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Variations in the surface and volume of three Diatoms along the Suez Canal

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The diatoms Rhizosolenia shrubsolei, R. calcar-avis and Guinardia flaccida were chosen to assess the variations in their surface and volume in relation to variations in temperature, salinity and water density. The samples were collected from Suez Bay, Bitter Lake and Port Said in winter and summer 1970. Conceiving the cell as a closed cylinder, the surface-A and the volume-V for 100 cells of each species from the 3 regions were calculated, based on the length and diameter of the cells.

For R. shrubsolei, the A as well as A/V ratio were higher in summer than in winter in Suez Bay and Bitter Lake. Such condition may be related to the decrease of the water density in summer in both regions (Table 1). Otherwise, Port Said population showed smaller A in summer than in winter, but its A/V was higher in summer (Table 1). This may be related to the lower salinity of Port Said and accordingly the A/V must be increased to keep the cell float.

For R. calcar-avis, the summer population of Suez Bay was not treated due to its rarity. Population of this species showed more or less different pattern from that of R. shrubsolei. In the Bitter Lake and Port Said, the summer A was lower than in winter (Table 1). However, the A/V for the two populations were higher in summer. This behaviour is contrary to that of R. shrubsolei and may indicate that the light requirement of R. calcar-avis is relatively high and it may proliferate in water of high temperature and high salinity. This may also is in agreement with the ecological affinity of this species as it is a tropical and subtropical species.

Region	Season	Temp.	Salinity	σt	R. shrubsolei A(mm^2) X 10^{-4}	R. shrubsolei V(mm^3) X 10^{-6}	R. shrubsolei A/V	R. calcar-avis A(mm^2) X 10^{-4}	R. calcar-avis V(mm^3) X 10^{-6}	R. calcar-avis A/V	Guinardia flaccida A(mm^2) X 10^{-4}	Guinardia flaccida V(mm^3) X 10^{-6}	Guinardia flaccida A/V
Suez Bay	W	15	41.2	30.61	313	137	229	800	843	94	215	193	111
	S	30	41.7	27.01	318	135	236	-	-	-	211	195	108
Bitter Lake	W	14	44.6	33.18	339	148	229	1192	1521	78	291	308	94
	S	29	45.8	30.39	461	287	161	818	735	111	159	112	142
Port Said	W	15	37	26.76	350	177	198	1091	1409	77	248	261	95
	S	28.5	38	24.51	240	108	222	512	450	114	273	254	108

Table 1- Temperature, salinity, water density and average surface and volume of the 3 diatom species in the 3 regions in winter (W) and summer (S).

For Guinardia flaccida, spatial variations of A were more pronounced than the seasonal variations. However, in the Bitter Lake, the A as well as A/V were remarkably higher in winter than in summer and in the mean time, the summer A was the lowest for the 3 regions in both seasons (Table 1). This may indicate that Guinardia flaccida, a south temperate species probably does not prefer the very surface water of the Bitter Lake with high temperature, salinity and illumination, particularly in summer; it therefore may sink down.

Thus the 3 diatom species showed more or less different pattern of seasonal and spatial variations of the A and A/V. These variations may be related to the variations in temperature, salinity and water density as well as specific gravity and ecological affinities of the different species. The interaction between these factors leads to increase or decrease in the surface and volume of the cells in order to keep their floating level.

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Size variations of *Guinardia flaccida* (Castracane) Peragallo in different zones of the Suez Canal

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The variations in cell dimensions of the diatom Guinardia flaccida in 3 separate zones of the Suez Canal were examined in winter and summer. The observed variability is tentatively ascribed to the effect of temperature and salinity variations.

The sampled zones were: Suez Bay-S (S‰ :41.2-41.7‰.), the Bitter Lake-B (S‰:44.6-45.8‰.) and Port Said-P (S‰:37.39‰). Samples were collected in February (temp.:14-15°C) and July (temp.:29-30°C). Length-L and diameter-D of 100 cells from each zone were measured in both winter and summer. The data were statistically treated according to SNEDECOR (1956) and HAYSLETT (1970).

The cell dimensions of Guinardia flaccida were subjected to remarkable variations in the 3 zones of the Canal. The summer population at S exhibited significant increase in cell diameter and insignificant decrease in length compared to winter (Table 1 and Figs. 1&2). In B, both cell dimensions decreased significantly in summer. The P individuals were subjected to remarkable increase in cell length and decrease in diameter during summer. Analysis of variance indicated highly significant (HS) seasonal variations in the cell dimensions (Table 1).

Zone	Parameter	F ratio	
S	L	2.87	NS
	D	7.02	HS
B	L	10.39	HS
	D	344.63	HS
P	L	89.04	HS
	D	90.82	HS

Table 1- Seasonal variations. Analysis of variance of length & diameter in the 3 zones.

Remarkable spatial variations in the length and diameter were also observed among the 3 populations in winter and summer. In winter, variations between the S and B populations were highly significant (Table 2), where B population tended towards the longer and wider individuals. The P population exhibited shorter lengths than those of both S and B, indicating a highly significant variation. (Table 2). Otherwise, the variations in the cell diameter between P and B were not significant (NS). In general, regional variations in the cell dimensions among winter populations were significant. The summer populations of S&B showed significant regional variations (Table 2). The B individuals were mostly longer and narrower. The P population exhibited highly significant variations in length compared to S&B(Table 2). However, cell diameter of P varied remarkably from that of B, while it was comparable to that of S.

The results indicate that variations in cell dimensions may be related to variations in temperature and salinity.

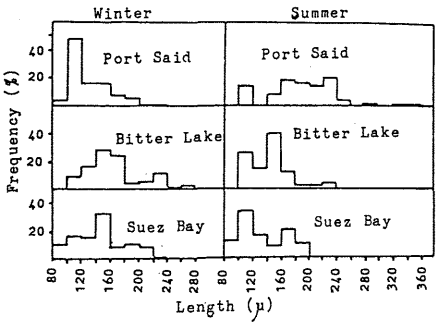

Fig. 1- Different components of cell length (% frequency) in the studied zones in winter and summer.

Parameter	S-B	B-P	P-S	S-B-P
		Winter		
L	HS	HS	HS	HS
D	HS	NS	HS	HS
		Summer		
L	HS	HS	HS	HS
D	NS	HS	NS	HS

Table 2- Spatial variations, analysis of variance of L&D in winter and summer.

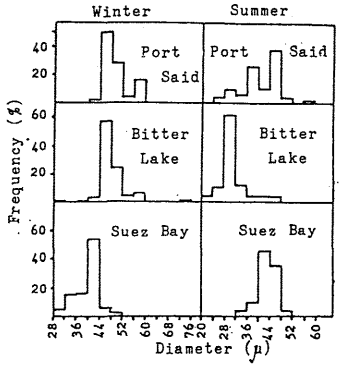

Fig. 2- Different components of cell diameter (% frequency) in the studied zones in winter & summer.

REFERENCES

HAYSLETT, M.S., 1970. Statistics made simple. Publ. W.H.Allen, London.

SNEDECOR, 1956. Statistical methods. The Iowa State College Press, Iowa USA.