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REVIEW

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Regarding the competition for the academic position „Professor" in Professional Area 4.3. Biological Sciences, scientific speciality "Ecology and Ecosystem Protection", announced by IBER - BAS, State Gazette no. 45/3.06.2025

The competition has been announced for the "Biomonitoring and environmental risk" Section of the "Ecosystem Studies, Ecological Risk and Conservation Biology" department at the Institute of Biodiversity and Ecosystem Research - Bulgarian Academy of Sciences (IBER-BAS). The sole candidate for this position is Dr. Mihaela Nikolova Nedyalkova, who is an Associate Professor in the „Biomonitoring and Environmental Risk" Section at the IBER-BAS. She has submitted all the required documents for the competition.

The documents submitted by Associate Professor Nedyalkova indicate that the procedure for disclosure and announcement was carried out in accordance with the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria, as well as the accompanying implementation regulations. Additionally, it complies with the Regulations on the Conditions and Procedures for Acquiring Scientific Degrees and for Holding Academic Positions at the Bulgarian Academy of Sciences, as well as the relevant regulations at the IBER–BAS.

1. Candidate's Career Development Summary

Dr. Mihaela Nedyalkova graduated in 1989 with a Master's degree in Biology, specialization Ecology, from Sofia University "St. Kliment Ohridski." From 1990 to 1994, she was a full-time PhD student at the Institute of Zoology at the Bulgarian Academy of Sciences. During this period, she developed her dissertation titled "Dynamics in the Composition of Food and Energy Needs of House Mice (*Mus spicilegus*, Petenyi, 1882 and *Mus musculus musculus*, Linnaeus, 1758) in Syntopian Conditions." Her research addressed various aspects of

population ecology in small mammals, the cycling of substances, and energy flow, which served as foundational elements for her subsequent scientific work. From 1994 to 2006, Dr. Mihaela Nedyalkova worked as a biologist specialist. She then served as a senior assistant in the "Biomonitoring and Ecological Risk" section at IBER-BAS from 2006 to 2017. In 2017, Dr. Nedyalkova was appointed to the academic position of Associate Professor. To date, she has accumulated 35 years and six months of experience in her field.

Dr. Nedyalkova's scientific interests include ecotoxicology, physiological ecology, biomonitoring, and the population ecology of small mammals. Her expertise is reflected in her extensive publication activity and her involvement in numerous national and international projects.

2. Scientometric Indicators and the Significance of Research Results

Assoc. Prof. Dr. Nedyalkova is participating in this competition with 26 scientific papers and 3 book chapters, primarily in the fields of ecotoxicology and physiological ecology. All of her scientific papers are co-authored by both Bulgarian and international scientists. The certificate confirming her fulfillment of the minimum national requirements under Article 2b of the Act on the Development of the Academic Staff in the Republic of Bulgaria for the scientific field 4 (Natural Sciences, Mathematics, and Informatics) and professional field 4.3 (Biological Sciences) indicates a point total that meets, and even exceeds, the required minimum for the established criteria. Therefore, the minimum national requirements for the position of professor are fulfilled as follows:

The indicator from group "A" is fulfilled (50 points).

The indicators from group "B" contribute a total of 142 points to the candidate, exceeding the required 100 points. This includes 9 publications primarily in the field of ecotoxicology, indexed in either WoS or Scopus, categorized into different quartiles as follows: one publication in the Q1 quartile and one in Q2, both published in the specialized journals *Toxics* and *Sustainability*, and six publications in the Q3 quartile, published in *Acta Zoologica Bulgarica*. The final publication from group "B" is indexed only in SJR and was presented in the proceedings of the 10th *Jubilee International Conference of the Balkan Physical Union*, contributing an additional 10 points. In the majority of these publications (7 out of 9), the candidate occupies either the first or second author position, indicating a leading role in the

scientific research. Additionally, one of the publications was developed in collaboration with foreign scientists.

According to indicators from group “Г”, Assoc. Prof. Nedyalkova has presented papers for 287 points out of the required 200 (220 according to the requirements of the Bulgarian Academy of Sciences), distributed as follows:

Group (Г7) – 17 publications (242 points): This includes one publication in Q1, two in Q2, seven in Q3, one in Q4, and six publications in journals with SJR that do not have an Impact Factor (IF). The focus of these publications is broader and encompasses topics such as the role of small mammals in the transmission of zoonotic diseases, the biological responses of organisms to ionizing and non-ionizing radiation, as well as faunal and population studies. In nine of these publications, the candidate is listed as the first, second, or third author (2 publications in 1st place, 10 publications in 2nd place, and 1 publication in 3rd place). In the remaining publications, the candidate holds lower positions, specifically fourth, sixth, seventh, and ninth. The research has been published in prestigious scientific journals, including *Veterinary Sciences, Acta Protozoologica*, *Microbiology Research*, *Iran J Parasitol*, *Acta Zoologica Bulgarica*, and *BioRisk*. Additionally, in six of these publications, Assoc. Prof. Nedyalkova is a co-author alongside foreign scientists.

According to the indicators from group "Г" (Г8), Assoc. Prof. Nedyalkova has presented three book chapters that focus on ecotoxicology in small mammals, earning a total of 45 points. The last of these chapters has been accepted for publication. They are co-authored with her colleague and former doctoral student Petar Ostoich, along with other researchers. Assoc. Prof. Nedyalkova is in second place among the authors, which further demonstrates her expertise in this field.

According to the "D" indicator, the candidate has achieved a total of 272 points, surpassing the minimum requirement of 100 points (or 120 points as per the Bulgarian Academy of Sciences standards). Out of 214 total citations, 136 are found in journals indexed by Scopus or WoS, while 78 citations are attributed to journals that do not have an Impact Factor (IF) or Scimago Journal Rank (SJR). A total of 25 scientific papers are cited in specialized journals with an IF. The high citation frequency of the candidate's research in reputable journals, such as *Biological Trace Element Research, Acta Zoologica Bulgarica, Environmental Science and Pollution Research, Applied Ecology and Environmental Research,* and *Marine Pollution Bulletin*, underscores the importance of her scientific contributions and the relevance of her

research field. A reference from the Scopus database indicates that Assoc. Prof. Nedyalkova has an h-index of 6, excluding self-citations. The publications in *Acta Zoologica Bulgarica* and *Biological Trace Element Research* have recorded the highest citation rates.

The indicators from group "E" are demonstrated by 208 points, surpassing the 150 points required by national standards. Assoc. Prof. Nedyalkova, along with Prof. R. Mecheva from IBER-BAS, served as the scientific supervisor for a PhD student who successfully defended a dissertation in 2019 on the topic: "Ecotoxicological Biomonitoring - Principles, Concepts, and Application in Terrestrial Vertebrates." According to the reference, she has participated in 14 national scientific projects and one international project. Additionally, she led a completed national scientific project funded by the Bulgarian National Science Fund, Ministry of Education and Science, highlighting her skills in managing scientific research. The materials provided for review also indicate specific funding, such as 116,000 BGN in financial resources, which the candidate successfully attracted to her organization through her leadership on the project. All the mentioned projects align with her scientific interests and fall within the scope of the competition.

3. Main Research Areas and Key Scientific Contributions

The publications related to this competition focus on ecotoxicology, physiological ecology, faunistic, and population ecology. The research conducted by Assoc. Prof. Dr. Mihaela Nedyalkova primarily involves small mammals, particularly laboratory and wild rodents. The research is current and has scientific and applied value. I accept the report presented by Assoc. Prof. Dr. Nedyalkova regarding her contributions to scientific publications, although it does not clearly differentiate between the contributions that are confirmatory and those that are original.

The main contributions can be presented in four main areas:

1. *Ecotoxicological studies with a focus on the detoxification of the organism*

2. *Biological response of the organism to the impact of ionizing and non-ionizing radiation in the environment*

3. *Role of small mammals in the transmission of zoonotic diseases*

4. *Faunistic and population studies*

One of the significant contributions in the field of ecotoxicology, particularly concerning the detoxification of organisms, is the assessment of oxidative stress caused by subchronic exposure to lead, cadmium, or their combination in kidney and liver cells of laboratory white mice. The highest levels of lipid peroxidation, indicated by malondialdehyde (MDA) levels, were observed in the kidneys following cadmium exposure, confirming its pronounced nephrotoxic effects. Implementing effective detoxification strategies is crucial for mitigating the physiological damage caused by pollution and for maintaining population homeostasis in affected ecosystems over the long term. The findings published in studies 1 and 8 represent a fundamental contribution to the field of ecotoxicology. Additionally, for the first time, a study was conducted to evaluate the safety and applicability of the natural zeolite clinoptilolite, mined from the Eastern Rhodopes region, as a food supplement for small rodents. The results confirm the presumed lack of acute and chronic toxicity when administered orally. Clinoptilolite, after undergoing mechanical purification and sodium exchange, shows significant potential as an enterosorbent for heavy metals and positively influences the growth dynamics and overall physiological condition of animals. This has considerable scientific and applied importance, as indicated in publications 6 and 21. Furthermore, through a comprehensive approach that included morphophysiological, haematological, cytogenetic, and biochemical methods, it was demonstrated that in animals with chronic intoxication, the administration of zeolite reduces the bioaccumulation of cadmium in the body by 30% to 45%. This emphasizes its potential as an effective natural enterosorbent with a strong detoxification effect. The study also clarifies that heavy metal intoxication leads to significant disturbances in leukocyte kinetics, with inconsistent changes seen across different populations of white blood cells, particularly affecting granulocytes the most (publication 5).

In the second area, focusing on the biological response of organisms to the impacts of ionizing and non-ionizing radiation in the environment, the contributions mainly relate to biological monitoring. Research has been conducted analyzing the effects of various types of radiation, both natural and anthropogenic, on selected indicator species of small mammals. A notable contribution includes the introduction of a new approach to assess the effects of UV radiation that penetrates the skin of living organisms. This work employs a comprehensive analysis of genotoxic and cytotoxic effects, which enhances the methods available for the biological assessment of radiation exposure. Additionally, long-term research on the dynamics of total β-activity within organisms and populations of small rodents has demonstrated significant differences in β-radiation levels based on altitude in the Rila Mountains. The

analysis of the accumulated data enables the authors to confidently conclude that small rodents serve as effective bioindicators for radiological monitoring in high-mountain ecosystems (publications 7, 9, 20, and 24).

In the third area, which focuses on the role of small mammals in the transmission of zoonotic diseases, analyzing pathogens in small mammal populations provides vital information about the ecological and epidemiological relationships between species. This analysis also aids in developing effective strategies to prevent the spread of zoonoses. For example, serological markers indicating the circulation of Lyssavirus have been documented in cave bats in Vietnam. This documentation helps in understanding mechanisms of viral resistance and in the early detection of potential zoonotic threats in the wild (publication 10). Furthermore, to investigate the possible role of small rodents as vectors for the African swine fever virus (ASFV), studies were conducted on the gut microbiome of the bank vole (*Myodes glareolus*) and the wood mouse (*Sylvaemus sylvaticus*) in the area of Beli Iskar village, Rila Mountain. The results of these studies indicate that wild animals, except wild boars, do not significantly contribute to the epidemiology of the disease. These findings enhance our understanding of the reservoir potential of small rodents and lead to a more precise assessment of the risks posed by wildlife in the spread of African swine fever (publication 14).

Faunistic and Population Studies – The data gathered on the species composition of the terrestrial fauna on the Danube island of Tsibar, from studies conducted there for the first time, significantly enhance the previously limited information about the area. The identification of the raccoon dog (*Nyctereutes procyonoides*) on the island is particularly important for the conservation of biological diversity (publication 11). Additionally, research conducted at different altitudes in the Rila and Lozenska Mountains has demonstrated functional relationships between the abundance of small rodents and various habitat characteristics. This research contributes to a better understanding of the ecological mechanisms that regulate the spatial distribution of these rodents (publications 4 and 25).

4. Profile of the Candidate's Research Work

Associate Professor Nedyalkova has a well-defined scientific profile in the field of ecology. It is based on her research, which is both fundamental and applied, as well as on her project and educational activities. She has successfully defended one doctoral student and conducted exercises on secondary productivity for bachelor's students at the Faculty of Biology at Sofia University. These accomplishments lead me to believe that the candidate's research

profile aligns well with the specialty of "Ecology and Ecosystem Protection," which is the focus of the announced competition. Moreover, in her roles as head of the Ecosystem Studies, Ecological Risk and Conservation Biology department and deputy director of IBER, BAS, Associate Professor Nedyalkova showcases strong organizational skills, which are essential for a well-established scientist in her professional field.

5. Critical Remarks and Recommendations

Critical Remarks: I have no critical remarks regarding the candidate's scientific output overall. The candidate's publications are of high quality, have been published in specialized scientific journals, and have undergone peer review. However, there are some gaps in the attached documentation that should be noted:

1. There is no list of participation in national and international forums.

2. The candidate's general and individual Impact Factor (IF) is not indicated, which would be useful for analysis in the field of scientometrics.

3. The proposed list of publications by Assoc. Prof. Dr. Michaela Nedyalkova for the competition for the academic position of "Professor," does not specify that publication No. 16 is a "*short communication*": Rodrigues de la Fuente, A. O., Gomez-Flores, R., Heredia-Rojas, J. A., Garsia-Munos, E. M., Vargas-Villarreal, J., Hernandes-Garsia, M. E., Gonzales-Salazar, F., Garza-Gonzales, J. N., Beltcheva, M., Heredia-Rodríguez, O. (2019). Trichomonas vaginalis and Giardia lamblia Growth Alterations by Low-Frequency Electromagnetic Fields. Iranian Journal of Parasitology, 14(4), 652-656.

Recommendations: I recommend that the candidate continue to publish actively, aiming to enhance the visibility of their research by submitting to first and second-quartile journals indexed in Web of Science (WoS) and Scopus.

6. Personal Impressions of the Candidate

I know Dr. Mihaela Nedyalkova personally, and I consider her to be an active and accomplished researcher in the field of ecology, with a particular focus on ecotoxicology and physiological ecology. Throughout our professional interactions, she has consistently demonstrated responsiveness and a willingness to collaborate. I believe that Associate Professor Mihaela Nedyalkova's engagement with students at the Faculty of Biology, particularly during her classes, also contributes significantly to shaping their scientific interests.

CONCLUSION

The candidate in the announced competition, Assoc. Prof. Dr. Mihaela Nedyalkova is a well-established scientist with significant scientific and applied contributions. She not only meets but exceeds the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria as well as the criteria set by the Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences for holding the academic position of "Professor."

Dr. Nedyalkova's scientific profile aligns perfectly with the thematic focus for which this competition has been announced. After reviewing the materials and scientific works presented by the candidate and analyzing their significance and the contributions found within them, I confidently provide my strong positive assessment. I recommend that the esteemed members of the Scientific Council of IBER-BAS cast a positive vote for the election of Assoc. Prof. Dr. Mihaela Nedyalkova to the academic position of "Professor" in the professional area of 4.3. Biological Sciences, speciality "Ecology and Ecosystem Protection."

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