PRELIMINARY OBSERVATIONS CONCERNING THE INFLUENCE ON THE DECOMPOSITION OF GELATINOUS MARINE ORGANISMS OF THE LIFE OF SOME PLANKTONIC ALGAE

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Abstract

In recent decades, in the Black Sea ecosystem many changes occurred associated with the effect of anthropogenic pollution; but a significant number of these changes are due to the introduction of exotic species. Among the these are the soft shell clam *Mya arenaria*, the gastropod *Rapana thomasiana* and the gelatinous ctenophore *Mnemiopsis leidy* all of which we consider to be biological pollution. Four species of gelatinous animals are common in the Black Sea: two scyphozoares-*Aurelia aurita* and *Rhyzostoma pulma* and two ctenophores-*Pleurobrachia pileus* and *Mnemiopsis leidyi*. In this paper we present data about pH, salinity, proteins content, carbohydrates, ammonia, and urea in sea water after the decomposition of gelatinous organisms and the influence of this phenomenon on algal proliferation.

Keywords: Aurelia aurita, Mnemiopsis leidy, Prorocentrum sp, Diatoms spp.

At the beginning of the 1980 the accidental introduction of the north western Atlantic ctenophore *M. leidyi* radically affected the entire pelagic fauna of the Black Sea. As the *M. leidyi* inhabits the same depth range and utilizes the same food resources as *A. aurita*, a large population of *A. aurita* was nearly replaced by *M. leidyi*.These two species, *A. aurita* and *M. leidy* were studied recently with regard to their biological and ecological characteristics [1, 2]. According the available literature [3] the concentration of the biogenic elements in the bodies of *M. leidyi* is smaller than the concentration of the same elements in the body of *A. aurita*. As a result of chemical analysis it is established that the mass development of *M. leidyi* has a negative effect on the hydrochemical structure of the Black Sea [3].

When recalculated in terms of total dry weight, the bodies of these "gelatinous organisms" contain an order of 10 tons of the elements, C, N, P, Si. The reference material does not include data concerning the contribution of these organisms to general flow of organic substances in marine waters sediments. The aims of this work is to present some observation concerning the alteration of the marine environment characteristics after the dying of the gelatinous organisms in the water and the influence of their decomposition on the life of some plankton organisms. The observations are based upon laboratory experiments. The tests had in view the kinetics of the decomposition of gelatinous organisms in marine water and the influence of this phenomenon on the algal proliferation. In an experiment in the stationary conditions of the laboratory the gelatinous organism was introduced in marine filtrate water, in a ratio of 1:20g/ml; the samples were draw periodically and in laboratory cultures of *Prorocentum* spp and *Diatomeae* the liquid mass and the powdery extracts were introduced respectively in a ratio of 1% and 100 micrograms/ml; the effects were established by the algal density measurement and their comparison with a control sample. The modification of the environment characteristics as a result of the introduction of the dead gelatinous organisms is evident. Thus:

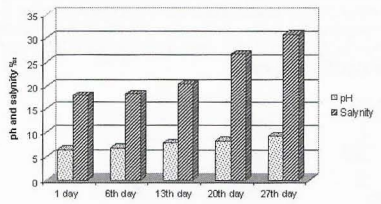

Fig. 1. pH and salinity in experimental condition

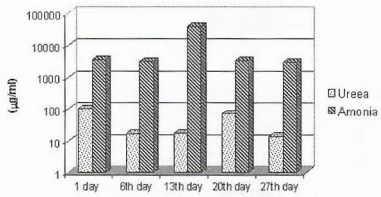

Fig. 2. Variation of the concentration of amonia and urea in experimental condition

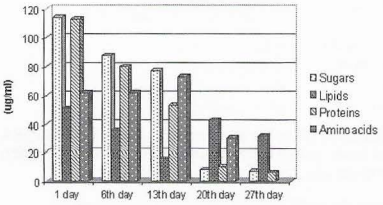

Fig. 3. Presence of carbohydrates, proteins and aminoacids in experimental condition

1) the pH and the salinity showed an evident increase, the pH became highly alkaline (Fig. 1);

2) the contents of urea and ammonia vary differently, however. Their accumulation and maintaining are clear (Fig. 2);

3) the concentration of organic compounds analyzed generally decrease (proteins, carbohydrates, amino acids) with the exception of the lipids which at onetime show an maximums (Fig. 3).

This diversity is probably due to the biochemical and microbiological support of the environment but, for the aim of the paper are relevant in some aspects :

1) the maintaining and the duration of the biotransformation which includes decomposition and accumulation;

2) the alteration of the experimental environment .

As to the behavior of the marine organisms in the experimental conditions our observations concerning the marine microalgae, *Diatoms spp* and *Prorocentrum sp* underline their response capacity to the presence in the environment of the substances resulting from the decay of the gelatinous organism. Thus:

1) those two species had a different behavior in the environments inoculated with the marine gelatinous marine extracts;

2) the *Diatomeae* had a similar behavior against the liquid extracts from medusa *A. aurita* ctenophores *M leidy* and the mixture of them (as we found them in the natural environment. (Fig. 4);

3) their growth achieved a maximum after four days followed by a diminution of the number of cells after seven days (Fig. 4);

4) a different response was seen with the powder obtained from the same organisms and introduced in the water which induced an appreciable multiplication of cells. This may be due to the consequence of the drying operation;

5) the culture of *Prorocentrum spp*, had a different manner of response; the introduction of extracts from medusa had an inhibitory effect on the growth of algae but the same type of extracts from ctenophores actually showed some slight stimulatory activity (Fig. 5).

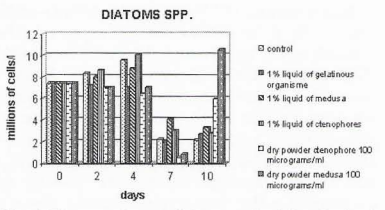

Fig. 4. The experiment of the growth of the algal culturs *Diatoms* spp.mixed with gelatinous organismsomogenated liquid and powdery extracts

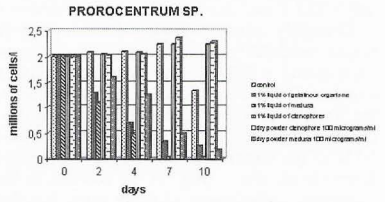

Fig. 5. The experiment of the growth of the algal culturs *Prorocentrum* sp .mixed with gelatinous organismsomogenated liquid and powdery extracts

The results of laboratory experiments may contribute with some information related to the ecological response. However our data can not be extrapolated directly to the natural environment yet, but may suggest modeling experiments such as physical factors together with chemical and eco-biochemical results.

References

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