

Opinion

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Subject: Competition for Associate Professor in Hydrobiology - announced in the State Gazette issue No. 36 of 23.04.2024.

In the announced competition for the academic position "Associate Professor" at IBEI - BAS, the only candidate is Assoc. Dr. **Hristina Vassileva Kalcheva**. In my opinion the documents of Dr. Kalcheva submitted for participation in the competition for "Associate Professor" in the professional field 4.3. Biological Sciences, scientific specialty Hydrobiology (01.06.11) for the needs of the research group Invasive Alien Species, section Biodiversity and Functioning of Freshwater Ecosystems, are completed according to the requirements of the Law of the Development of Academic Staff in the Republic of Bulgaria.

The applicant submitted a total of **43** scientific papers for the competition. In my opinion, they are entirely on the theme of the competition.

The presented works are grouped in sections:

1. Publications connected with the dissertation theses for obtaining a doctoral degree - **8 pcs**.
2. Publications submitted for the procedure for competition for associate professor are **35 pcs**.
27 abstracts from participation in **18** international and national scientific conferences are also presented in a separate list. I believe that they are also an important illustration of Dr. Kalcheva's scientific activity at scientific forums.

The scientific interests and contributions of the candidate in the habilitation competition are diverse, related to the study of communities in different types of water bodies in Bulgaria and in other countries. The main focus of Dr. Kalcheva's research is on the study of bacterioplankton of water bodies and is directed towards the study of the dynamics of its quantitative parameters in temporal and spatial aspects. Relationships of bacterioplankton with environmental factors and with other communities of grazing (independent) trophic networks such as phytoplankton, zooplankton, macrophytes, fishes, etc. under conditions of climatic changes and presence of alien, invasive species are studied too.

The subject of research in the publications of Dr. Kalcheva requires the use of numerous mathematical and statistical methods what are used in modern hydrobiological practice. She skillfully handles these methods, the results of which she uses in interpreting the data obtained and forming relevant conclusions.

From the submitted list of publications, the total number of papers in IF journals, refereed and indexed - are 20. Chapters of books/monographs in which the candidate participated are 4 pcs. Publications in journals without IF or SJR (some indexed in WoS and Scopus), and in conference proceedings are 10 pcs.

In each of the presented papers Dr. Kalcheva is co-author with colleagues from the country and/or abroad. **In my opinion, her publication activity shows the author's ability to work in scientific teams and solve relevant scientific problems.**

The applicant has attached a reference from which it is evident that up to the present moment he has participated in **14** funded - scientific projects with external funding for BAS.

In the works submitted for the competition, the contributions of the Dr. Kalcheva's contributions are grouped into relevant Hydrobiological directions, the most significant of which are, in my opinion, the following:

1. Freshwater microbial ecology and complex ecosystem studies in:

Studies of water bodies in the Danube floodplain terrace and the Danube River. Particularly useful, in my opinion, are her contributions related to the study of the swamps of Beliane Island and their connections with the course of the Danube River. Her scientific contributions in the search for the links between the communities of the standing water basins and those of the Danube in the Hungarian sector of the river are valuable. Finding positive correlations between the abundance of zooplankton of the order Cladocera and suborder Calanoida with the abundance of bacterioplankton indicate the crucial interactions between these two important aquatic communities. It seems logical that the abundance of bacterioplankton is directly related to the hydrological regime of the river. The seasonal and spatial development of bacterioplankton, its negative relationship with dissolved organic carbon (DOC) and its positive correlation with the amount of biogenic elements and chlorophyll-a indicate that bacterioplankton is actively involved in the degradation of dead organic matter. The process is basic for water selfpurification, with remineralisation of biogenic elements for the needs of phytoplankton in the respective wetlands. Dr Kalcheva believes that the significant difference in nitrogen and phosphorus concentrations in Hungarian and Bulgarian wetlands is due to the presence of a flushing effect in Hungarian wetlands what are situated near by Danube river and cooncted with it. This is due to their effective connection with the river and its minimisation or complete absence in the Bulgarian ones. As a result, Bulgarian marshes often have oxygen deficiency causing denitrification and mobilisation of phosphorus from the sediment. Therefore, they show higher total phosphorus concentrations and lower total nitrogen concentrations than Hungarian riverine wetlands.

The candidate's research on bacterioplankton of the Srebarna eutrophic water body and Danube river, as well as the search for the causes of its accelerated eutrophication, have a strong contribution in my opinion.

2. Invasive alien species - spread, routes of introduction, prevention and management.

As the Danube River is one of the main transport routes for the introduction of alien, invasive species in Europe, the data obtained by the applicant are particularly valuable for understanding the invasion mechanisms of the water bodies and catchment areas concerned.

Studies of 49 dams 23 of them affected and 26 unaffected by *Dreissena* spp. were compared based on original and literature data. They reveal the impact of mussels on ecosystems and specifically on bacterioplankton and its spatial and temporal development. The relationship between water column transparency, total phosphorus (TP) and chlorophyll-a (Chl) concentrations in these dams was sought.

Thanks to both the active participation and research of Dr. Kalcheva, two networks for invasive species have been established and are operational - the Eastern and Southern European Network for Invasive Alien Species (ESENIA) and the Danube Invasive Alien Species Network (DIAS). The obtained data show the need for cooperation and coordinated actions related to invasive alien species at regional level.

3. Influence of organic fertilization on primary production and other environmental factors in carp ponds with fish production applications.

The resultant relationships may contribute to increased production in carp fish farming ponds. Also assist in improving management practices for better water quality in fish farm ponds. Three fertilized and four control carp polyculture ponds were analyzed. The aim was to establish relationships between biotic and abiotic factors and their influence on primary production. The effect of manure on the ponds was sought. The relationship of nitrate-nitrogen with gross primary production was found, followed by an increase in chlorophyll-a concentration and N/P ratio in fertilized ponds. The influence of top-down control on the food chain is exerted by the zooplankton. Plankton respiration in fertilised ponds shows a positive relationship with chlorophyll-a, nitrate ions and total nitrogen. In control ponds, zooplankton abundance is positively correlated with water flow. There was a negative correlation between nitrate-nitrogen and water transparency. The results provide opportunity to improve existing production management practices in fish farms. The results of a three-year experiment in fertilized and control carp ponds were analyzed to establish relationships between abiotic factors, their influence on primary plankton (PP) production, and fertilization effects. Large seasonal (monthly) variations reduce the ability to differentiate differences between fertilized and

control ponds. Abiotic factors such as oxygenation, dissolved oxygen content and pH in fertilized ponds were higher than in control ponds. Increased level of oxygenation, phosphate phosphorus and pH was found in the fertilized ponds in the last year.

4. Application of statistical methods in data analysis in other hydrobiological studies:

The ecological characteristics of 17 species of the family Taeniopterygidae (Insecta: Plecoptera) in Bulgaria were analyzed. The main environmental factors that determine the distribution and abundance of the species from the family Taeniopterygidae in Bulgarian rivers are the 11 substrate types, altitude, oxygen saturation and dissolved oxygen, determined by multivariate analyses (CCA) and non-parametric Spearman correlations. The conservation status of some species was assessed according to IUCN criteria.

In Dr. Kalcheva's research, numerous statistical analyses have been applied in the processing of results concerning both aquatic communities and ecotoxicological studies in which she has participated. These analyses have also been applied to studies of pesticides and forest ecosystems.

5. Scientific - applied contributions -

An important part of Dr. Kalcheva's research, in my opinion, is the linking of the results what she has obtained concerning the studied water bodies with the recommendations and guidelines given by the EU Water Framework Directive 2000/60.

A total of **98** known citations of her works are listed in the attached reference list. **Of these, 60 are in Web of Science and SCOPUS refereed journals and 38 in publications in non-impact factor journals and dissertations.** The attached known citations are significantly more than the required number specified in the law on the development of academic staff and the relevant regulations. I have found no self-citations or hidden self-citations in the attached list of citations.

Conclusion:

On the basis of the scientific and scientific-applied contributions contained in the submitted works, I consider that they are sufficient in number and quality and meet the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria. I consider that the Dr. Hristina Kalcheva has significant research experience in laboratory and field research. Principal asst. Kalcheva also has relevant expertise gained during work with alien, invasive species participating in relevant research projects. In my estimation, Asst. Dr. Kalcheva meets and exceeds the criteria of the competition for associate professor in Hydrobiology at IBEI - BAS. As a member of the scientific jury, I would recommend to the esteemed Scientific Jury of the competition, and to the esteemed Scientific Council of the

Institute of Biodiversity and Ecosystem Research to award the academic position of Associate Professor to Dr. Hristina Kalcheva.

Date: 18.08.2024

Assoc. Prof. Dimitar Kozhuharov