

## REVIEW

by **Prof. DSc. Georgi Georgiev Markov (retired)**  
**freelance associate at the Institute of Biodiversity and Ecosystem Research,**  
**Bulgarian Academy of Sciences**

of the materials submitted for participation in a competition  
for occupying the academic position “**associate professor**”  
in **Plovdiv University “Paisii Hilendarski”**

in: field of higher education 4. Natural sciences mathematics and informatics,  
professional field 4.3. Biological sciences (Zoology - vertebrate zoology)

In the competition for “**associate professor**” announced in the “Newspaper of State”, issue 98 of 19.11.2024 and on the website of Plovdiv University (PU) for the needs of the Department of Zoology at the Faculty of Biology (FB), only Dr. Vessela Ilieva Mitkovska from the Department of Zoology at the FB of PU, participated as a candidate.

### **1. General presentation of the received materials**

By order No. PD-22-440 of 18. 02. 2025 by the Rector of PU, I was appointed as a member of the scientific jury of a competition for holding the academic position of “**associate professor**” in the PU of field of higher education 4. Natural Sciences Mathematics and Informatics, professional field 4.3. Biological Sciences (Zoology - vertebrate zoology), announced for the needs of the Department of Zoology at the Faculty of Biology.

Only one candidate has submitted documents for participation in the announced competition: “**chief assistant**” Dr. Vessela Ilieva Mitkovska from the Department of Zoology at the Faculty of Biology of Plovdiv University.

The set of materials presented by Dr. Vesela Mitkovska is in accordance with Law on the Development of the Academic Staff in the Republic of Bulgaria and the Regulations for the Development of the Academic Staff of PU. Among the documents submitted are: (i) the competition announcement in the Newspaper of State; (ii) a Curriculum vitae; (iii) diplomas for the acquisition of the scientific and educational degree “Doctor”; (iv) a statement of scientific contributions; (v) lists of scientific papers, citations, participation in scientific events; (vi) copies of scientific papers, as well as other materials allowing to assess her scientific research and pedagogical activity.

Here I would like to mention the very precise preparation of each of the attached lists and documents, a fact that I appreciate as a very serious attitude of the candidate to the conduct of the competition and an expression of his broad general culture and professional background.

The candidate Dr. Mitkovska has submitted for review 21 scientific papers, 2 teaching aids and documents for participation in 8 national projects, 1 international project and 2 national programs, under which scientific research activity has been carried out and are taken into account in the final assessment. Participation in them is certified by the relevant documents, which are attached to the review package. 3 scientific papers on the dissertation for the PhD degree and 6 scientific papers deposited when occupying the academic position of “chief assistant” at the Faculty of Biology of the UP, are not reviewed. Scientific papers outside the scope of the competition have not been proposed. All scientific papers submitted for participation in this competition have been published in English in reputable journals in the country and abroad. Dr. Mitkovska has a high level of teaching activity in the Department of Zoology of the Faculty of Biology of the UP, carried out through the preparation of courses and leading lectures, exercises and seminars.

## **2. Brief biographical data of the candidate**

The attached autobiography, in which each of the individual stages of Dr. Mitkovska's development is documented most conscientiously and informatively, allows one to trace her gradual passage through the various stages of scientific training, research and teaching activities, revealing her upward development. She graduated with a “Master's degree in Biology”, specialization “Genetics and Microbiology” in 1999, after which she received the scientific and educational degree “Doctor” in the field of vertebrate zoology and from 2015 to the present she has been a “chief assistant” in the Department of Zoology by the Faculty of Biology of the UP.

## **3. General characteristics of the candidate's activities**

Zoology is a broad natural science discipline, which, in addition to studying the form and structure of animals, the processes that occur in them, their individual and historical development, also examines their relationships with the environment. In studying the impact of negative factors affecting the health status of certain types of animal organisms, the possibility of their use as bioindicators for the state of the environment in certain geographical regions also arises. In this broader aspect of zoological research and teaching, the comprehensive evaluation of Dr. Mitkovska for participation in the competition for “associate professor” of Vertebrate Zoology in Department of Zoology of the Faculty of Biology at the PU.

### **➤ *Evaluation of the candidate by indicators, according to the minimum requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria***

The values of the indicators for occupying the academic position of “associate professor” according to the minimum requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria and its Implementing Regulations are analyzed in Table 1.

**Table.** Values of the indicators for holding the academic position "Associate Professor", according to the minimum requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria

Group	Indicators	Required points	Scored Points
<b>A</b>	1. Dissertation for the educational and scientific degree of "Doctor"	<b>50</b>	<b>50</b>
<b>B</b>	4. Habilitation work - scientific publications in journals that are refereed and indexed in Web of Science and Scopus	<b>100</b>	<b>120</b>
<b>G</b>	7. Scientific publication in journals that are referenced and indexed in Web of Science and Scopus, outside the habilitation work	<b>200</b>	<b>242</b>
<b>D</b>	11. Citations in scientific publications, monographs, collective volumes and patents, referenced and indexed in Web of Science and Scopus	<b>50</b>	<b>100</b>
<b>Total points</b>		<b>400</b>	<b>512</b>

The report is filled out very correctly and reports in detail the implementation of all indicators:

- ✓ 21 scientific publications, all in scientific journals classified by quartiles and referenced and indexed in world-renowned databases of scientific information (Web of Science and Scopus), of which:
  - Scientific papers for indicator B4 – 6 pcs. (Q1 – 2 pcs.; Q2 – 2 pcs.; Q3 – 2 pcs.);
  - Scientific papers for indicator G7 – 15 pcs. (Q1 – 2 pcs.; Q3 – 7 pcs.; Q4 – 6 pcs.).
- ✓ 1 collective monograph (Indicator D8);
- ✓ 50 citations in scientific publications referenced and indexed in world-renowned databases of scientific information (Web of Science and Scopus).

The summary assessment of Dr. Mitkovska's research activity shows that it covers both formally and actually the required minimum requirements published in the Law on Research and Development of the Republic of Bulgaria and in the Regulations for its implementation

➤ ***Candidate assessment and compliance with the additional requirements of the Faculty of Biology based on information submitted by Dr. Mitkovska***

- ✓ 2 teaching aids (both co-authored);
- ✓ 7 successfully graduated students in the relevant field of the competition;
- ✓ participation in 11 scientific projects and programs;
- ✓ participation in the administrative activities of the faculty - in committees on accreditation procedures, quality of education, etc.

The analysis of the candidate's compliance with the additional requirements of the Faculty of Biology, PU regulations shows that Dr. Mitkovska's teaching and administrative activities have been strong throughout her time at the Faculty of Biology and that she has supported the development of the research and teaching process in the Department of Zoology.

➤ ***Characteristics of the scientific activity presented in the “habilitation work” (Indicator B.4)***

Dr. Mitkovska's scientific activity, presented in “habilitation work” - scientific publications in journals that are referenced and indexed in Web of Science and Scopus, is composed of 6 scientific papers, reflected in indicator B4. They are distributed in journals falling into 3 quartile categories (Q1 – 2 pcs.; Q2 – 2 pcs.; Q3 – 2 pcs.). These papers are mainly related to the importance of monitoring exposure and studying the impact of xenobiotics on living organisms in controlled and natural environments.

In article **No. B.4.1**, the mutagenic potential of the environment adjacent to the lead-zinc smelter near Plovdiv is assessed, by studying the genomic response of the biomonitor species yellow-throated wood mouse; in article **No. B.4.2**, the degree of DNA damage caused by chronic industrial and agrochemical pollution of surface waters in natural populations of the great water frog is quantified. The observed genotoxic effects on the water frog's DNA, manifested as abnormalities in the erythrocyte nuclei and DNA damage, show a clear causal relationship with the parameters of surface waters, heavy metals, metalloids and pesticides; in article **No. B.4.3**, the potential cytotoxic and genotoxic effects on young individuals of the common carp, caused by the permissible levels of the organophosphorus pesticide chlorpyrifos - a priority pollutant in surface freshwaters; Article **No. B.4.4** confirms the prevalence of DOBV in wild rodents in Bulgaria and states that the epidemiological situation in the Balkan Peninsula requires further studies of hantaviruses in rodent hosts and cases of HFRS in humans; Article **No. B.4.5** assesses the potential *in vivo* genotoxicity of nickel and lead concentrations considered safe by regulatory agencies. For this purpose, juvenile common carp were exposed for 72 hours in laboratory conditions to different concentrations of nickel and lead, considered to be average for years according to Directive 2008/105/EC. Then, alkaline comet assay was applied to peripheral blood erythrocytes. It was shown that availability on cytotoxic effects and it is confirmed use on nuclear anomalies as effective biomarker; in article **No. B.4.6** the potential relationship between blood parasites and micronuclear frequencies in erythrocytes of wild rodent populations from anthropogenically affected and background areas is evaluated. The obtained results provide grounds for including rodents with protozoal and bacterial infections in biomonitoring studies to assess genotoxicity in contaminated areas.

➤ ***Joint detailed analysis of the results reflected in the “habilitation work” (Indicator B.4) and “author's reference” (Indicator D.7 )***

The review of the journals in which the main results of Dr. Mitkovska's scientific activity have been published, reflected in the “habilitation work”, clearly shows their connection with scientific knowledge about the environment and research of pollution, through the study of biological objects. Her multifaceted activity in the field of zoology is emphasized in the joint detailed analysis of the obtained results reflected in the “habilitation work” – 6 publications and “author's reference” outside the “habilitation work” – 15 publications, which indicates that the contributions of the candidate's research activities can be differentiated into three main areas.

The information in publications **B.4.1, B.4.6, D7.4, D.7.10** and **D.8.1** protect the candidate's scientific developments in the direction of **“Assessment of the genotoxic and cytotoxic potential of the environment through biomarkers, in different types of zoomonitors”**. The more significant achievements that I believe should be noted here are that for the first time in Bulgaria, the comet assay method was used for the purposes of biomonitoring to assess DNA damage expressed through single- and double-strand breaks and alkali-labile sites. This sensitive molecular-genetic biomarker was applied in the study of natural populations of zoomonitor species of small rodents of the genus *Apodemus*, genus *Mus* and genus *Microtus* for *in situ* assessment of the genotoxic potential of the environment in areas with varying degrees of anthropogenic pollution. Thus, the candidate brings this very informative method out of sterile biochemistry laboratories and popularizes it for practical purposes in the field of biomonitoring for environmental quality. A combined approach of two molecular genetic biomarkers (micronucleus frequency and DNA damage) is proposed. The importance of the molecular genetic markers used for early, adequate and prognostic assessment of genotoxic stress and mutagenic potential of the environment has been proven. The general biological similarity between humans and small mammals has allowed their use as model species for predicting ecological risk and extrapolating the results obtained to humans. In this light, the results obtained contribute to the assessment of the genotoxic risk of the population in the studied areas with varying degrees of anthropogenic pollution.

Dr. Mitkovska is right to focus on the study of small mammals, because a number of toxicological studies have shown that some rodents easily accumulate more pollutants than other mammals. This fact is predetermined by the specificity of their feeding habits and limited living space, which is why a number of changes in their organism reflect the level of pollution in their biotope.

The results obtained and contributions in scientific papers **C.4.4, D.7.3, D.7.14, D.7.5, D.7.13** and **C.4.6** show the desire of Dr. Mitkovska to emphasize **the role of vertebrates as a vector and**

**reservoir of viral zoonoses and blood parasites.** This she has successfully done by separating this specific knowledge into a special section of her research activity. In this section, it is shown that her research can be related to the study of rodents of the extremely dangerous hantaviruses for humans, causing severe hemorrhagic fever with renal syndrome. As a result of the study conducted, “hot spots” (Smolyan, Smilyan, Batak, Velingrad and Peshtera) from the territory of Bulgaria were identified, characterized by a high risk of infection with hantaviruses for the human population. A number of factors influencing the association of Dobrava hantavirus infections in the yellow-throated wood mouse and the field mouse have been evaluated; The potential relationship between blood parasites and micronuclear frequencies in erythrocytes of wild rodent populations from anthropogenically affected and background areas in Bulgaria was determined.

The description of the standard karyotypes of two rare species of the Bulgarian mammalian fauna – the rice field mouse and the western wide-toothed mouse, and the assessment of the main reproductive parameters of the most common mesopredators in Bulgaria – the golden jackal and the red fox under sympatric conditions, presented in articles **D.7.6**, **D.7.15** and **D.7.7** complement the broad spectrum of Dr. Mitkovska scientific research. They strengthen the fundamental nature and originality of her scientific research activity and **form an additional direction - analysis of species-specific biological characteristics in mammals.** My expectation is that in the future work of Dr. Mitkovska, this direction will strengthen and give a more unambiguous character to her scientific research activity in the field of vertebrate zoology.

#### **4. Assessment of the candidate's personal contribution**

I am convinced that in all scientific research, Dr Mitkovska has been a necessary, useful, and in many cases a leading researcher, coming along the lines that in all articles a well-defined niche of her presence is noticeable.

#### **5. Citation**

An interesting insight into the candidate's scientific activity is obtained after an analysis of the 50 citations presented by her. The article published in *Ecotoxicology and Environmental Safety* was cited 9 times: 8 times in journals with quartile Q1 and 1 time - with Q2. Another article published in *Environmental Science and Pollution Research* was cited 22 times: 17 times in Q1, 2 times in Q2 and 3 times in Q4. A third article published in *Heliyon* was cited 10 times: 8 times in Q1, 2 times in Q2 and 3 times in Q4. Only these three articles (14.3%) covered 41 citations or 82% of all citations and they to a greater or lesser extent cover bioindicator or similar topics. Despite this imbalance in the

citations of individual articles, I accept that the representativeness of the journals in which these citations were made has helped establish Dr. Mitkovska as a recognized specialist in assessing the harmful impact of the environment on animals and their use in bioindication of environmental quality.

## **6. Educational and pedagogical activities of the candidate**

In total, for the five-year period 2020 – 2025, the assessment of the candidate based on the information submitted by Dr. Mitkovska shows that he possesses enviable educational and pedagogical activity - 756 hours of lectures on various subjects and in various courses; 101 hours of seminars; 2,794 hours of exercises; 2 teaching aids; preparation of graduate students; conducting field practices, etc. The conscientiously prepared report for this activity leaves no doubt about the enormous and diverse volume of work done in this mandatory area for the appearance of scientists in higher educational institutions in the country. I am convinced that Dr. Mitkovska has gained solid experience, which will undoubtedly be useful to her in her future work as a lecturer and university scientist.

## **7. Critical remarks and recommendations**

My expectation is that in Dr. Mitkovska's future work, the direction of **analysis of species-specific biological characteristics in mammals** will strengthen and will give a more unambiguous character to her scientific research activity in the field of vertebrate zoology.

## **8. Personal impressions**

I have personal observations of Dr. Mitkovska's work during her field practice. She impressed me with her competent and responsible attitude at every stage of the practice.

## **CONCLUSION**

After familiarizing myself with the materials and scientific papers presented in the competition, analyzing their significance and the scientific and applied scientific contributions contained in them, as well as scientific and teaching activities, I find it reasonable to give my **positive** assessment and with conviction to recommend to the Scientific Jury to prepare a report-proposal to the Faculty Council of the Faculty of Biology for the election of “chief assistant” Dr. Vessela Ilieva Mitkovska to the academic position of “**associate professor**” at the PU “Paisii Hilendarski” in: field of higher education “Natural Sciences, Mathematics and Informatics”, professional direction 4.3. “Biological Sciences (Zoology - Vertebrate Zoology)”.

18.03.2025

Reviewer: .....

/Prof. DSc Georgi Markov/