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A Seasonal Study of the Surface Phytoplankton of the Red Sea North of Jeddah

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ABSTRACT. A total of 124 species of the phytoplankton belonging to 37 genera were recorded in Obhur Creek region, north Jeddah during 1982. Diatoms were the most numerous. Nine species of diatoms and four species of dinoflagellate were new records for the area. As temperature rose during Spring and Summer, it was observed that the number of the dinoflagellate species increased noticeably, while the number of the diatoms species decreased. Furthermore, a decline in the standing crop of the phytoplankton was noticed. Autumn represents the more favourable season for phytoplankton growth.

An obvious increase in the number of the phytoplankton species around the year was noted seaward off Obhur Creek.

The Red Sea occupies an exceptional position among marine basins. It is a land locked semi-enclosed water body, located in an arid zone, thus creating unusual hydrographic conditions.

Knowledge of the Red Sea phytoplankton is still scanty, particularly in the shallow neritic zone. A few scattered observations, based on a limited number of net samples were made by Ostenfeld and Schmidt (1901), Schröder (1906) and Matzenauer (1933).

More recently, Halim (1969) reported 84 diatom and 125 dinoflagellate species, mostly in the open water of the Red Sea. About 220 phytoplankton species were recorded in the neritic water of Jeddah by Dowidar *et al.* (1978). Khalil *et al.* (1984) recorded 73 diatom and 27 dinoflagellate species in the region of south Jeddah. Meanwhile, Dorgham and Khalil (1984) noticed 70 species of diatoms associated with the brown alga *Cystoseira myrica* in the coastal water of Jeddah.

The present study deals with the seasonal variations of the species composition, distribution and standing crop of the phytoplankton (diatoms and dinof-

lagellates), during the period of February - November 1982, at the region of Obhur, north Jeddah, Red Sea (Saudi Arabia).

Materials and Methods

The study area (Obhur Creek), is located at about 35 km north of Jeddah center, between 21°42′ and 21°47′N, and 39°04′ and 39°09′E (Fig. 1). It is a narrow winding creek, connected to the Red Sea and extending for a distance of about 9 km eastward. It has an average width of half a kilometer and reaches a maximum depth of 50 m (Behairy *et al.* 1983).

A total of 72 qualitative and quantitative phytoplankton samples were collected seasonally during February, May, August and November 1982 from three stations; Station I is located in the Red Sea proper at 4 km offshore, Station II lies at the entrance of the Creek and Station III is in the middle of the Creek (Fig. 1). Surface water temperature at each station was measured at the times the phytoplankton samples were collected. Phytoplankton samples (5 quantitative and one horizontal haul) were taken at each station as follows:

a) *Quantitative samples:* 5 litres of water samples taken at a depth of 50 cm below the surface. All samples were preserved in 4% neutralized formalin and concentrated to a 100 ml volume by the sedimentation method (Utermöhl 1936). The standing crop is expressed in cells/litre (c/l).

b) Horizontal phytoplankton net No. 25 (55 μm) was used simultaneously to collect surface phytoplankton samples for the qualitative assessment of the species composition. All phytoplankton samples were preserved in 4% neutralized formalin.

Identifications were made *via* the works of Brandt and Apstein (1908), Jörgensen (1911), Hustedt (1930), Cupp (1943), Wood (1963a,b), Hendey (1964), Sournia (1967 and 1968) and Simonsen (1974).

Results and Discussion

A total of 124 phytoplankton taxa were recorded during the period of the study. The majority was diatoms; the dinoflagellates were less in number (Table 1). Most of the species of the phytoplankton were temperate and tropical forms; some were Indo-Pacific forms.

Nine species of diatoms (*Asteromphalus heptactis, Chaetoceros diversus, Coscinodiscus granii, Ditylum brightwellii, Hemiaulus hauckii, Lauderia borealis,*

Licmophora lyngbyei, *Nitzschia socialis* and *Rhizosolenia alata f. indica*) and four species of dinoflagellates (*Amphisolenia globifera*, *Ceratium carriense f. volans*, *Ceratium tetrastichon* and *Peridinium punctulatum*) were new records to the area.

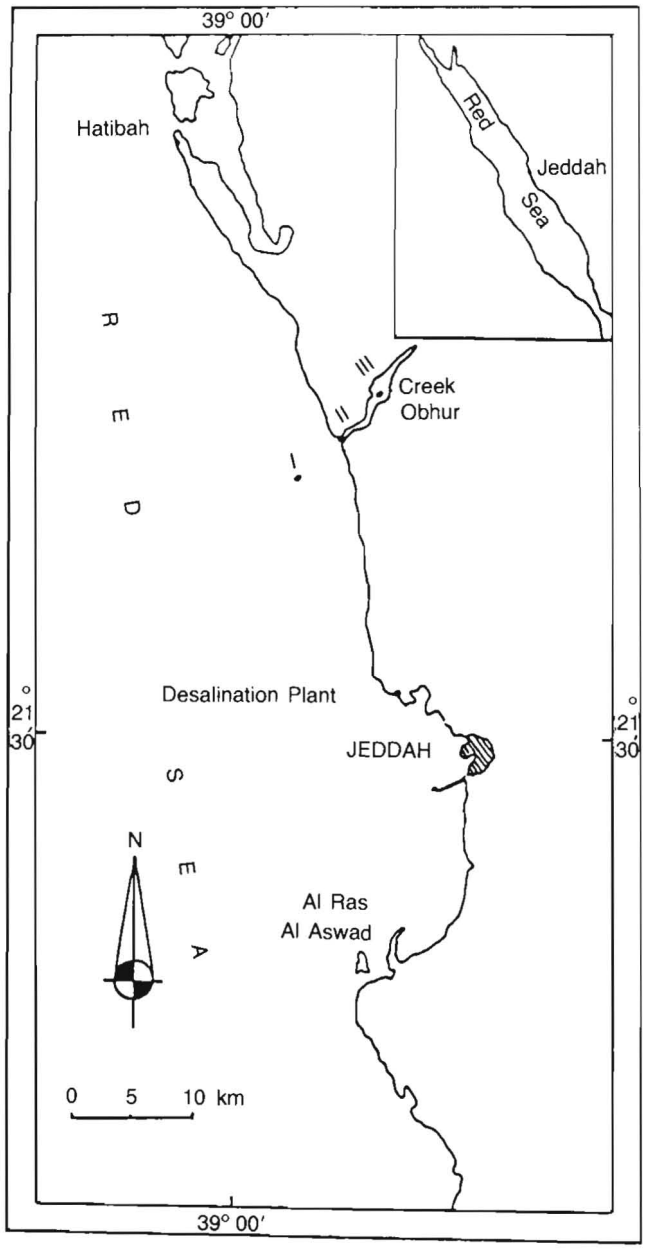

Fig. 1. Map of Jeddah coast (Red Sea) showing the sites of phytoplankton collection.

Table I. Seasonal distribution of the phytoplankton species in the region of North Jeddah (Obhur Creek)

W=winter; Sp=spring; Su=summer; A=autumn; Aff.=affinity; C=cosmopolitan; I=Indopacific; P=temperate; T=tropical; c=common; f=frequent; l=less frequent; r=rare; −=absent ∗=new records

Species / Seasons (1982)	Stations												Aff.
	I				II				III				
	W	Sp	Su	A	W	Sp	Su	A	W	Sp	Su	A	
A) Diatoms													
Actinopytchus undulatus (Bail.) Ralfs	−	l	f	f	−	−	f	f	−	−	l	−	C
Asterionella japonica Cleve	c	f	f	c	c	−	f	c	c	−	−	c	C
Asteromphalus heptactis (Bréb.) Ralfs	r	r	−	−	r	−	−	−	−	−	−	−	P
Bacteriastrum delicatulum Cleve	f	−	−	l	f	−	r	−	f	−	−	−	P
Bacteriastrum elongatum Cleve	r	−	−	−	−	−	−	−	−	−	−	−	T
Biddulphia aurita (Lyng.) Bréb.	−	−	−	r	−	−	−	−	−	−	−	−	C
Biddulphia pelagica Schröder	−	r	−	r	−	−	r	−	−	−	−	−	P
Biddulphia sinensis Greville	r	−	−	−	−	−	−	−	−	−	−	−	P
Cerataulina bergonii (Peragallo) Schütt	r	−	−	−	−	−	−	−	−	−	−	−	P
Chaetoceros affinis Lauder	−	l	f	f	−	−	f	f	−	−	−	l	C
Chaetoceros atlanticus Cleve	r	−	−	−	−	−	−	−	−	−	−	−	C
Chaetoceros brevis Schütt	−	−	r	r	−	−	−	r	−	−	−	−	P
Chaetoceros coarctatus Lauder	−	l	l	l	−	l	−	l	−	l	r	−	T
Chaetoceros compressus Lauder	l	−	l	f	−	l	−	l	r	−	−	−	C
Chaetoceros curvisetus Cleve	f	f	−	l	f	f	−	−	l	−	−	−	C
Chaetoceros dadayi Pavillard	r	−	−	r	r	−	−	−	−	−	−	−	T
Chaetoceros danicus Cleve	−	−	−	r	−	−	−	r	−	−	−	r	C
Chaetoceros decipiens Cleve	−	−	−	r	−	−	−	r	−	−	−	−	C
Chaetoceros densus Cleve	r	−	−	r	−	−	−	−	−	−	−	−	P

Table 1.–(continued)

Species	Seasons (1982)	Stations												Aff.
		I				II				III				
		W	Sp	Su	A	W	Sp	Su	A	W	Sp	Su	A	
Chaetoceros didymus Ehrenb.		–	–	–	r	–	–	–	–	–	–	–	–	C
Chaetoceros distans Cleve		r	–	–	l	–	–	–	r	–	–	–	–	P
**Chaetoceros diversus* Cleve		r	–	r	–	–	–	–	r	–	–	–	–	T
Chaetoceros lorenzianus Grun.		l	–	–	–	r	–	–	–	–	–	–	–	C
Chaetoceros messanensis Castracane		l	–	l	–	l	–	–	l	–	–	–	r	T
Chaetoceros pendulus Karsten		–	r	–	–	–	–	–	–	–	–	–	–	C
Chaetoceros peruvianus Brightwell		r	–	–	–	–	–	–	–	–	–	–	–	C
Chaetoceros pseudocurvisetus Mangin		–	–	–	l	–	–	–	r	–	–	–	–	T
Chaetoceros socialis Lauder		–	–	–	r	–	–	–	r	–	–	–	–	P
Chaetoceros tetrastichon Cleve		–	–	–	r	–	–	–	–	–	–	–	–	T
Chaetoceros tortissimus Gran		l	f	l	–	–	l	l	–	–	–	–	r	P
Climacodium frauenfeldianum Grun.		l	l	l	l	–	l	l	l	–	–	l	l	P
Coscinodiscus centralis Ehrenb.		–	f	f	–	–	f	l	–	–	l	–	–	C
Coscinodiscus concinnus Wm. Smith		l	–	–	r	l	–	–	–	r	–	–	–	P
Coscinodiscus excentricus Ehrenb.		–	–	f	f	–	–	f	f	–	–	f	l	C
Coscinodiscus gigas Ehrenb.		–	f	–	r	–	f	–	–	–	l	–	–	P

Table 1.–(continued)

Species	Seasons (1982)	Stations I W	I Sp	I Su	I A	II W	II Sp	II Su	II A	III W	III Sp	III Su	III A	Aff.
**Coscinodiscus granii* Gough		–	–	–	r	–	–	–	r	–	–	–	–	C
Coscinodiscus perforatus Ehrenb.		–	l	–	r	–	l	–	–	–	r	–	–	T
**Ditylum brightwellii* (West.) Grun.		–	–	–	r	–	–	–	r	–	–	–	–	P
Eucampia cornuta (Cleve) Grun.		r	–	–	–	–	–	–	–	–	–	–	–	T
Guinardia flaccida (Cast.) H. Peragallo		–	–	–	r	–	–	–	–	–	–	–	–	C
Gyrosigma balticum (Ehrenb.) Cleve		r	–	–	–	–	–	–	–	–	–	–	–	P
**Hemiaulus hauckii* Grun.		–	–	–	r	–	–	–	–	–	–	–	–	T
Hemiaulus membranaceus Cleve		–	r	r	–	–	–	–	–	–	–	–	–	P
**Lauderia borealis* Gran		r	–	–	–	r	–	–	–	–	–	–	–	P
Leptocylindrus danicus Cleve		–	l	l	l	l	–	–	–	–	–	r	–	C
**Licmophora lyngbyei* (Kütz.) Grun.		–	–	l	f	l	–	–	–	–	–	l	l	C
Navicula membranacea Cleve		–	–	–	r	–	–	–	r	–	–	–	r	P
Nitzschia closterium (Ehrenb.) Wm. Smith		f	–	l	–	l	–	–	r	l	–	–	–	C
Nitzschia longissima (Bréb.) Ralfs		–	l	f	f	–	–	f	f	–	–	f	f	C
Nitzschia pacifica Cupp		f	f	–	l	f	–	–	l	l	–	–	–	P
Nitzschia pungens Grun.		f	–	l	–	f	–	–	–	l	–	–	–	P
Nitzschia seriata Cleve		l	–	l	–	l	–	–	–	l	–	–	–	P
**Nitzschia socialis* Greg.		l	l	–	r	l	l	–	–	l	–	–	–	P
Planktoniella sol (Wallich) Schütt		r	–	–	r	–	–	–	r	–	–	–	–	T
Rhizosolenia alata f. *alata* Brightwell		–	f	f	f	–	f	f	l	–	f	f	–	C
**Rhizosolenia alata* f. *indica* Peragallo		l	r	–	–	r	–	–	–	r	–	–	–	T
Rhizosolenia bergonii H. Peragallo		f	–	l	f	f	–	–	l	–	–	–	l	P
Rhizosolenia calcaravis Schultze		f	f	–	l	f	l	–	–	–	l	–	–	T

Table 1.–(continued)

Species	Seasons (1982)	Stations I W	Sp	Su	A	II W	Sp	Su	A	III W	Sp	Su	A	Aff.
Rhizosolenia castracanei H. Peragallo		–	f	f	–	–	f	l	–	–	l	–	–	T
Rhizosolenia clevei Ostenfeld		–	r	–	–	–	–	–	–	–	–	–	–	I
Rhizosolenia cylindrus Cleve		r	–	–	r	–	–	–	r	–	–	–	–	P
Rhizosolenia delicatula Cleve		–	l	f	f	–	–	f	f	–	–	–	l	P
Rhizosolenia fragillissima Bergon		l	f	l	–	–	l	–	–	–	l	–	–	C
Rhizosolenia hebetata (Bail.) Gran		f	f	c	c	l	–	c	c	–	–	–	c	C
Rhizosolenia imbricata Brightwell		c	f	–	c	c	–	–	c	f	–	–	c	C
Rhizosolenia shrubsolei Cleve		f	l	–	–	l	–	–	–	l	–	–	–	P
Rhizosolenia stolterfothii H. Peragallo		–	f	l	l	–	l	–	–	–	l	–	–	C
Rhizosolenia styliformis Brightwell		–	l	–	l	–	–	–	l	–	–	–	–	C
Stephanopyxis turris (Grev.) Ralfs		r	–	–	–	–	–	–	–	–	–	–	–	P
Thalassionema nitzschioides Hustedt		r	–	–	–	–	–	–	–	–	–	–	–	C
Thalassiosira decipiens (Grun.) Jörg.		–	l	l	c	–	–	–	–	–	–	r	r	P
Thalassiothrix frauenfeldii Grun.		r	–	–	–	–	–	–	–	–	–	–	–	P
Thalassiothrix longissima Cleve & Grun.		f	f	c	c	f	–	c	c	–	–	c	c	T
B) Dinoflagellate														
Amphisolenia bidentata Schröder		–	l	f	f	–	–	f	l	–	–	f	l	P
**Amphisolenia globifera* Stein		r	–	–	l	–	–	–	r	–	–	–	–	P
Ceratium arietinum Cleve		–	l	–	f	–	–	l	f	–	–	–	f	P
Ceratium belone Cleve		r	–	–	–	r	–	–	–	–	–	–	–	T
Ceratium breve (Ost. & Schm.) Schröder		f	f	–	l	f	f	–	–	f	f	–	–	T
Ceratium candelabrum (Ehrenb.) Stein		r	–	–	r	–	–	–	–	–	–	–	–	P
Ceratium carriense Gourret		f	l	–	f	f	–	–	f	–	–	–	f	P

Table 1.–(continued)

Species	Seasons (1982)	Stations I W	Sp	Su	A	II W	Sp	Su	A	III W	Sp	Su	A	Aff.
**Ceratium carriense* f. *volans* (Cleve) Jörg.		–	–	l	l	–	–	–	l	–	–	–	r	P
Ceratium contortum (Gourret) Cleve		f	–	f	f	–	–	f	l	–	–	–	l	T
Ceratium contrarium (Gourret) Pavillard		c	f	f	l	f	l	–	–	f	–	–	–	P
Ceratium declinatum Karst.		f	l	l	l	f	–	l	l	–	–	–	–	P
Ceratium dens Ost. & Schm.		f	l	–	l	f	l	–	–	–	–	–	r	I
Ceratium extensum (Gourret) Cleve		f	–	f	f	–	–	f	f	–	–	l	–	P
Ceratium furca (Ehrenb.) Clap. & Lachm.		c	c	f	f	c	c	–	f	–	f	–	f	C
Ceratium fusus (Ehrenb.) Dujardin		c	c	f	f	c	c	–	f	c	f	–	–	C
Ceratium gibberum Gourret		r	–	–	–	–	–	–	–	–	–	–	–	P
Ceratium hexacanthum Gourret		–	–	–	r	–	–	–	r	–	–	–	r	P
Ceratium karstenii Pavillard		–	l	r	–	–	–	r	–	–	–	–	–	P
Ceratium kofoidii Jörg.		r	–	–	l	–	–	–	r	–	–	–	r	T
Ceratium lunula Schm.		r	–	–	r	–	r	–	–	–	r	–	–	T
Ceratium macroceros (Ehrenb.) Cleve		–	l	–	l	–	l	–	–	r	–	–	–	P
Ceratium massiliense (Gourret) Jörg.		f	f	f	f	–	f	f	l	–	l	–	l	P
Ceratium pentagonum Gourret		r	r	–	–	r	r	–	–	–	–	–	–	C
Ceratium ranipes Cleve		–	–	r	r	–	–	r	–	–	–	–	–	P
Ceratium reflexum Cleve		r	–	–	r	–	–	–	r	–	–	–	r	T
Ceratium schmidtii Jörg.		–	l	f	f	–	–	f	f	–	–	l	l	I
Ceratium teres Kofoid		c	c	f	l	c	f	f	–	c	f	–	–	P
**Ceratium tetrastichon* Cleve		–	–	r	r	–	–	–	r	–	–	–	–	P
Ceratium trichoceros (Ehrenb.) Kofoid		c	f	f	c	c	–	f	c	–	–	–	f	T
Ceratium tripos (Müller) Nitzsch		f	f	f	c	f	–	f	c	–	l	–	c	C

Table 1.—(continued)

Species / Seasons (1982)	Stations												Aff.
	I				II				III				
	W	Sp	Su	A	W	Sp	Su	A	W	Sp	Su	A	
Ceratium vultur Cleve	f	l	l	f	–	l	l	f	–	–	–	f	T
Ceratocorys horrida Stein	l	–	r	l	r	–	–	r	–	–	–	–	P
Dinophysis caudata Saville & Kent	–	–	l	l	–	–	l	l	–	l	–	–	P
Dinophysis hastata Stein	–	–	r	–	–	–	–	–	–	–	–	–	P
Dinophysis miles Cleve	l	f	l	l	l	l	–	–	–	l	–	–	I
Goniodoma polyedricum (Pouch.) Jörg.	f	–	l	f	f	–	l	–	l	–	–	–	P
Goniodoma sphaericum Murray & Whitting	–	r	r	–	–	r	–	–	–	r	–	–	P
Gonyaulax monacantha Pavillard	r	–	–	–	–	–	–	–	–	–	–	–	P
Gonyaulax polygramma Stein	l	l	l	l	l	l	–	–	l	–	–	–	P
Ornithocercus magnificus Stein	–	l	l	f	–	l	–	l	–	–	–	r	P
Ornithocercus quadratus Schütt	r	–	–	l	–	–	–	r	–	–	–	r	P
Peridinium conicum (Gran) Ost. & Schm.	–	–	r	–	–	–	–	–	–	–	–	–	C
Peridinium depressum Bailey	l	–	l	f	–	–	l	f	–	–	l	f	C
Peridinium oceanicum Vanhoffen	–	–	f	l	–	–	f	–	–	–	l	–	C
**Peridinium punctulatum* Paulsen	r	–	–	–	–	–	–	–	–	–	–	–	P
Prorocentrum compressa (Bail.) Osten.	f	l	l	l	f	–	l	–	l	–	–	–	C
Prorocentrum micans (Ehr.)	–	l	f	l	–	–	l	l	–	–	l	–	C
Pyrocystis fusiformis (Thompson) Murray	–	–	r	r	–	–	–	–	–	–	–	–	I
Pyrocystis lunula Schütt	l	l	–	l	l	l	–	–	l	–	–	–	C
Pyrocystis pseudonoctiluca (Thompson) Murray	l	l	l	l	l	l	l	–	–	–	l	r	I
Pyrophacus horologicum Stein	–	r	l	l	–	–	–	l	–	–	–	l	P

In the winter samples, the spatial distribution of the phytoplankton showed that the number of the species of diatoms recorded at the offshore location (St. I) was nearly twice that noticed at the entrance of the Creek (St. II), and about threefold that recorded at the inside of the Creek (St. III), (Fig. 2, winter). The number of the dinoflagellate species followed a more or less similar pattern of distribution as that of diatoms.

The number of the phytoplankton species recorded during winter was relatively higher than those observed in spring or in summer.

The following species were noticed only during winter:

a) *Diatoms: Bacteriastrum elongatum, Biddulphia sinensis, Cerataulina bergonii, Chaetoceros atlanticus, C. peruvianus, Eucampia cornuta, Gyrosigma balticum, Stephanopyxis turris, Thalassionema nitzschioides* and *Thalassiothrix frauenfeldii.*

b) *Dinoflagellates: Ceratium belone, C. gibberum, Gonyaulax monacantha* and *Peridinium punctulatum.*

The standing crop of the phytoplankton during winter varied from 1100 c/l (St. III) to 3500 c/l (St. I), with an average of 2110 c/l, (Fig. 4).

Lower values in the number of the phytoplankton species (Fig. 3) and the standing crop (Fig. 4) were observed in the spring and summer samples. A gradual increase in the number of dinoflagellate species was noticed in the area, accompanied by a marked diminution in the number of the diatom species (Fig. 2, spring and summer). The increase in the dinoflagellate species may affect the occurrence of the diatoms. The same phenomenon was observed at locations south of Jeddah, during March-May 1982 by Khalil *et al.* (1984); moreover, Halim (1969) indicated that the dinoflagellate species seem to thrive at the high temperatures of the Red Sea summer. The present data coincide with that finding. Concerning the surface water temperature of the study area, no great difference was noticed between the three localities. The lowest average value (22.5°C), occurred in February (winter), then gradually rose to an average (29.2°C) in May (spring), while the maximum average value (33.6°C) was observed in August (summer), thereafter the temperature declined to an average (26.3°C) in November (autumn).

The interaction of light and temperature is probably the most important of the environmental factors (Reynolds 1973). Accordingly, higher temperature of the surface water in the study area during summer, besides the day length (about 15 hr), may affect the phytoplankton growth and consequently the number of the species.

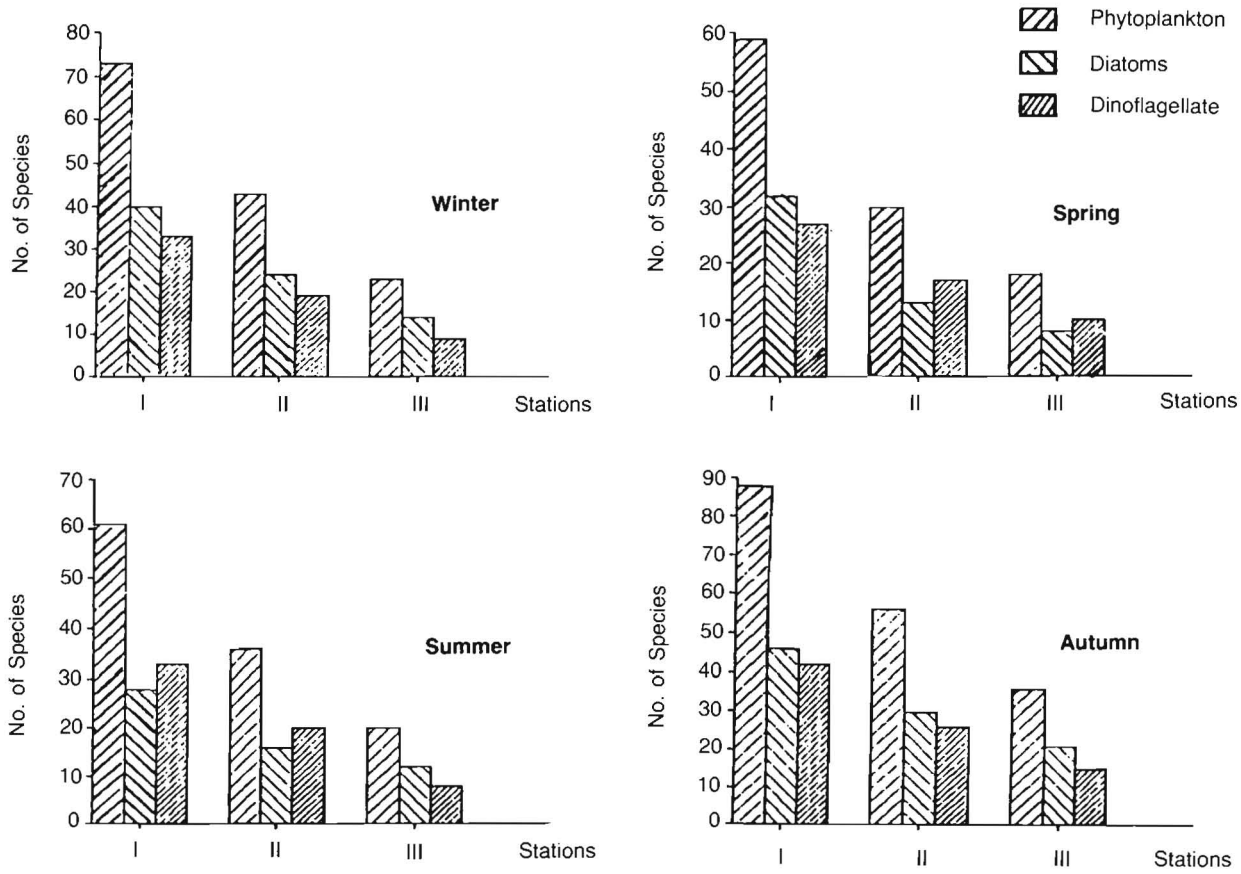

Fig. 2. Seasonal variations in number of phytoplankton (diatoms and dinoflagellate) species, during 1982, North Jeddah.

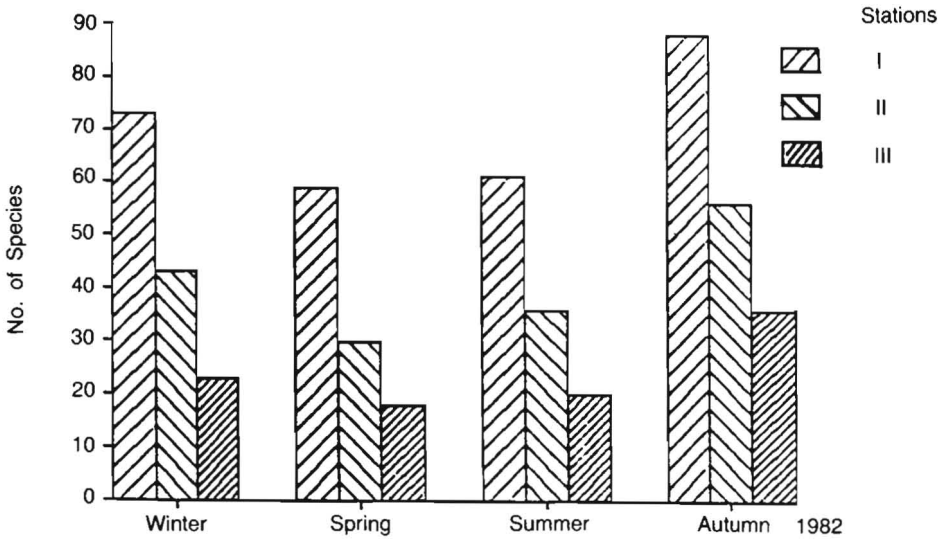

Fig. 3. Seasonal variations in number of phytoplankton species at offshore (I), entrance of Creek (II) and inside of Creek (III), North Jeddah.

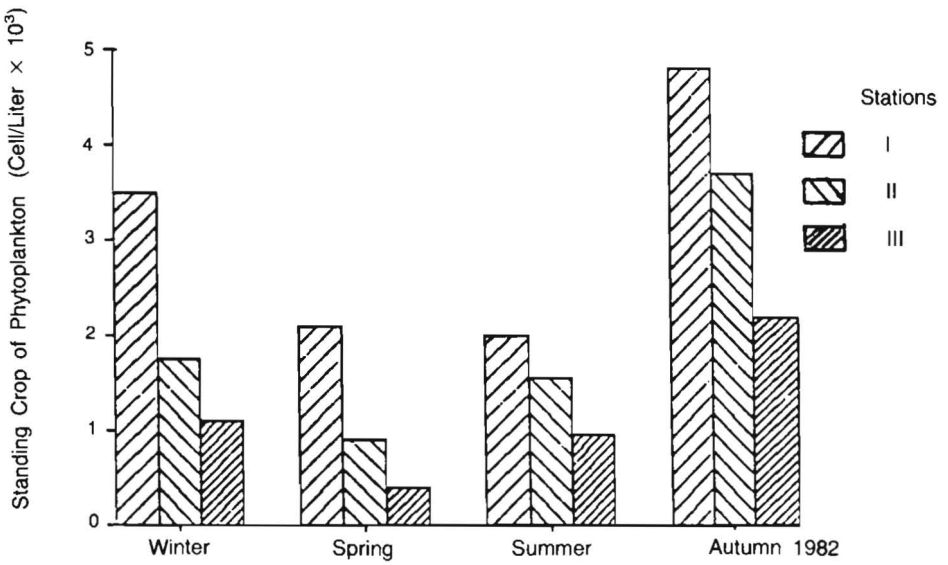

Fig. 4. Seasonal variations in the standing crop of phytoplankton (cells/liter), North Jeddah.

Furthermore, a marked diminution in the standing crop of the phytoplankton was observed during spring (Fig. 4), with an average of 1130 c/1. Later on, during summer, a slight increase in the standing crop was observed, with an average of 1500 c/1 (Fig. 4).

Only two species of the diatoms were restricted to the spring: *Chaetoceros pendulus* and *Rhizosolenia clevei;* whereas the following two species of the dinoflagellate were confined to the summer: *Dinophysis hastata* and *Peridinium conicum.*

During autumn, the recorded numbers of both diatoms species and dinoflagellate species were higher than those noticed in the other seasons (Fig. 2) and they constituted about 71% of the total recorded number of the phytoplankton species around the year.

The following species were recorded only in autumn:

a) *Diatoms: Biddulphia aurita, Chaetoceros danicus, C. decipiens, C. didymus, C. pseudocurvisetus, C. socialis, C. tetrastichon, Coscinodiscus granii, Ditylum brightwellii, Hemiaulus hauckii, Guinardia flaccida* and *Navicula membranacea.*

b) *Dinoflagellates: Ceratium hexacanthum.*

The standing crop of the phytoplankton, during autumn, attained more than twofold that of the summer value. It ranged from 2200 c/1 (St. III) to 4800 c/1 (St. I), with an average of 3570 c/1 (Fig. 4).

Morcos (1970) pointed out that the upward movement of deep water during summer in the northern part of the Red Sea on the arabian coast may partly affect the phytoplankton production. On the other hand, regarding the concentration of nitrate, which is an essential limiting major nutrient for phytoplankton growth, Ewins and Spencer (1967) and Saad and Fahmy (1984) indicated that the nitrate concentration, in the region of Jeddah coast, ranged from 0.07 µg at N/1 in May to 3.46 µg at N/1 in November.

The present data showed the same trend, where maximum values in the number of the phytoplankton species and the standing crop were observed in November (autumn), which may be attributed to an increase in nutrient salts, especially the concentration of nitrate. Consequently, the present data agreed with those given above by Morcos (1970) and Saad and Fahmy (1984). Moreover, the present data coincided with the findings of Halim (1969), that diatom species appear to be outstandingly high in number in the Red Sea during November.

Generally, a large number of the phytoplankton species recorded in the Obhur region are probably perennial. It is to be noted that the population of diatoms and dinoflagellates of the Obhur area is highly diversified. The population is mainly composed of cosmopolitan, tropical and sub-tropical forms; some are restricted to the Indo-Pacific tropical-equatorial belt.

The present floristic data indicate that the most dominant species are represented by neritic taxa.

An obvious increase in the number of the phytoplankton species around the year was remarked seaward off Obhur Creek.

According to Behairy *et al.* (1983), the surface water from Red Sea, entering into the Obhur Creek extends landward. Moreover, Sheikh (1981) revealed that the surface water near the Creek entrance is freely exchanged with the Red Sea water outside the Creek, compared with the water inside the Creek. Accordingly, the surface water inside the Creek is slowly exchanged with the Red Sea water reverting to that at the entrance, that may affect the replenishment of the nutrients in the surface water inside the Creek and, consequently, the phytoplankton growth. Therefore, it can explain the poor fertility inside the Creek.

Since different methods are often used for collecting and enumerating phytoplankton samples, direct comparisons of community parameters such as species diversity can only be approximate. However, the studies of Halim (1969) and Dowidar *et al.* (1978), shed some light on the phytoplankton species of the Red Sea, particularly in neritic waters. Compared with the work of Khalil *et al.* (1984), in which they recorded 73 species of the diatoms and 27 species of the dinoflagellates at three localities, south of Jeddah; the present data indicate that the region north of Jeddah is relatively richer in the number of phytoplankton species than that south of Jeddah.

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دراسة موسمية للعوالق النباتية السطحية بالبحر الأحمر شمال جدة

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تمت دراسة التغيرات الموسمية للتركيب النوعي، والتوزيع، والمحصول القائم للعوالق النباتية بالمياه السطحية بمنطقة أبحر، شمال جدة، وذلك خلال عام ١٩٨٢م. وتشير نتائج البحث إلى تسجيل ١٢٤ مصنفاً من العوالق النباتية معظمها من الدياتومات (diatoms) بينما تقل اعداد ثنائية السوط (dinoflagellate) ـ وقد بلغت الأنواع المسجلة لأول مرة بالمنطقة ٩ أنواع من الديوتامات بالإضافة إلى ٤ أنواع من ثنائية السوط.

وقد أبرزت النتائج أن الخريف هو أفضل فصول العام لإزدهار العوالق النباتية بمنطقة البحث يليه فصل الشتاء. كما تم تسجيل اعداد كثيرة من الأنواع التي قد اقتصر تواجدها على موسم واحد.

أهم الملاحظات التي توصلت إليها نتائج البحث هي أنه بارتفاع درجة حرارة المياه السطحية خلال فترتي الربيع والصيف ازدادت باطراد اعداد الأنواع ثنائية السوط مصحوبة بانخفاض واضح في أعداد أنواع الدياتومات.