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Zagreb, 24.03.2017.

REPORT ON THE THESIS

PhD Dissertation

Title: Biodiversity of phytoplankton in Lake Stechlin (Germany)

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SUMMARY

The thesis titled *Biodiversity of phytoplankton in Lake Stechlin (Germany)*, makes a significant scientific contribution to the investigation of processes related to climate change, which affect the phytoplankton assemblages and biodiversity of Lake Stechlin.

Phytoplankton, as the main component of primary production in freshwaters, drives lentic aquatic ecosystem functioning. The investigation of phytoplankton assemblage in lotic system is a valuable scientific work in general. It brings advancements in ecological investigations and it is a good predictor of environmental changes in taxonomical and functional way. Extending the knowledge of phytoplankton succession is very important to understand and evaluate better the results of monitoring assessments, and also conservation of aquatic ecosystems. Climate change brings significant shifts in ecosystems, mostly critical for the biota. So, investigation of sensitive oligotrophic lakes is crucial considering these issues, especially investigations of autotrophic component such as phytoplankton. A change in phytoplankton assemblages is usually the first sign of changes in ecosystem, and it is very well used in this dissertation for resolving the main topic and hypothesis of the thesis.

The statement of the problem

The problem under investigation is phytoplankton biodiversity in Lake Stechlin, the effect of extreme weather events and deepened thermocline on its succession by application of

functional approach; and concern about potential toxicity and equilibrium condition which offer spatial and niche segregation for DCM- forming cyanobacteria. According to thesis points this dissertation satisfies the required characteristics to consider it as a relevant scientific investigation. This thesis answers the question of possible effects of global climate change on the phytoplankton community using mesocosm experiments and accordingly addresses an important problem from a scientific point of view.

The specification of the research methodology

An oligo-mesotrophic, mostly dimictic lake, Lake Stechlin located in North-eastern Germany, was chosen as a study area. For the purpose of the project the microcosm experiment was established considered 24 large-sized enclosures and a central reservoir built in the south basin of the Lake. The standard Utermöhl methodology was used in the investigation of the phytoplankton. This methodology is consistent with the objectives, it is pertinent and most appropriate at the present time and within the context. Also, in methodology section the candidate correctly specified all of the steps following the sampling, identification and counting. The phytoplankton was considered taxonomically and using functional approach. Statistical analyses are adequate and well presented. Using program R statistical analyses were well adjusted to particular object of the thesis.

The materials and methods used are suitable for addressing questions posed in the dissertation.

Overall evaluation

The doctoral dissertation of Selmeczy Géza Balázs is written in English language and comprises of 101 pages, 216 references, 29 figures and 9 tables.

The thesis begins with a thorough and comprehensive overview of the required preliminaries and previous results obtained by scientists who have contributed towards research topics. Literature review is well done and it is up to date. The scope of references demonstrates the extensive literature usage and the candidate's ability to select relevant literature for a given topic.

The hypothesis and objectives are specified correctly and in the original manner. The fundamental theories presented in the thesis have consistency and they can be proved.

Subsequent chapters contain significant new results devoted to:

1. Possible effects of global climate change, specifically the effect of an extreme weather event, on the phytoplankton community of Lake Stechlin in mesocosm experiments. Objective was to study how the hydrological parameters of the lake will be affected by a simulated summer storm in large mesocosm facilities, what will be the impact of these changes on the phytoplankton community and how will it change the ratio of phytoplankton functional groups.
2. Effect of the deepened summer stratification on the summer phytoplankton assemblage of Lake Stechlin. And the main goal of the experiment described in this chapter was to mimic a deepened thermocline during the summer stratification in large size mesocosms.

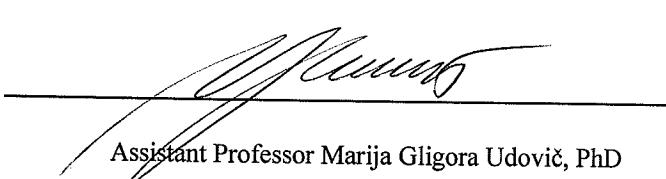
3. Toxin production in Lake Stechlin. Thus, the aim was to detect genetic potential to produce microcystin and other cyanotoxins in Lake Stechlin, not only related to mass-developing cyanobacteria, but also those, which constitute a minor part of the cyanobacterial community of the Lake.
4. Spatial and niche segregation in Lake. The main idea was to investigate whether or not the three populations were vertically segregated.

The main results can be summarized as follows: summer storms can have a major effect on phytoplankton community dynamics and may transfer to higher trophic levels, the climate change is likely to result changes in the stratification because of the increasing temperature and 2 meter deeper epilimnion than the average epilimnion had a significant effect on the phytoplankton community. During the last 15 years biomass of cyanobacteria increased substantially in Lake and toxins were produced by low biomass representatives, and not by the dominants. During the analyses a rarely occurring deep chlorophyll maximum was observed with spatial niche segregation close to equilibrium conditions.

All presented results support the thesis and all results are presented adequately. There is internal consistency between the theory and the practice. The results were discussed in critical fashion, proposing other issues for further investigation, are well cited, and new valuable conclusions that can be implemented in both scientific and monitoring investigations have been generated.

The assessment of the report submitted as a thesis

Doctoral dissertation of Géza Balázs Selmeczy is an independent, cohesive scientific work of high academic merit. It is made according to the proposed topic and aims of the thesis. By its formulation of research questions, methodology, theoretical and empirical foundation, documentation, treatment of the literature, form of presentation and original scientific contribution, it satisfies the standards. The formulation of the thesis is correct and well planned. All the arguments and presented conclusions are tenable. The dissertation generates new academic knowledge and it is of sufficiently high quality that has been published or it is prepared for publishing. With his doctoral thesis the applicant Géza Balázs Selmeczy showed that he is able to competently introduce the scientific problem and successfully solve it. With the selection of literature sources and the discussion of his own results he showed the ability of critical thinking and scientific awareness. Based on the positive evaluation I find the dissertation to be of sufficient quality to be defended in a public disputation. Dissertation of **Géza Balázs Selmeczy: Biodiversity of phytoplankton in Lake Stechlin (Germany)** is based on his own original research and, in case of successful public defence, I suggest providing the PhD qualification to the applicant.



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