Review

by Prof. Iskra Vitanova Ivanova,

Member of the NJ according to the order of the Rector of the Sofia University "St. Kliment Ohridski" RD-38-611/15.12.2021 regarding:

participation in the competition for the academic position "Professor" in the field of higher education

4. Natural sciences, mathematics and informatics, professional field

4.3 Biological sciences (Ecology and protection of ecosystems - Ecology of microorganisms)

In the competition for "Professor" announced in the State Gazette, issue 87 of 19.10.2021, only one candidate participates: Assoc. Dr. Anelia Evgenieva Kenarova

Brief biographical reference and assessment of the publishing activity

Associate Professor Dr. Anelia Evgenieva Kenarova was born on October 4, 1959. He graduated from Sofia University and in 1984 acquired the professional qualification of biotechnologist, specialist in biotechnological processes.

In 1993-1996 she was a full-time doctoral student and successfully defended her dissertation. The work experience of the candidate in the specialty with his doctoral studies exceeds 27 years. The teaching activity of Assoc. Prof. A. Kenarova began in 1998 as a senior assistant in the Department of Ecology and Environmental Protection at the Faculty of Biology, Sofia University. Prior to that, she worked for 4 years in the Department of Biotechnology at the same faculty as a specialist biologist. Since 2010 he has been an associate professor in the Department of Ecology and Environmental Protection. Associate Professor A. Kenarova is actively involved in administrative activities. She is currently the Deputy Dean of the Faculty of Biology, as well as the second term head of the department.

General description of the materials submitted in the competition.

The materials presented by the only candidate Assoc. Prof. Dr. Anelia Kenarova fully meet the requirements of the competition and present the specific evidence on the required criteria for the competition, as well as present the overall production of the candidate through lists of publications and citations and the text of the submitted contributions, the CV, etc. The presented documentation is extremely well arranged and very detailed, including digital copies of the publications related to the participation in this competition, as well as their summaries in Bulgarian and English.

For participation in the competition for the academic position "Professor" 24 scientific publications were presented, which were not used for the acquisition of ONS "Doctor" and the

academic positions "Chief Assistant" and "Associate Professor". The scientific papers are distributed as follows:

- 20 publications in publications with impact factor or impact rank, which are referenced and indexed in the databases with scientific information - Web of Science and Scopus;
- 2 publications in refereed publications without impact factor or impact rank, but included in the scientific contributions;
- 2 publications in books with scientific review.

The scientific works of Assoc. Prof. Dr. Anelia Kenarova can be distributed in accordance with the criteria for the minimum national requirements of ZRASRB and the Regulations to it, as follows:

1. Criterion "A" - an abstract of a dissertation for the award of educational and scientific degree "Doctor" - (50 points);

2. Criterion "B" - articles are presented that are not used for obtaining the educational and scientific degree "Doctor", and for holding the academic position "Associate Professor" (102 points)

3. Criterion "D" includes 22 publications in publications that are referenced and indexed in world-famous databases of scientific information (Web of Science and Scopus), which are in categories Q1 - Q4, published chapters of 2 books (289 points).

4. Criteria "E" includes citations in scientific journals, monographs, collective volumes and patents, referenced and indexed in world-famous databases of scientific information (Web of Science and Scopus) (320 points).

According to the additional requirements of the BF, Assoc. Prof. Anelia Kenarova is the head of a successfully defended doctoral student (counts 25 points), project manager, participation in a national project and participation in an international one. The attracted funds from projects amount to BGN 17.61 (total number of points - 212.61) Assoc. Prof. Kenarova significantly exceeds the minimum requirements.

Overview of the scientific and scientific-applied contributions of the candidate

The contributions of the presented materials for participation in the competition for the academic position "Professor" in the scientific specialty Ecology and Ecosystem Protection - Ecology of microorganisms can be grouped in several areas:

1. Influence of soil pollution with heavy metals and radionuclides on the condition of soil microbial communities

By using different methods of analysis - cultivation, metagenomic and epifluorescence microscopy, the presence of a direct relationship between the level of soil contamination with heavy metals and radionuclides and the abundance of soil bacterial communities (B4.1, B4.4, and G0.1) and D7.13)**.**

Show the change in the structure of bacterial soil communities in pollution with heavy metals and radionuclides, expressed in reducing the share of Verrucomicrobia and Acidobacteria and increasing that of Bacteroidetes with increasing levels of pollution. results from uranium mine areas in Bulgaria. (B4.1 and DG7.13)**.**

Archaeological communities in radionuclide and heavy metal contaminated substrates have been shown to be represented only by the order Nitrososphaerales (kingdom Crenarchaeota, type Thaumarchaeota), which includes mainly ammonia-oxidizing archaea All sequences show close similarity a sequence of uranium mines in Sliven shows a close resemblance to Candidatus Nitrososphaera gargensis Ga9. The contribution is of a scientific nature and the results obtained enrich the few available data on habitats contaminated with radionuclides and heavy metals. (G7.5).

Soil contamination with heavy metals and radionuclides has been shown to adversely affect the activity of soil dehydrogenases and phosphatases (acidic and alkaline), as this effect is complex and is determined by the concentration of the pollutant and local soil characteristics. the implementation of scientifically based programs for remediation of contaminated soils. (B4.2, B4.3, G7.13 and G0.1).

The negative effect of radionuclide and heavy metal contamination on the catabolic activity of soil and sedimentary bacterial communities has been proven. The negative effect is expressed in the reduced bacterial activity, but also in the extended in proportion to the pollution lag-phase in the absorption of carbon compounds. The published data enrich the limited database of soils with mixed contamination by heavy metals and radionuclides. (B4.2, B4.5 and G0.1).

Protection with radionuclides and heavy metals has been shown to alter the functional profiles of soil / sediment bacterial communities Altered functional profiles suggest a permanent imbalance in the cycle of substances. (B4.2, B4.5 and G0.1).

It has been shown that the change in the functional profiles of soil / sediment bacterial communities under the influence of radionuclides and heavy metals is accompanied by a decrease in their diversity. This dependence is an expression of metabolic plasticity of bacterial communities and ability to partially compensate for external influences. (B4.2, B4.5 and G0.1)

Changes in bacterial abundance, species composition, functional profiles and enzyme activities in contamination with radionuclides and heavy metals are a function not only of the level of pollution but also of major soil factors such as organic substrate, inorganic nitrogen, inorganic phosphates and pH. (B4.2, B4.3, B4.4, G7.12, G7.13 and G7.14).

2. Influence of soil contamination with QuadrisR on the condition of soil microbial communities

The reaction-response of soil urease, beta-glucosidase, arylsulfatase, acidic and alkaline phosphatases to the introduction of the fungicide QuadrisR into the soil was studied for the first time. The recovery of enzyme activity lasts more than four months, which may affect the normal transformation of substances in the soil. All enzymes without urease have bioindicative value and can be used to assess the effect of QuadrisR, (G7.12).

QuadrisR alters the functional profiles of bacterial communities, with the working dose weakly stimulating the absorption of more resistant carbon sources, and higher doses negatively affect the absorption of both resistant and readily available carbon sources. There was no statistically significant correlation between azoxystrobin residues (active ingredient of QuadrisR) in the soil and the level of absorption of Biolog carbon compounds, except for the first month after treatment. (D7.14).

The Biolog EcoPlateTM test can be used in monitoring studies to evaluate the effect of heavy metals, radionuclides and fungicides on the catabolic activity and functional profiles of the affected bacterial communities (B4.2, B4.5, G7.14, G0.1 and G8.1).

The similarities and differences in the response-response (change in the absorption of Biolog carbon compounds) of bacterial communities according to the nature of the contaminant - radionuclides, heavy metals and fungicides are shown (B4.2, B4.5, G7.14, G0.1 and G8.1).

The use of QuadrisR selects antibiotic resistance in soil bacterial communities (G7.9 and G7.10).

3. Ecosystem functions and ecosystem services

Intensive development of agriculture in Bulgaria reduces the capacity of agro-ecosystems to perform a number of ecosystem functions and provide ecosystem services. high level of ecosystem services (G7.8, G7.11).

Ecosystems (soil and aquatic) have been found to have the capacity to self-purify petroleum hydrocarbons, thanks to their preserved ecosystem functions, as it correlates with the abundance and activity of oil-degrading bacteria and depends on season and local environmental conditions. (D7.6 and D0.3).

Methane-oxidizing bacterial strain MM1 (G7.7) has been isolated, which can be used in bioremediation programs to reduce methane emissions from old landfills. It is shown that the isolated strain has high ecological plasticity in relation to the temperature of the medium and the concentration of methane. (G7.7).

4. Bacterial communities of extreme ecosystems

By PCR amplification with subsequent restriction analysis (ARDRA) showed that the bacterial communities of Tear and Kidney (Seven Rila Lakes) have a low level of genetic similarity both within one year and between the same months of two consecutive years. The low genetic similarity proves the existence of an ecological strategy for rapid growth and a sharp change in the composition of bacterial communities depending on the change in the values of environmental factors. (D7.1 and D7.4).

Correlation analyzes have shown that the main factors with a controlling effect on the abundance and biodiversity of the pelagic bacterial communities of Tear and Kidney are

temperature and primary productivity (Tear and Kidney), predation (Tear), phosphates, nitrates, amount of total suspensions and pH (Kidney) (G7.1 and G7.4).

It is found that the richest in bacteria are bare gravelly soils, but in principle there is no linear relationship between the type of habitat (bare gravelly soils, subsoil: moss, higher vegetation and mixed vegetation) and the total bacterial abundance in the soils of the island Livingston (G7.2 and G7).

It has been shown that the catabolic activity and functional profiles of soil bacterial communities correlate with habitat type, and this correlation is associated with the adaptation of soil bacteria to available local carbon sources - cryoprotectants, animal remains and others. (G7.2).

Actinomycete strains isolated from the soils of Livingston Island have been identified as members of the genus Streptomyces. The isolates synthesize an antibiotic complex with activity against phytopathogenic bacteria and can be used as producers of plant protection products. (G7.3).

The scientific information on the characteristics of the soil microbial communities on Livingston Island, published so far, is summarized through tables, figures and discussion, thus creating a good information base for future research. The largest share in these studies are the works of scientists from Bulgaria. (G8.2).

Summarizing the contributions made with conviction, I emphasize that some of them are fundamental, scientifically applied, original and confirmatory and are expanding our knowledge in the field of ecology of microorganisms Special attention are studies on soil contamination with heavy metals and radionuclides on soil microbial communities. The impact of soil contamination with QuadrisR on the state of the soil microbial population is a new and perspective study.A lot of new data on bacterial species in extreme ecosystems are archived.

Learning activity

Assoc. Prof. Anelia Kenarova conducts lecture courses and practical classes in the bachelor's and master's programs of full-time and part-time students. He is a holder of seven basic courses in the field of ecology and environmental protection. She was the head of 32 graduates. She has successfully completed one doctoral student and one during studies.

Critical remarks and recommendations

I have no critical remarks on the materials presented by Assoc. Prof. Dr. Anelia Evgenieva Kenarova!

Personal impressions

I have known Assoc. Prof. Kenarova for many years. She is an impressive person with many talents and teaching skills. A public figure and activist in science and education, Assoc. Prof.

Kenarova contributes to the high level of knowledge transfer not only to students, but also serves the cause of the prosperity of the Faculty of Biology at Sofia University. I am personally fascinated by Assoc. Prof. Kenarova, a modest woman, but at the same time a scientist and disseminator of knowledge in the field of ecology of microorganisms.

Conclusion

The documents and materials presented by Assoc. Prof. Dr. Anelia Evgenieva Kenarova meet all the requirements of ZRASRB, the Regulations for the implementation of ZRASRB at Sofia University "St. Kliment Ohridski". The achieved scientific and scientific-applied contributions are at a high professional level, which is confirmed by the list of publications with her participation in journals in the international databases Scopus and WoS and citation of the results. The candidate is an established scientist in the field of ecology of microorganisms, has the ability to focus on current issues in line with modern science, to get into their essence and present innovative ideas.

Based on everything noted so far, I strongly recommend to the members of the esteemed scientific jury, formed by a decision of the Faculty of Biology, protocol №RD-38-611 / 15.12.2021 to propose to the Faculty to award Assoc. Anelia Evgenieva Kenarova in the academic position "Professor" in the professional field 4.3 Biological Sciences (Ecology and Ecosystem Protection - Ecology of Microorganisms.

Sofia

07.02.2022

Reviewer:

Prof. I. Ivanova