El-Kashafa, MX= Mex; Ct= count: ind/m^2, Fr. = frequency in months).

Species	AQ		GL		K		MX	
	Ct	**Fr.**	**Ct**	**Fr.**	**Ct**	**Fr.**	**Ct**	**Fr.**
Amphinomidae								
Eurythoe complanata (Pallas, 1766)	54	4	17	3	0	0	0	0
Linopherus canariensis Langerhans, 1881	52	5	100	5	3	1	3	1
Pareurythoe cf. *borealis (M. Sars, 1862)*	0	0	0	0	7	2	0	0
Dorvilleidae								
Schistomeringos rudolphi (Delle Chiaje, 1828)	9	1	17	2	0	0	7	3
Lumbrineridae								
Lumbrineris coccinea (Renier, 1804)	1	1	0	0	0	0	3	1
Eunicidae								
Eunice vittata (Delle Chiaje, 1828)	2	2	0	0	0	0	0	0
Leodice antennata Savigny in Lamarck, 1818	2	2	3	2	0	0	0	0
Palola siciliensis (Grube, 1840)	0	0	7	2	0	0	0	0
Lysidice unicornis (Grube, 1840)	7	3	0	0	0	0	0	0
Oenonidae								
Arabella iricolor (Montagu, 1804)	0	0	0	0	0	0	7	2
Chrysopetallidae								
Chrysopetalum debile (Grube, 1855)	182	9	43	8	0	0	0	0
Hesionidae								
Oxydromus agilis (Ehlers, 1864)	4	1	0	0	0	0	0	0
Oxydromus pallidus Claparède, 1864	10	6	33	2	10	4	3	3
Neogyptis cf. *mediterranea* (Pleijel, 1993)	0	0	0	0	0	0	3	1

Table 1: continued.

Species	AQ		GL		K		MX	
	Ct	Fr.	Ct	Fr.		Ct	Fr.	Ct
Nereididae								
Ceratonereis (Composetia) costae (Grube, 1840)	4	1	7	2	3	1	0	0
Nereis splendida Grube, 1840	65	2	27	6	17	5	66	7
Perinereis cultrifera (Grube, 1840)	0	0	7	1	0	0	23	3
Platynereis insolita Gravier, 1899	24	4	0	0	0	0	0	0
Pseudonereis anomala Gravier, 1899	71	9	870	10	0	8	930	10
Phyllodocidae								
Nereiphylla rubiginosa (Saint-Joseph, 1888)	0	0	0	0	3	2	0	0
Spionidae								
Dipolydora armata (Langerhans, 1880)	0	0	17	1	0	0	7	2
Dipolydora coeca (Örsted, 1843)	1	0	*7*	1	10	3	13	4
Polydora ciliata (Johnston, 1838)	0	0	7	1	3	1	30	5
Syllidae								
Branchiosyllis exilis (Gravier, 1900)	56	7	213	9	30	3	0	0
Brania pusilla (Dujardin, 1851)	1	1	0	0	3	1	20	2
Exogone verugera (Claparède, 1868)	9	2	0	0	0	0	3	1
Salvatoria clavata (Claparède, 1863)	0	0	0	0	3	2	0	0
Salvatoria limbata (Claparède, 1868)	129	2	0	0	0	0	0	0
Odontosyllis fulgurans (Audouin & Milne Edwards, 1833)	1	1	0	0	0	0	0	0
Opisthosyllis brunnea Langerhans, 1879	3	3	0	0	0	0	13	2
Syllis armillaris (O.F. Müller, 1776)	1	1	0	0	0	0	0	0
Syllis gracilis Grube, 1840	15	6	53	3	37	5	264	6
Syllis hyalina Grube, 1863	1	1	3	1	10	4	17	2
Syllis gerlachi (Hartmann-Schröder, 1960)	0	0	0	0	0	0	7	2
Syllis prolifera Krohn, 1852	1	1	143	6	70	2	893	6
Syllis pulvinata (Langerhans, 1881)	9	6	73	5	77	5	7	1
Syllis schulzi (Hartmann-Schröder, 1960)	12	12	1113	10	607	10	1037	9
Syllis variegata Grube, 1860	25	8	310	7	303	9	114	6
Trypanosyllis zebra (Grube, 1860)	0	0	0	0	13	1	10	2
Serpulidae								
Hydroides dianthus (Verrill, 1873)	0	0	20	2	7	1	21	5
Hydroides elegans (Haswell, 1883)	0	0	73	2	23	5	150	7
Serpula concharum Langerhans, 1880	0	0	177	3	10	1	34	5
Spirobranchus triqueter (Linnaeus, 1758)	14	6	2340	10	8220	10	4987	7
Cirratulidae								
Caulleriella bioculata (Keferstein, 1862)	0	0	0	0	7	1	0	1
Cirriformia filigera (Delle Chiaje, 1828)	0	0	27	2	17	3	310	9
Dodecaceria concharum Örsted, 1843	28	1	23	5	13	4	37	2
Kirkegaardia annulosa (Hartman, 1965)	0	0	0	0	0	0	13	3
Terebellidae								
Loimia medusa (Savigny, 1822)	1	1	37	2	347	5	0	0
Saccocirridae								
Saccocirrus papillocercus Bobretzky, 1872	0	0	67	2	0	0	7	1
Arenicolidae								
Branchiomaldane vincenti Langerhans, 1881	39	2	0	0	7	2	3	1
Capitellidae								
Capitella capitata (Fabricius, 1780)	20	6	0	0	7	2	140	5
Capitella cf. *minima* Langerhans, 1880	1	1	0	0	0	0	0	0
Notomastus profundus (Eisig, 1887)	1	1	17	2	0	0	0	0
Opheliidae								
Polyophthalmus pictus (Dujardin, 1839)	6	2	53	6	3	1	13	1
Orbiniidae								
Naineris laevigata (Grube, 1855)	9	4	30	5	7	2	3	1

Furthermore, *Nereis splendida* rarely appeared at AQ and was semi-persistent at the other three sites, while *Syllis pulvinata* was semi-persistent at AQ, GL and EK, but rarely occurred at MX, *Syllis gracilis* occurred as semipersistent at most sites, and rarely at GL. Some species appeared to be semi-persistent at one site only, like *Oxydromus pallidus* at AQ, *Dodecaceria concharum, Nianereis laevigata* and *Polyophthalmus pictus* at GL, *Lomia medusa* at EK, *Polydora ciliata, Cirriformia filigera, Hydroides dianthus* and *Serpula concharum* at MX, or at two sites such as *Capitella capitata* at AQ and MX, *Hydroides elegans* at EK and MX, *S. prolifera* at GL and MX, *Linopherus canariensis, C. debile* and *B. exilis* at AQ and GL.

On the other hand, 7 alien species were recorded during the present study, namely *Eunice antennata* (Indo/Pacific) *Eurythoe complanata (*Atlantic/Pacific), *H. elegans* (Circumtropical), *H. dianthus* (NW Atlantic), *L. medusa* (Cosmopolitan), *P. anomala* (Indo-Pacific), *S. Schulzi* (Indian/Red Sea).

DISCUSSION

Spatial and temporal distribution of benthic marine assemblages in shallow habitats, are strongly affected by the interaction between abiotic and biotic factors, as these habitats experience wide fluctuations of environmental characteristics, like temperature, salinity, wave action, etc. (Witman and Dayton 2001). The continuous spatiotemporal variation in polychaete assemblages along the Alexandria coast appeared to be characteristic feature, especially during the past two decades, since the Alexandria coast was exposed to fundamental changes, including modification of sewer system of the Alexandria City, widening of the coastal road, frequent filling processes of the beaches, dumping of great amount of concrete blocks along the shore and inside the sea water for protection.

The present study recorded four polychaete species for the first time, which could be considered as new to the Egyptian Mediterranean Coast. These species were *Kirkegaardia annulosua, Dipolydora armata, Neogyptis* cf. *mediterranea*, and *Notomastus profundus*. These species are known as Atlantic and/or Mediterranean species (Fauchald, 2007), and it is expected that the occurrence of such species in the study area may indicates their transference through ships ballast waters or by the current regime in the Mediterranean. In addition, *Dipolydora armata* is also widespread in tropical and subtropical regions (Fauchald, 2007).

The number of polychaete species recorded during the present study (56 species) was markedly lower than those found earlier along the Alexandria coast, particularly during the past three decades. Fauvel (1937). For example, Abd El-Naby (2005) identified 114 species in 1990-2001, while Hamdy (2008) found only 73 species in 2005-2006. During the past three decades the topography of the Alexandria shore area was exposed to fundamental changes due to the widening of the coastal road and dumping of thousands of concretes along the shore and inside the sea for protection. In addition, the modification of sewer system of Alexandria City and stopping waste discharge caused pronounced changes in the environmental condition of the study area.

The present study recorded 19 families along the Alexandria coast, indicating the the highest diversity of family Syllidae (16 species) and markedly low diversity of other families (1-4 species each). These observations appeared different from those of Dorgham *et al.* (2014), who recorded 23 families, with 22 species of Syllidae (22 species), and higher number of representatives for other families, like, Nereididae (9 species), Serpulidae (6 species), and Eunicidae (5 species). The high diversity of

Syllidae seems to be common in the Mediterranean Sea (San Martín, 2003; Arvanitidis *et al.*, 2002; Musco, 2012).

However, at the stressed site (MX), most Syllids sustained low species richness and poor populations, particularly when compared to those recorded earlier by Dorgham *et al.* (2014) at the same site. These differences could be attributed to the variation in physico-chemical parameters at El-Mex, as these factors directly affect the composition of the sessile macrobenthos forming the polychaete habitat (Giangrande, 1990). In the meantime, the high counts of the syllids *S. prolifera*, *S. schulzi*, *S. gracilis*, and *S. variegata* at El-Mex indicated their tolerance to variable environmental conditions. This is supported by several studies that reported Syllidae species as remark of stressed environments (e.g. Musco *et al.*, 2004; Giangrande *et al.*, 2005; Serrano *et al.*, 2006).

In addition to the previously mentioned changes in the coast of Alexandria, the abundance and species composition of polychaetes on the hard bottom was largely affected by the density and species composition of algal cover at the sampling sites (Dorgham *et al.*, 2014), whereas the differences in polychaete abundance and diversity along the coast of Alexandria were associated with the variation in the area and species composition of the algal cover at the different sampling site (Hamdy *et al.*, 2018).

The numerical abundance of polychaetes showed wide temporal and spatial variation along the Alexandria coast. The differences in monthly pattern seems to be affected by other environmental factors rather than the temperature as the temporal changes in temperature showed no pronounced variation between the sampling sites. On the other hand, the spatial differences could be explained according to the clear differences in the environmental characteristics at each sites. For example, the two eutrophic sites, EK and MX hosted the highest polychaete count, while the less stressed sites sustained pronouncedly low count. However, MX harbboured lower count than EK, mainly due to the continuous variable salinity and water quality.

As compared to the last record, polycahete abundance dropped from an average of 5525 ind/m^2 during 2005-2006 (Hamdy, 2008) to 1919 ind/m^2 during the present study. This drop was due to the marked decrease in the abundance of several dominant species during the past decade, like *C. capitata*, *Dipolydora cacea*, *S. schulzi*, *S. pulvinata*, *Syllis hyalina*, *S. gracilis*, *Opisthosyllis brunmea*, *N. laevigata*, *P. anomala*, *Platynereis insolita*, *N. splendida*, *L. canariensis*, and the complete disappearance of other species such as *C. cirratus*, *Spirobranchus tetraceros*, *S. pirifera*, *S. clavata*. On the other hand, the pollution indicator serpulid species, *S. triqueter*, showed abnormal high abundance prevailing all other polychates along the Alexandria coast during the present study. Increasing abundance of such filter feeder species is indicative of a habitat with high level of organic input (Arvanitidis *et al.*, 1999).

The comparison with the last study (Hamdy, 2008) revealed the disappearance of several polychaete species and the appearance of other species along the Alexandria coast during the past two decades (Table 2). Also, several families were missed during the present study, such as Polynoidae, Sabellidae, Sabellariidae, and Protodrilidae. In addition, the most assemblages of the families Phyllodocidae and Hesionidae were not recorded during the present study.

According to the present study, 15 species could be accounted as persistent and endemic to the Alexandria coast (Table 3) since Fauvel (1937). Other species appeared after Fauvel (1937) and still existing in the area (Table 4), some species

occurred on the Alexandria coast for long time and disappeared during the present study (Table 5).

Table 2: Main Change in polychaete community during the past decade.

Species disappeared during the present study	Species recorded during the present study
Alitta succinea (Leuckart, 1847)	*Syllis armillaris* (O.F. Müller, 1776)
Nereis zonata Malmgren, 1867	*Leodice antennata* Savigny in Lamarck, 1818
Neanthes acuminata (Ehlers, 1868)	*Pareurythoe* cf. *borealis* (M. Sars, 1862)
Namanereis pontica (Bobretzky, 1872)	*Oxydromus agilis* (Ehlers, 1864)
Brania arminii (Langerhans, 1881)	*Neogyptis* cf. *mediterranea* (Pleijel, 1993)
Exogone dispar (Webster, 1879)	*Capitella minima* Langerhans, 1880
Haplosyllis spongicola (Grube, 1855)	*Notomastus profondus* (Eisig, 1887)
Myrianida prolifera (O.F. Müller, 1788)	*Caulleriella bioculata* (Keferstein, 1862)
Sphaerosyllis hystrix Claparède, 1863	*Cirriformia filigera* (Delle Chiaje, 1828)
Sphaerosyllis pirifera Claparède, 1868	*Kirkegaardia annulosa* (Hartman, 1965)
Syllides fulvus (Marion & Bobretzky, 1875)	*Dipolydora armata* (Langerhans, 1880)
Leodice miurai (Carrera-Parra & Salazar-Vallejo, 1998)	*Polydora ciliata* (Johnston, 1838)
Marphysa sanguinea (Montagu, 1813)	
Phyllodoce cf. *longifrons* Ben-Eliahu, 1972	
Eulalia viridis (Linnaeus, 1767)	
Eumida sanguinea (Örsted, 1843)	
Lepidonotus clava (Montagu, 1808)	
Syllidia armata Quatrefages, 1866	
Microphthalmus sczelkowii Metschnikow, 1865	
Microphthalmus aberrans (Webster & Benedict, 1887)	
Dasybranchus caducus (Grube, 1846)	
Heteromastus filiformis (Claparède, 1864)	
Cirratulus cirratus (O. F. Müller, 1776)	
Sabellaria spinulosa (Leuckart, 1849)	
Amphiglena mediterranea (Leydig, 1851)	
Vermiliopsis infundibulum (Philippi, 1844)	
Spirobranchus tetraceros (Schmarda, 1861)	
Protodrilus sp.	
Scoletoma impatiens (Claparède, 1868)	

Table 3: Persistent polychaete species on the Alexandria coast since Fauvel 1937.

Species	Species
Arabella iricolor (Montagu, 1804)	*Perinereis cultrifera* (Grube, 1840)
Capitella capitata (Fabricius, 1780)	*Platynereis insolita* Gravier, 1899
Ceratonereis (Composetia) costae (Grube, 1840)	*Pseudonereis anomala* Gravier, 1899
Dodecaceria concharum Örsted, 1843	*Syllis gracilis* Grube, 1840
Lumbrineris coccinea (Renier, 1804)	*Syllis hyalina* Grube, 1863
Naineris laevigata (Grube, 1855)	*Syllis prolifera* Krohn, 1852
Nereis splendida Grube, 1840	*Syllis variegata* Grube, 1860
Palola siciliensis (Grube, 1840)	

Table 4: Persistent polychaete species on the Alexandria coast recorded after Fauvel 1937.

Species	Species
Boccardia polybranchia (Haswell, 1885)	*Hydroides dianthus* (Verrill, 1873)
Branchiomaldane vincenti Langerhans, 1881	*Hydroides elegans* (Haswell, 1883)
Branchiosyllis exilis (Gravier, 1900)	*Linopherus acarunculatus* (Monro, 1937)
Brania pusilla (Dujardin, 1851)	*Dipolydora coeca* (Örsted, 1843)
Chrysopetalum debile (Grube, 1855)	*Schistomeringos rudolphi* (Delle Chiaje, 1828)
Exogone verugera (Claparède, 1868)	

Table 5: Persistent polychaete species on the Alexandria coast missed during the present study.

Species	Species
Alitta succinea (Leuckart, 1847)	*Lepidonotus clava* (Montagu, 1808)
Marphysa sanguinea (Montagu, 1813)	*Sabellaria spinulosa* (Leuckart, 1849)
Eumida sanguinea (Örsted, 1843)	*Sphaerosyllis hystrix* Claparède, 1863
Vermiliopsis infundibulum (Philippi, 1844)	*Sphaerosyllis pirifera* Claparède, 1868

As a general conclusion, it seems that during the two past decades, polychaetes has been subjected to fundamental changes in species composition, numerical abundance, and pattern of dominance. Several families and species disappeared from the coast, while other species were recorded for the first time. These changes are due to the engineering processes of the coastal road, variations in the topography of the coast line and modification of the sewer system of Alexandria City.

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ARABIC SUMMARY

التغييرات الحديثة فى مجتمعات الديدان عديدة الأشواك على ساحل الأسكندرية، مصر.

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تناول هذا البحث دراسة ديناميكية مجتمع الديدان عديدة الأشواك شهريا على ساحل الأسكندرية خلال الفترة من أكتوبر ٢٠١٤ إلى أكتوبر ٢٠١٥. وقد أظهرت النتائج وجود ٥٦ نوعا من هذه الديدان، بما في ذلك أربعة أنواع سجلت لأول مرة في منطقة الدراسة وهي
Kirkegaardia annulosua, *Dipolydora armata, Notomastus profundus, Neogyptis* cf *. mediterranea*.

أوضح البحث ان الأنواع المسجلة تنتمي إلى ٤٢ جنسا و ١٩ عائلة مع هيمنة عائلة سيليدي، وأن الكثافة العددية للديدان تباينت بدرجة كبيرة على المستوى المكانى والمستوى الزمانى، حيث كان تراوح عند مواقع جمع العينات بين حد أدنى قيمته ٢٣٣ ± ٣٠٥ فردا للمتر المربع وحد أقصى ٣٩٠١ ± ٢٥٩٧ فردا للمتر المربع، وقد تبين أن عددا قليلا من الأنواع هو المسؤول عن الكثرة العددية للديدان.

وبالمقارنة مع الدراسات السابقة، كشفت الدراسة الحالية انخفاض واضح في ثراء الأنواع مع انخفاض واضح في الكثافة العددية للديدان متعددة الأشواك على الساحل الإسكندرية، ويرجع ذلك أساسا إلى انخفاض ملحوظ في وفرة الأنواع السائدة العديد من العقدين الماضيين.

ويمكن أن تعزى التغييرات فى مجتمع الديدان عديدة الأشواك إلى العمليات الهندسية التى أجريت لتوسيع كورنيش الأسكندرية خلال العقدين الماضيين والتى أدت إلى تغيير كبير فى تضاريس خط الساحل وكذلك تعديل نظام الصرف الصحي لمدينة الإسكندرية.