

**Planktonic Protista associated with "color-tides" in Izmir Bay
(Aegean Sea)**

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One of the most important factors affecting the seawater color is the quantity of organisms living within the body. Generally, during red tides, $10^6 - 10^8$ cells/l densities of protists give their pigment colors to the seawater. However, this range may decrease to $10^3 - 10^5$ cells/l when the cell sizes increase (JACQUES and SOURNIA, 1979; STEIDINGER and HADDAD, 1981; STEIDINGER, 1983).

In coastal seas and in the bays, the red-tides have been known as most important events changing the seawater color and sometimes causing PSP (paralytic shellfish poisoning) and NSP (neuro-toxic shellfish poisoning). Yet, though some species of diatoms, dinoflagellates and ciliates are not poisonous, they may excessively grow in convenient circumstances and may create green-, yellow-, etc. tides. This event may cause biological pollution especially in the bays where the nutrient budgets have been supported continuously with agricultural and domestic inputs. Furthermore, these protists whose high cell densities cause decrease of the depth of euphotic zone have negative effects on the biota indirectly by stimulating toxic extracellular nitrite production by phytoplankton living under low light intensities in the presence of adequate nitrate.

In the present study, the planktonic protists caused different type color-tides (toxic and non-toxic) of Izmir Bay were determined and their effects on the biota were summarized. The material has been collected with the project support of FAO-MAP (MED POL) TUR/24-H.

As could be seen from Table I, 4 species of diatoms (2 centric, 2 pennate), 11 species of dinoflagellates, 1 species of euglenoid flagellate and 1 species of photosynthetic symbiotic ciliate are responsible for color-tides and their excessive growth in the eutrophicated waters of Izmir Bay cause changes of seawater color.

Undoubtedly, *A. minutum*, *G. polyedra* and *G. spinifera* are the most important species among others because they have caused PSP sometimes. Although there exist some reports about the toxicity of *P. micans* and *P. triestinum* blooms; there are not clear evidences on the subject from Izmir Bay.

During the blooms of non-toxic color-tides the super increases of dissolved O_2 and CO_2 in seawater (produced by phytoplankton as a result of photosynthesis during the day and night) may cause gas bubbles and hypoxia illnesses respectively in many crustaceans and fishes. Especially hypoxia is the main reason of the mass emergences of the crab *Carcinus mediterraneus* Gerniauský, 1884 onto land on the nights during the blooms.

Table I: The planktonic protists responsible for color-tides in Izmir Bay.

Species	Blooming month	Color of the sea	Max. cells in a lt.	Tox.
BACILLARIOPHYCEAE				
<i>Coscinodiscus granii</i> Gough	1,2,6,7,10	Greenish -orange	$2 \cdot 10^3$	-
<i>Nitzschia closterium</i> (Ehrenberg) W. Smith	1,2,3	Pale olive -green	10^5	-
<i>Phaeodactylum tricorutum</i> Bohlin	6,7	Pale brown	10^7	-
<i>Thalassiosira rotula</i> Meunier	10,11,12	Greenish -brown	$2 \cdot 10^4$	-
PYRROPHYCEAE				
<i>Alexandrium minutum</i> Halim	3,4,5,6	Reddish -brown	10^7	PSP
<i>Ceratium furca</i> (Ehrenberg) Claparède et Lachmann	3,4	Brownish -orange	$4 \cdot 10^4$	-
<i>Gonyaulax polyedra</i> Stein	5,6	Reddish -brown	$5 \cdot 10^4$	PSP
<i>Gonyaulax spinifera</i> (Claparède et Lachmann) Diesing	5,6	Reddish -brown	$2 \cdot 10^4$	PSP
<i>Noctiluca scintillans</i> (Macartney) Ehrenberg	1,2,3	Pink -patches	$2 \cdot 10^4$	NH ₃
<i>Oxytoxum scolopax</i> Stein	5,6,7	Pale -orange	$2 \cdot 10^4$	-
<i>Prorocentrum micans</i> Ehrenberg	1,2,5,6	Yellowish -orange	$9 \cdot 10^7$?
<i>Prorocentrum triestinum</i> Schiller	6,7,8	Pale -orange	$6 \cdot 10^4$?
<i>Protoperidinium longipes</i> Balech	4,5,8,9	Pale -orange	$2 \cdot 10^4$	-
<i>Protoperidinium steini</i> (Jørgensen) Balech	5,6,7,8	Pale -brown	$7 \cdot 10^4$	-
<i>Protoperidinium trochoideum</i> (Stein) Balech	5,6	Brownish -orange	$6 \cdot 10^6$	-
EUGLENOPHYCEAE				
<i>Eutreptia</i> sp.	7,8,9	Light -green	$7 \cdot 10^5$	-
CILIATA				
<i>Mesodinium rubrum</i> (Lohmann) Hamburger and Buddenbrock	1,2,3,9	Reddish -orange	$9 \cdot 10^4$	-

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