

STATEMENT

From assoc. prof. Lyudmila Petrova Simova-Stoilova, PhD,
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Regarding: a competition for the academic position associate professor, Field of higher education 4. Natural sciences, mathematics and informatics, professional direction 4.3. Biological sciences (Microbiology/enzymology), announced in the State Gazette No 84/04.10.2024 for the needs of Department "General Microbiology", Laboratory of Microbial biochemistry within the Stephan Angeloff Institute of Microbiology (SAIM) -BAS

Regarding the procedure

Based on the normative documents for Promotion in Science in Bulgaria, the Regulations for the development of the academic staff at BAS and the specific requirements at SAIM, BAS, the decision of the Scientific Council of SAIM (protocol No. 12 from 26.11.2024), and order of the Director of SAIM No. I-162/26.11.2024), I am included as an external member of the Scientific Jury for the present competition. Only one applicant has submitted documents for participation in the competition for "Associate Professor" - Dr. Yana Gancheva Gocheva, which since 2016 is working as an assistant prof. at SAIM - BAS, Department of "General Microbiology". All necessary documents are presented, covering both the National criteria for Promotion in Science and the specific criteria of SAIM - BAS for the academic position of "Associate Professor" at the Institute of Microbiology

Professional path of the applicant

Yana Gancheva Gocheva graduated in 1993 from the Faculty of Biology, Sofia University "St. Kliment Ohridski" as a Master in Biotechnological Processes, and completed her doctoral studies (1997-2001) at the Department of "General and Applied Microbiology" of the Faculty of Biology, Sofia University. She successfully defended her PhD thesis (2001) on the topic "Studies on the influence of Ca²⁺ binding proteins on the differentiation of *Streptomyces hygroscopicus* 155". During the period October 2004 - June 2006, Dr. Yana Gocheva was a research associate at SAIM, BAS, Section "Mycology". At that time, she also completed two post-doctoral specializations - January 2003-September 2004 at GTP Technology, Labege, France (a business organization engaged in research and development) and July 2006 - September 2007 at Ben Gurion University, Department of Natural Sciences, Beersheba (Israel). From September 2007 to the end of December 2008, the applicant worked as a research associate at ELBI Bulgaricum in a laboratory for research and development. In the period 2009-2016, Yana Gocheva was a project expert in a business organization, and in the meantime she completed (2014) a second master's degree at the UNWE in international project management. Since September 2016, Dr. Yana Gocheva came back at SAIM as an assistant professor at the Department of General Microbiology. Since 2022, the applicant is also working as an external evaluator for the National Innovation Fund. The data presented in Yana Gocheva's Professional Biography show a diverse theoretical and practical training, as well as interest and experience in the practical application of scientific results. An independent check of the web of science and scopus databases (10.01.2024) shows that Dr. Yana Gocheva is a co-author in a total of 26 articles referenced in scopus, total number of citations without any self-citations – 166, H index 7 (scopus), total impact factor 40.89 (web of science, based on 12 publications). Her publication

activity for the last 5 years (2020-2024) is very impressive - a total of 23 publications, 15 of which in Q1-Q4 journals, including two articles published after submitting the documents for the competition.

Science metric indicators related to the competition

For participation in the competition for "Associate Professor" Yana Gocheva has presented 29 of her scientific works (out of a total of 32 - three are for acquiring the degree "doctor"), of which 19 are in Q1-Q4 journals.

Compliance with the minimum national requirements (according to the Regulations for the Implementation of the ZRASRB - amended and supplemented by SG No. 15 of 19.02.2019) - criterion A - 50 points (degree "doctor" according to a diploma from the Higher Attestation Commission of Bulgaria in January 2002, scientific specialty 01.06.12 Microbiology), criterion B (Habilitation works - scientific publications in journals referenced and indexed in WoS/Scopus) - 125 points (required 100 points), covered by 3 Q1 publications, 1 - Q2 and 2 - Q3, criterion D (publications outside the habilitation works) - 252 points (required 220 points) from 2 publications Q1, 5 - Q2, 1 - Q3, 6 -Q4 and one collective monograph; criterion D (citations in scientific publications referenced and indexed in WoS/Scopus) – 224 points (required 60 points). To sum up, a total of 651 points (necessary 430 points).

Compliance with the additional criteria for academic promotion at SAIM, BAS . According to the document "Regulations on the conditions and procedure for acquiring scientific degrees and holding academic positions at the Institute of Microbiology - BAS" which is included in the set of documents for application, the specific criteria at SAIM are much higher than the national ones, namely: 20 publications after "doctor" (in journals with IF/SJR, monographs, chapters of monographs, proceedings of international forums published in full text, patents) with a total IF at least 20, leading author in 5 of the publications, H index 5, at least 100 citations, participation in at least 3 projects. Yana Gocheva has submitted a reference for 29 publications outside of "doctor", in 7 of them - first author, IF for the entire scientific career - 41.5 (based on 16 publications with IF), Citations - 195 (scopus), personal H index 7, participation in 5 projects (of which 3 - at the National Science Fund, 1 - funded by the European Space Agency, 1 funded by SAIM).

According to the presented materials, Dr. Gocheva exceeds both the minimum national requirements and the specific criteria of SAIM for the academic position of "Associate Professor".

General characteristics of the scientific activity of the applicant

The main scientific interests of the applicant are in the field of applied microbiology and enzymology. Yana Gocheva's scientific work after the degree "doctor" can be conditionally divided into 4 periods - in the Mycology section of SAIM, postdoctoral specializations, applied work at ELBI Bulgaricum, work on various project tasks at the Department of General Microbiology, SAIM. Each of these periods has resulted in high-quality scientific publications.

An important scientific task of Dr. Yana Gocheva at the Mycology section was characterization of the biodiversity among filamentous fungi from Antarctica, isolation and identification of perspective strains, study of their cellular response to low-temperature stress, temperature-dependent modifications in the growth and morphology of colonies, the role of protective enzymes such as catalase and superoxide dismutase in the stress response. The major contribution of Dr. Yana Gocheva in these studies is reflected in three publications, in which she is first author.

Dr. Yana Gocheva's postdoctoral specializations have broadened her scientific horizons in both applied and theoretical directions. During her post-doc in France, she participated in a project on the construction, expression, purification and characterization of a recombinant enzyme - malate quinone oxidoreductase. The recombinant enzyme preparation was used to create a biosensor for monitoring the fermentation in wine production. During Dr. Gocheva's specialization in Israel, the

formation of a disrupted quaternary structure of protein molecules under stress conditions was studied on model yeast strains with a removed gene encoding the Pac2D protein. A new role for the Pac2 protein under stress conditions was proposed based on its ability to interact with both the microtubules of the cytoskeleton and the proteasomes. It should be noted that each of Dr. Yana Gocheva's specializations abroad resulted in a Q1 publication with her active participation.

Dr. Gocheva tested the antibacterial activity of a number of strains of lactic acid bacteria isolated from boza, identifying the most promising producer strain (*Lactococcus lactis* sbsp. *lactis* 14), optimizing its cultivation, and purifying the bacteriocin. Using gene-specific PCR techniques, lactococcal cultures from the ELBI Bulgaricum collection were characterized and genes that confer the strains a technological advantage were identified. Lactococcal cultures were tested for presence of genes for nisin synthesis as an indicator of antimicrobial activity. Lactococcal cultures that are potentially lysogenic were discovered, due to the presence of a prophage integrase gene. The results of these practically oriented studies in search of new biotechnologically significant characteristics resulted in 2 publications, in which Dr. Gocheva is the second author.

As an Assistant Professor in the Department of General Microbiology, Dr. Gocheva actively participates in different projects unified as research on new enzymes from various bacterial and fungal producers and their potential applications.

Of particular interest are the sialidase enzymes originating from non-pathogenic bacteria and fungi. Sialidase enzyme was isolated from the non-pathogenic saprophyte *Oerskovia paurometabola*, was purified and characterized. The results have been published in 2 articles, in which Dr. Gocheva is the third author.

The effect of natural products – extracts from *Rosa damascena* and *Origanum vulgare* ssp *hirtum*, as well as of pure molecules of quinic acid, rutin and fisetin, on the activity of bacterial sialidases has been studied. The results are presented in 2 publications with Dr. Gocheva as the first author.

The distribution of the sialidase enzyme in filamentous fungi from the mycological collection of SAIM, isolated from different habitats, and the role of the regulatory mechanism named catabolite repression have been studied in detail. Increased sialidase activity has been found as a result of oxidative stress in filamentous fungi. A purified enzyme preparation has been obtained and characterized. The results on sialidases from filamentous fungi are reflected in 4 publications, in which Dr. Gocheva is a co-author.

Other research by Dr. Gocheva is related to the isolation and characterization of aerobic, anaerobic and microaerophilic communities with cellulose-degrading activity from different ecological niches. A laboratory protocol for the degradation of cellulose waste has been elaborated and the influence of microgravity on the processes of cellulose degradation has been studied. Five articles have been published based on these results, with the applicant as a co-author.

Separately, Dr. Gocheva has actively participated in studies on the microbiome of reptiles, which are asymptomatic carriers of various zoonotic pathogens - 24 opportunistic bacterial species were isolated and identified from the cloacal microflora of five lizard species. Their sensitivity to antibiotics and the production of some enzymes, factors of virulence, were assessed. Among the most common bacterial species are *Hafnia alvei*, *Pseudomonas aeruginosa*, *Klebsiella oxytoca* and representatives of *Enterobacter* spp., *Citrobacter* spp. and *Enterococcus* spp., but most isolates are sensitive to antibiotics and have limited production of enzymes with a role in pathogenesis, and therefore pose a relatively low risk to human health. There are 4 publications with the participation of the applicant based on these results.

As a further scientific interest and future perspective for work, Dr. Gocheva has pointed out the isolation of microorganisms - new producers of phytases from different habitats in Bulgaria, and the study of the characteristics and the role of these enzymes regarding their potential application in agriculture. The interest was expressed through a publication of review articles on phytases by Dr. Gocheva, and a submission of a project to the Bulgarian National Science Fund in partnership with colleagues from the Institute of Plant Physiology and Genetics, BAS.

Main fundamental and applied-science contributions of the applicant

I accept the applicant's report on scientific and applied contributions, emphasizing some of them:

Contributions related to obtaining new knowledge

- a large number of filamentous fungi from Antarctica have been isolated and identified and their mechanisms of adaptation to low temperature stress have been studied;
- the role of the Pac2 protein was studied on the impaired formation of the quaternary structure of proteins in model eukaryotic organisms - yeasts under stress conditions;
- new knowledge about the enzyme sialidase (EC3.2.1.18) in bacteria and fungi - distribution of the enzyme in a previously unexplored taxonomic group of microorganisms, the effect of catabolite repression, increased sialidase activity as a result of oxidative stress;
- new information about the microbiome of reptiles from the territory of Bulgaria has been obtained.

Contributions with a strong applied impact

- study of specific aroma-forming characteristics of lactic acid bacteria in relation to their use in functional foods;
- construction and purification of a new recombinant enzyme malate quinone oxidoreductase with application in biosensors for monitoring fermentation in wine production;
- protocols for isolation, purification and characterization of sialidase from a non-pathogenic saprophyte and from the Antarctic fungal strain *Penicillium griseofulvum* P29 with the aim of their potential application in the food and pharmaceutical industries;
- inhibitory effect of extracts of *Rosa damascena* and *Origanum vulgare ssp hirtum* and pure natural compounds on bacterial sialidases - a basis for the development of new antimicrobial therapies and disease prevention;
- possibility for the microbiological degradation of cellulose waste by mixed bacterial communities and pure cultures isolated from different ecological niches.

Conclusion

Assist.prof. Dr. Yana Gocheva is a promising scientist, mastering a diverse arsenal of methods, versatile and adaptable, skillfully combining theoretical with applied aspects in microbiological research, with a clear vision for her future scientific research. The submitted documents for the competition show that Dr. Gocheva fully meet and even exceed both the unified national and the specific criteria of the Institute of Microbiology, BAS for holding the academic position of "Associate Professor". All this gives me the reason, as a member of the scientific jury, to assess positively the overall scientific work of Dr. Yana Gocheva and to confidently recommend her promotion into the academic position of "Associate Professor" in Microbiology/Enzymology at the Department of "General Microbiology", Laboratory "Microbial Biochemistry" of "Stefan Angelov" Institute of Microbiology- BAS.

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Prepared by:
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