Fission rates of some unicellular algae from the Black Sea Phytoplankton

by

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Abstract

Division rates for several species of unicellular algae taken from the Black Sea are given as studied in laboratory conditions. The fission rate is interrelated with several factors that can induce fission, and the results obtained in the laboratory are correlated with observations on natural communities.

Résumé

On donne le temps de division de quelques algues unicellulaires de la mer Noire, dans les conditions de laboratoire. On fait une interrelation avec les facteurs qui peuvent faire varier le temps entre deux divisions. Les résultats obtenus dans des conditions de laboratoire sont comparés avec les observations effectuées sur les populations naturelles.

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The study of the dynamics of species successions, as well as the interrelations between the primary and secondary trophic levels, requires the knowledge of algal fission rates. However, the existent data on this topic are still scarce [MOROZOVA - VODIANITZKAIA, 1957; LANSKAIA, 1963].

Weekly observations on both common and uncommon forms have led us to select the following species : *Cyclotella caspia* Grun., *Tetracoccus sp.*, and *Platymonas impellucida* McLachl. & Parke.

Cyclotella, a common form, develops during late spring and summer. Binary division occurred with a frequency of once every 24 hours in late spring, causing a high standing stock. The biomass reached the highest values in June-July, when the species represented up to 53.3 % of all the diatoms. This biomass was obtained after the transition from binary to sexual reproduction. Although spores and dead cells were observed in the first ten days of August, *Cyclotella* maintained a high biomass until the end of August.

The species *Chlorella*, *Platymonas* and *Tetracoccus* appeared in spring and maintained a low level until June, when they reached their maximum abundances. On 24th July 1969, for instance, the highest biomass values for these species were noted : 800 *Chlorella*, 480 *Platymonas* and 280 *Tetracoccus* cells/l.

In cultures, the modification of only one factor such as nutrition or temperature was sufficient to obtain different fission rates (Table 1 and 2).

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Table 1
The fission rate (in hours) related to concentration of nutrient substances

Alga	*PM_5 medium + organic extract °/oo 25 ml	50 ml	Fission rate in seawater + 25 ml °/oo 100 ml	organic extract
Chlorella sp.	12 hours	8	7	28
Tetracoccus sp.	37	15	20	26
Platymonas impellucida	24	—	30	84

*MIHNEA, 1972

Table 2.
The fission rates of *Cyclotella* related to nutrition

Media and organic compounds added*	Fission rate (hours)
AA_1 Na-taurocolic and asparagina	24
AA_2 asparagina and L-leucina	12
AA_5 L-leucina	1.5
AA_6 asparagina	2
AA_7 music acid	6
AA_8 alpha-cetoglutaric acid	8.5
AA_9 dextrina	6
PM_4 (only mineral compounds)	48
PM_5 (double concentration of PM_4)	18

*MIHNEA, 1972

Our observations have proved that only 22° C has induced sexual reproduction in *Cyclotella*, and consequently, a higher number of cells.

Conclusions

The results indicate how the division rate can be influenced by the prevalence of some trophic ions, their ratio, the organic nutrients present (especially their sort), and also temperature. The reduced numbers of some phytoplankters in the coastal waters, although all the required conditions appear to be present, should be explained by the high value of these cells as food for secondary consumers.

References

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