



REVIEW

By: Assoc. Prof. Dr. Trayana Spassova Nedeva, Faculty of Biology, Sofia University “St. Kliment Ohridski”, member of the scientific jury appointed by order No РД-38-611/15.12.2021 of the Rector of Sofia University “St. Kliment Ohridski”, Prof. Anastas Gerdjikov, Dr. Habil.

Re: The materials submitted for participation in a competition for the academic position Professor of Sofia University “St. Kliment Ohridski” in Higher Education area 4. Natural sciences, mathematics and informatics; Professional area 4.3. Biological sciences, Ecology and Ecosystems Conservation - Ecology of Microorganisms

The competition for the academic position Professor in HE area 4. Natural sciences, mathematics and informatics, Professional area 4.3. Biological Sciences, Ecology and Ecosystems Conservation - Ecology of Microorganisms has been launched for the needs of the Department of Ecology and Environmental Protection at the Faculty of Biology of Sofia University “St. Kliment Ohridski” in SG no. 87/19.10.2021. Assoc. Prof. Dr. ANELIA EVGENIEVA KENAROVA is the only applicant that has submitted documents for this competition within the deadline regulated by the law. Currently, she is working on a permanent position at the same department.

1. General presentation of the procedure and the applicant

The presented materials, available online on the website of Faculty of Biology, Sofia University (<http://biofac-unisofia.com/index.php/s/zeqkAj3GDaK2EyB>) are in compliance with the requirements of the Act for the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its implementation, and the Regulations for the conditions and the order for acquiring scientific degrees and holding academic positions in Sofia University “St. Kl. Ohridski”. They also meet the recommended criteria for holding the academic position of Professor in Professional area 4.3. Biological sciences. The documentation presented for the competition is structured clearly and correctly. It reflects the educational/pedagogical, scientific, applied research, and administrative activity of the applicant in both qualitative and quantitative aspects.

As a member of the scientific jury, I declare that comply with the requirements of Art. 4 of the Act for the Development of the Academic Staff in the Republic of Bulgaria and I have no common research publications or conflict of interest with the applicant in the competition.

Assoc. Prof. Dr. Anelia Kenarova graduated Sofia University "St. Kl. Ohridski", Faculty of Biology in 1989 and was awarded a Master degree in Biotechnology - Specialist in Biotechnology Processes, with specialization in Microbiological processes and technologies. She defended her PhD thesis "Taxonomic identification of *Streptomyces sp.* K455, characterization of the produced antibiotic complex and its application capabilities" in 1999 at Department of Biotechnology, Faculty of Biology, Sofia University. She commenced her professional activities at the same department; began her academic career at the department of Ecology and Environmental Protection in 1998, successively holding the positions of Senior Assistant Professor (1998-2001) and Chief Assistant Professor (2001-2010), and since 2010 she has been an Associate Professor.

As a specialist in the field of Ecology and Ecosystems Conservation, Assoc. Prof. Dr. Anelia Kenarova performed expert activity preparing environmental assessment reports, EIA of plans, programs and projects in the waste management sector for the period 2004-2016 related to the implementation of national infrastructure projects of substantial economic significance.

Assoc. Prof. Dr. Anelia Kenarova is an active member of the academic community of Sofia University (see details in the section "Assessment of administrative activity").

The scientific production of Assoc. Prof. Dr. Anelia Kenarova comprises 63 papers published in peer-reviewed and indexed journals, in proceedings of international and national conferences, and in popular science journals and educational materials. This scientific production amounts a total IF of 20.558, h-index 7 (Scopus) and 9 (Google Scholar), distributed as follows: 1 chapter in a book published by foreign publishing house, 1 chapter in a book published by Bulgarian publishing house, 33 research papers in peer-reviewed and indexed journals with IF or SJR, 24 research and educational papers in peer-reviewed journals without IF and SJR and oral presentations published in conference proceedings, 2 papers in popular science journals, 2 textbooks and a PhD thesis. According to Scopus/Web of science research databases, the presented papers are cited 160 times, and in other databases - 65 times.

Twenty-four publications are presented in the competition for the academic position of Professor. Among them, 1 chapter in a book published by foreign publishing house, 1 chapter in a book published by Bulgarian publishing house, 20 research papers in international peer-reviewed and indexed journals, distributed by quartiles as follows: Q1 - 4 pcs., Q2 - 7 pcs., Q3 - 5 pcs., Q4 - 3 pcs. and Q0 - 1 pc.; 2 research and educational papers in peer-reviewed journals without IF and SJR (discussed in the 'contributions' section of the documentary). The reference

in Scopus/Web of science and other databases shows that these papers were cited 124 and 33 times, respectively.

The research activity achievements were reported at 14 international and 17 national scientific forums with posters and oral presentations, all of them presented for participation in the competition.

Assoc. Prof. Dr. Anelia Kenarova participated in and was a leader of 26 research projects that reflected her purposeful scientific and applied research activity, and her professional competence. Eleven of them are presented for participation in the competition (8 national and 3 international research projects, being a coordinator of 3 of the national ones). The total amount of funds of these projects for the Sofia University is 88 078.00 BGN.

2. General assessment of the applicant activity

2.1. Assessment of educational and pedagogical activity

The educational and pedagogical activity of Assoc. Prof. Dr. Anelia Kenarova as a lecturer at the Faculty of Biology of Sofia University, encompasses teaching in Bachelor, Master and PhD degree programmes. On average, her total and auditorium workloads over the last 5 years are 578 and 466 hours, respectively. This activity comprises the development and conducting of lecture courses (all compulsory) within the BSc programmes in Ecology and Environmental Protection (Ecology; Environmental protection, Waste management; both regular and distance learning), Biomanagement and sustainable development (Ecology and environmental protection, Waste management), Biology (Ecology and environmental protection); MSc programmes Ecology (Ecology of microorganisms), Environmental protection (Ecology of urban systems), Environmental protection for non-specialists (Waste management, Air quality and control). She conducts training on Ecology and Environmental Protection for all B.SC. programmes at the Faculty of Mathematics and Informatics of Sofia University.

In the early years of her pedagogical work, Assoc. Prof. Dr. Kenarova has also been involved in practical classes and field practices in various disciplines related to Ecology and environmental protection and Microbial ecology.

She has participated in the supervision of a PhD student that has already defended her thesis, and currently is supervising a PhD student at full-time education. Thirty-two graduates have successfully defended their BSc and MSc thesis under her supervision (9 of them during the competition period).

She is the co-author of 2 textbooks.

Conclusions on 2.1: The applicant's educational and pedagogical activity meets the criteria of the Act for the Development of the Academic Staff in the Republic of Bulgaria and the Regulations for its implementation for the Academic Position Professor. Assoc. Prof. Kenarova is a highly erudite lecturer engaged actively and responsibly with an enlightening mission and with innovative spirit and competences in the field of general and microbial ecology and environmental protection.

2.2. Assessment of scientific and applied research activities

Scientific papers and research activity

The reference for compliance with the minimal state requirements in accordance with Art. 2b of the Act for the Development of the Academic Staff in the Republic of Bulgaria for HE area 4. Natural Sciences, Mathematics and Informatics, Professional area 4.3. Biological Sciences, indicates that the applicant's research achievements fully fit the stipulated criteria, as follows:

- ✓ Indicators of group A: PhD thesis - **50 p.**
 - ✓ Indicators of group C: C4 habilitation work - scientific publications in journals that are referenced and indexed in research database (Web of Science or Scopus) - **102 p.** (minimum requirement -100 p.)
 - ✓ Indicators of group D: D7 - research articles in international peer-reviewed and indexed journals, and G8 - published book chapter or joint monograph - **289 p.** (minimum requirement 200 p.)
 - ✓ Indicators of group E: cited papers – **320 p.** (minimum requirement 100 p.)
 - ✓ **Indicators of group E14 - E18 - Project activity - 187.61 p.** Twenty-five points to E13 – supervision of successfully defended PhD student, are also referred to this indicator.
- Total - **212.61 p.**

Scientific and applied research contribution

The applicant's research contribution is in the field of ecology of microorganisms and their use as bioindicators to assess the influence of different pollutants on biological communities. Studies were focused on various model habitats where indicators such as bacterial abundance and diversity, genetic similarity, metabolic activity, reaction-response behavior, both in *norma* and stress conditions, associated with disturbed environmental equilibrium or extreme abiotic factors were studied. These contributions can be grouped as achievements with scientific, applied-scientific and methodical value. They are commented in the review in this sequence.

Major scientific contribution:

- ✓ Direct link between the level of soil contamination with different pollutants (heavy metals, radionuclides, and fungicides) and the abundance of soil bacterial communities has been established whose structural changes have been traced by phylogenetic analysis. The negative impact of soil contamination on the catabolic activity of the soil microflora depending on the concentration of the pollutant and the local peculiarities of the soil is demonstrated. This impact reflects on the functional profiles of the soil/sediments' bacterial communities in terms of reducing functional diversity. The dependence of the microbial responses to the type of pollutant (heavy metals, radionuclides, fungicides) was established. The results achieved and the trends revealed allow the selection of certain enzymes as bioindicators for assessment of soil pollution and the establishment of research-based programmes for remediation of contaminated soils. (confirmatory)
- ✓ The correlation between the bacterial catabolic activity and functional profiles and the type of habitat – (normal and extreme) and its changes has been shown. The dependence of the genetic similarity (in seasonal and annual dynamics) on the habitat characteristics is also proven. (confirmatory)
- ✓ For the first time it is shown that the tendency in the bacterial functional changes under radionuclides and heavy metals results from the metabolic plasticity of bacterial communities and their ability to partially compensate external impacts. (original)
- ✓ For the first time, the prevalence of Thaumarchaeota communities in contaminated with radionuclides and heavy metals habitats has been demonstrated and phylogenetic information has been generated that contributes to enrichment of the knowledge for the distribution of representatives of these archaea in such specific habitats (original).
- ✓ The direct dependence of Bulgarian agriculture practice and the capacity of agroecosystems to perform important ecosystem services has been demonstrated; an approach for biodiversity conservation in order to maintain a high level of these services has been proposed. (original)
- ✓ The diversity of soil microbial communities (abundance, catabolic activity, functional profiles) in extreme habitats in Bulgaria and around the world has been assessed, and the factors controlling these parameters have been identified. (original)
- ✓ The temporal and spatial dynamics of bacterial communities inhabiting extreme ecosystems such as high-mountain glacial lakes and Livingston Island soils has been established. A phenomenon of quick shift of communities, confirmed by catabolic profiles has been found in the former. (original)

Major applied research contribution:

- ✓ The database for contaminated soils was enriched with information on the impact of mixed heavy metals and radionuclides contamination as well as pesticides, bioindicators for the assessment of pollution detrimental effects on the soil capacity to nutrient transformation. (confirmatory)
- ✓ The adaptation capacity of bacteria from crude oil amended soil and aquatic ecosystems has been demonstrated due to their preserved ecosystem functions. The significance of these results, associated with the correlation between the abundance and activity of oil-degrading bacteria and local environmental conditions, is important for their practical application for soil/water bioremediation and recovery. (confirmatory)
- ✓ The use of the pesticide QuadrisR has been shown to select antibiotic resistance in soil bacterial communities. These facts put on the agenda the risk of fungicides application in agriculture as a possible pathway for selection of antibiotic-resistant bacteria. (original)
- ✓ Bacterial strains with specific metabolic characteristics: methane oxidation capacity, biosynthesis of antibiotic complexes against phytopathogenic bacteria, have been isolated from different extreme habitats that can be used in bioremediation and plant protection programmes. (original)

Major methodological contribution:

- ✓ A complex methodological approach, including cultural, biochemical (enzyme analyses), molecular (genetic and metagenomics analyses) and microscopy (epifluorescence) methods was used to assess the dependence between the level of environmental pollution and the bacterial abundance/diversity/functional profiles.
- ✓ The applicability of the **Biolog EcoPlateTM** test has been established in conducting monitoring studies to assess the influence of heavy metals, radionuclides and fungicides on the catabolic activity and the functional profiles of the bacterial communities.

Conclusion on 2.2: The applicant fully meets the criteria of the Act for the Development of the Academic Staff in the Republic of Bulgaria and the Regulations for its implementation for the acquisition of the Academic Position Professor. For the indicators D, E and F (F14-E18) the applicant exceeds significantly the regulatory requirements.

2.3. Assessment of administrative activity

Assoc. Prof. Dr. Anelia Kenarova has a long-term effective administrative commitment: Vice-Chairman of the Elections' Commission at Biological Faculty (2012 – 2016), member of the General Assembly of Sofia University (2015 – 2019 and 2019 – 2023), member of the Faculty Council of the Faculty of Biology (2012 – 2016, 2016 – 2020, and 2020 – 2024). Member of the Scientific Commission of the Faculty of Biology (2016 – 2020). Since 2016, Assoc. Prof. Dr. Anelia Kenarova has been holding the senior positions of a Vice-Dean of Faculty of Biology (2020-at present) and Head of the Department of Ecology and Environmental Protection (2016-at present).

3. Assessment of the applicant's personal contributions

The thorough review of the presented by Assoc. Prof. Dr. Anelia Kenarova research papers and accompanying documentation allows me to assume that her personal contribution to the experimental design and development, analysis, interpretation and publication of the scientific achievements does not raise any doubts. The author's reference for the scientific contributions summarizes the correctly performed scientific and applied research activities and reflects logically the achieved results. In addition, the positive assessment of the educational and pedagogical work must be pointed out. Assoc. Prof. Dr. Anelia Kenarova successfully integrates her research interests to this work to result in synergy between science and education. with the research aspects of her professional development. Her administrative engagements are equally responsive for maintaining this balance. I have known Assoc. Prof. Dr. Kenarova for 3 decades and point out her consistent and sustainable approach to fulfilling her professional duties that proves its effectiveness. I am convinced that she has all professional qualities: scientific capacity, teaching skills, administrative approach and team-working abilities to hold the Academic Position "Professor" of Sofia University "St. Kl. Ohridski".

4. Critical remarks and recommendations

I have no remarks or recommendations to the presented materials and documentation, research and teaching activity.

5. Conclusion

All formal requirements specified in the Act for the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its implementation, and the Regulations for the conditions and the order for acquiring scientific degrees and holding academic positions in Sofia University "St. Kl. Ohridski" have been fulfilled. Convincing evidence for scientific, applied research, and educational/pedagogical activity of high quality are presented. The analysis of their significance allows me to confirm the positive assessment, presented above and to strongly recommend to the esteemed scientific jury, appointed by order No РД 38-611/15.12.2021 of the Rector of Sofia University "St. Kl. Ohridski" to issue a report-proposal to the Faculty Council of the Faculty of Biology at Sofia University "St. Kl. Ohridski" for the election of Assoc. Prof. Dr. ANELIA EVGENIEVA KENAROVA for the academic position Professor in HE area 4. Natural sciences, mathematics and informatics, Professional area 4.3. Biological sciences, Ecology and Ecosystems Conservation - Ecology of Microorganisms

04.02.2022

Sofia

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