

## **ATTITUDE OF REVIEWER**

**by Prof. Dr. Svetlana Temelkova Bancheva from IBER - BAS, Member of the Scientific Jury  
for the competition for the academic position "Professor"  
in the field of higher education 4. "Natural sciences, mathematics and informatics", professional  
field 5.11. Biotechnology (Technology of biologically active substances) for the needs of the  
Department of Biotechnology, Laboratory of Metabolomics of the Institute of Microbiology-BAS  
Candidate: Assoc. Prof. Dr. Milen Ivanov Georgiev**

### **1. General presentation of the received materials under the procedure and the candidate**

The only participant in the competition for "Professor" in the professional field 5.11. Biotechnologies (Technology of biologically active substances) for the needs of the Department of Biotechnology, Laboratory of Metabolomics of the Institute of Microbiology "Stefan Angelov" - BAS (IMicB-BAS), announced in State Gazette no. 47 from 22.05.2020, is Assoc. Prof. Dr. Milen Georgiev. He holds a Master's degree in Biotechnology from the University of Food Technology, Plovdiv, acquired in 2001, as well as a PhD degree in Biology of Biologically Active Substances, code 02.11.11 from 2006. After defending his PhD Thesis, Dr. Georgiev won a grant for postdoctoral specialization "Marie Curie Postdoctoral Fellow" at the Institute of Food Technology and Bioprocessor Engineering, Technical University of Dresden, Germany, and in the period 2010-2012 - in Institute of Biology, Leiden University, The Netherlands. From 2007 until today the colleague works without interruption at IMicB-BAS, where he successively holds the scientific positions "Research Associate I degree" (2007-2010) and "Associate Professor" (2010-). In 2017 he took over the management of the Center for Plant System Biology and Biotechnology in Plovdiv, and from 2020 - of the Laboratory of Metabolomics at IMicB-BAS.

All materials on the competition are prepared in accordance with the all requirements of the Act for the Development of the Academic Staff in the Republic of Bulgaria (ADASRB), the Rules for its implementation, The Regulations for the implementation of the ADASRB of BAS and the Regulations for the development of the academic staff of IMicB-BAS of the academic position of "Professor".

I am very impressed by the extremely active research work and respectful scientific production of Assoc. Prof. Milen Georgiev during his career development. He is the author /

co-author of 130 scientific publications with total impact factor 392.02, cited over 2500 times. At the invitation of the organizers, he has participated with oral presentations at over 50 scientific forums in 20 countries. He leads and participates in research projects worth over BGN 33.5 million. Winner of three awards Pythagoras, the Marin Drinov Award of the Bulgarian Academy of Sciences for young scientists, a diploma for high scientific achievements from the Board of the Bulgarian Academy of Sciences and many others. He is a Chairman of the organizing committee of all four International ICNPU Conferences, a co-editor of 3 scientific journals with a high impact factor and is a member of the editorial board of three others journals.

He participated in the competition with 57 scientific papers, grouped according to the instructions for meeting the minimum national requirements for Professional field 4.2. Chemical sciences. Twenty-eight of them are publications equivalent to habilitation work (Group "B") with a total numerical value of the respective quartiles of 639 points! (at the required 100). The predominant part of them (19 pcs.) are in magazines with Q1, 7 pcs. - in Q2 and 2 pcs. in Q4. Group "D" includes 26 scientific publications (21 in Q1, 4 in Q2 and 1 in Q3) and 3 chapters of books with a total numerical value of the respective quartiles of 665 points! (at the required 200). In 26 of the publications Assoc. Prof. Georgiev is the first or corresponding author. For group "D" he is presented a list of 1057 established citations in scientific journals, referenced and indexed in WEB of SCIENCE and SCOPUS with a total numerical value of 2115 points (with a required 100). To the group "E" is a list of 12 participations in research projects, of which 5 international, 6 national and 1 commercial contract. The total amount of attracted funds for the basic organizations under the projects led by Assoc. Prof. Dr. Milen Georgiev is over BGN 6,700,000. The total numerical value of the points in this group is 1604 (with a required 150). The attached statement shows that the candidate does not only cover but also exceed between 3 and 21 times the minimum national requirements for academic positions "Professor" in the respective professional field.

## **2. General characteristics of the applicant's activities**

The main scientific interests of Assoc. Prof. Georgiev are in the field of plant biotechnology, chemistry of natural molecules (including metabolomics and metabolic profiling) and pharmacology. His contributions are numerous, the most important of which can be related to the following areas:

### Plant biotechnology

Bases for complex knowledge of the metabolic manipulation of the secondary metabolism in plants have been created. It is worth noting the proposed coherent model of spatial repression of rutin biosynthesis by jasmonate-responsive subgroup 4 MYB transcription factors in *Fagopyrum tataricum*; the development of an effective protocol for initiating transformed root crops from *Verbascum xanthophoeniceum* by applying genetic transformation with *Agrobacterium rhizogenes* and treatment with ultrasound; the design of a pulsed aeration column bioreactor suitable for culturing a devil's claw cell suspension (*Harpagophytum procumbens*) and the production of a pharmaceutically significant verbascoside.

#### Chemistry of natural molecules

A metabolic platform has been created for a complex analysis of the metabolic imprints of the biochemical reactions in the cells and its use for qualitative and quantitative control of complex pharmaceutical products and food additives. Of these, I would mention the development of an analytical platform for the study of the phytochemical composition of different species of *Rhodiola*, the recognition of unique metabolites and the identification of counterfeit commercial products; here it was found that by TX-MS and RT-qPCR, *Mycobacterium tuberculosis* exposed to cinnamaldehyde treatment - can use its outer membrane as a physical barrier to various stressors; it has been found that *Verbascum xanthophoeniceum* and *V. nigrum* accumulate significant amounts of the pharmaceutically-important harpagoside and verbascoside, forsythoside B and leucosceptoside.

#### Isolation and purification of biologically active molecules, incl. using liquid-chromatography

Two new iridoid glycosides were isolated from the leaves of *Sambucus ebulus*. A scheme for the isolation and purification of molecules from its fruits has been developed and quercetin-3-O-laminaribioside and isorhamnetin-3-O-laminaribioside have been identified for the first time.

#### Antineoplastic potential and mechanism of action of extracts and pure molecules.

I would note the following contributions: it has been found that in the treatment of breast cancer with flaxseed extract (*Linum usitatissimum*) there is a dose-dependent decrease in their cell viability; the flavonoid scandenolone effectively inhibits tumor growth and increases the number of apoptotic cells in cancer tissue during xenotransplantation of MCF-7 cancer cells into mice.

### Evaluation of anti-inflammatory and immunoregulatory activity of extracts and pure molecules.

The contributions here are numerous, but the following deserve to be emphasized: it has been found that the extract of *Clinopodium vulgare* L., caffeic and chlorogenic acids have a pronounced potential to inhibit COX-2 expression; salidroside and curcumin show immunomodulatory, anti-inflammatory and anti-depressant effects in rats; extract of *Rhodiola* has a beneficial effect on learning and memory in both healthy rats and rats with scopolamine-induced amnesia; extracts and preparations of *Harpagophytum procumbens*, as well as verbascoside show strong anti-inflammatory properties, etc.

### Evaluation of the antiviral potential of extracts and pure molecules.

It was found that the extract of *Nepeta nuda* L show pronounced anti-herpes activity.

### Development of methods for obtaining new materials based on the principles of "green" chemistry.

A method for plant-based synthesis of nano-materials (gold and silver) by ethanol extraction of *Melissa officinalis* L has been developed. Nanoparticles (silver and gold) are the most promising material for future applications.

It makes a great impression that the colleague uses appropriate methods in his research, which allow him to obtain reliable results. The analytical part of the publications submitted for review is in-depth and comprehensive. The scientific areas in which Assoc. Prof. Georgiev works are extremely relevant and promising. I welcome the information provided on the colleague's future research plans. It shows that he has a clear vision of what direction he will focus on in his next innovative and extremely ambitious tasks.

### **Participation in the scientific training of students**

In recent years, Assoc. Prof. Georgiev has been actively involved in teaching activities at Plovdiv University "Paisii Hilendarski". Since 2018, he has been conducting a specialized course of lectures on "Metabolomics" for master students from this university. He has prepared 3 doctoral students, 5 graduates and 9 postgraduates.

### **Conclusion**

Based on the materials submitted in the competition by Assoc. Prof. Dr. Milen Georgiev, it is clear that he far exceeds (between 3 and 21 times) most of the national criteria for holding the academic position of "Professor", defined by national law. His research profile fully meets

the expectations for the announced position. He is an extremely erudite, world-renowned scientist in the field of plant biotechnology, chemistry of natural molecules (including metabolomics and metabolic profiling) and pharmacology, a desirable partner for research projects. The field in which he works is of great scientific and applied interest. He is the manager of several international projects, having attracted funds for over BGN 6,700,000.

Based on the foregoing, I confidently recommend the members of the scientific jury to support the selection of Assoc. Prof. Dr. Milen Georgiev of the academic positions "Professor" in the professional field 5.11. Biotechnologies (Technology of biologically active substances) for the needs of the Department of Biotechnology, Laboratory of Metabolomics of IMicB-BAS.

18.09.2020 г.

Sofia

Signature:

(Prof. S. Bancheva, PhD)