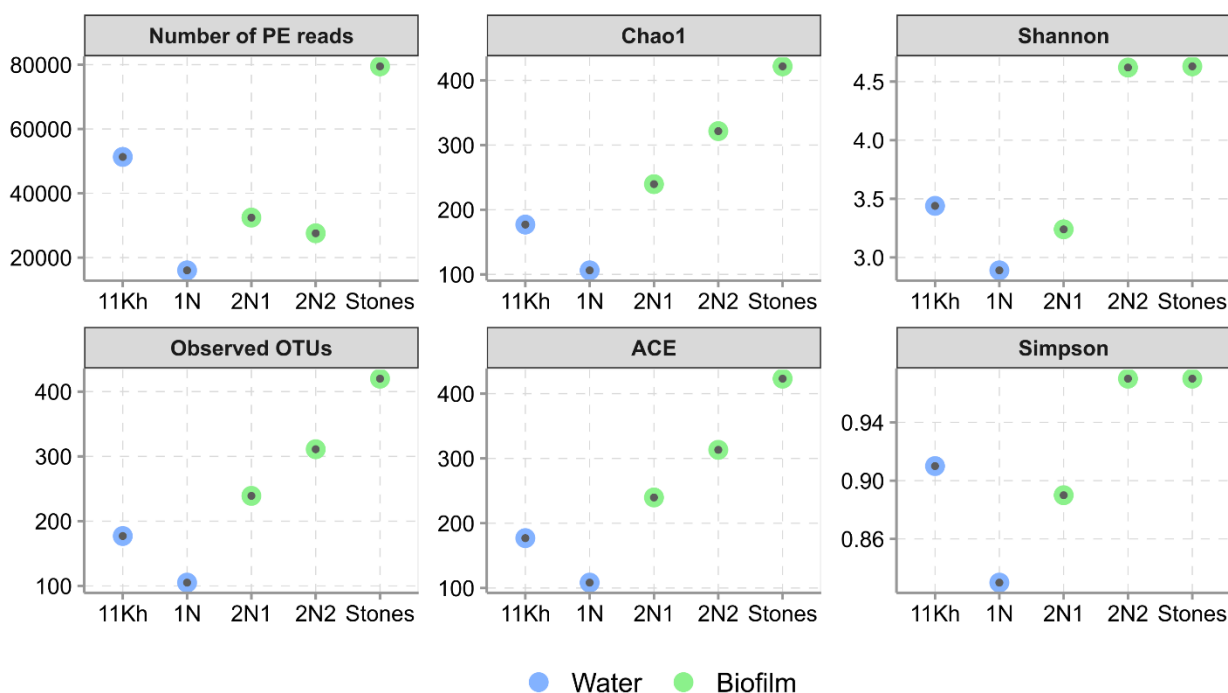


## Water Quality, Toxicity and Diversity of Planktonic and Benthic Cyanobacteria in Pristine Ancient Lake Khubsugul (Hövsgöl), Mongolia

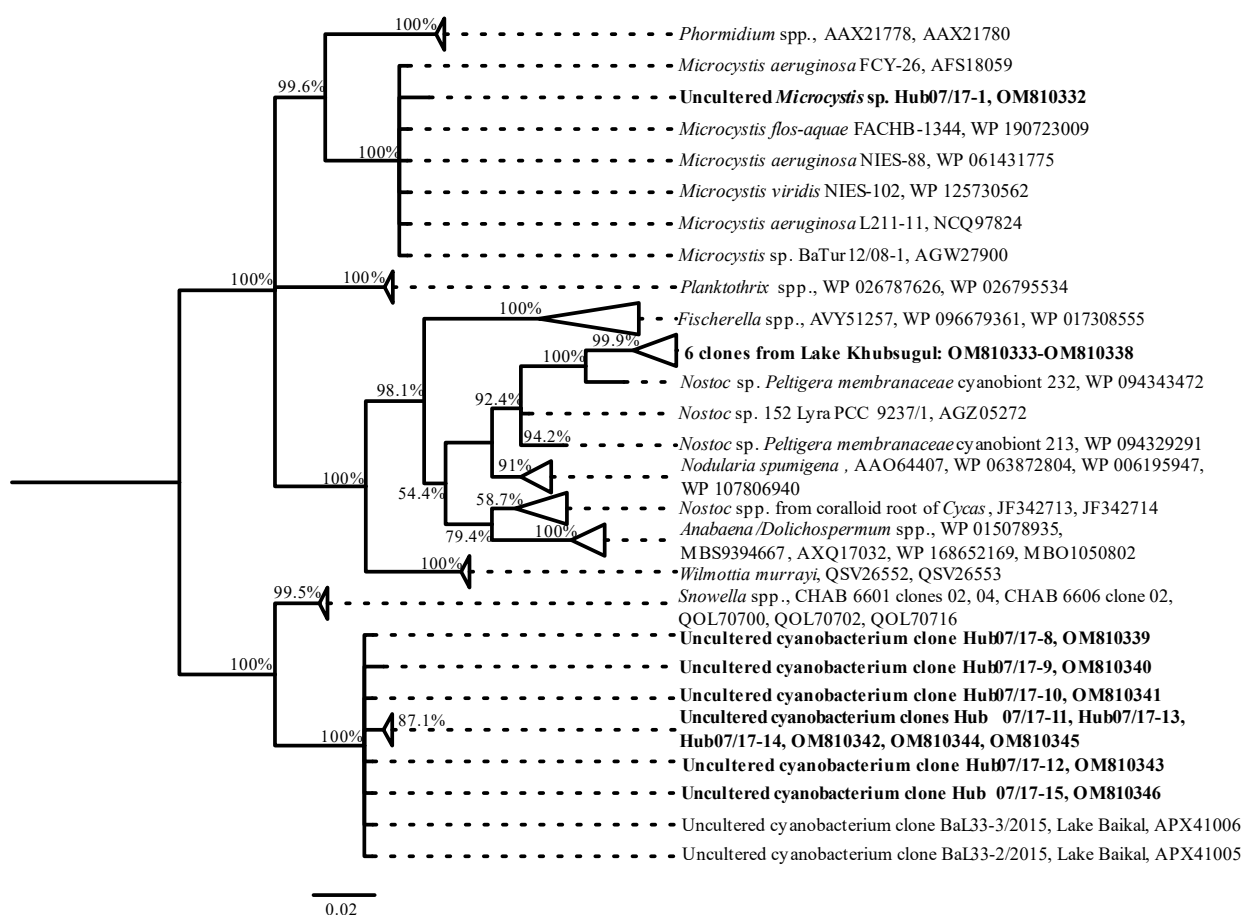
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**Table S1.** Cyanobacteria species composition, abundance and biomass in biofilms on stones (n=8) from Lake Khubsugul.

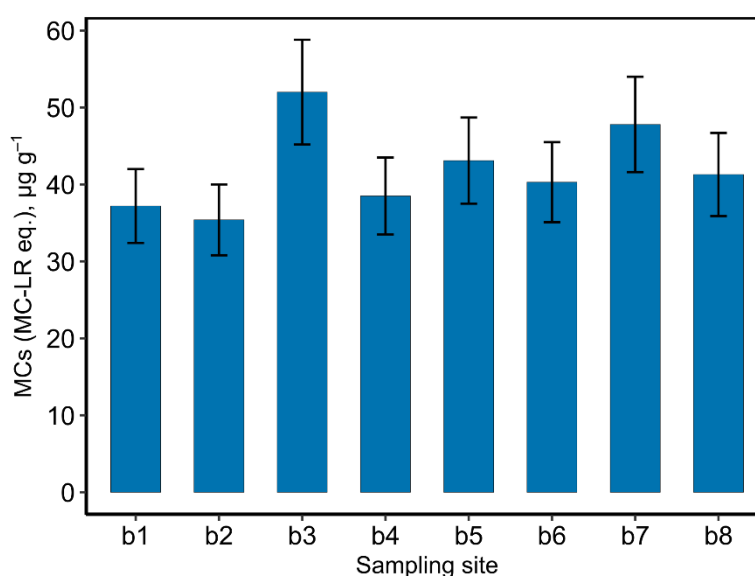
Species	Abundance, Ind. m <sup>-2</sup>		Biomass, g m <sup>-2</sup>	
	Mean	SD	Mean	SD
<i>Rivularia coadunata</i>	58115942	5039303	4407	303
<i>Leptolyngbya</i> sp.	17758152	3481410	3	0,49
<i>Nostoc</i> sp.	5448370	2431507	157	70
<i>Chamaesiphon subglobosus</i>	851449	224186	0,02	0,01
Total	81580616	6415337	4566	319



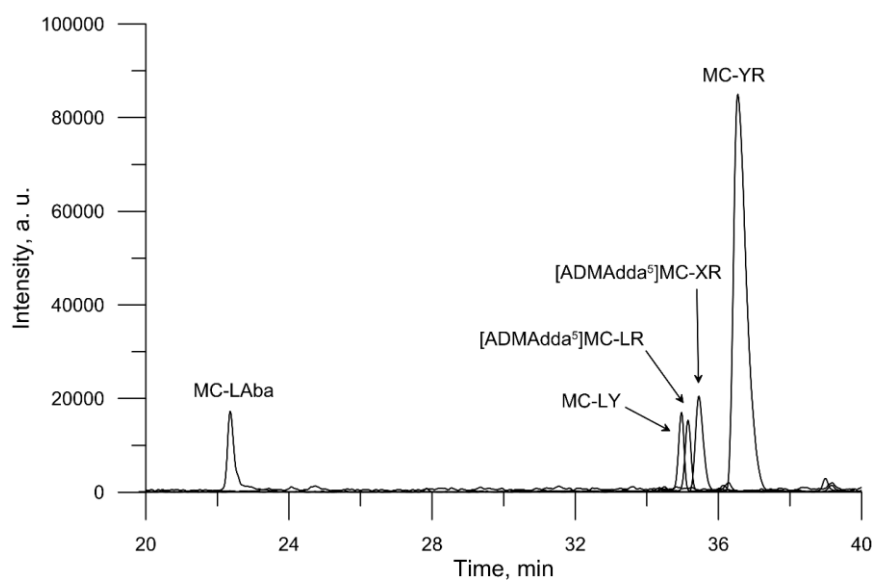
**Figure S1.** Number of pair-end reads, OTUs, and alpha-diversity indices for bacterial communities in the samples from Lake Khubsugul.



**Figure S2.** Unrooted phylogenetic tree obtained with MrBayes based on the alignment of *mcvE* gene sequences of cyanobacteria. Sequences from Lake Khubsugul are in bold. Bayesian posterior probabilities are indicated near their nodes. The scale bar shows 0.02 estimated substitutions per site.



**Figure S3.** Total MC concentration detected by ELISA in biofilms from stony substrates sampled in the coastal zone near Khankh settlement (st. "Stones"). Error bars represent standard deviation.



**Figure S4.** Extracted ion current chromatogram of microcystins from the Lake Khubsugul, integrated sample "Stones".

**Table S2.** Faecal indicator microorganisms in the water from Lake Khubsugul sampled on 11 to 14 July 2017.

No	Sample	Total coliforms, CFU in 100 ml	Thermotolerant coliforms, CFU in 100 ml	<i>E. coli</i> , CFU in 100 ml	Enterococci, CFU in 100 ml	Coliphages, PFU in 100 ml
1	1H, 0 m	0	0	0	4 ± 1	0
2	2H, 0 m	5 ± 1	4 ± 0	4 ± 0	6 ± 0	0
3	3H, 0 m	1 ± 0	1 ± 0	1 ± 0	0	0
4	4H, 0 m	0	0	0	1 ± 0	0
5	5H, 0 m	54 ± 2	0	0	2 ± 0	0
6	6H, 0 m	2 ± 1	2 ± 1	2 ± 1	1 ± 0	0
7	7H, 0 m	0	0	0	0	0
8	8H, 0 m	2 ± 1	2 ± 1	2 ± 1	0	0
9	9H, 0 m	24 ± 2	0	0	0	0
10	10H, 0 m	0	0	0	0	0
11	1N, 0 m	0	0	0	0	0
12	1N, 5 m	0	0	0	0	0
13	1N, 10 m	0	0	0	0	0
14	1N, 15 m	0	0	0	0	0
15	1N, 25 m	0	0	0	0	0
16	11Kh, 0 m	0	0	0	2 ± 1	0
17	11Kh, 5 m	0	0	0	0	0
18	11Kh, 10 m	0	0	0	2 ± 1	0
19	11Kh, 15 m	2 ± 1	2 ± 1	2 ± 1	0	0
20	11Kh, 25 m	2 ± 1	2 ± 1	2 ± 1	0	0

Note: CFU – colony-forming units; PFU – plaque-forming units.

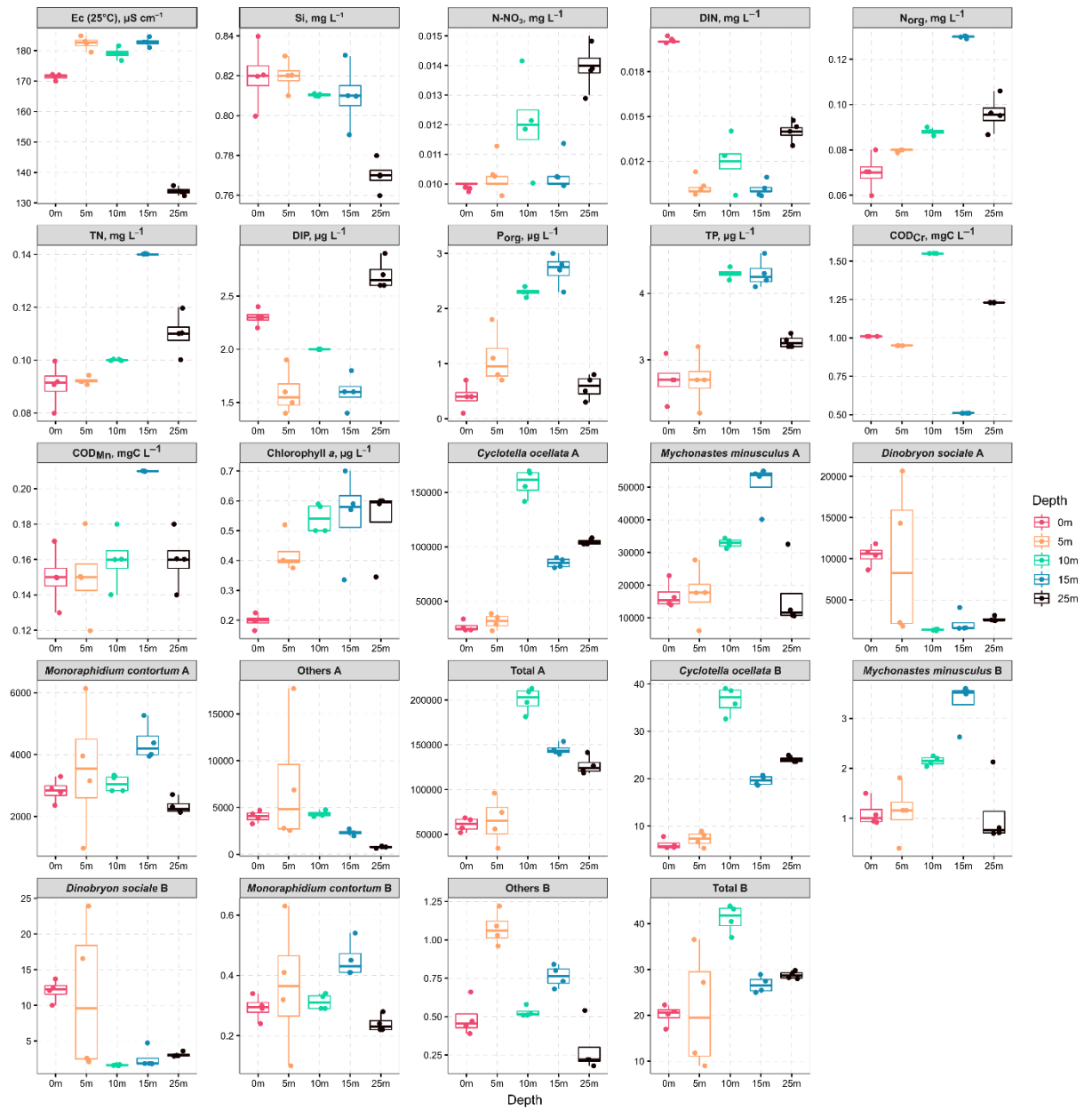
**Table S3.** Guideline values of water safety indicators in surface water according to normative documents of the Russian Federation [68–70].

Water use category	Total coliforms, CFU in 100 ml	Thermotolerant coliforms, CFU in 100 ml	<i>E. coli</i> , CFU in 100 ml	Enterococci, CFU in 100 ml	Coliphages, PFU in 100 ml
Category I	≤ 1000	≤ 100	≤ 100	≤ 100	≤ 10
Category II	≤ 500	≤ 100	≤ 100	≤ 10	≤ 10

Note: CFU – colony-forming units; PFU – plaque-forming units.

**Table S4.** Results for Kruskal-Wallis test based on depth factor dependence.

Factor	n	statistic	df	p.adj	p.adj.signif
Ec_25°C	20	16.729	4	0.00218	**
Si	20	10.271	4	0.0361	*
N <sub>org</sub>	20	17.414	4	0.00161	**
TN	20	16.484	4	0.00243	**
DIP	20	17.386	4	0.00163	**
P <sub>org</sub>	20	16.171	4	0.0028	**
TP	20	16.514	4	0.0024	**
COD <sub>Cr</sub>	20	18.286	4	0.00109	**
COD <sub>Mn</sub>	20	10.529	4	0.0324	*
Chl_a	20	11.143	4	0.025	*
Cyclotella_ocellata_A	20	17.513	4	0.00154	**
Mychonastes_minusculus_A	20	13.900	4	0.00762	**
Dinobryon_sociale_A	20	13.657	4	0.00847	**
Monoraphidium_contortum_A	20	11.037	4	0.0262	*
Others_A	20	14.314	4	0.00636	**
Total_A	20	17.171	4	0.00179	**
Cyclotella_ocellata_B	20	17.513	4	0.00154	**
Mychonastes_minusculus_B	20	13.910	4	0.00759	**
Dinobryon_sociale_B	20	13.657	4	0.00847	**
Monoraphidium_contortum_B	20	10.829	4	0.0286	*
Others_B	20	15.953	4	0.00308	**
Total_B	20	13.657	4	0.00847	**



**Figure S5.** Boxplots for nutrient concentrations in different depth water layers in Lake Khubsugul. Non-parametric Kruskal-Wallis test was executed to assess if there is any significant difference between the average nutrient concentrations in different depth layers of water. Abbreviations: A – abundance, B – biomass.