

Hydrological conditions of penetration of Mediterranean Sea organisms into the Black Sea

by

A. K. BOGDANOVA

Institute of biology of South Seas, Academy of sciences of Ukr. SSR, Sevastopol (SSSR)

Many investigators note the increase in the number of Mediterranean Sea organisms which turned out in the Black Sea during the last ten years. In our view it is related to the rise of the low Bosphorus current in the periods of a lack of water (from 1942-1946 to 1952-1956).

The Mediterranean species of animals and plants penetrating into the Black Sea are initially concentrated in the near-Bosphorus region of the Black Sea. L.S. JAKUBOVA [1948] names 20 Mediterranean sea species which have been found in the near Bosphorus area and which don't occur in the other Black Sea regions.

A number of interesting collections have been made in this region by Bulgarian and Rumanian expeditions [KENEVA-ABADJIEVA, 1964; MARINOV, 1959; BACESCO & MARGINEANU, 1959; DUMITRESKO, 1959, 1960, 1962]. Three community groups—Amphiura *Terebellides stroemi*, *Sternaspis scutata* and *Modiola phaseolina* — were singled out by the Institute of biology of South Seas of Ac. Sc. Ukr. SSR while studying the benthos in the near-Bosphorus region of the Black Sea in 1958-1962. The first two biocoenoses are situated to north-west out of the Bosphorus in the zone of main stabil stream of Mediterranean waters. Phaseolina is absent there but a considerable number of Mediterranean species is found. Biocoenosis of phaseolina is situated northerly out of the Bosphorus, where its traces are marked only by the maximum inflow of the Mediterranean waters.

In the Black Sea waters the mediterranean species of phytoplankton have been found repeatedly [STROYKINA, 1940; MORZOVA-VODJANITSKAJA, 1948]. In August of 1960 Rumanian investigators have found several species of phytoplankton which are new for the Black Sea [SKOLKA & BODYANU, 1963].

In recent years the mediterranean species of phyto- and zooplankton are met with over and over again not only in the near-bottom layers of the near-Bosphorus region but also in the open sea. Several new for the Black Sea species of phytoplankton have been found by L.V. GHEORGIEVA (*Syracosphaera coronata*, *S. cornifera*, *Amphidinium conradi*, *A. vigrense*, *Ceratium teres*, *C. furca* var. *eigranium*, *Gymnodinium pygmaeum*, *Cochlodinium citron*, *Oxytoxum parvum*, *Biddulphia alternans*).

When cultivating the algae taken from the near Bosphorus region of the Black Sea L.A. LANSKAYA has singled out several more new algae overlooked before (*Amphidinium klebsii* Kof. Sw., *Thalassiothrix mediterranea* var. *pacifica* Cupp., *Gimnodinium* sp., *Amphiprora* sp.) The cell division rate picked up from the Mediterranean waters stream was 2,5-3 times as low in the Black Sea water as the other one of the transformed Mediterranean water of a high salinity (32-34,5 ‰).

The point is, that the Mediterranean conditions are more favourable for them as compared to that of the Black Sea. At the same time the survival of these algae in the Black Sea water shows that they are euryhaline and hence are able to populate the Black Sea.

E. V. PAVLOVA has detected some zooplankton species in the near Bosphorus region of the Black Sea often met with in the Mediterranean Sea. In May the Mediterranean Sea organisms (*Corycaeus furcifer* Claus and *Microseteia rosea* Dana) were found only as single specimens whereas in the October

plankton such forms as *Oncea*, *Microsetella* and *Euterpina*) come to the tens and more [PAVLOVA, 1965]. This seems to be interpreted as being due to more intensive entry of Mediterranean water in October 1962 relative to that in May of the same year [BOGDANOVA, 1965]. The above mentioned species occur in considerable number in the Aegean and Adriatic seas throughout the water column from 10 to 300 meters and lower. Certainly, far from all of the Mediterranean phyto- and zooplankton species brought by the Lower Bosphorus current from the Sea of Marmora survive in the Black Sea. Otherwise the Black sea would have been populated by the Mediterranean organisms long ago. Only those appear to survive which subjected preliminarily to an acclimation in the surface freshened waters of the Sea of Marmora, where salinity is distinguished by the considerable seasonal and non-periodic variations (from 20,5-22,5 to 30 ‰).

Under certain hydrometeorological conditions those species of the Mediterranean Sea plankton which have lived for a long time in surface waters of the Sea of Marmora and have already adapted to significant seasonal and non-periodic variations in salinity, get into the Black Sea. Some of them seem to be able to endure the migration into the Black Sea, i.e., into the environment with still greater freshening. Such assumption is confirmed by the collection of living individuals of Mediterranean plankton in the Black Sea (*Clausocalanus arcuicornis*, *Calocalanus pavo*, *Calocalanus pavoninis*, *Oncea minuta*, *Corycella* sp., *Lucicutia flavicornis*). Some organisms such as *Microsetella rosea*, *Euterpina acutifrons*, *Ocaea dentipes* have been found in quite considerable numbers (from 16 to 42 specimens) in the near-bottom layer in the stream of the Lower Bosphorus waters with salinity 30,4-34,2 ‰.

The plankton of the Sea of Marmora is studied very little. Single observations listed in the literature give some pictures of the plankton composition and its vertical distribution. The surface freshened layer is populated far more than the abyssal waters under the area of a sharp salinity rise [DEMIR, ACARA, 1955].

The intensity of the Lower Bosphorus current, its waters salinity and composition of the Mediterranean plankton are directly concerned with the location depth of the saline proper waters of the Sea of Marmora in the region of the South Sill. The layer depth of the sharp rise of salinity in the near-Bosphorus region of the Sea of Marmora varies with the seasonal periodicity and relative to the wind effect and wind tidal circulation. The wind and wind tidal circulation result in a sharp variation of the hydrological characteristics of the Marmora waters at the South Sill level and consequently in the quantity change and partly species composition of the plankton driven by the Lower Bosphorus current.

During a water transport away from the coast when the interface between the water columns rises higher than the South Sill depth, the waters of high salinity are driven with the here living plankton in minute quantity into the Lower Bosphorus current. By the piling up in the near Bosphorus region of the Sea of Marmora the Lower Bosphorus current is formed by the intermediate somewhat freshened waters with abundant plankton.

Thus the most favourable time for penetration of the Mediterranean plankton into the Black Sea is autumn and winter when the entry of the upper freshened waters of the Sea of Marmora increases. In April-June regardless of the often frequency of the southerly and south-wester (32-45 %) the considerable exceeding of the average monthly Black Sea level over the Mediterranean will sink on an average the inflow of the Lower Bosphorus waters. The mediterranean organisms quantity penetrating into the Black Sea seems to be reduced also at the time in comparison with the autumn-winter season.

As regards hydrological conditions of Mediterranean plankton penetration into the Black Sea L.I. JAKUBOVA [1948] seems to be right while assuming these species as penetrating in the near Bosphorus region of the Black Sea in the larval stage with the Bosphorus current waters. Then all above mentioned as regards penetration conditions of the Mediterranean plankton forms into the Black Sea relates also equally to the larval stages of benthos being a part of plankton.

To be completely sure in the above mentioned assumption the additional biological observations to be carried out in the different seasons and during the different winds are necessary not only in the near-Bosphorus region of the Black Sea but also in the Sea of Marmora. Some groups of organisms in the Sea of Marmora seem to inhabit only a freshened layer, the other one-only the saline waters under the salinity leap layer.

It is likely that some organisms possess a more wide euryhaline properties and live freely in saline as well as in surface freshened waters. The detailed observations have not been carried out in the Sea of Marmora, this sea is badly studied in all from the biological point of view though it is of great interest as a intermediate nexus between Mediterranean and Black Sea conditions.

Nature itself has performed an experiment for the ecological evolution of animals and plants in the system of seas with different salinity connected by the straits. Under the natural conditions the organisms migrate gradually from the Mediterranean waters of high salinity to the Black Sea waters of lower one when passing through the straits.

Therefore the broad complex of hydrological and biological tests in the near straits areas of the Aegean, Black and Marmora Seas by the common efforts of different specialists will make a contribution in the knowledge of the sea life.

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En l'absence de l'auteur et d'un rapporteur désigné, le président présente rapidement cette communication qui porte sur une zone d'échanges intéressante entre Méditerranée et mer Noire, par l'intermédiaire de la mer de Marmara.

L'auteur considère les facteurs (vents-salinité) et les saisons favorables ou défavorables aux échanges : c'est en automne et en hiver que la migration des organismes se fait vers la mer Noire.

Le phytoplancton et le zooplancton, y compris les stades larvaires planctoniques d'organismes benthiques sont successivement considérés.

Pas de discussion.

