R E P O R T

regarding the materials submitted for participation in the competition
for the academic position "**Associate Professor**", for the needs of the "General Microbiology" Department, "Microbial Genetics" Laboratory, Institute of Microbiology, BAS

In the area of higher education 4 . Natural sciences, mathematics and informatics professional direction 4.3. Biological Sciences (Microbiology - microbial degradation of toxic environmental pollutants), published in the Government Newspaper no. 29/12/04/2022

Candidate: **Assist. Prof. Dr. Maria Gerginova Gerginova**

prepared by **Prof. Margarita Kamburova, DSc,**
"Stefan Angeloff" Institute of Microbiology, BAS

I am included in the Scientific Jury for the selection of a "Associate Professor" for the needs of the Department "General Microbiology", Laboratory "Microbial Genetics" by order of the Director of the Institute of Microbiology (IMicB), BAS No. I-69/30.05.2022. In the announced competition (Government Newspaper No. 29/12.04.2022), the only candidate is Dr. Maria Gerginova Gerginova, Assist. Prof. in the same laboratory. As a member of the scientific jury, I declare that we have no common articles with the candidate in the list submitted list for the competition.

Brief reference to the candidate's career development

Dr. Gerginova's interest in the biological sciences was manifested even with the choice of high school education. She graduated from the National Science and Mathematics High School "Prof. Lyubomir Chatalov" in 1988, after which she graduated as a Master in Biotechnological Processes at Sofia University "Kliment Ohridski", Faculty of Biology in 1993. In the same year she started working as a specialist at the Institute of Microbiology (IMikB), BAS and her whole further career passes in this institute through all stages of scientific development (specialist, assistant, assist. prof.). In 2002, she successfully defended a dissertation on the topic "Study of the process of phenolic biodegradation by yeast *Trichosporon cutaneum* R57" and received the scientific and educational degree "Doctor" in the scientific specialty "Microbiology". She was chosen for Assist. Prof. in 2011.

Description of the presented scientific works and scientometric indicators

Requirements under the Law for the Development of the Academic Staff in the Republic of Bulgaria (ZRASRB)

Assist. Prof. Gerginova is an author of 41 scientific works with a total impact factor of 23.454, and in the current competition she participated with 26 works, which do not include those two presented for the acquisition of the educational and scientific degree "Doctor". In the list of publications covering indicators criteria "B" and "D" from ZRASRB, 18 publications are included, 16 of them are with IF and SJR, and two are only with SJR. Five of the presented publications are included in the "B" list of the habilitation reference according to the ZRASRB, one of them is indexed Q1, three are indexed Q2 and one is indexed Q3. Among the 13 publications with Impact Factor/SJR included in list "D", two are in journals with Q1, five are with Q2, five are with Q3, two are with Q4. Her works have found a place in such prestigious international journals as Processes (IF 2.847), International Journal of Environmental Science and Technology (IF 2.540), Fungal Biology (IF 2.184), Journal of Industrial Microbiology and Biotechnology (IF 1.919), Enzyme and Microbial Technology (IF 1.897), Biochemical Engineering Journal (IF 1.889).

Table. 1. Minimal national criteria for the scientific degree "Associated Professor"

Group of criteria	Content	Required points for "associate professor"	**Assist. Prof. M. Gerginova points**
A	Index 1	50	**50**
B	Index 2	-	
C	Indexes 3 or 4	100	**100**
D	Sum of the indexes from 5 to 10	200 (220 according BAS)	**239**
E	Index 11	50	**578 (289 x 2)**
F	Sum of the indexes from 12 to 18	-	**150**
Total sum		405	**1117**

The list of citations in publications referenced in Scopus and Web of Science contains 289 titles (without self-citations of all authors), which determines the number of points under indicator "E". Although there is no requirement for points according to criteria "F", Assist. Prof. Gerginova collects the significant number of 150 points due to her participation in 12 research projects, among which one international, one under the Operational Program "Science and Education for Intelligent Growth", co-financed by the European Union, nine national and one institutional. She is a leader in one among the national projects.

As can be seen from the results reflected in Tab. 1, the applicant's indicators for all criteria exceed those required by ZRASRB. The total number of Dr. Gerginova points is 1117, while the required are 405.

Specific requirements of the Institute of Microbiology

Similarly, the candidate fulfills all the specific requirements of IMicB, BAS (Table 2). Among the 26 publications presented in the competition, 18 are in IF/SJR journals, 4 are book chapters and 4 are published in full text in international conferences proceedings. The candidate is the first author in seven of them. The list of citations submitted includes more than three times the number required, and the number of completed projects is more than six times greater. Her H-factor is almost twice as large as required. She has participated in 29 conferences and congresses, half of them abroad. Recognition of the respect she enjoys in the Institute and her organizational qualities is her inclusion in several attestation commissions.

Table. 2. Additional criteria of IMicB, BAS for "Associate Professor"

Academic degree	**Number of publications in IF journals, monographs, chapters of monographs, proceedings of international forums published in full text, patents**	**citations***	**IF***	**H-index***	**Additional requirements****
Associate Professor	*20 (without included in doctor degree)* *First or corresponding author in five of them*	*100*	*20*	*5*	*Participation in 3 projects*
Assist. Prof. Maria Gerginova	**A total of 26 publications (excluding those included for "doctor") in 7 of them first author**	**289**	**23.454**	**9**	**Participation in 12 projects, leader for one of them**

Main directions in the research work and most important contributions

The main object of research in the work of Dr. Gerginova is the biodegradation of toxic chemical compounds by bacteria, yeasts and filamentous fungi. The scientific efforts of the candidate are concentrated in three main directions, namely:

• **Biodegradation by yeasts and filamentous fungi of highly toxic industrial pollutants from the oil refining industry** such as phenol and its derivatives, as well as polyaromatic substances included in the culture medium as the sole source of carbon and energy. Biokinetic models have been created for mathematical description, evaluation and comparison of the studied biodegradation processes.

• **Analysis of enzymes directly involved in the degradation of aromatic and polyaromatic compounds.** The intracellular enzymes phenol hydroxylase, hydroquinone hydroxylase and catechol 1,2-dioxygenase, which have a key role in the microbial catabolism pathway of phenol and aromatic compounds, were investigated.

• **Identification of microorganisms and genes encoding enzymes with catabolite activity in the degradation of aromatic xenobiotics.** A rapid hybridization approach (Dot blot) was developed to identify the metabolic pathway of aromatic compound degradation in known and newly isolated

microorganisms. Original pairs of oligonucleotide primers were designed and used to amplify gene sequences encoding phenol hydroxylase and catechol 1,2-dioxygenase. These genes have been identified and partially sequenced in a number of fungi. The amino acid sequences encoded by them were studied.

• **Other directions** - metagenomic analyzes of mining wastewater samples, design of primers for the Cu/Zn-superoxide dismutase gene and analysis of the partial AK sequence.

In my opinion, the candidate's **most important original scientific contributions** are:

• Strains with a high potential for purification of soils and waters contaminated with aromatic compounds have been isolated.

• A strategy for managing the degradation of toxic compounds based on biokinetic models is proposed.

• For the first time, the presence of key enzymes of the ortho-mechanism of the 3-oxoadipate pathway for the assimilation of phenolic compounds in several fungal strains has been established.

• For the first time, the presence of high phenol hydroxylase activity in the degradation of naphthalene and anthracene was found in fungi.

• Original oligonucleotide primers were designed to amplify the partial gene of phenol hydroxylase and catechol 1,2 dioxygenase and the coding amino acid sequences were analyzed.

- A rapid hybridization approach (Dot blot) was developed to identify the metabolic pathway of aroma compound degradation in known and newly isolated microorganisms.

CONCLUSION

Based on the submitted materials for the competition and the analysis of their significance, I consider that the scientific-metric indicators of Assist. Prof. Maria Gerginova exceed the quantitative criteria for occupying the academic position of "associate professor", laid down in the Law for the Development of the Academic Staff in the Republic of Bulgaria (ZRASRB) and the Regulations thereto, as well as the Regulations of the IMicB-BAS. She is a promising scientist with a leading contribution in the field of degradation of phenol, phenol derivatives and low molecular weight polyaromatic substances, as well as their mixtures by bacteria, yeast strains and filamentous fungi. Her expertise in classical and modern methods used in the fields of microbiology, molecular biology and bioinformatics, her excellent computer skills and willingness to share her knowledge make her a desirable for collaboration colleague and consultant. On the basis of the above, I confidently support her candidacy and recommend the scientific jury to propose to the Scientific Committee of the IMicB, BAS to choose Assist. Prof. Gerginova for "Associate Professor" in professional direction 4.3. Biological Sciences, specialty Microbiology.

August 5, 2022 Signature:

Prof. M. Kamburova, Ph.D.