OPINION

by Prof. Dr. Yordan Ivanov UZUNOV,

Member of the Scientific Jury, appointed by Order No. 18/26.01.2024

of the Director of IBER-BAS, for the defense of the PhD thesis:

STRUCTURE AND FUNCTIONS OF HYDROZOOCENOSES IN TEMPORARILY DRYING WATER BODIES,

by PhD student Pencho Danchev Ivanov

for awarding educational and scientific degree "Doctor of sciences/PhD" in the scientific qualification Hydrobiology (code 06.01.11)

The PhD candidate is enrolled in doctoral studies at the Department "Aquatic Ecosystems" of IBER-BAS with duration 01.2013-01.2017, according to Order No. 310/27.12.2012. However, the Individual Learning Plan was only adopted in April 2014. Among the documents presented by Pencho Ivanov, there are none addressing the extension of the period of study in 2018, as implied in his CV. The collegium of the Department of Aquatic Ecosystems has discussed the results and decided to allow the dissertation of his thesis with a defense procedure held on January 11, 2024.

During the period of the PhD studies, the Individual plan was fully implemented and the achieved results were evaluated with 350 credit points. Two full-text reports and one article were published in the journal Proceedings of the Bulgarian Academy of Sciences; two reports were presented in scientific forums held in 2015 and 2016 with international participation. All papers are on the topic of his dissertation.

The PhD thesis was prepared in full compliance with the requirements of IBER Regulations, respectively with the national and academic guidelines. The obtained results are presented on 168 pages, incl. 79 figures, 4 tables and 13 pages of appendices. The bibliography list features 111 titles, of which only 7 are in Cyrillic (mainly aid/identification literature, and regulations), the remaining 104 are in Latin. A good command of 4 foreign languages gives the PhD candidate access to diverse literature sources, which he skillfully handles. It is noteworthy that 58 titles (58%) were published after 2000, and 17% were after 2020. This is indicative of his good awareness and relevance of the cited literature sources.

The main goal of the study, with respect to his doctoral thesis, is to trace the composition and dynamics of zooplankton and zoobenthos in waterbodies with variable hydrological conditions, which dictate the behavior of the physical and chemical parameters of the investigated sites. Four stagnant waterbodies have been selected for the study: the karst lakes *Lilov vir* and *Dragomansko blato*, *Aldomirovo blato* and the artificial lake *Ariana*, as standing reservoirs with different degrees of drying. As examples for drying rivers, the mouths of the Black Sea rivers *Silistar* and *Butamyata* were chosen. However, the latter are flooded almost all year round, incl. and during the dry seasons; where is no water current present, but there is a constant water surface, free of aquatic vegetation next to the sandbar that separates them from the sea. Field observations and measurements were carried out in the periods Apr-Aug 2012, 2013, 2014, 2015, and in 2016 samples were taken only from *Dragomansko blato*. The river sites were visited in the

summers of 2013, 2014 and 2015. The total number of samples collected was 155, of which 79 zooplankton and 76 zoobenthos. A total of 56 samples were collected from the four river sites. In parallel, measurements of a number of hydrochemical and physical indicators were carried out, according to the approved requirements for assessing the ecological condition in Bulgaria. The applied methods for collection, primary and subsequent processing of materials and data correspond to the accepted standard methods. However, the comprehensive arsenal of statistical and other methods adopted by the PhD student to process the obtained results is striking, as well as his command of the classic cenotic indicators e.g. Warwick's ABC-curves, qualitative modeling, cluster, ordination, hierarchical, multifactorial and other analyses, etc.

Subsequently, the PhD student`s analyzes and summarizes chemical, physical and hydro-morphological parameters of the investigated waterbodies; the species composition, abundance and structure (species and trophic) of the studied communities in standing and flowing conditions, skillfully using the selected statistical methods to show and prove the role of the hydrological and human factors in the formation of the benthic and planktonic zoocenoses.

On this basis, the presented conclusions follow directly from the data analyzed above. The unevenness in the arrival of the primary materials, their shortage in certain cases is compensated by the well-chosen statistical methods, therefore I trust the conclusions formulated in this way. The contributions are also formulated objectively, and tied to the achieved results. As for the recommendations, they are somewhat vaguely defined and lacking an addressee.

I have shared my critical notes with the PhD student in advance; most of them have been accounted for; the texts/illustrations have been corrected accordingly. However, my conflicted opinion remains regarding the choice of the urban lake *Ariana* as a suitable object for the topics' aims and tasks of the dissertation formulated as there are.

There is no doubt that in the upcoming (likely significant) periods of drought and increasingly shortened hydroperiods, any measures taken to ensure the construction of water corridors and to protect the quality and ecological status of the decreasing water levels in our water economy, will be a serious challenge for hydrobiocenoses and in general for hydroecosystems to provide humans and society with many ecosystem services.

In conclusion: The dissertation presented by the PhD student Pencho Danchev Ivanov on the topic "Structure and functions of hydrozoocenoses in temporarily drying water bodies" fully meets the requirements for awarding the scientific educational degree "Doctor" in Hydrobiology with its relevance, comprehensiveness, pioneering nature and proven statistical presentation of the results. I strongly urge the honorable Scientific Jury to vote for awarding this degree to Pencho Danchev Ivanov.

Sofia, April 20, 2024

Prepared the opinion:

Prof. Dr. Y. Uzunov,
Member of the Scientific Jury