

## TYCHOPLANKTONICAL ALGAL ASSOCIATIONS OF THE SAJÓ

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### Abstract

The water mass of the Sajó is characterized by algal associations of heterogeneous combination. On the basis of the overall picture of the investigations, the *rheoplankton-like* associations are the most characteristic. Apart from these, rheon-like, and even typically plankton-like algal associations may also be observed.

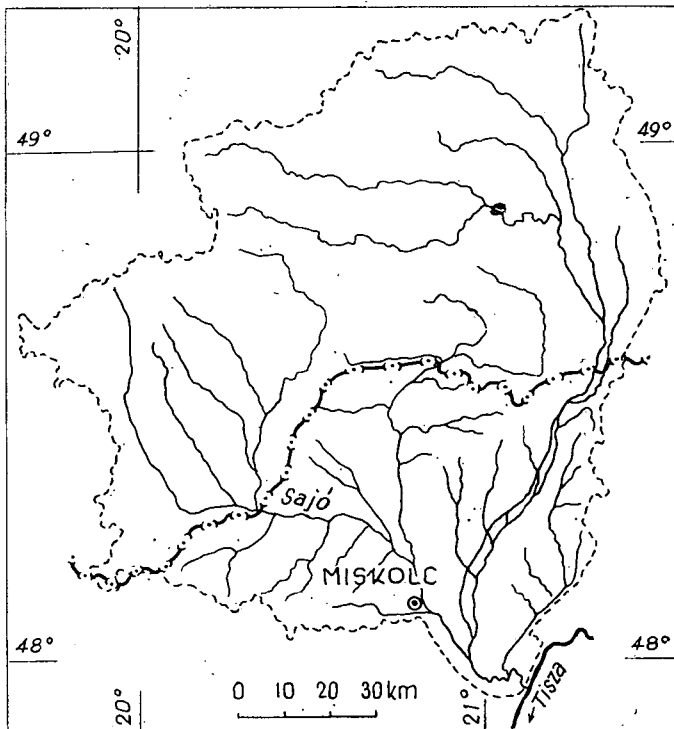


Fig. 1. Major polluters of the Sajó (A map).

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The dominance of *Diatoma* (Bacillariophyceae) and their richness in form are characteristic of the tycho planktonical algal associations of the Sajó.

From the algal organisms that are regarded to have some indicator value referring to the eutrophicated state of the river, several organisms occur in the Sajó, as well. At the same time, an algal population maximum is casually induced by the mass-production development of several algal taxons.

I am reporting in this paper on the algological investigational results of a waterway which is in national relation not too considerable, and therefore not of central interest. But this waterway is of emphasized importance in the economy of water quality of Northern Hungary and, in addition, it has casually a considerable effect on the water quality of the Tisza. Therefore, the data published — compared with the results of the Tisza-research of great past — may be applied in the future.

(The area of the Reservoir is shown in map-appendix 1).

The Sajó has been kept in evidence, already since 1949, as a waterway that is polluted or very strongly polluted in the whole year. But it has only occurred since the second half of 1956 that the pollution of the Sajó has become systematic and stable. Even in these days, its water quality causes us great anxiety on several occasions, in spite of the casually appearing more favourable states. A cause of this is partly the effect of new pollutions, partly the presence of the still existing old pollutions.

(The major polluters are shown in map-appendix 2).

Consequently, the river Sajó is divided, in its stretch in this country, into water living-spaces which can be characterized by extreme water-qualities (VÁNCSA 1972, 1974a, 1975a, 1975b, 1976b).

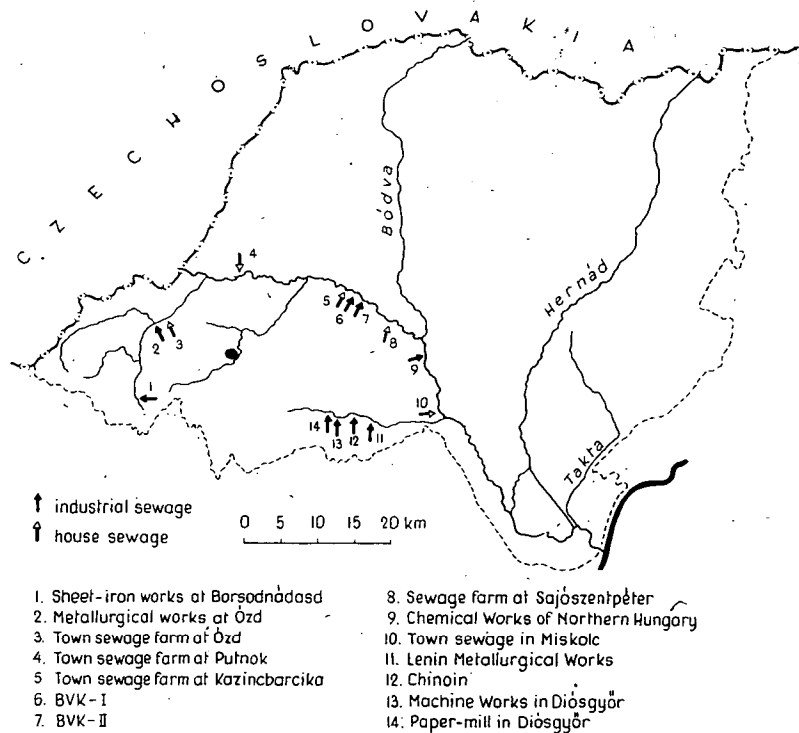


Fig. 2. Characteristic investigational sectors of the Sajó (A map).

### Summing up evaluation of the results of the investigation

I have investigated the qualitative and quantitative composition of the tycho planktonical algal vegetation of the Sajó since 1965, with particular regard to characterizing the water-quality conditions and estimating the possibilities of water-utili-

zation. Up to 1975, I have studied the qualitative and quantitative conditions of as many as 754 samples dipped (VÁNCSA 1974b, 1975b, 1975c, 1976a, 1976b, 1976c, and 1977a, 1977b, as well as VÁNCSA—ANDRIK 1977). My present publication is written on the basis of the studies enumerated, completed by the establishments of the recent results of my investigations. Thus omitting to discuss the results of the investigations in detail, I am publishing here only the comprehensive evaluation of these. (If it seems necessary, I am referring shortly to my earlier papers, as well but in this case I am also mentioning the older publication treating of the subject).

From among the sections investigated, I have primarily performed planned and systematic samplings in the following ten sections:

		river km
(1) Sajópüspöki	highway bridge	123,5
(2) Putnok	railway bridge	112,8
(3) Sajókaza	highway bridge	95,1
(4) Sajószentpéter	highway bridge	76,5
(5) Miskolc	highway bridge	53,8
(6) Felsőzsolca	railway bridge	49,3
(7) Sajólád	highway bridge	38,9
(8) Ónod	ferry (Rákóczi castle)	33,8
(9) Kesznyéten	highway bridge	10,4
(10) Ószederkény	ferry	1,5

(The characteristic sections investigated are shown in map 3)

The results of the investigations in other sections are not discussed in this paper. The enumeration of these is therefore omitted.

It can be established on the basis of the investigations that the water-mass of the Sajó — as a sestobiotical biotope — is characterized by the algal associations of heterogeneous combination (VÁNCSA 1975a, 1977b):

The dominance of Diatoma is characteristic of the tycho planktonical algal associations of the Sajó (Chrysophyta — Bacillariophyceae). The occurrence of other algae is changing (VÁNCSA 1975c, 1976a, 1976c). The blue-green algae (Cyanophyta) live primarily in the upper river reaches, the green algae (Chlorophyta) in the lower river reaches.

In the periods of investigations serving for basis of the evaluation, I could observe the occurrence in the Sajó of several taxons from among the algal organisms of phytoeston-associations referring to the eutrophicated state of the river and regarded as having some indicator-value (UHERKOVICH 1971, VÁNCSA 1977b). In addition to the organisms published so far, a recent completing datum is the occurrence of *Stephanodiscus hantzschii* GRUN.

Investigating the tycho planktonical algal vegetation, I have so far observed the appearance in large numbers of the following organisms: *Cyclotella Meneghiniana* KÜTZ., *Cyclotella* spp. KÜTZ., *Stephanodiscus dubius* (FRICKE) HUST, forma *longiseta* CL., *Stephanodiscus hantzschii* GRUN., *Nitzschia acicularis* W. S. M. *Cryptomonas pyrenoidifera* GEIL., *Cryptomonas tetrapyrenoidosa* SKUJA, *Chlamydomonas Ehrenbergii* GOROSCH., *Crucigenia* spp. MORREN.

All the algal values of the Sajó in litre-numbers can characteristically be expressed in a hundred thousand order of magnitude. In Winter I have also experienced ten thousand values, while in Spring and in late-Summer — Autumn values of a million, as well. And even in an extreme case, there occurred a value of ten million order of magnitude, too.

All the changes in the total alga/l number are also considerably influenced by the human water-utilizing and water-polluting activities.

On the basis of the total alga/l values from 1974—1975, which amount to more than a half (395) of all the investigations between 1965—1975 (754), the Sajó is characteristically of *mesotrophic* nature (VÁNCSA 1977b).

The peculiar forms of the algal population maxima are the following:

In case of a population maximum originating from beyond the frontiers, the Sajó may be characterized by tychoplanktonical algal associations of rich population in the border section (e.g., the late Summer of 1969, the Winter of 1974, the late Summer of 1975), which, in the stretch in this country, sooner or later regresses.

In case of a population maximum originating from an affluent, the Sajó can be characterized by a tychoplanktonical algal association of thin population above the inflow of the affluent. But as a result of the algal population maximum, below the inflow it becomes an association of rich population (e.g., in the late Summer of 1969, the Autumn of 1971, the early Summer of 1973, the Spring of 1974, the Summer of 1974). Following this, sooner or later it regresses.

In case of a population maximum developing in the Sajó primarily, the algal population maximum is induced by the multiplication of an algal taxon that could be observed in the Sajó in advance but there it was of characterless occurrence (e.g., in the late Summer of 1969, in the Spring of 1974, in the Summer of 1974).

In case of a population maximum, developing in the Sajó secondarily, an algal population maximum is induced in the Sajó by the multiplication of an algal taxon (e.g. in the Autumn of 1971) that was till then not observed in the Sajó, got there from the affluent but was there, too, of a characterless occurrence.

Taking into consideration the participation proportion of the characteristically occurring algal taxons, and by reason of comparing the orders of magnitude of the total alga/l values, we may establish that there are also in the Sajó “phytoseston” associations characterized by an algal vegetation of “varied combination” and “rich population”—*i.e.*, referring to an eutrophicated state of the river (VÁNCSA 1977b).

We have no chlorophyll-content investigation suitable for a comparative evaluation. But the chlorophyll-a values being at our disposal — similarly to the total alga/l values — also refer to (FELFÖLDY, 1974) that the Sajó, in its stretch in Hungary, is casually of eutrophicated character!

For demonstrating the tychoplanktonical algal associations of the Sajó, we use the results of seven longitudinal-section investigations, appearing as characteristic. The evaluation of these — in the sections which are suitable for characterizing changes — can be summarized in the following.

In the late Summer of 1969, the population maximum coming from beyond the frontier, developing in the river stretch in this country and reaching its peak, was forced back. In the Sajó a secondary population maximum developed. Then both population maxima were strongly forced back, one after the other. Their place was taken over by the population maximum of an affluent (VÁNCSA 1974b).

In the Autumn of 1971, the algal population that were strongly transformed by the population maximum, passing from the affluent, were balanced with a low litre-number. And later on, after their strong transitional recession, owing to the multiplication of the algal taxon which appeared in the affluent as a concomitant, there developed a secondary population maximum in the Sajó.

In the early Summer of 1973, the algal population are balanced with a low litre-number; they changed considerably only in the reaches before the mouth. This can similarly be attributed to an effect of the affluent (VÁNCSA 1977a).

In the Spring of 1974, the litre-number is equalized but the effect of the primary algal population maximum, coming about in the home stretch, and that of the affluents are well-visible in the river stretch before the mouth.

In the Summer of 1974, there was an equalized low population maximum with a small litre-number to be seen in the Sajó as produced primarily, and its development and decrease were followed by the development of a population maximum originating from the affluent.

In the Winter of 1974, the population maximum passing through the frontier of the country was unchanged in a long river stretch, and later on it diminished.

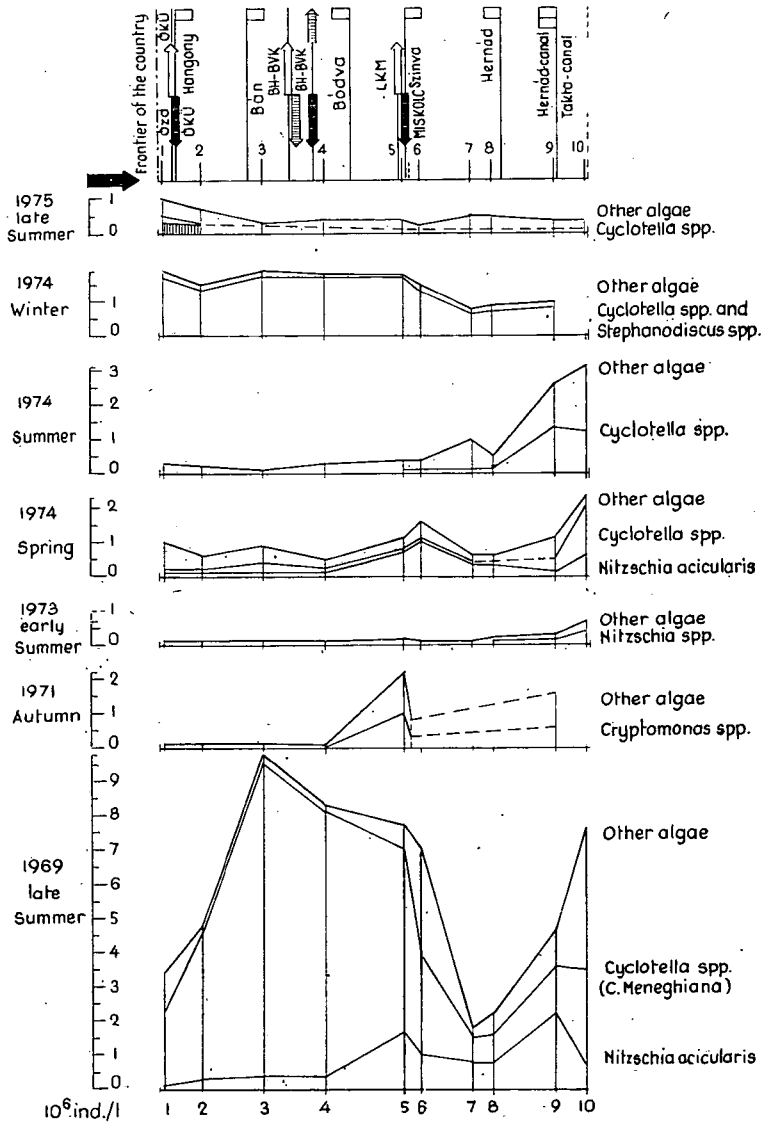


Fig. 3. Comparison of the characteristic tychoplanktonical algal associations of the Sajó (A graph).

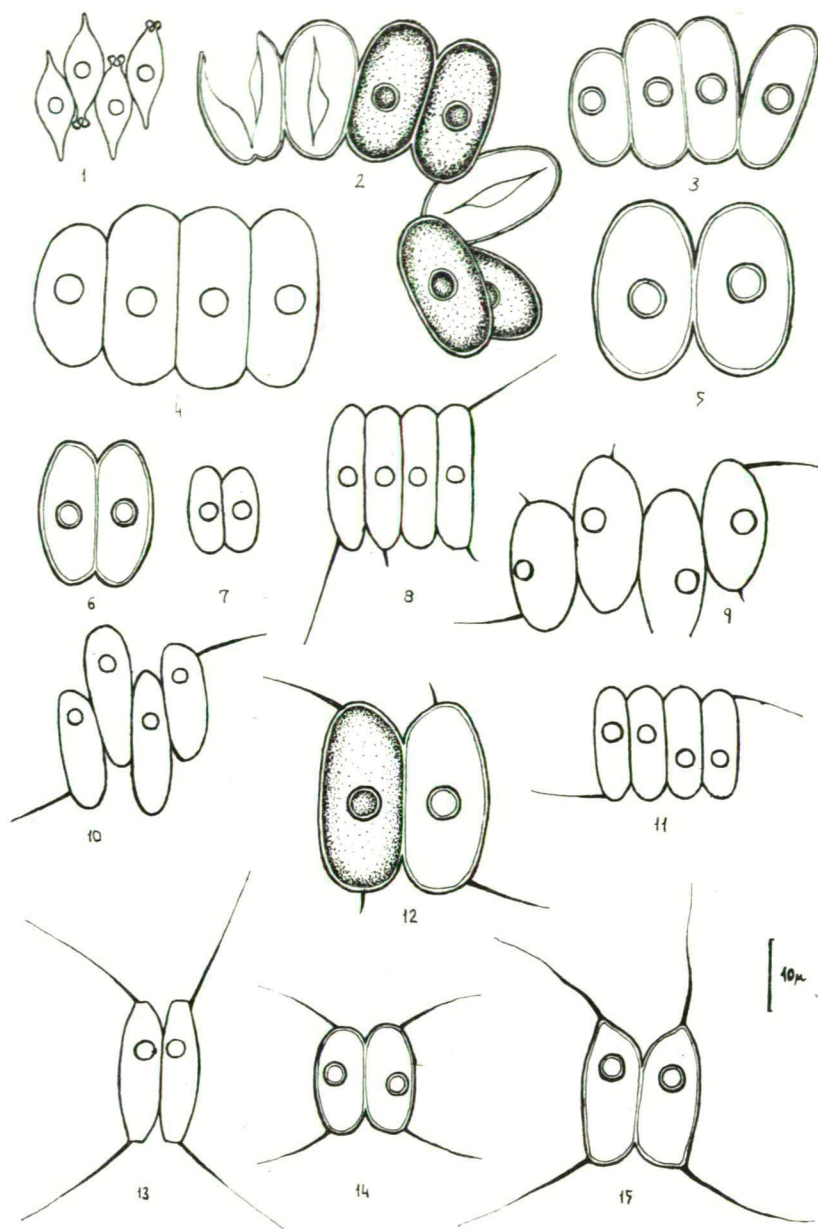


Fig. 4. A few representatives of the *Scenedesmus* genus. (Original algal drawings of the author of the Sajó).

(1) *Scenedesmus acutus* MEYEN var. *globosus* HORTOB.

(2—7) *Scenedesmus ecornis* (RALFS) CHOD.

(8) *Scenedesmus bicaudatus* (HANSG.) CHOD.

(9—10) *Scenedesmus intermedius* CHOD. var. *bicaudatus* HORTOB.

(11—12) *Scenedesmus bicaudatus* (HANSG.) CHOD.

(13) *Scenedesmus opoliensis* P. RICHT.

(14—15) *Scenedesmus quadricauda* (TURP.) BREB.

In the late Summer of 1975, from beyond the frontier, an algal association of rich population passed. Its strong decrease was followed in the home river stretch by a comparative equalization. The effect of affluents was then hardly to be observed but in the stretch section before the mouth in manifested itself more in the impoverishment of, and decrease in, the algal vegetation, owing to their flood-like character.

**The algal taxons determined from the Sajó according to the main taxonomical groups:**

<i>Cyanophyta</i>	Chroococcales	9
	Hormogonales	10
<i>Euglenophyta</i>	Euglenales	32
<i>Chrysophyta</i>	Xanthophyceae	3
	Chrysophyceae	9
	Bacillariophyceae	
	Centrales	13
	Pennales	70
<i>Pyrrophyta</i>		7
<i>Chlorophyta</i>	Chlorophyceae	
	Volvocales	15
	Chlorococcales	70
	Ulothrichales	1
	Siphonoclaicales	1
	Conjugatophyceae	
	Desmidiiales	9
	Zygnemales	1
Total algal taxons		<hr/> 250

(Some characteristic representatives of the *Scenedesmus* genus are shown by fifteen original drawings in Fig. 4.)

*Acknowledgment*

The algological investigations of the Sajó were carried out according to Dr. TIBOR HORTOBÁGYI's instructions. I should like to record my gratitude to him for this. Special thanks are due to Dr. GÁBOR UHERKOVICH and Dr. GÁBOR SZEMES, as well as to the research workers of the Water-quality Examining Laboratory of Water Management of Northern Hungary for their valuable co-operation.

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