

Nutrient kinetics of algal populations in two gulfs adjoining the Attic Peninsula one receiving effluents*

by

R. DUGDALE**, J. MAC ISAAC** and D. BLASCO***

***Department of Oceanography, University of Washington (U.S.A.)*

****Instituto de Investigaciones Pesqueras, Barcelone (Espagne)*

Uptake rates of nitrate and ammonium by natural populations of phytoplankton were measured in the Petalion and Saronikos Gulfs, using nitrogen-15 as a tracer. Marked differences in the rates were observed with the effluent-enriched Saronikos populations utilising the nitrogen compounds at higher rates. The composition of the populations was fundamentally similar, suggesting that oligotrophic ecosystems may adapt to enrichment by marine sewage outfalls without large changes in species composition.

Table 1.

Diatoms	Saronikos	Petalion
<i>Bacteriastrum hyalinum</i>	×	×
<i>Cerataulina bergonii</i>	×	
<i>Chaetoceros affinis</i>	×	×
<i>Chaetoceros compressum</i>	×	×
<i>Chaetoceros curvisetum</i>	×	
<i>Chaetoceros debilis</i>	×	
<i>Chaetoceros decipiens</i>	×	
<i>Chaetoceros glandazii</i>		×
<i>Chaetoceros lauderii</i>		×
<i>Chaetoceros peruvianus</i>	×	×
<i>Coscinodiscus</i> sp.	×	×
<i>Dactyliosolen mediterranea</i>		×
<i>Guinardia flacida</i>	×	
<i>Hemiaulus hauchii</i>		×
<i>Lauderia borealis</i>	×	×
<i>Leptocylindrus danicus</i>	×	×
<i>Nitzschia seriata</i>	×	
<i>Nitzschia closterium</i>	×	
<i>Pleurosigma</i> sp.	×	
<i>Rhizosolenia alata</i>	×	×
<i>Rhizosolenia calcaravis</i>		×
<i>Rhizosolenia fragilissima</i>		×
<i>Rhizosolenia hebetata</i>	×	
<i>Rhizosolenia imbricata</i>		×
<i>Rhizosolenia stolterfothii</i>	×	×
<i>Schroderella delicatula</i>	×	
<i>Skeletonema costatum</i>	×	
<i>Stephanopyxis turris</i>	×	
<i>Thalassionema nitzschiodes</i>	×	×
<i>Thalassiosira decipiens</i>	×	

* Communication présentée par M. DUGDALE.

Table 1.

Dinoflagellates	Saronikos	Petalion
<i>Ceratium macroceros</i>	×	
<i>Ceratium fusus</i>	×	
<i>Ceratium symmetricum</i>	×	×
<i>Cochlodinium brandtii</i>		×
<i>Gymnodinium</i> sp.	×	×
<i>Gyrodinium fusiforme</i>	×	
<i>Peridinium depressum</i>	×	
<i>Peridinium oviforme</i>	×	
<i>Phalacroma rotundatum</i>	×	
<i>Pyrocistis</i> sp.	×	

TABLE 1. — Occurrence of diatoms and dinoflagellates species in surface water at Thompson 47 Sta. 13 in the Petalion Gulf and Sta. 27 in the Saronikos Gulf.

Table 2.

Station	Nitrate Uptake $\mu\text{g-At/da}^{-1}$	Nitrate $\mu\text{g-At/liter}$	Ammonium $\mu\text{g-At/liter}$	Ammonium Uptake $\mu\text{g-At/da}^{-1}$
Petalion				
11 ^a	.0196	0.06	0.02	0.490
14 ^a	.0293	0.05	—	.0782
20	.0325	0.04	0.03	.0776
23	.0497	0.02	0.06	.1757
25	.0519	0.09	0.06	.0726 ^b
34 ^a	.0277	0.04	0.01	.0650 ^b
46 ^a	.0294	0.05	0.08	.0680 ^b
Mean	.0343	0.05	0.04	.0837
Saronikos				
27	.2212	0.04	0.49	.2258
29	.1509	0	0.14	.1027
30	.0376 ^c	0.56	1.62	.0994
31	.0426	0.20	0.84	.0869
32	.1109	0.10	0.49	.1484
33	.1466	0	0.08	.1587
47	.0148 ^c	1.08	1.80	.0926
48	.0373 ^c	0.80	0.98	.1375
49	.3283	0.24	0.14	.4055
50	.3150	0.01	0.08	.3867
51	.3083	0.01	0.14	.3722
Mean	.1558	0.28	0.62	.2015

TABLE 2. — Maximal rates of nitrate and ammonium uptake measured in the Petalion and Saronikos Gulfs. Experiments were incubated for 18-26 hr periods, including all daylight hours. At stations where more than one depth was sampled the maximal rate for the station was used, and in some cases the depths differ for maximal nitrate and ammonium uptake at the same station. a At location CM-1; b Calculated; c Uptake clearly suppressed by high ammonium concentration.

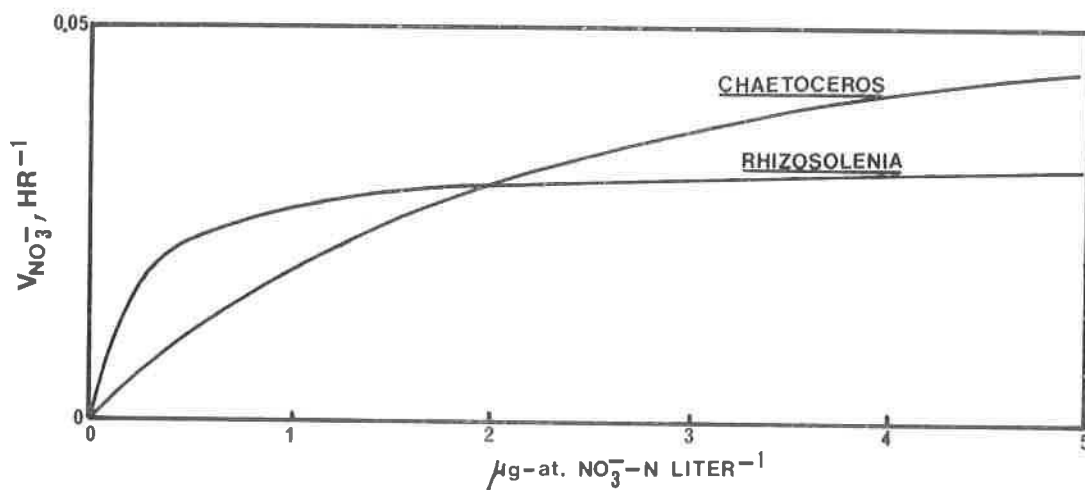


FIG. 1. — Hypothetical curves for nitrate uptake vs. nitrate concentration for two species of algae. Values for V_{max} were taken from Riley (1963b); hypothetical values of K_t for nitrate uptake were assigned. For *Chaetoceros socialis*, $V_{max} = 0.068/\text{hr}$, $K_t = 2.50 \mu\text{g-at. NO}_3^- \text{-N/liter}$; for *Rhizosolenia alata*, $V_{max} = 0.034/\text{hr}$, $K_t = 0.25 \mu\text{g-at. NO}_3^- \text{-N/liter}$.

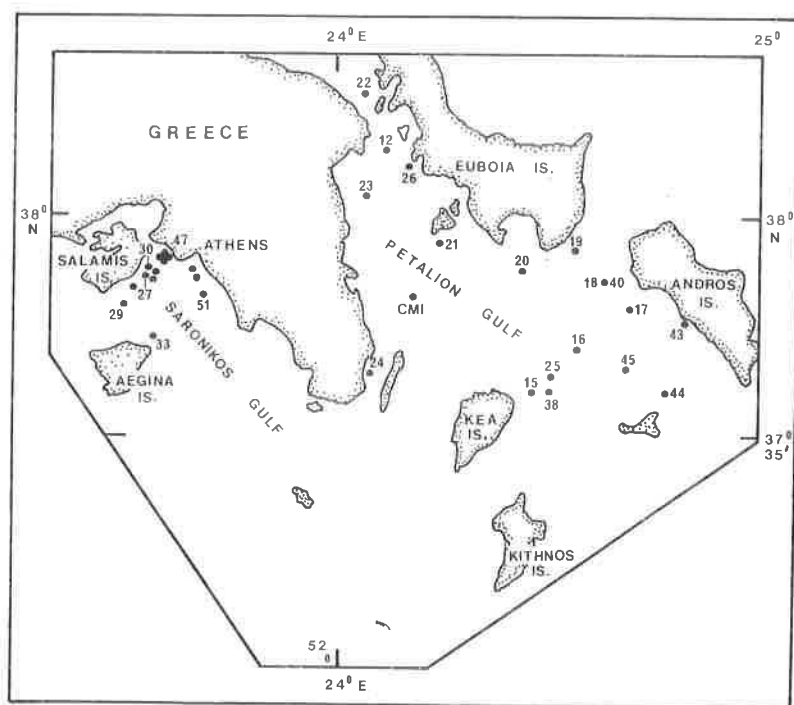


Fig. 2. — Map of the studied region.

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