

## **REVIEW**

**Regarding:** Competition for the Academic Position of “Professor” at the Roumen Tsanev Institute of Molecular Biology (IMB), Bulgarian Academy of Sciences (BAS), in Professional Field 4.3 Biological Sciences, specialty “**Molecular Genetics**”, announced in the State Gazette, No. 16/10.02.2026.

**Reviewer:** Prof. Roumyana Silvieva Mironova, PhD  
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By Order No. 53-OB/10.03.2025 of the Director of IEMPAM-BAS, I was appointed as a member of the Scientific Jury in a competition for the academic position of “Professor” at the same institute in the field of higher education 4. Natural Sciences, Mathematics and Informatics, Professional Field 4.3 Biological Sciences, specialty “**Molecular Genetics**”, announced in the State Gazette, No. 16/10.02.2026, for the needs of the Gene Regulation Department at IMB-BAS. One candidate has applied for participation in the announced competition – Assoc. Prof. Galina Simeonova Radeva, PhD, Associate Professor at the same institute, with more than 41 years, 3 months and 9 days of academic and professional experience in the specialty of the announced competition as of the date of submission of the application documents. The candidate has submitted all required documents in accordance with the Academic Staff Development Act in the Republic of Bulgaria (ASDARB, amended State Gazette No. 102 of 23.12.2022), the Regulations for its Implementation (amended State Gazette No. 1 of 06.01.2026), and the respective regulations of BAS and IMB-BAS, which makes her fully eligible to participate in the competition.

### **Biographical Data**

Assoc. Prof. Galina Radeva obtained her Master's degree in 1984 from the Faculty of Biology of Sofia University “St. Kliment Ohridski”, specializing in General and Industrial Microbiology with Virology. In 1995 she obtained the educational and scientific degree “Doctor” (PhD) in the specialty of the present competition, “**Molecular Genetics**”, by defending a doctoral dissertation entitled “**Molecular Genetic** Characterization of Bacteria of the Genus *Rhizobium* and Construction of Strains with Enhanced Symbiotic Activity” at IMB-BAS. Her professional career has been entirely associated with IMB-BAS. During the period 1984–1996 she worked as a Biologist, conducting research in the field of molecular genetics of symbiotic nitrogen-fixing microorganisms and yeasts. In 1996 she was elected Research Associate II<sup>nd</sup> Degree, and during the period 2001–2010 she held the position of Research Associate I<sup>st</sup> Degree. Since 2010 she has been Associate Professor at IMB-BAS, where she has developed active research in the field of molecular ecology of microbial communities, led national and international research projects, maintained an active publication record, and participated in the training of young researchers. Assoc. Prof. Radeva has also carried out extensive administrative activities. Since 2014 she has served as Chair of the Scientific Council of IMB-BAS and as a member of the Scientific Council of IPPG-BAS. Since 2013 she has been responsible for supervision and safety in work involving genetically modified organisms (GMOs). Her international scientific qualification has been supported by numerous specializations, fellowships, and research grants, including a postdoctoral specialization at the Institute of Radiochemistry in Dresden, Germany (1999–2000), a grant from the European Science Foundation (1999), a Wellcome Trust Fellowship at UMIST, Manchester, United Kingdom

(1998), research specializations at the University of Bayreuth, Germany (1995), the University of Helsinki, Finland (1993–1994), and the Russian Research Institute of Agricultural Microbiology in St. Petersburg (1987). *The overall scientific, educational, and administrative activities of Dr. Galina Radeva have been consistently directed toward the advancement of molecular biology, **molecular genetics**, and microbial ecology and fully correspond to the professional field and scientific area of the announced competition.*

### Scientometric Indicators

The overall scientific output of Assoc. Prof. Galina Radeva comprises a total of 61 scientific publications published during the period 1986–2025 in national and international scientific journals indexed and abstracted in the internationally recognized databases Web of Science and Scopus. For participation in the present competition, the candidate has submitted a total of 22 scientific publications with a **cumulative Impact Factor (IF) of 24.806**, distributed among indicator groups B and G. Group B4 includes six publications constituting the habilitation thesis, while Group G7 comprises fifteen publications outside the habilitation thesis, together with one book chapter (Indicator G8). All publications are indexed in Web of Science and/or Scopus. The publications under Indicator B4 are distributed by quartile as follows: three publications in Q1 journals, one publication in a Q2 journal, and two publications in Q3 journals. Under this indicator the candidate has accumulated 125 points, thus exceeding the required minimum of 100 points. The publications under Indicator G7 are distributed among journals of different quartiles, including two publications in Q1 journals, six in Q2 journals, three in Q3 journals, and four in Q4 journals, yielding a total of 248 points against the required minimum of 200 points (220 points for BAS). In addition, one book chapter (Indicator G8) contributes 15 points. The total number of points under Group G indicators is 278. **I would particularly like to emphasize that among all 22 publications submitted for the competition, Assoc. Prof. Radeva is not the leading (first or last) author in only three publications (i.e., 15%) - a circumstance that is far from common in competitions for the academic position of Professor.** The scientific works of Assoc. Prof. Radeva have received substantial international recognition. For the purposes of the competition, 210 independent citations in scientific journals, monographs, and collective volumes indexed in Web of Science and Scopus have been presented, excluding self-citations. These citations generate 420 points under Indicator D11, exceeding by more than three times the minimum national requirement of 100 points (120 points for BAS). The citations appear in prestigious international journals in the fields of microbiology, ecology, and environmental sciences, demonstrating the high visibility and significance of the candidate's scientific contributions. Under the indicators of Group E, the candidate also substantially exceeds the minimum requirements. Assoc. Prof. Radeva has supervised two successfully defended PhD students, participated in seven national and one international research project, led five national research projects, and served as head of the Bulgarian team in two international projects. The funds attracted through research projects contribute an additional 66 points. The total of 406 points under Group E significantly exceeds the required minimum of 150 points. *The presented scientometric indicators clearly demonstrate sustained publication activity, high international visibility of the scientific results, and a substantial contribution to the training of scientific personnel and the management of research projects. The candidate not only fulfils but considerably exceeds both the minimum national requirements and the specific requirements of the Bulgarian Academy of Sciences for occupying the academic position of Professor.*

### **Review of the Candidate's Scientific Works**

The habilitation thesis of Assoc. Prof. Radeva (publications included in Group B) comprises six scientific papers united by a clearly defined and highly relevant research theme related to the investigation of the taxonomic diversity, functional potential, and ecological role of microbial communities in anthropogenically affected soils contaminated with heavy metals and radionuclides. The studies were carried out using contemporary molecular-genetic, metagenomic, microbiological, and bioinformatic approaches, including the construction of 16S rRNA gene clone libraries, amplicon sequencing using the Illumina MiSeq platform, metagenomic analyses, and functional profiling of microbial communities. Within the candidate's overall research activity, three major scientific directions can be distinguished.

**The first research direction** is related to the investigation of the taxonomic diversity and composition of microbial communities in soils affected by mining and metallurgical industries (**B4\_1, B4\_2, B4\_3, B4\_6**). It has been established that bacterial communities in contaminated soils are characterized by high diversity and are predominantly represented by members of the phyla Proteobacteria, Acidobacteriota, Actinobacteriota, and Bacteroidota. It has been demonstrated that the degree of contamination with heavy metals and radionuclides leads to substantial changes in the structure of bacterial communities and promotes the selection of resistant taxa. Through the application of 16S rRNA gene retrieval approaches, numerous uncultivable bacterial representatives associated with heavy metal resistance were identified. A particularly significant achievement is the deposition of 265 novel sequences in the international GenBank database, representing an important contribution to the global body of knowledge concerning soil microbial diversity. It was further established that archaeal communities are represented mainly by members of the genus Nitrososphaera, involved in ammonia oxidation processes, while fungal communities are dominated by representatives of the phylum Ascomycota exhibiting different degrees of tolerance to heavy metals. A number of bacterial and fungal bioindicator taxa suitable for monitoring and assessment of contaminated soil ecosystems were identified.

**The second research direction** encompasses studies on the functional potential of microbial communities and their adaptation to environmental stress factors (**B4\_3, B4\_4, G7\_1, G7\_2, G7\_5, G7\_6, G8\_1**). By employing the bioinformatic tool PICRUSt2, metabolic pathways and mechanisms of heavy metal resistance were predicted, including efflux systems involved in the detoxification of copper, zinc, cadmium, nickel, and arsenic. A relationship between these resistance mechanisms and the dominant bacterial taxa in contaminated soils was demonstrated. Assoc. Prof. Radeva also investigated the functional profiles of cultivable bacterial communities using the Biolog EcoPlate™ system and demonstrated that long-term contamination alters patterns of carbon-source utilization and results in reduced bacterial functional diversity. The obtained results reveal the existence of metabolic plasticity and adaptive mechanisms that enable partial compensation for adverse environmental impacts. Within this research direction, soil health was also evaluated through analyses of key enzymatic activities. It was found that dehydrogenases,  $\beta$ -glucosidase, and alkaline phosphatase are particularly sensitive to heavy metal contamination and can be successfully employed as bioindicators of soil ecological status.

**The third research direction** focuses on the influence of abiotic factors on the structure and functioning of microbial communities (**B4\_5, G7\_3, G7\_4, G7\_5, G7\_13, G7\_14**). It was established that the content of organic matter, nitrate ions, soil moisture, soil texture, and pH substantially modify the effects of heavy metals on soil microorganisms. It was demonstrated

that long-term contamination results in a reduction of both bacterial abundance and microbial activity, whereas more favorable soil characteristics contribute to maintaining higher microbial diversity. Of particular interest are the results obtained from studies of the high-mountain glacial lake Salzata, where a high diversity of bacterial ecotypes and considerable adaptability of microbial communities to changing environmental conditions were documented.

The publications included in Group G expand and complement the thematic scope of the habilitation thesis. Three principal research directions can be identified within these publications: Functional characteristics of microbial communities in soils contaminated with heavy metals and radionuclides (**G7\_1–G7\_6 and G8\_1**); The impact of the fungicide Quadris® on soil microbial communities (**G7\_7–G7\_12**); Investigations of natural antimicrobial substances (**G7\_15**). Assoc. Prof. Radeva investigated the effects of the widely used fungicide Quadris® on soil microorganisms. It was established that the application of high doses of the fungicide leads to a substantial reduction in the functional activity of bacterial communities, alters patterns of utilization of various carbon substrates, and affects the activity of key soil enzymes. A particularly important finding is the demonstration of a relationship between fungicide application and the selection of bacterial resistance to aminoglycoside antibiotics. This finding reveals a novel aspect of the impact of pesticides on the soil microbiome and on the formation of the soil resistome. Publication **G7\_15** presents results concerning the biological activity of protein and peptide fractions isolated from snails and crustaceans. It was demonstrated that some of the investigated fractions exhibit selective antibacterial activity against Gram-negative bacteria, highlighting their potential as a source of novel natural antimicrobial agents. *The scientific contributions of Assoc. Prof. Radeva, as reflected in the habilitation thesis and the publications included in Group G, may be summarized as follows: Elucidation of patterns in the structure and taxonomic composition of microbial communities in soils contaminated with heavy metals and radionuclides; Identification of bacterial, archaeal, and fungal bioindicator taxa suitable for environmental monitoring; Elucidation of mechanisms of microbial adaptation and resistance to heavy metals through metagenomic and functional analyses; Development and application of modern approaches for assessing soil health and ecological risk; Clarification of the impact of agrochemicals on soil microbial communities and the development of antibiotic resistance; Generation of new knowledge on natural antimicrobial agents with potential applications in biomedicine and biotechnology.*

### **Project Activity**

Assoc. Prof. Galina Radeva has actively participated in national and international research projects for more than two decades. The total number of projects in which she has participated or is currently participating is fifteen. A significant proportion of these projects have been funded by the National Science Fund of the Ministry of Education and Science, as well as through national research programmes, European programmes, and bilateral agreements for scientific cooperation. Particularly noteworthy is Assoc. Prof. Radeva's contribution as a project leader. She has served as principal investigator or coordinator of five national research projects, including an ongoing project devoted to the structure and functions of the soil microbiome in forest ecosystems along an altitudinal gradient. Assoc. Prof. Radeva's international project activity includes participation in a bilateral cooperation project with the Hungarian Academy of Sciences devoted to the physiological mechanisms of stress tolerance in the resurrection plant *Haberlea rhodopensis*, as well as leadership of the Bulgarian research team in two collaborative projects with the Czech Academy of Sciences. As principal investigator of research projects,

Assoc. Prof. Radeva has attracted a total of BGN 330,893.75 in external funding for scientific research activities. Her project work demonstrates her ability to initiate, organize, and manage scientific investigations of both practical and societal significance. *Overall, the project activity of Assoc. Prof. Radeva is characterized by consistency, clear thematic focus, and substantial international scope. It is directly related to current issues in microbial ecology, soil health, environmental monitoring, and the sustainable management of natural resources and contributes significantly to the advancement of contemporary research in molecular microbiology and microbial ecology.*

### **Educational Activity**

Assoc. Prof. Radeva has extensive experience in university teaching. Since 2007 she has participated in the Master's degree programme “Bio- and Medical Informatics” at Sofia University, where she delivers the lecture course “Introduction to Molecular Biology and Computational Molecular Biology”. Within the framework of her research activities, she has also participated in specialized training courses in molecular biology, microbiology, and bioinformatics methods intended for undergraduate and graduate students, doctoral candidates, and early-career researchers. Her teaching activity is focused on contemporary areas of the biological sciences, including molecular identification of microorganisms, microbial community analysis, metagenomics, microbial ecology, and bioinformatic approaches for the processing and analysis of genetic data. Particularly noteworthy is Assoc. Prof. Radeva’s contribution to the supervision of undergraduate and graduate students. During the period 2010–2024, she served as scientific supervisor of ten successfully defended diploma theses at Sofia University within Bachelor's and Master's degree programmes in Microbiology, Environmental Biotechnology, Microbiological Control, and Environmental Protection. Her activities as supervisor of doctoral students include co-supervision of two successfully defended PhD candidates. In addition to educating undergraduate and doctoral students, Assoc. Prof. Radeva has actively contributed to the development of young scientists. During the period 2019–2020, she served as mentor to a young researcher within the National Programme of the Ministry of Education and Science “Support for Young Scientists and Postdoctoral Researchers”, thereby contributing to the professional development of young investigators in the fields of molecular microbiology and microbial ecology. *It may be concluded that the educational activity of Assoc. Prof. Radeva is consistent, multifaceted, and closely connected with contemporary research in molecular biology and microbial ecology. Through her teaching, supervision of diploma students and doctoral candidates, and mentoring of young researchers, she has made a substantial contribution to the training of highly qualified specialists and researchers in the field of biological sciences.*

### **Compliance with the Minimum National Requirements**

The table below presents the compliance of Assoc. Prof. Radeva with the minimum national requirements according to Table 1 of the Regulations for the Implementation of the Academic Staff Development Act in the Republic of Bulgaria (adjusted for BAS with respect to Indicators G and D):

<b>Indicator Group</b>	<b>Minimum Required Points</b>	<b>Candidate’s Points</b>
A	50	50
B	100	125
G	200 (220 for BAS)	278

D	100 (120 for BAS)	420
E	150	406
<b>Total</b>	<b>640</b>	<b>1 279</b>

The table clearly demonstrates that Assoc. Prof. Radeva fulfils and, for almost all indicators, substantially exceeds both the minimum national requirements and the requirements stipulated in the BAS Regulations on the Conditions and Procedures for the Acquisition of Scientific Degrees and the Occupation of Academic Positions. Her total score is approximately twice the required minimum.

## **CONCLUSION**

The analysis presented in this review demonstrates that Assoc. Prof. Radeva fully satisfies all formal requirements of the Academic Staff Development Act in the Republic of Bulgaria, the Regulations for its Implementation, and the internal rules and requirements of both the Bulgarian Academy of Sciences and the Institute of Molecular Biology for occupying the academic position of Professor. Moreover, she not only fulfills but exceeds by a factor of two the minimum national requirements for this academic position. Among the strongest aspects of her candidacy are her clearly defined scientific profile and the pronounced practical relevance of her research achievements. Assoc. Prof. Radeva has also demonstrated substantial experience in project management, a responsible attitude toward the training and development of young scientists, and well-established national and international scientific collaborations, all of which constitute a solid foundation for her future academic development. Therefore, I strongly recommend that the distinguished Scientific Jury of the present competition propose to the Scientific Council of the Institute of Molecular Biology of the Bulgarian Academy of Sciences to vote IN FAVOUR of the election of Assoc. Prof. Galina Simeonova Radeva, PhD, to the academic position of Professor in Professional Field 4.3 Biological Sciences, specialty **Molecular Genetics**.

June 8, 2026

Prof. R. Mironova