

## REVIEW

ON the documents of the competition for the academic position "Assoc. Professor" in the field of higher education 4. *Natural sciences, mathematics and informatics*, professional direction 4.3. *Biological Sciences*, scientific specialty *Microbiology*

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### **1. Information about the competition**

The competition for the academic position of "*Associate Professor*" in the field of higher education 4. Natural Sciences, Mathematics and Informatics; professional field 4.3. Biological Sciences, scientific specialty *Microbiology* is announced for the needs of a laboratory in Microbial Biochemistry - Department of General Microbiology, at the Institute of Microbiology, Stefan Angelov-BAS in the State Gazette No. 84/04.10.2024 г., with a term of 2 months.

I participate in the scientific jury of the competition in accordance with Order **No. I-162/20.11.2024** of the Director. on the basis of Art. 4 (3), (4) of the Law on the Protection of Scientific Interests of the Republic of Bulgaria, the Regulations of the Bulgarian Academy of Sciences and the Regulations of the Institute of Microbiology and Microbiology-BAS and the decision of the National Council of the Institute of Microbiology and Microbiology-BAS, Minutes **No. 12 of 26.11.2024**.

I have been elected as a reviewer at the regular meeting of the Scientific Jury, held on 12.12.2024 year. As a regular member of the Scientific Jury, I declare that I have no common projects or conflicts of interest of any other nature within the meaning of para. 1, items 3 and 5 of the Law on the Protection of Scientific Interests of the Republic of Bulgaria with the candidate.

### **2. Information about the candidates in the competition**

The only candidate who submitted documents for this competition, within the period regulated by the ZRASRB, is Dr. Yana Gocheva. She has over 25 years of work experience, is currently on a basic employment contract as a chief assistant in the Laboratory of Microbial Biochemistry, for whose needs the competition was announced. Yana Gocheva is a Master's degree holder, graduated in "Biotechnological Processes" from the Faculty of Biology of Sofia University "St. Kliment Ohridski". In 2013-2014, she completed a second Master's degree "International Economic Relations" - Management of International Projects at the University of National and World Economy, Sofia. This provides new important theoretical knowledge with practical benefits in academic growth, namely - project preparation; risk analysis and management; financial analysis; cost-benefit analysis; team management, conflict management, communication and presentation skills. The candidate holds a PhD in Microbiology (specialty 010612) and has over 15 years of experience in the specialty. Her professional growth was facilitated by two postdoctoral specializations in leading international organizations - 2006-2007 at Ben Gurion University, Department of Natural Sciences, Beersheba (Israel) and in 2003-2004 at GTP Technology, Labege (France).

Dr. Gocheva's academic career is entirely in the scientific specialty of *Microbiology*, starting as a Research Associate, Mycology Section at ImikB-BAS in 2000 for two two-year periods. She worked for 1 year as a Research Associate, Laboratory for Research and Development at ELBI Bulgaricum and since 2016 she has been a Chief Assistant Professor in the Department of General Microbiology - ImicB-BAS. I would like to celebrate 7 years. professional experience as Executive Director/Project Expert, related to management and participation in various projects, organization of trainings and events, organization of conferences and consulting activities. I appreciate this additional experience as very useful, especially in today's mainly project-based principle of financing scientific research. Dr. Yana Gocheva is fluent in 2 foreign languages - English and French.

### **3. Evaluation of the candidate's scientific production and scientimetric indicators**

#### **3.1. Characteristics and evaluation of scientific and publication activity**

Senior Assistant Professor Yana Gocheva has presented a list of 32 scientific papers, 29 of which are participating in the competition for "associate professor". Three publications are presented for the acquisition of the educational and scientific degree "doctor" and it is noted that they are not being discussed in the current competition. The scientific output has a **total impact factor of 41.502, formed by 24** articles referenced and indexed in world-renowned databases of scientific information, as follows:

- 6 articles in international refereed journals - Q1
- 5 articles in international refereed journals - Q2
- 3 articles in international refereed journals - Q3
- 8 articles in international refereed journals - Q4
- 2 articles in international refereed journals without SJR

In addition, eight papers summarize the results of scientific research activities, publishing them in non-refereed journals with scientific review or in edited collective volumes. A list of 9 participations in scientific forums is also presented, of which 7 are posters and 2 are reports.

In terms of thematic plan, scientific developments are undoubtedly aimed at solving current scientific challenges, directly or indirectly related to microbiology, entirely in the terms of biological sciences. The scientific papers cover the period from 2000 to 2024. The presented papers, after the PhD degree testify to continued intensive research work on scientific topics, relevant to the period. This shows that she develops its scientific research, always following the latest challenges. The wide spectrum of scientific topics, affecting various current problems of microbiology, as well as some methodological approaches in search of scientific challenges, is impressive. The candidate's work contributes to the development of microbiological research on various groups of microorganisms - from beneficial ones (*Streptomyces* and lactic acid bacteria), through various enzyme producers, to pathogens.

#### **3.2. Evaluation of citations of scientific works**

The candidate submits for participation in the competition for "Associate Professor" a reference for 112 citations of scientific works found in the databases of *Scopus*, *ISI Web of Knowledge*, for the period 2000-2024. This citation in the scientific community in our country and abroad is objective evidence of the quality of the scientific production of Senior Asst. Yana Gocheva and proves the serious international response of the developed and published works.

Confirmation of the latter is the **h factor** - 7 (according to Scopus) and the fact that even the articles published in 2023-2024 have already been cited.

#### **4. Assessment of the fulfillment of the requirements of the ZRASRB for occupying the academic position of "Associate Professor" in the relevant scientific field**

The candidate has defended a Doctoral dissertation (specialty Microbiology 010612) on the topic: "Research on the role of calcium-binding proteins in *Streptomyces hygroscopicus* 155", with diploma 2771 of 21.01.2002 according to Protocol No. 15.2011.2001 of Commission 3 of the Bulgarian Accreditation Commission.

##### **4.1. Fulfillment of the minimum National requirements under the Law on the Protection of Scientific and Technical Research of the Republic of Bulgaria,**

Regarding the minimum national criteria according to the Law on the Protection of Scientific and Technical Research of the Republic of Bulgaria, Senior Assistant Professor Yana Gocheva participated in the competition with the following scientometric indicators:

- **In group B under indicators 3 and 4: 125 points** were presented out of the required 100 points, formed by 6 scientific publications, with an impact rank of -SJR, 3 of which in scientific publications with a quartile of Q1, 1 with a quartile of Q2 and 2 with Q3

- **In group D under Indicators 7 and 8**, evidence for **252 points** was presented out of the required **200 minimum points**. Of these, **240 points** were formed by 14 articles, as follows: **2 -Q1; 5 - Q2; 1 -Q3; 6 -Q4**, which are in international refereed scientific publications (cited by Scopus or WOS).

- The candidate successfully covered with **224 points. Indicator 11 in group E** "*Citations in scientific publications, monographs, collective volumes and patents, referenced and indexed in world-renowned databases with scientific information*" with a required score of **60 points**. They are formed by 112 **citations** from the *Web of Science and Scopus* databases. The good citation of scientific articles is impressive, which is a good certificate of their significance.

- **According to the indicators in group E in the competition for Associate Professor in 4. Natural Sciences:** ZRASRB and the Regulations for its implementation do not require minimum points. But in fulfillment of the additional conditions, according to the regulations of IMikB, the candidate has submitted a certificate of participation in 4 national and 1 international projects.

**In summary** From the duly completed report for "Minimum required points by groups of indicators for the various scientific degrees and academic positions according to the Law - ZRASRB, it is evident that the candidate fully fulfills and even exceeds some of them, forming 651 points, instead of the required 430 points for "*Associate Professor*":

##### **4.2. Assessment for fulfillment of additional criteria for the growth of the academic staff at IMicB-BAS when occupying the academic position "Associate Professor"**

Dr. Yana Gocheva also fulfills additional criteria, according to the Regulations of IMikB-BAS, for the growth of the academic staff at IMikB-BAS when occupying the academic position "Associate Professor". For participation in the competition, she presents 23 scientific papers, published after acquiring the PhD degree, in refereed journals (with IF/SJR). The rich palette of contemporary scientific research on problems of modern microbiology for the period 2000-2024, in which they are summarized and published, is impressive. All of them are thematically in the management of the unit of the Department of General Microbiology, for

whose needs the competition was announced. The conditions for the number of articles in which the candidate is the first author are met - instead of 5 she presents 7 such. As I noted, a certificate of active participation in 5 projects is presented - of which 3 national, 1 international and 1 internal institute. Outside the activities of the unit, she presents 2 projects with personal participation.

#### **4.3. Evaluation of scientific and applied scientific contributions**

As I have already emphasized, it is evident from the publications that the scientific research activity of Chief Assistant Yana Gocheva is diverse, in a number of current areas of microbiological research. They show a constant scientific search in various thematic areas, accompanying the growth of Yana Gocheva as a microbiologist. From the discussed scientific works submitted for participation in the competition, can clearly outline the personal contribution of the candidate to enriching existing knowledge and theories in the field of general and applied microbiology. Scientific, methodological and applied scientific contributions are found, of an original and confirmatory nature) in the study of eukaryotic and prokaryotic microorganisms, which can be summarized thematically as follows:

##### **(1) Scientific contributions in the study of filamentous fungi and yeasts: -**

- The biodiversity of filamentous fungi from Antarctica - a poorly studied habitat - has been studied. Representatives of the genera *Penicillium*, *Aspergillus*, *Mucor*, *Cladosporium*, *Alternaria*, *Verticillium* and *Botrytis*, grouped according to their growth temperature range (4 – 28 °C), have been proven as exclusively psychrophilic, psychrotrophic or mesophilic fungi.

- The mechanisms of microbial adaptation to low temperature stress: Changing environmental temperature, which is one of the most common stresses, could be crucial for their use in the biotechnology industry and in environmental research. Although researchers have been studying the response to low temperature stress in various organisms for the past two decades, relatively little is known about the difference between the antioxidant response of cells to low temperature stress (cold stress) in Antarctic microorganisms and temperate microorganisms. In this regard, the results obtained have important theoretical implications: Our study showed that lowering the temperature from the optimum to 15 ° or 6 °C leads to a cellular response typical of oxidative stress: a significant decrease in biomass production; an increase in the levels of oxidatively damaged proteins and the accumulation of storage carbohydrates (glycogen and trehalose) compared to growth at the optimum temperature. The cellular response to cold stress also includes an increase in the activity of the enzymes superoxide dismutase and catalase, which are key in directly scavenging reactive oxygen species. It was shown, that this response is species-dependent rather than dependent on the degree of cold stress.

- New knowledge about the metabolic activity and potential of these groups of microorganisms as producers of enzymes with unique characteristics.

- • New information of important theoretical significance has been obtained in model eukaryotic organisms - yeast: For the first time, the role of the Pac2 protein and the reasons for the impaired formation of the quaternary structure of proteins in these microorganisms have been established.

**(2) Scientifically applied contributions to the study of lactic acid bacteria** –The data on their metabolic activities and their specific aroma-forming characteristics have been supplemented, as a prerequisite for their use in functional foods. Dr. Gocheva achieves this with an original protocol of genetic PCR-based tests.

**(3) New knowledge with theoretical and applied significance in the study of enzymes, biodegradation of specific substrates:**

- Broad-spectrum fundamental scientific research on the enzyme sialidase (EC 3.2.1.18) in bacteria and fungi.

- A new recombinant enzyme malate quinone oxidoreductase was constructed and purified with application in the creation of biosensors for monitoring and controlling fermentation in wine production.

- For the first time, the possibility of microbiological degradation of cellulose waste and its conversion into a valuable resource in conditions of Earth gravity and microgravity (space station model) by mixed bacterial communities and pure cultures isolated from different ecological niches was compared.

**(4) New data with theoretical significance regarding the microbiome of reptiles from the territory of Bulgaria.**

**(5) Search for methodical approaches to obtain biogas from waste products-** experimental studies of two-phase anaerobic degradation of corn sludge in semi-continuous automatic and semi-automatic mode of operation of a cascade of two anaerobic bioreactors with monitoring and control systems. A new element is the use of a waste product from the corn grain processing process to extract starch, as a substrate in the anaerobic digestion process with simultaneous production of hydrogen and methane.

Behind these 5 aspects, in which the scientific research of Dr. Gocheva can be conditionally grouped, important results with theoretical and practical significance can be highlighted, which I will examine in a little more detail. I highly appreciate the results of the candidate's enzymatic research.

Current and most extensive are the studies of sialidases. Sialidase preparations are used in structural and functional studies of sialoglycans, in the production of sialylated therapeutic proteins and synthetic substrates for use in biochemical studies, etc. They are obtained mainly from pathogenic microorganisms; therefore, the search for pathogenic sialidase producers is of utmost importance for the safe production of this enzyme. In this regard, we highly appreciate the isolation, purification and characterization for the first time of the sialidase enzyme from the non-pathogenic saprophyte *Oerskovia paurometabola* 129 and the selection of a promising strain *Penicillium griseofulvum* P29 and the optimization of the cultivation parameters for the production of the sialidase enzyme. A protocol for the purification of the sialidase enzyme produced by the Antarctic strain *Penicillium griseofulvum* P29 has been created. Of important theoretical importance are the data on:

- The distribution of the sialidase enzyme in the previously unexplored taxonomic group of filamentous fungi.

- An original scientific contribution is the data obtained for the first time on the effect of catabolite repression and the mechanisms of regulation of sialidase synthesis in filamentous fungi.

- For the first time, increased sialidase activity as a result of oxidative stress has been demonstrated in a filamentous fungus.

- For the first time, the inhibitory effect of extracts from *Rosa damascena* and *Origanum vulgare ssp hirtum* and natural compounds on bacterial sialidases obtained from *Vibrio cholerae non-O1*, *Arthrobacter nicotianae* and *Oerskovia paurometabola* was investigated, with

theoretical and applied significance in the development of new antimicrobial therapies and prevention of various diseases. Bacterial sialidases are enzymes that participate in a number of vital processes in microorganisms and in their interaction with the host or the environment. Their study is in response to their widespread use for scientific and applied purposes, which necessitates the search for highly efficient and non-pathogenic producers. Therefore, an important scientific contribution is the first description of sialidase from *Oerskovia paurometabola* and the partial purification of the produced extracellular enzyme preparation.

A thorough review of the abstracts and the submitted scientific papers and the accompanying competition documentation give me reason to assume that the personal contribution to the experimental development, analysis, interpretation and publication of the submitted scientific contributions is proven.

### **Conclusion**

I highly appreciate the scientific and research activities of Dr. Yana Gocheva. I believe that with her dedicated scientific and research work, proven professionalism and experience in applied microbiological research, she will contribute to the successful development of the project programs of the Laboratory of Microbial Chemistry and the Department of General Microbiology.

Active publication activity, citation, project activity, and outlined scientific and applied contributions are the indicators with which Senior Asst. Yana Gocheva fully meets both the minimum requirements of the ZRASRB and those in the Regulations of ImikB-BAS for holding the position of "Associate Professor".

I strongly suggest that the esteemed scientific jury and the members of the Scientific Council of ImikB-BAS evaluate the candidacy of Senior Asst. Yana Gocheva on merit and vote positively for holding the scientific position of "Associate Professor" in professional field 4.3. Biological Sciences, speciality in Microbiology.

18.01.2025

Reviewer .....  
(Prof. Dr. Svetla Danova, DSc)