Notes on the rotifers of coal mine water in Eastern Poland

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Abstract

The species composition and quantitative structure of the rotifer fauna was investigated in a reservoir containing coal mine water. Only nine mainly planktonic species of rotifers, were found. Two of these were dominating: *Brachionus angularis* and *B. rubens*. They are typical indicators of eutrophic waters. Chlorides and sulphates may have an influence on the occurrence and quantitative structure of rotifer assemblages in the investigated reservoir.

Introduction

A reservoir of coal mine water with an area of 3.5 ha and a maximum depth of 2.7 m was investigated. It was formed near one of the coal mines newly opened in the Leczna-Wlodawa Lakeland (Eastern Poland). Coal mine water from a depth of 900 m was pumped into this reservoir. The physical and chemical properties, such as temperature, O_2, pH, N-total, Ca, SO_4, etc. of these waters are very similar to those of natural reservoirs existing in this region (Radwan *et al.* 1971, 1972 & 1973).

Only chlorides occurred in high concentration in the investigated reservoir. They ranged from 676.8 mg Cl · l^{-1} to 683.1 mg Cl · l^{-1}. These values were, on occasion, higher than those of the industrial sewage dumped into rivers. It seems probable that these waters may be dangerous to natural biocenoses in this region.

Plankton investigations were carried out during April to October, 1981. Both quantitative and qualitative samples were taken each month. Changes in the frequency of occurrence and abundance were determined together with abiotic factors of the environment.

Results

Only nine species of rotifers were found to exist in the reservoir. They were: *Asplanchna brightwelli* Gosse, *Brachionus angularis* Gosse, *B. calyciflorus* Pallas, *B. rubens* Ehrenberg, *Keratella quadrata* (Müll.) *Lecane closterocerca* (Schmarda), *L. luna* (Müll.), *Polyarthra vulgaris* Carlin and *Rhinoglena frontalis* Ehrenberg. Moreover, rotifers from the order of Bdelloidea occurred frequently. Small seasonal changes were noted in the number of species: five species were found in April but nine species in July and October (Fig. 1). The highest abundance was shown by *B. angularis* and *B. calyciflorus;* they dominated during the whole sampling period, in waters showing high chloride concentration and low trophy, even though some authors regard them as rotifers preferring eutrophic waters (Hakkari 1972; Radwan 1976; Lair 1980). Those two species formed 93% of the total number of rotifers in the reservoir.

In the investigated reservoir of coal mine water, there was a clear positive correlation between temperature, dissolved oxygen concentration and abundance of predominating rotifers, just as in natural lakes. However, with a decrease in tempera-

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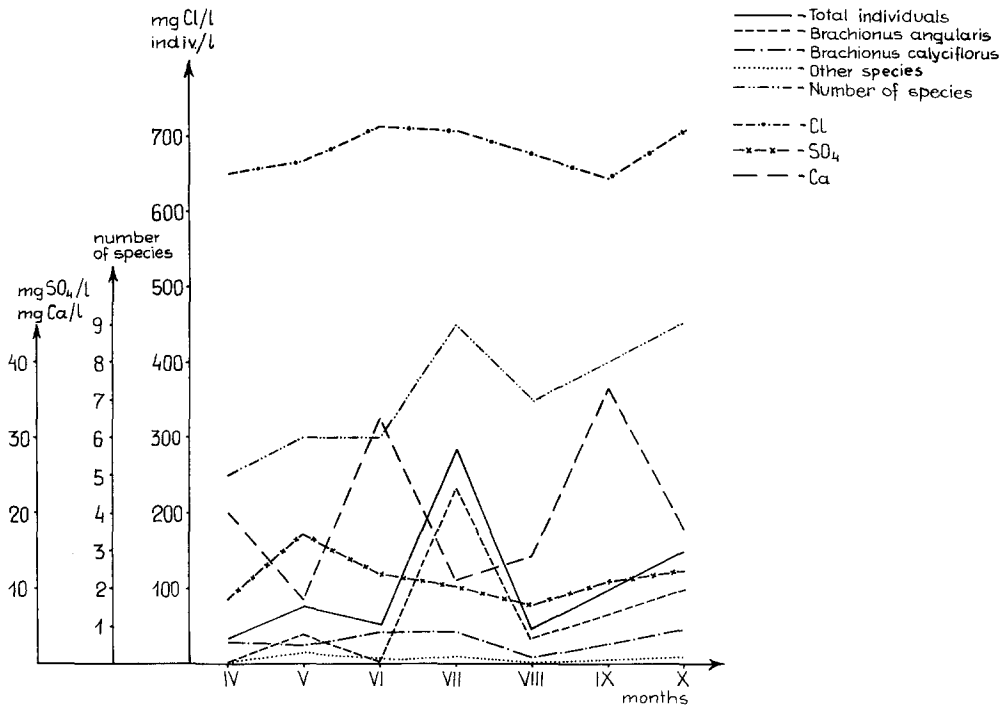

Fig. 1. Seasonal changes of the frequency of occurrence and abundance of the rotifers in the reservoir of coal mine water.

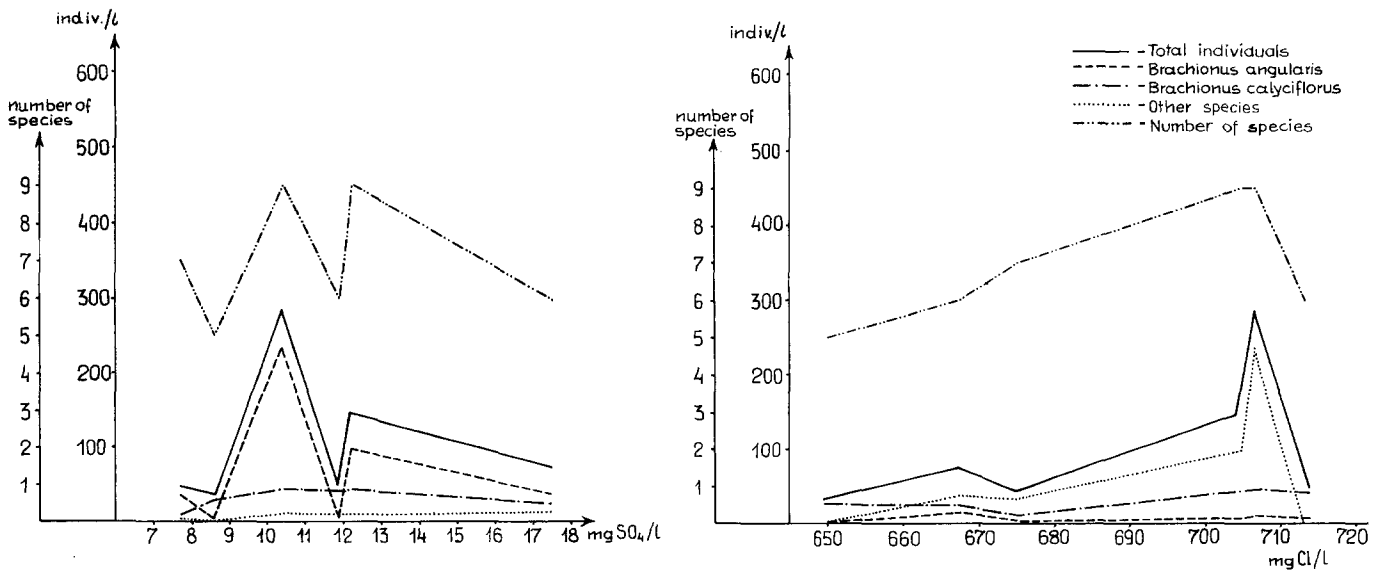

Fig. 2. Correlations between the frequency of occurrence, abundance of the rotifers and the chloride and sulphate concentration in the investigated pond.

ture connected with an increase of oxygen concentration, the abundance of some rotifer species decreased. It is possible that at this time there was an increase in chloride concentration which had an effect on the abundance of rotifers. On the other hand there is, on the whole, a clear positive correlation between the abundance of some species and the concentration of chlorides in water (Fig. 2).

Other chemical factors, such as Ca^{2+} and SO_4^{2-} probably have a smaller effect on the abundance of predominating species living in the coal mine pond. However, the highest abundance of rotifers was noted at lower concentrations of these compounds, especially calcium (Fig. 3).

It should be kept in mind that not one, but many environmental factors effect the occurrence and abundance of separate rotifer species in waters of different types (Hofmann 1977; Radwan 1973).

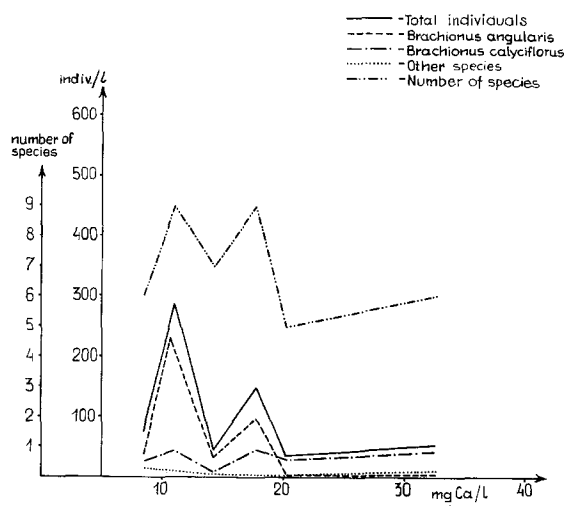

Fig. 3. Correlations between the frequency of occurrence and abundance of the rotifers and the calcium concentration in the investigated pond.

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