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2, 2197376 - ,

e-mail: L.Voloshko@inbox.ru

³In-te of Microbiology, Academy of Sciences of the Czech Republic,
VÍde ská 1083, 14220 Praha 4, I 61388971, Czech Republic

« »
(- ,)

« » (.-)

LA LF,

SF608 – , F.

Planktothrix agardhii (Gom.) Anagn. et Kom. CALU1306

* (*Microcystis* (Kütz.) Elenk., *Anabaena* Bory

.). , -
, -
: , « » ,
(*Cyanophyta*), *Planktothrix agardhii*,

(*Cyanophyta*) (Drabkova et al., 1996; Gromov et al.,

1996; , 2005).
« » -

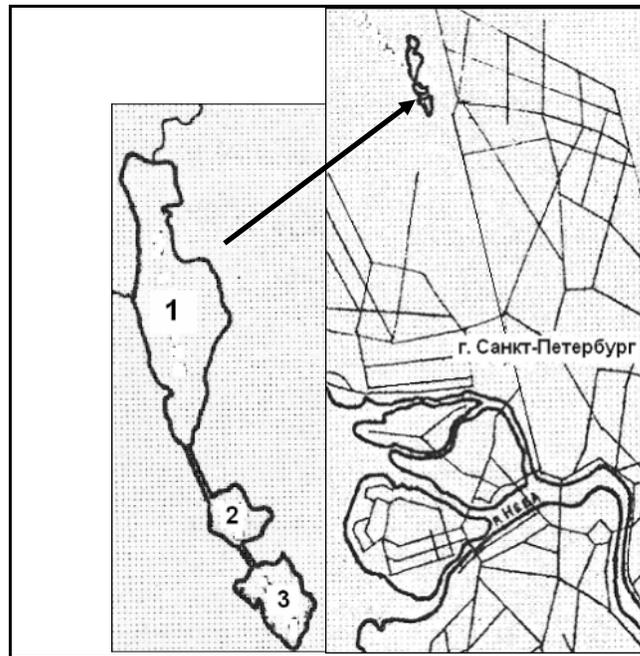
(, 2008; Voloshko et al., 2008b).

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* *Cyanobacteria* = *Cyanophyta*.

(, 1998).
 (~1²).
 pH
 ,
 .
 2 (, 2005).
 .
 ,
 .
 ,
 (, 2005).
 (78) - 2004-2005 . « »
 1-
 70 ° .
 .
 (200) 70 %-
 (6) 1
 4000 g 1
 (HPLC)
 .
 in
 vitro - SP2
 (Mosmann, 1983).
 ()
 (3 10),
 .
 1 .
 (200) 37 ° 5 . ;

() (10)
 5 . -
 , . . .
) (%
 Sunrise-Tecan 590-640
 (%),
 < 20 %
 ; 20-50 % - ; 50-80 % -
 ; >80 % -
 (Cannel et al., 1988). (Sigma) 50 mM tris-HCl (7,6)
 150 . . -1. N-
 -D,L- -p- (BARNA; 4,6),
 100 . 50 10
 37 °
 5 . 115
 Sunrise-Tecan 37 ° 30 60
 410 . ,
 >50 %.



.1. - : 1- ; 2- ; 3-

(Ellman et al., 1961; Mahmood, Carmichael, 1987),

Sunrise-Tecan. 125
(8,0), 50 . . -⁻¹ , 25 7,6 M
5,5- -2- 20

30 6,2 - (I)
5- -2- (TNB).

12 30 ° . 412 10

(100 % - , -
).
50 %, .

HPLC-

HP 1100 Mass Spectrometer MSD SL-Ion Trap (Meriluoto, Eriksson, 1988).

Zorbax XDBC8 (4,6×150). -
(30 100 %- 30)
0,6 . -⁻¹ 30 ° .
20 .

: - «ion-trap» -
(PDA).
230 (10-25).
- (m/z)
(MSI).

(-) , -
[+]⁺,
[+ Na]⁺ [+]⁺,
[+ -₂]⁺.

(1997 .)

30 · 10⁻³ .
Planktothrix agardhii (, , 2005),
80 %
Anabaena flos-aquae,
A. lemmermanii, *A. spiroides*, *Microcystis aeruginosa* *M. wesenbergii* (. 1).
50
(Skulberg, 2005).
(Sivonen, 1996).
(Skulberg, 1993; Gromov et al.,
1996).
15 , 11
(. . 1).

1. *Cyanophyta* 2005 .

<i>Anabaena flos-aquae</i> (Lyngb.) Bréb.	Porter, 1887
<i>A. lemmermanii</i> P. Richt.	Fitch et al., 1934
<i>A. planctonica</i> Brunnth.	–
<i>A. spiroides</i> Kleb.	Beasley et al., 1983
<i>Aphanizomenon flos-aquae</i> (L.) Ralfs	Jackim, Gentile, 1968
<i>Chlorogloea microcystioides</i> Geitl.	–
<i>Gloeocapsa turgida</i> (Kütz.) Hollerb.	–
<i>Gloeotrichia echinulata</i> (J.E. Smith et Sowerby) P. Richt.	Ingram, Prescott, 1954
<i>Merismopedia tenuissima</i> Lemm.	–
<i>Microcystis aeruginosa</i> (Kütz.) Kütz.	Hughes et al., 1958
<i>M. wesenbergii</i> Kom.	Gorham, Carmichael, 1988
<i>Planktothrix agardhii</i> (Gom.) Anagn. et Kom.	Skulberg, Skulberg, 1985
<i>Snowella lacustris</i> (Chod.) Kom. et Hind.	Gorham, Carmichael, 1988
<i>Synechocystis aquatilis</i> Sauv.	Lincoln, Carmichael, 1981
<i>Woronichinia naegeliana</i> (Ung.) Elenk.	Berg. et al., 1986

in vitro c

SP2 39 % -

(. 2).
(Mahmood, Carmichael, 1987)

22 %-

-a().

2 .

SP2 (%)

(%)

Planktothrix agardhii

		<i>P. agardhii</i>
	39	37
	-	99
	22	28

- () *Anabaena flos-aquae*
A. lemmermannii (Carmichael et al., 1997).

, $50 = 20 \cdot 10^{-1}$ (Carmichael et al., 1997).

HPLC (Bláha, Maršálek, 2000). HPLC

LA LF (. 2, . 3). 50
 $50-1000 \cdot 10^{-1}$.

LA

; 50 $50 \cdot 10^{-1}$ (Botes et al., 1985).

(Carmichael, 1994).

Amanita phalloides Link. (Carmichael, 1997).

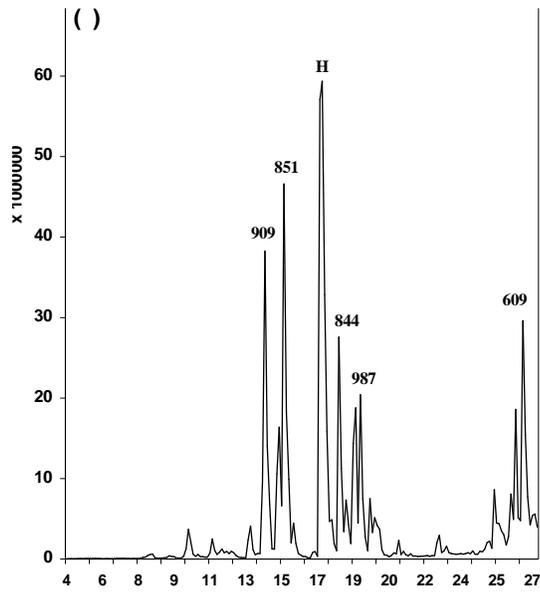
(Bell, Codd, 1994).
Anabaena, *Anabaenopsis*, *Microcystis*, *Nostoc*
Planktothrix.

(Sivonen, Jones, 1999).
 ()
 - 1 . -1,
 (Rantala et al., 2004).

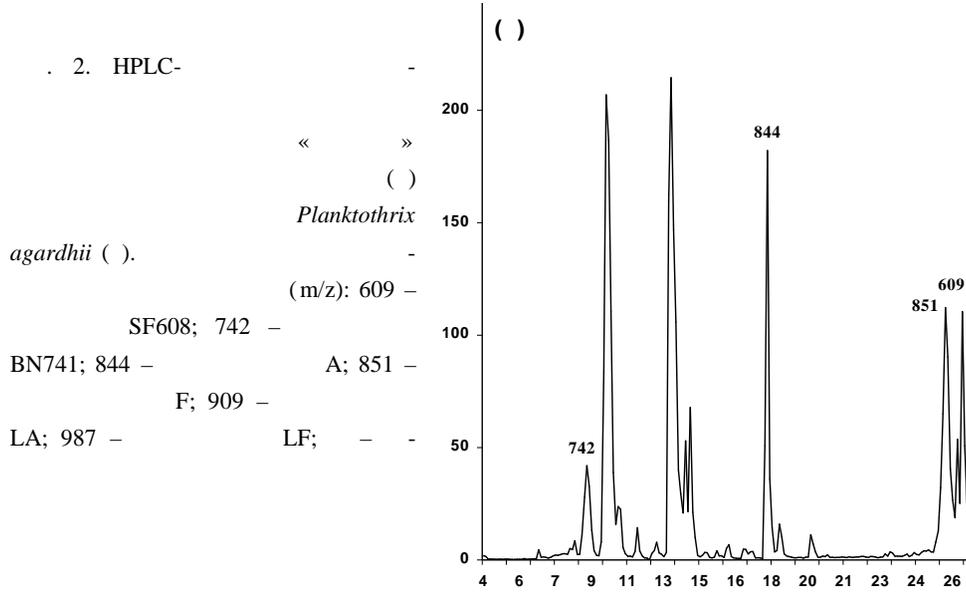
3.
 (PI - ; EI - ; -
 , -)

[+] ⁺				
				<i>Planktothrix agardhii</i>
605.5		-	+	-
609	SF608	PI	+	+
742	BN741	PI	-	+
775		-	-	+
844	A	EI	+	+
846		-	-	+
851	F	PI	+	+
909	c LA		+	-
987	c LF		+	-

(),
 ,
 SF608,
 F.
 LA,
 F (m/z 605.5),
 298-A.



2. HPLC-



Planktothrix agardhii (CALU1360),
 « »
 , *P. agardhii*

(Luukkainen et al., 1993). 2000 .

(PSP),
(Pomati et al., 2000).
Planktothrix sp.
(Skulberg, 1993; Carmichael, 1997).
CALU1306

A, F SF608 (.
.2; .3).

(Kardinal, Visser, 2005).

LR *Microcystis*
aeruginosa

LR
« » , *Microcystis* spp. (Lahti
et al., 1997).

P. agardhii, *Microcystis*,
Anabaena .

(LPS),
LPS
(Weckesser,
Drews, 1979).
A, LPS.

(.-)
30 ·⁻³ .
Planktothrix agardhii.
in vitro c

SP2 39 %-

L.N. Voloshko ^{1,2}, A.V. Pinevich ¹, J. Kopecky ³, N.N. Titova ¹, P. Hrouzek ³ & P. Zelik ³

¹Department of Microbiology, St. Petersburg State University,
2 Oranienbaumskoye Chausse, St. Petersburg 198504, Russia
E-mail: L.Voloshko@inbox.ru

²Komarov Institute of Botany, Russian Academy of Sciences,
2 Prof. Popov St., St. Petersburg 197376, Russia

³Institute of Microbiology, Academy of Sciences of Czech Republic,
Videřská 1083, 14220 Praha 4, I 61388971, Czech Republic

WATER BLOOMS AND TOXINS PRODUCED BY CYANOBACTERIA IN THE LOWER SUZDALSKOE LAKE (SAINT -PETERSBURG, RUSSIA)

The analysis of freeze-dried phytoplankton biomass extracts collected during the water bloom in the Lower Suzdalskoe Lake (St. Petersburg) was performed using a high efficiency liquid chromatography method. The analysis revealed the presence of hepatotoxic microcystin LA and LF in the biomass, as well as other biologically active compounds – protease inhibitors microcin SF608 and anabeno-peptides A and F. Dangerous phytotoxins were not found in the biomass extract of the plankton dominant *Planktothrix agardhii* (Gom.) Anagn. et Kom. CALU1306. The presence of microcystins in the biomass is apparently due to the populations of other cyanobacteria (*Microcystis* (Kütz.) Elenk., *Anabaena* Bory, etc.). It has been concluded that the water bloom conditions require the effective control of environmental factors that cause eutrophication using chromatographic techniques, immunosorbent assays, and protein phosphatase tests.

Keywords: Suzdalskiye Lakes, water bloom, cyanobacteria (*Cyanophyta*), *Planktothrix agardhii*, biologically active substances, toxins.

... .. (Cyanophyta, Cyano-
bacteria) // – 2008. – **18**, 1. – . 3-20.

... ..
:
1998. – 68 .

... .. // – 2005. – **41**, 1. – . 3-12.

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