

## **REVIEW**

**by Academician Atanas Ivanov Pavlov - Professor at Institute of Microbiology -  
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on the materials presented for participation in a competition for borrowing on the academic Position ' **associate professor** ' in Institute of Microbiology - BAS.

**Professional field:** 4.3. Biological Sciences (Microbiology – microbial degradation of toxic environmental pollutants).

In the competition for 'associate professor' , announced in State newspaper, no . 29 of 12. 04. 2022 and on Web page on Institute of Microbiology - BAS for the needs of Department of General Microbiology, Laboratory of Microbial Genetics, as candidate participates Ch. Ass. Prof. Dr. Maria Gerginova Gerginova from same department and laboratory.

### **1. General presentation of the received materials**

#### **Subject :**

By order No. I-69 dated 30.05.2022 of the Director of the Institute of Microbiology - BAS, I was appointed a member of the scientific jury of a competition for the academic position of 'associate professor' at the Institute of Microbiology - BAS, Professional field 4.3. Biological sciences (microbiology – microbial degradation of toxic environmental pollutants), announced for the needs of the Department of General Microbiology, Laboratory of Microbial Genetics.

Only one candidate submitted documents for participation in the announced competition: Ch. Ass. Prof. Dr. Maria Gerginova Gerginova from the Department of General Microbiology, Laboratory of Microbial Genetics at the Institute of Microbiology - BAS .

The set of materials presented by Dr. Maria Gerginova is in accordance with the Regulations for the Development of the Academic Staff of the Institute of Microbiology - BAS, and includes all the required documents.

Candidate Dr. Gerginova has attached lists of a total of 41 scientific papers and 12 research projects. 39 scientific works are accepted for review, which are outside of the dissertation for the ONS "doctor" and are counted in the final evaluation, as well as 12

scientific research projects. 2 scientific works related to the dissertation for obtaining the educational and scientific degree "doctor" are not reviewed.

## **2. General data on the candidate's career and thematic development**

Dr. Maria Gerginova graduated with a master's degree in "Biotechnological Processes", in Faculty of Biology of SU "St. Kl. Ohridski" in 1993 and acquired an educational and scientific degree "doctor" in 2002 at the Institute of Microbiology - BAS with the topic of the dissertation: "Study of the process of phenolic biodegradation by *Trichosporon yeast cutaneum* R57 ". Dr. Gerginova began her career in 1993 at the Institute of Microbiology at the BAS holds the position of "specialist" in the Laboratory of Biosynthesis of Organic Acids. In 1996, she was appointed to the position of "research associate" at the "Microbial Genetics" section at the same institute, and since 2011 she is currently the chief assistant at the same laboratory. In fact, Dr. Gerginova's entire work experience is related to the Institute of Microbiology - BAS.

Dr. Gerginova's research work, over the years, is entirely related to research in the field of biodegradation of toxic chemical compounds by bacteria, yeasts and filamentous fungi. It should be noted that this thematic direction coincides with the declared priorities of the EU and the Republic of Bulgaria - "Protection of the environment" and "Bio-based economy 2030".

## **3. General characteristics of the applicant's activity**

### **3.1. Main directions in the research work and most important scientific contributions**

All presented scientific articles, by Dr. Gerginova, are in the field of biodegradation of toxic chemical compounds by microorganisms. The main directions in the research work of Dr. Gerginova can be summarized as follows:

- Analysis of enzyme activities involved in the degradation of aromatic and polyaromatic compounds;
- Identification of microorganisms and genes encoding enzyme activities related to the degradation of aromatic xenobiotics.

The published data, in the indicated areas, are valuable both from a fundamental point of view and as a basis for the development of further applied research.

The applicant's submitted statement of scientific contributions articulates correctly and in detail the scientific contributions arising from the results of her research work. The main contributions resulting from the intensive scientific activity of Dr. Maria Gerginova can be considered as new data, data confirming previously stated theses and methodical:

- New data

= Original data were obtained on the presence of key enzymes (phenol hydroxylase and catechol 1,2-dioxygenase) of the ortho-mechanism of the 3-oxoadipate pathway for the assimilation of phenolic compounds in representative yeasts and filamentous fungi;

= Genes encoding enzymes with phenol hydroxylase and catechol-1,2-dioxygenase activity were sequenced for the first time in a representative of the species *Aspergillus glaucus*.

- Data confirming previously stated theses

= *Trichosporon cutaneum* R57 and *Trametes versicolor* 1 strains have been shown to degrade and assimilate mixtures of phenol and its derivatives;

= Hydroquinone hydroxylase, a class A flavoprotein monooxygenase, was found to be involved in the degradation of phenol by strains belonging to the species *Aspergillus fumigatus*.

- Methodical

= Best-fit biokinetic models for the degradation rates of phenol, hydroxy substituted phenols, and the toxic aromatic compounds 2,6-dinitrophenol,  $\alpha$ -methylstyrene, and acetophenone were established, and a strategy for managing the degradation of toxic compounds was proposed on this basis;

= Original oligonucleotide primers suitable for PCR amplification of genes encoding enzymes with phenol hydroxylase and catechol 1,2 dioxygenase activity in filamentous fungi were created;

= Molecular taxonomic analysis of 21 bacterial and 2 fungal strains was performed and the resulting oligonucleotide sequences were registered in the NCBI GeneBank.

### **3.2. Significance of the obtained results**

The presented documents characterize Dr. Gerginova as an actively working scientist who will most likely develop as a leader in the field of environmental biotechnology. Her scientific production of 41 scientific works is proof of active and successful work in the field of scientific research. The number of scientific publications and their distribution by rubrics, presented below, exceed the criteria of the Institute of Microbiology - BAS and the minimum national requirements for holding the academic position "associate professor".

The distribution of the scientific works, in connection with the current competition, by relevant headings, in the country and abroad, is as follows: 19 publications in refereed publications with IF/SJR, of which 2 in journals from the first quartile, 11 in journals from the second quartile, 3 in third quartile journals and 3 in fourth quartile journals, and 12 publications in refereed and non-refereed journals and proceedings. Also presented are 8 book chapters (collections from international scientific forums). In 23 of her publications, Dr. Gerginova is the lead (first or second) author - an excellent qualitative indicator of her level of career development. There are no submitted documents for implemented developments.

Over the years, Dr. Maria Gerginova has co-authored 14 poster presentations presented at international scientific forums, as well as 15 presented at national scientific forums.

The contributions listed above, as well as the scientometric indicators of the presented scientific production (over 280 citations, Impact factor 23.454 and H-index 9), define Dr. Gerginova as a recognizable scientist among the international collegium in her field of competence.

### **3.3. Demonstrated research teamwork skills**

The scientific production cited above would not be possible without comfortable funding of the scientific research of the group in which the candidate works. In this regard, we can also define Dr. Gerginova's indicators as good for the level of her career development - she is a member of the scientific teams of 12 projects, of which 1 is international, 1 is funded by the OP "Science and Education for Intelligent Growth and 10

national. The projects in which Dr. Gerginova participated have a total funding of BGN 1,450,785 .

The above-discussed scientific works, obtained results, scientific and applied contributions, as well as the topics of the projects in which Dr. Gerginova participated clearly show that the candidate has a clearly defined profile of his scientific interests and work in the field of environmental biotechnology and with an emphasis on the biodegradation of toxic chemical compounds by microorganisms.

#### **4. Formal report on compliance of scientometric indicators with national and institutional criteria**

The presented data regarding the scientific of Dr. Maria Gerginova exceed the criteria of the Institute of Microbiology at the BAS and the minimum national requirements for holding the academic position of "associate professor".

National minimum requirements - the applicant meets the requirements for group of indicators "A" (50 points) and for group of indicators "B" (100 points). It exceeds the requirements for the groups of indicators "D" (239 items with the required 220 items) and "D" (578 items with the required 60 items).

##### Additional requirements of the Institute of Microbiology at BAS :

- Number of publications in journals with IF/SJR, monographs, chapters of monographs, proceedings of international forums, published in full text, patents - 26 (after ONS "Doctor") in 7 of them 1st author at required 20 (after ONS "doctor") in 5 of them 1st author;
- Citations – 289 out of a required 100;
- H-index – 9 with required 5;
- Participation in projects – 12 with 3 required

#### **CONCLUSION**

The documents and materials presented by Ch. Ass. Prof. Dr. Maria Gerginova Gerginova, meet all requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (ZRASRB), the Regulations for the Implementation of ZRASRB and the relevant Regulations of the Institute of Microbiology - BAS.

The candidate in the competition has submitted a sufficient number of scientific works published after the materials used in the defense of the ONS "doctor". The candidate's works contain original scientific and applied contributions that have received international recognition, a representative part of which has been published in journals and scientific collections issued by international academic publishing houses. The scientific level of Ch. Ass. Prof. Dr. Maria Gerginova Gerginova is undoubtedly.

The achievements of Ch. Ass. Prof. Dr. Maria Gerginova Gerginova results in the scientific activity, fully comply with the specific requirements and accepted in the Regulations of the Institute of Microbiology - BAS for the application of ZRASRB.

After getting acquainted with the materials and scientific works presented in the competition, analyzing their significance and the scientific, scientific-applied and applied contributions contained in them, I find it reasonable to give my positive assessment and to recommend the Scientific Jury to prepare a report-proposal to the Scientific Council of the Institute of Microbiology at the BAS for the election of the Ch. Ass. Prof. Dr. Maria Gerginova Gerginova, in the academic position of 'associate professor' at the Institute of Microbiology at the BAS, professional field 4.3. Biological Sciences (Microbiology – microbial degradation of toxic environmental pollutants).

July. 2022

Reviewer:

(Academic Prof. Dr. Atanas Pavlov )