

## THE OCCURRENCE OF *APHANIZOMENON ISSATSCHENKOI* (USSACZEW) PROSCHKINA-LAVRENKO IN LAKE BALATON

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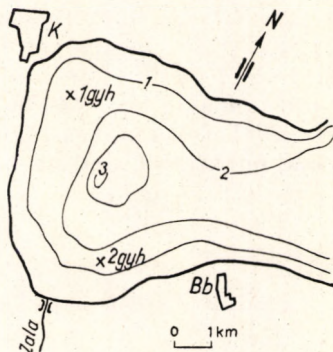
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The biologists of VITUKI (Research Institute of Water Resources) have been carrying out investigations on Lake Balaton for several years. According to L. TÓTH's notes the water of Keszthely Bay was strikingly green during the sampling on July 24, 1973, it rather resembled a fish-pond. Under normal conditions the chlorophyll investigations require 2 litre of filtered water, in the present case 500 ml was sufficient, which indicates a great increase in the quantity of planktonic algae. In the course of laboratory experiments the quantity of chlorophyll-a C/a/ 32.688 mg/m<sup>3</sup> turned out to be four times larger than at the same period a year before (July 18, 1972: C/a/ 7.46 mg/m<sup>3</sup>). The biologists of the Biological Research Institute had observed water bloom in this area, but during sampling neither neustic blue-greens nor algal clusters were encountered on the surface of the water. These facts instigated further sampling of water to make qualitative and quantitative analyses.

### Sampling and methods

The sampling was carried out at two points of Keszthely Bay by L. TÓTH (*Fig. 1*). He treated the 250 ml lifted sample with Lugol-solution (JKJ) on the spot and then fixed it in formaline (2 per cent concentration). The



*Fig. 1.* The sketch map of Keszthely Bay with the sampling places

author carried out the qualitative investigations according to methods customary in algology, while the quantitative ones under the Utermöhl plankton-microscope.

### Results

When analysing the samples *Aphanizomenon issatschenkoi* at both sampling places was found which proved to be new to Lake Balaton. In Hungary it was known only from Pond HERMANN OTTÓ (Mecsek) of extremely high trophity (UHERKOVICH et al., 1973).

#### *Aphanizomenon issatschenkoi* (USSACZEW) PROSCHKINA-LAVRENKO

The species is placed in the family of Nostocaceae, order Hormogonales, phylum Cyanophyta. First it was described as *Aphanizomenon elenkinii* and was investigated by KOMÁREK and Ettl (1958) in details. STARMACH (1966) and KONDRATYEVA (1968) mention it as *Aphanizomenon issatschenkoi*. Its synonyms are as follows: *Anabaena issatschenkoi* USSACZEW, *Aphanizomenon elenkinii* KISELEV, *A. elenkinii* var. *gracilis* KASZTANOVA, *A. elenkinii* f. *meotica* ПИЦК. KONDRATYEVA (1968) states that sometimes it develops in large masses, but does not constitute a significant biomass like *Aphanizomenon flos-aquae* does. It can be easily mistaken for *Oscillatoria setigera*, but may be distinguished from it on the basis of heterocysts and epispores.

The trichomes of the specimens in Lake Balaton are single straight or slightly curved and constricted at the cross walls. The apices attenuate into sharp points of 0.5–1.2  $\mu$ , their total length varies between 120–800  $\mu$ . The intercalary heterocysts are cylindrical, solitary, 7.5–9.2  $\mu$  in length and 3.2–5.4  $\mu$  in breadth. The spores situated far from heterocysts are solitary and intercalary. The size of the elongated, elliptical spores is 13.7  $\times$  6.2  $\mu$ . The cells are cylindrical and have well-developed gasvacuoles, 5–8.7  $\mu$  in length and 2.5–4.5  $\mu$  in breadth. The apical cells attenuate, sometimes elongate. The apices are acute, 12–23.7  $\mu$  in length, 0.5–1.2  $\mu$  in breadth, and occasionally curved (Figs 1–3).

The water blooms observed in Lake Balaton and especially in Keszthely Bay (SEBESTYÉN, 1934; HORTOBÁGYI, 1962; TAMÁS, 1965a; 1967; 1969; HORTOBÁGYI and KÁRPÁTI, 1966; 1967), indicate the increase in the quantity of algae. The appearance of new species like *Aphanizomenon issatschenkoi* or *Rhizochrysis limnetica* (TAMÁS, 1972b) means the qualitative change of the algal flora, similarly to the role of new reedgrass species (TÓTH, 1972) which appeared in the open-water of the lake. Both the quantitative and qualitative changes focus the attention to the ever increasing trophity of the lake. The results of the quantitative and qualitative analysis of algae causing the present water bloom are given in Table 1.



Fig. 2. The trichome of *Aphanizomenon issatschenkoi* with a heterocyst



Fig. 3. The trichome of *Aphanizomenon issatschenkoi* with a heterocyst



Fig. 4. The trichome of *Aphanizomenon issatschenkoi* with a heterocyst and an epispore

### Summary

On July 24, 1972 a water bloom was observed in the Keszthely Bay. The lifted samples contained specimens of *Aphanizomenon issatschenkoi* (USSACZEW) PROSCHKINA-LAVRENKO, which proved to be new to Lake Balaton. The present study includes the description of the alga and data on the qualitative and quantitative analysis of the composition of phytoplankton (see *Table 1*).

TABLE 1

Species	Place of sampling No. 1.		Place of sampling No. 2.	
	10 <sup>3</sup> i/l	%	10 <sup>3</sup> i/l	%
<i>Aphanizomenon issatschenkoi</i> (USSACZEW) PROSCHKINA-LAVRENKO and <i>A. gracile</i> LEMM.	624.0	11.03	1360.0	11.54
<i>Anabaena spiroides</i> KLEBAHN	162.9	2.88	409.7	3.50
Total of Cyanophyta	786.9	13.91	1769.7	15.04
<i>Cyclotella</i>	602.2	10.64	2185.3	18.50
<i>Fragilaria crotonensis</i> KITTON	104.0	1.84	110.7	0.94
<i>Melosira granulata</i> var. <i>angustissima</i> MÜLL.	29.7	0.53	—	—
<i>Nitzschia acicularis</i> W. SMITH	504.0	8.91	527.7	4.48
<i>Symedra acus</i> KÜTZ.	—	—	147.7	1.25
Other Bacillariophyceae	548.5	9.69	1764.5	14.90
<i>Planctonema lauterbornii</i> SCHMIDLE	81.4	1.44	—	—
Total of Chrysophyta	1869.8	33.05	4735.9	40.07
<i>Ceratium hirundinella</i> (O. F. MÜLL.) SCHRANK	43.0	0.76	32.8	0.28
<i>Cryptomonas erosa</i> EHR.	297.0	5.25	930.2	7.90
<i>Cryptomonas pusilla</i> BACHM.	755.5	13.35	1465.5	12.40
Total of Pyrophyta	1095.5	19.36	2428.5	20.58
<i>Chlamydomonas</i> sp.	229.7	4.06	81.2	0.69
<i>Lagerheimia genevensis</i> CHOD.	44.4	0.78	81.2	0.69
<i>Oocystis</i>	66.1	1.17	221.5	1.88
<i>Scenedesmus spinosus</i> CHOD	58.0	1.03	110.7	0.94
<i>Tetrastrum staurigeniaeforme</i> (SCHROED.) LEMM.	50.1	0.88	166.1	1.41
Total of Chlorophyta	448.3	7.92	660.7	5.61
Other algae (21 species)	1455.4	25.76	—	—
(19 species)	—	—	2185.2	18.70
Grand total:	5655.9	100.00	11780.0	100.00

## Acknowledgement

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*APHANIZOMENON ISSATSCHENKOI* (USSACZEW)  
PROSCHKINA-LAVRENKO ELŐFORDULÁSA A BALATONBAN

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**Összefoglalás**

1973. VII. 24.-én a Keszthelyi-öbölben vízszíneződést lehetett észlelni. Az ekkor merített vízmintákban előfordult az *Aphanizomenon issatschenkoi* (USSACZEW) PROSCHKINA-LAVRENKO kékalga. A faj az irodalmi áttekintés alapján új adatnak bizonyult a Balatonra. A cikk az alga leírását és a phytoplankton összetételének kvalitatív és kvantitatív analizisét tartalmazza (lásd táblázat).