

## **REVIEW**

From Prof. Dr. Yordan Ivanov UZUNOV,

Retired, former Chair of the Department of aquatic ecosystems, IBER-BAS (2010-2018)

### **About the competition for the academic position** **“Professor”**

Of the only candidate **Assoc. Prof. Eliza Petrova UZUNOVA**  
in the scientific area 4.3. Biological sciences; Scientific specialty Hydrobiology – Ichthyology  
and aquaculture, declared for the needs of Sofia University “St. Kliment Ohridski” in the  
State Gazette no. 82/14.10.2022

The current review is prepared in compliance with Order No. 38/611 (15.11.2022) by the Rector of Sofia University to assign a Scientific Jury for conducting the above competition and following the decisions of its first meeting held on 19.12.2022.

The candidate has submitted a complete set of documents (copies of diplomas, lists of publications, and other materials) following the requirements of the “Act on Development of the Academic Staff in the Republic of Bulgaria”, the Regulations for its implementation, and the internal university regulations for the terms and conditions for acquiring scientific degrees and for holding academic positions at SU “St. Kl. Ohridski”.

The Scientific Jury voted solid that the materials correspond to the requirements under Art. 4 and Art. 14, item 2 of PURPNSZADSU-AS of 13.07.2022, which admitted the candidate to the evaluation procedure.

Following the Rules of Sofia University for occupying academic positions the materials have been examined and evaluated as follows:

#### **1. Regarding educational activity:**

After completing her higher education, Dr E. Uzunova's career took place entirely in the same Department of General Hydrobiology and Aquaculture, where she starts as an assistant in

May 1996. Subsequently, she is promoted to senior (12.2000-11.2004) and chief assistant (11.2004-05.2013) positions. In 2004 she defends a dissertation thesis on the topic "Influence of heat shock on ploidy, survival and sexual maturation of brook-trout (*Salvelinus fontinalis*)". Since 2013, she is holding the academic position "ASSOCIATED PROFESSOR" in the Department.

The educational activity of the candidate fully corresponds to the content of the competition, in particular in the field of applied ichthyology (freshwater and marine aquaculture), in which she builds her career as a university teacher. From the presented documents it is clear that Assoc. Prof. E. Uzunova teaches the basic course in Hydrobiology for full-time and part-time students of the master course EOOS, as well as she holds a total of 5 compulsory and/or optional lecture courses (mainly in the field of aquaculture, management, and conservation of fish resources and other related academic disciplines, included in the master program of "Applied Hydrobiology and Aquaculture" or in various disciplines in the Faculty of Biology. According to the attached report, her annual horarium is more than 500 lecture hours (436 hours) and seminars/exercises (83 hours). The ratio of lecture hours to total classroom occupancy is 0.84 (84%).

Her teaching activity also includes lectures to groups of practitioners both at home (4) and abroad (1), related to conservation, reproduction and management of fish resources and their habitats; ecological status monitoring, etc.

Although currently, the candidate is a co-author to one handbook (E20.1 *A practical guide to exercises in ichthyology...*, 2021), both the presented training reports and numerous methodologies, instructions, tools for analysis and assessment, they all have a similar methodical character for various phenomena and effects of hydromorphological changes on the ecological status of water bodies, in particular on the Biological Quality Element "fish/fish fauna", according to the methodological guidelines of Annex V of WFD 2000/60/EU and national Regulation H-4/2013 ( G0.14, G0.15, G0.16, G8.1-G.8.6).

An important place in her teaching activity is the training of graduates and PhD students. Since 1998, 20 graduates have successfully defended their theses, 9 of them after the candidate's first habilitation (2013). Three PhD students have been trained, 2 successfully defended – one in 2020 and the second one in 2023; the third one has the right to defense since 2017 (see 15. Reference by indicators...).

It should be pointed out that the candidate teaches the basic courses in Ichthyology and Aquaculture for students from the ERAZMUS program, which is not mentioned in the

currently materials presented. In 2014, she gave lectures at the University of Niš (Serbia) and conducted a two-day practical training course for students and specialists in the field of the assessment of the environmental impacts of the construction of small hydropower plants (E15.4).

## **2. Regarding scientific activity:**

Below, only the materials/documents related to the candidate's activity and results AFTER the first habilitation in 2013 are considered as the reviewer assumes that her earlier works and projects had been already evaluated and reviewed.

The candidate's research and scientific-applied activities cover a wide range of ichthyological issues, from seemingly trivial studies on the size-age structure and/or food spectrum of fish species/populations; introduction of molecular-biochemical methods for species identification and/or diagnostics of fish diseases, to dealing with problems related to the introduction and invasion of indigenous fish species, with the assessment of the conservation status of fish populations and habitat fragmentation as a factor in the formation of modern ichthyocenoses in our country, with the testing of ichthyological methods for determining the typology of water bodies according to WFD 2000/60/EU, etc. A large part of her works was focused on the problems of the scientific-applied questions in the scope of aquaculture, where the expertise of Dr. E. Uzunova is beyond any doubt.

In this sphere, several directions/groups of questions can be outlined - the subject of research and summary by the candidate:

- ❖ studies on the Bulgarian ichthyofauna, with attention to exotic/ nonindigenous and invasive fish species;
- ❖ methods and techniques for river habitats restoration aiming at ensuring the river continuum/ connectivity;
- ❖ studies on rare and endangered species of the Bulgarian ichthyofauna;
- ❖ studies on methodical issues in the field of aquaculture.

It should be emphasized that the activity and contributions of the candidate after her first habilitation upgrade her former researches and scientific approaches by introducing new research methods, expanding the range of studied species, applying a multidisciplinary approach to solving various research and/or applied problems.

This is clearly evident while looking through the projects that she managed or was part of. After the first habilitation, the candidate led 6 national scientific and/or educational projects

(Indicator E16), took part in 11 national (Indicator E14) and 5 international projects (Indicator E15), funded by the Operational Programs "*Maritime and Fisheries*" and "*BG03 "Biodiversity and Ecosystems"* program of the EU, the *European Regional Development Fund, Financial Mechanism of the European Economic Area (EEA)*, the Scientific Research Fund at SU "St. Kliment Ohridski", MOEW with the EEA, Black Sea Basin Directorate, Ministry of Agriculture, etc. The total amount of funds brought in by the projects that she had managed is a total of 150 000 BGN, spent on equipment, repairs, materials, consumables, etc. (Indicator E18).

Within the 6 teams' scientific research and teaching groups are formed, executing specific project tasks and aspects. They include not only experts from the Department, but also from other departments, institutes and/or universities. In the course of working on these projects, the candidate gained research experience, which enables innovative approaches and recommendations to be put in practice in the field of students training, fish farming, including aquaculture, and the national biological diversity conservation and protection, in particular species richness of the fish fauna in the Bulgarian water bodies.

A significant part of the results obtained in the implementation of the mentioned projects have been published in the scientific papers. A comparative table for different groups of scientific work with the candidate's authorship for the time before and after her habilitation (2013) is presented below. The numbers are accurate, but differ from those in NACID.

	<b>2013</b>	<b>2023</b>
I. SCIENTIFIC PUBLICATIONS, IN JOURNALS REFERENCED AND INDEXED IN WORLDWIDE DATOBASES SCIENTIFIC INFORMATION (WEB OF SCIENCE AND SCOPUS)	<b>12</b>	<b>22</b>
II. SCIENTIFIC PUBLICATIONS IN WORLDWIDE JOURNALS WITHOUT IMPACT FACTOR (IF) AND IMACT RANK (SJR) DURING THE CURRENT YEAR	<b>14</b>	<b>3</b>
III. FULL-TEXT ARTICLES PRESENTED AT SCIENCE FORUMS.	<b>8</b>	<b>1</b>
IV. BOOKS, CHAPTERS OF BOOKS, MONOGRAPHS IV-1. Monographs	-	<b>2</b>
IV. BOOKS, CHAPTERS OF BOOKS, MONOGRAPHS IV- 2. Books and chapters of books	<b>3</b>	<b>8</b>
V. PARTICIPATION IN SCIENTIFIC FORUMS (CONFERENCES, SYMPOSIUMS):		
V-1. International	<b>19</b>	<b>16</b>
V-2. National	<b>35</b>	<b>4</b>

Attention should be paid to the two monographic papers, which summarize the candidate's targeted studies in two of the main areas of her scientific activity - ichthyology with its diverse aspects (B3.1) and aquaculture (G5.1). The first paper is dedicated to the conservation of fish/species of the conservation-important genus *Cottus* (head bream) and summarizes the results of her own research conducted over the last 15 years. In addition to distribution, numbers and biomass of populations, morphological and cytogenetic characteristics, their habitat preferences, threats, conservation and restoration of the cephalopod populations are also discussed; specific practical guidelines for protection and restoration of the populations' conservation status and their habitats are presented. The need for the development and application of a new systematic approach, when preparing programs for their reintroduction, is substantiated; algorithms for making scientifically based decisions are proposed.

No less important is the monographic work (G5.1) dedicated to the aquaculture of salmonid fish (Salmonidae) in our country, which provides detailed, modern, theoretical and practical information on the cultivation and conservation of one of the most exploited in the economic aspect fish in the world. Of particular value to specialists and practitioners in this field is the attention with which threats to trout populations are discussed, starting with poaching and incompetent/illegal fishing practices and moving through water pollution and the destruction of specific habitats - in particular the impact of the hydro engineering structures to the river hydrology and morphology, the interruption of the river continuum by constructions of dams, the impact of diseases incl. parasites, the predatory press, and the negative role of alien exotics and invasive species, etc.

Part of the candidate's work as a researcher is devoted to the impacts of hydropower plants, incl. the so-called "small hydropower plants", on the river ecosystems and the ecological condition of the rivers concerning the fish population (papers G8.3-G8.6), as well as on some aspects of the acclimatization of new species of hydrobionts in Bulgaria (G8.1) and the forms of impact of aquaculture on the river environment and measures to overcome negative effects (D8.2). In co-authorship, she has also developed a monographic study (D8.6) with approaches to restore river continuity, in particular through fish passages, in which the biological foundations, the legal framework and the monitoring of their effectiveness are discussed.

In the recent years, Dr E. Uzunova has been in particular intensively developing various aspects of one of the most important issues of our time - the invasion of invasive species, incl. fish, with the consequences for native diversity and national fisheries (G7.1, G7.3, G7.5, G7.6, G7.9, G7.11, G7.12, G8.7 ). The candidate leads and manages a lot of projects with

national and/or university funding (see Indicator E14), some of which from non-national sources through Bulgarian institutions such as e.g. Operational Program “*Environment*”, Operational Programs “*Maritime and Fisheries*”, Financial Mechanism of the European Economic Area (2009-2014) and “BG03 Biodiversity and Ecosystems”.

The candidate took part in large-scale pan-European projects such as IBBIS (E15.2) and ESSENIAS-TOOLS (E15.3), directly related to the development of tools for monitoring, evaluation and management for the National System for Monitoring Biological Diversity, incl. of the Invasive Alien Species Network in South-Eastern Europe as a supporting tool for the management of alien species in Bulgaria, culminating in significant publications (G0.15, G0.16) in renowned international scientific journals. Also in this theme sphere, Dr E. Uzunova was involved as a co-author in the monographic work “*Short guide of invasive alien animal species from significance for the European Union and Bulgaria*” (G8.7). She also was part of the teams of some international projects such as RIVERS (E15.4), ANCHOR (E15.5), etc.

It should be emphasized the considerable number of participation in conferences at international and national level, symposia and other scientific events with 20 reports, almost all published full-text. From the presented here works, a total of 31 publications were cited 162 times - most of them in scientific publications with an impact factor and/or referenced/indexed in the worldwide network. Some papers are cited multiple times, e.g. paper number 2 (in the Appendices list of citations No. 13) was cited 34 times; another article under number 3 is cited 32 times. Both papers (published in 2021) summarize results from significant pan-European projects and were prepared with the co-authorship of by dozens of team members. The logic of the arrangement of the cited publications in the List ... No. 13, as well as the citations themselves after every paper, is not quite clear - by the years of publication of the articles or by the citations, or by another criteria.

The high expertise and scientific competence of Assoc. Prof. E. Uzunova give her a well-deserved place in authoritative scientific councils and scientific expert committees, as a member of Editorial board of the journal *Acta Zoologica Bulgarica* (from 2020) and secretary of the Yearbook of SU “St. Kl. Ohridski” - *book Zoology* (from 1998). Ministerial orders appoint her as a member of the Monitoring Committee of the Program Maritime and Fisheries (since 2021) and of the National Biodiversity Council (since 2022). She has been working as an expert for the development of normative documents (regulations) for fish passages (2015-

2019) and the veterinary and medical requirements for animal breeding sites, including fisheries (2019-2020).

The candidate is a member of the Union of Biologists in Bulgaria, the European Ichthyological Society (EIS) (since 2005) and the Fisheries Society of the British Isles (2012-2020).

From the original contributions listed in the author reference (see document 14), it can be concluded that the Dr E. Uzunova's research work was clearly clearly applied orientated, as she recently took part in the development of a 32-language tool (software application) to support decision making on the invasiveness of aquatic species (AS-ISK) (G0.14); a multilingual electronic tool (TAS-ISK) was developed and implemented for terrestrial animals' screening under current and future climate conditions (G0.15). The last one was applied for screening the invasiveness of hydrobionts (assessment of 819 non-indigenous species from 15 groups - freshwater and marine plants and animals) from all continents. A total of 33 species have been identified as "very high risk" of being or becoming invasive under future climate change (G0.16).

The candidate can regretted that a number of her results (e.g. methods for triploidization of (eastern) brook trout, algorithms developed for stocking, etc.) were not protected by a patent, although they are widely used in the practice of fish stocking in Bulgaria (see document 14).

The principles of assessment methodology for the admissibility of building new hydropower plants, which has not been developed in our country so far (G8.5), can be applied in practice, as well as the introduction of a guide for restoring river continuity (G8.6) through a multi-criterial system based on environmental, landscape and energy characteristics. The developed non-lethal and micro-invasive approach to the study fish nutrition (G7.10) also has potential for implementation, which can be widely used, especially when working with rare and endangered fish species in Bulgaria.

## CONCLUSIONS

My opinion is that the materials presented by Assoc. Prof. Dr Eliza Petrova Uzunova for the competition for the academic position "PROFESSOR" in Hydrobiology - Ichthyology and Aquaculture in the professional direction 4.3 "Biological Sciences" fully correspond to the requirements and characterize the candidate as a leading specialist-ichthyologist with a great practice in teaching and research, with contributions to the study of up to date issues of systematics, distribution and health status of native fish populations, of the introduction and invasion of alien fish in our water bodies, of the application of ichthyological methods,

indicators and metrics to assess the conservation status of endangered fish species and the ecological condition of water bodies in our country, etc.

Her ambition to introduce innovations in the methodologies and tools of her research work and practical implementation of the results is characteristic.

Based on the above, I recommend to the honorable Scientific Jury to propose to the Faculty Council of the Faculty of Biology to award Assoc. Prof. Dr Eliza Petrova UZUNOVA the academic position "PROFESSOR" in Hydrobiology - Ichthyology and Aquaculture in the professional direction 4.3 "Biological Sciences".

Sofia, 5 February, 2023

Reviewer:



Prof. Dr Yordan Uzunov