Bx.№ 780/ HO-05-06/15.08.2024г.

REVIEW

FROM PROF. DR. ZDRAVKO HUBENOV – NATIONAL MUSEUM OF NATURAL HISTORY, BULGARIAN ACADEMY OF SCIENCES OF THE MATERIALS, PRESENTED FOR PARTICIPATION IN A COMPETITION FOR THE ACADEMIC POSITION OF **Associate Professor** in the field of HIGHER EDUCATION 4. NATURAL SCIENCES, MATHEMATICS AND INFORMATICS; PROFESSIONAL DIRECTION 4.3. BIOLOGICAL SCIENCES; SCIENTIFIC SPECIALITY **HYDROBIOLOGY** FOR THE NEEDS OF THE DIVISION OF BIOLOGICAL DIVERSITY AND FUNCTIONING IN FRESH WATER ECOSYSTEMS OF THE DEPARTMENT OF AQUATIC ECOSYSTEMS AT THE INSTITUTE OF BIODIVERSITY AND ECOSYSTEM RESEARCH AT THE BULGARIAN ACADEMY OF SCIENCES, PUBLISHED IN THE SG, ISSUE Nº 36, 23.04.2024

By order № 45 from 20.06.2024 of the Director of the Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences I was appointed a member of the scientific jury in a competition for the academic position of Associate Professor in the field of higher education 4. Natural Sciences, Mathematics and Informatics; professional direction 4.3. Biological sciences (scientific speciality – Hydrobiology), for the needs of the division of Biological diversity and functioning in fresh water ecosystems (research group Invasive alien species) at the Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences.

Chief Assistant Dr. Hristina Vasileva Kalcheva from the Department of Aquatic Ecosystems at the Institute of Biodiversity and Ecosystem Research participates in the announced competition as a candidate.

CAREER DEVELOPMENT

Hristina Kalcheva graduated with a master's degree in Biology at the Sofia University St. Cl. Ohridski - (with specializations in Hydrobiology and Water Conservation) in 1990. From 1990 to 2006, she was a nurse at the Sofia Medical University - Departments of Allergology, Endocrinology, Pediatrics and in the Faculty of Dental Medicine. Between 2005 and 2009 she was a doctoral student at the Institute of Zoology. In 2011, after the defense of her dissertation "Trophic importance of the bacterioplankton in stagnant freshwater ecosystems - interaction with abiotic and biotic factors in the pelagium" she acquired the educational and scientific degree "Doctor of Hydrobiology". From 2009 to 2012, she was an assistant at the Institute of Zoology and at the Institute of Biodiversity and Ecosystem Research. Since 2012, she has been the

Chief assistant. She has a series of specializations related to the molecular methods in the microbiology, food webs in terrestrial and aquatic ecosystems, identification of the microorganisms and cell cultures, water quality, GIS systems for wetland conservation, extremophilic microorganisms in the hypersaline lakes, phototrophic bacteria, statistical courses etc., acquired in Bulgaria, Romania, Germany, Spain and England. Dr. Kalcheva has worked on 14 national and international research projects. She participated in 37 international scientific forums and was an editor of 7 Proceedings of Scientific Forums. She is an author of 42 scientific publications, 35 of which submitted for participation in the competition. She has over 100 citations (60 in the publications to Web of Science with IF and Scopus with SJR).

The set of materials presented by Dr. Hristina Kalcheva (on paper and electronically) is in accordance with the Law for RASRB, the Regulations of the Bulgarian Academy of Sciences for application of the Law for RASRB and the Regulations on the terms and conditions for obtaining scientific degrees and for holding academic positions at the Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences. The set includes documents described in the application of the candidate (№ 1-9) to the Director of the Institute of Biodiversity and Ecosystem Research (from 18.06.2024) for admission to the announced competition for associate professor, scientific speciality Hydrobiology. The set contains the necessary documents and 35 scientific publications, presented for the competition. The documents are prepared precisely and clearly reflect the activities of Dr. Hristina Kalcheva.

The presented data show the qualification, research experience and scientific activity, required for participation in the competition for an associate professor.

MAIN DIRECTIONS AND CONTRIBUTIONS

The scientific contributions are significant, original and mostly fundamentally theoretical and scientific applied. The main part of them are hydrobiological, ecological, taxonomical, faunistic and conservation. Some of the contributions are toxicological, methodological and bibliographical. The contributions represent a new direction and prove with new means significant aspects of existing scientific fields. Some of them can be taken as the formulation of a new hypothesis and can contribute to obtaining a number of confirmatory facts. The contributions from the research presented in the publications of Dr. Hristina Kalcheva are in several directions.

Faunistic contributions. Phototrophic purple sulfur and green non-sulfur bacteria were found in the Danube River floodplain (B4.2). The bacterioplankton in the Hungarian sector of the Danube River was studied (B4.7). The species composition of the zooplankton (23 crustacean species) from the Danube River and adjacent wetlands in the Middle Danube region was studied, and 2 foreign crustacean species were found. The bacterioplankton in the Srebarna Lake was

studied (G8.1, G8.2) and the phytoplankton in 18 Bulgarian dams (G7.1). A review of 48 freshwater invasive alien species in the Danube River basin and 219 marine forms was made (G8.4). The data for 17 Plecoptera species in Bulgaria are generalized (G7.11).

Ecological contributions. The bacterioplankton has been studied comparatively in different types of water bodies and its morphological adaptations have been elucidated. The reasons for the mass development of purple bacteria are determined (B4.2). The importance of the river connectivity for the biodiversity in the stagnant wetlands along the rivers is clarified (B4.2, B4.7). A correlation was established between the phyto- and zooplankton (B4.7) and the degree of the zooplankton press depending on the water body. The differences in the nitrogen and phosphorus concentrations in the Hungarian and Bulgarian wetlands were determined (B4.1) and the reasons for these differences were clarified. The limiting role of the phosphorus in the Srebarna Lake was clarified (G8.1) and the lake is defined as mesotrophic. For the first time, a regression equation was derived for the phytoplankton, water level, chlorophyll-a and dissolved nitrogen (G8.3). The influence of Dreissena on the bacterioplankton in 3 dams was studied (B4.6). Greater variability was established in the affected dams. The trophic state of the dams and the mooving of the metabolism to the benthal (G7.2, G7.4) were determined. The composition and number of the phytoplankton in relation to the *Dreissena* invasion (B4.4, D7.2) in 52 water bodies were considered. An increase in the oxygen concentration and water transparency was established (B4.3). The chlorophyll-a and water transparency indicate the ecological status of the invasived stagnant water bodies (B4.5).

Scientific applied and methodical contributions. The studies on the Srebarna Lake confirm the dynamic nature of the bottom overlays and prove the need for fluidity of the waters (G8.2). The effect of the fertilization in carp farms was investigated (G7.6, G7.7). Toxicological studies on the use of pesticides, growth inhibition and their effect on the DNA of the control plants were carried out (G7.12). This technology makes it possible to identify mutations. In two tree species, the radial growth (annual rings) was investigated in relation to the leaf area and leaf weight (G7.5). The resulting indexes provide information for choosing suitable tree species and increasing the income from the forests. The effect of freezing with liquid nitrogen on the yield of chlorophyll-a and some pigments was tested. A coefficient for correcting measurements with an old spectrophotometer to modern data for chlorophyll-a is proposed (G7.3).

Conservation of the fauna. The data for 17 Plecoptera species from the family Teniopterygidae are generalized - distribution, ecological characteristics, types of substrates, altitude, dissolved oxygen and conservation status according to IUCN and endemism (G7.11). The role of the invasive species of the genus *Dreissena* on

the state of the stagnant water bodies was scrutinized (B4.3, B4.4, B4.6, D7.2, D7.4). The invasive species in the Danube River region (127 abstracts and 41 contributions) and their impact on the biodiversity were reviewed (G7.9). The possibility of coordination between the interested countries was considered (G8.4).

THE REFERENCE OF THE CONTRIBUTIONS correctly and accurately reflects the achievements of the participant in the competition. It contains the most significant results and conclusions from the research.

Indicators		Number of points	Number of the candidate's points
Α	1 – dissertation Doctor	50	50
В	4 – monographs or publications [Q3 (6), Q4 (1)]	100	102
г	7 – publications in the referenced journals [Q2 (2), Q3 (6), Q4 (1), SJR (4)]	12-25	182
	8 – book chapter or monograph, peer-reviewed editions [4]	4 x 15	60
	Total required minimum	220	242
д	100 – citations: in publications with IP – 60	60 x 2	120
	refereed and indexed – 40		
	Total required minimum	60	120
Е	14 – Participation in a national scientific projects [7]	10 x 7	70
	15 – Participation in an international scientific projects [7]	20 x 7	140
	Total		(210)
Total sum of the indicators [exceeded 1.5 (2.1) times]		340	514 (724)

Table 1. Minimum number of points required for the scientific position Associate Professor

 and the indicators achieved by the candidate according to the presented documents

SIGNIFICANCE OF THE OBTAINED RESULTS

The research activity is well reflected in the documents of the competition. Dr. H. Kalcheva has presented 42 publications (7 publications related to the doctoral work and 35 for the competition): 16 articles with an impact factor and 19 publications in specialized, peer-reviewed and edited publications without an impact factor. Four of the publications can be assumed as monograph (or book) chapters. It makes an impression that two of the publications with an impact factor are in journals of the highest category - Q 2. The referred publications are distributed as follows: Acta zoologica bulgarica – 14; Comptes Rendus de l'Académie Bulgare des Sciences – 3; Ecologica Balkanica – 2; Bulgarian Journal of Agricultural Science – 1; Earth and Environmental Science – 1; Transylvanian Review of Systematical and Ecological Research – 4; Agricultural Science and Technology – 1; Universal Journal of Geoscience – 1; Bulgarian Journal of Soil Science – 1; ZooNotes – 1; Zenodo – 1; International Association for Danube Research & Danube Research Institute Hungarian Academy of Sciences – 1. All publications are co-authored as she is the first author of 5, second - of 7 and third and next - in the remaining publications. Dr.

Hr. Kalcheva has published in 10 foreign and international editions, and all publications (including those not presented for the competition) are in English. She participated with reports, posters and presentations in the work of 35 national and international scientific forums.

The achievements of Dr. H. Kalcheva are well accepted by the specialists and are cited. Her publications have been cited more than 100 times, with 60 citations in prestigious refereed editions (with an impact factor or equivalent). In the documents, she presented 98 citations according to the requirements of the competition (in publications with an impact factor and SJR there are 60 and in the refereed and indexed publications - 38 citations). There are 46 citations with an impact factor. The most cited (7 citations) is paper № D7.2, published in Comptes Rendus de l'Académie Bulgare des Sciences (scrutinizes the influence of the invasive species *Dreissena polymorpha* on the physicochemical parameters of the Zhrebchevo dam). The citations are from specialists working in related fields and cover the main part of her articles. In the publications with citations of the works of Dr. H. Kalcheva there are no ones with critical content. They are used for familiarization with the ecology of the microbiological communities, for clarifying problems with monitoring, fauna protection, familiarization with some methodological problems, etc. The number of citation points exceeds the accepted requirements by 50%.

The research work of Dr. H. Kalcheva is in the field of hydrobiology. It does not engage in direct implementation and implementation activities due to the nature of the field in which she works. However, the studies on the Srebarna Lake, the effect of the fertilization in the carp farms, the toxicological studies in the use of pesticides with detection of mutations, the correction factor for measurements from an old spectrophotometer, the effect of nitrogen freezing on the yield of chlorophyll-a, the study of invasive species of the genus *Dreissena* on the state of the stagnant water bodies (threats from them and their impact on the local ecosystems), the determination of the conservation significance of some hydrobionts and the preservation of the biodiversity in the benthic communities are of significant practical importance.

LEADERSHIP AND PARTICIPATION IN PROJECTS

The materials of the competition reflect the work of Dr. H. Kalcheva on 14 projects (7 national and 7 international).

The projects have a scientific and scientific-applied character, international or national funding and concern the biotechnology of the purple bacteria in resource recovery; the preserving of the freshwater mussels; system for the detection and prevention of the invasive alien taxa, importance of the diversity of habitats in the Danube River; comparing the Bulgarian and Hungarian Danube River basins; the Invasive Alien Species Network and its role; improvement of the biodiversity monitoring system; Danube River – corridor of the invasive species; sources of

surface water pollution; assessment and management of the genus *Dreissena* invasive species; optimization of the ecosystems under the conditions of climate changes.

EVALUATION OF THE PERSONAL CONTRIBUTION

The hydrobiological investigations of the natural ecosystems require teamwork. At the same time, the constant participation of many authors in a large number of common publications makes it difficult to assess the individual participation of the each one (whether it is methodical, experimental, expert, analytical and synthetical). It should be noted that in some cases it is not easy to establish the real personal contribution of the candidates. From the presented documents under the competition, a high personal contribution of Dr. H. Kalcheva in the implementation of the research work and the publication of the materials is established. This contribution is evident in the publications related to the bacterioplankton, freshwater microbial ecology, ecotoxicological research on the pesticides, use of the statistical methods and derivation of the coefficients, hydrobiont conservation, influence of the organic fertilization on the environmental factors and the role of the invasive alien species where her work is well outlined and in many cases methodical.

CLEARLY OUTLINED PROFILE OF SCIENTIFIC RESEARCH

The scientific qualification of Dr. H. Kalcheva is indubitable. The results achieved by her in the research activity exceed 2 times the requirements of the Bulgarian Academy of Sciences, accepted in connection with the Regulations for application of ZRASRB (Table 1). The work of Dr. H. Kalcheva is in the field of hydrobiology and covers freshwater microbial ecology, bacterioplankton, trophic interactions in the freshwater ecosystems; studies of wetlands along the Danube River; dams with or without *Dreissena*; routes of entry and spread of the invasive alien species; development of the statistical methods for analysis in the ecological, hydrobiological and ecotoxicological studies; influence of the fertilization on the primary production of the stagnant water bodies; purple phototrophic bacteria and their use for circular bioeconomy.

CONCLUSION. The candidate for the competition Chief Assistant Dr. H. Kalcheva has presented a sufficient number of scientific papers. Her works include original scientific and applied contributions that have received international recognition. The main part of her papers are in journals and scientific series published by international academic publishers. After getting acquainted with the materials and scientific works presented for the competition, analyzing their significance as well as the scientific and scientific-applied contributions, **I give a**

positive assessment and recommend the Scientific Jury and the Scientific Council to vote for the acquisition of Chief Assistant Dr. Hristina Vasileva Kalcheva, PhD, to the academic position Associate Professor at the Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences in the field of higher education 4. Natural sciences, mathematics and informatics; professional direction 4.3. Biological Sciences; scientific specialty Hydrobiology.

Sofia,

Reviewer:

15.08.2024

/Prof. Dr. Zdravko Hubenov/