

REVIEW

Based on the documents of the competition for the academic position "ASSOCIATE PROFESSOR" in the field of higher education 4. Natural Sciences, Mathematics and Informatics, Professional field 4.3. Biological Sciences, specialty Microbiology, announced in the State Gazette, issue 66 on August 12, 2025

BY: Prof. Dr. Svetla Danova, DSc., Department of General Microbiology, Institute of Microbiology "Stefan Angelov", Bulgarian Academy of Sciences

1. ABOUT THE COMPETITION:

The competition for the academic position "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 the Department of Infectious Microbiology, Laboratory "Bacterial Virulence, Resistance and New Antimicrobial Agents. It was published in the State Gazette, issue 66 on August 12, 2025. All deadlines and requirements for participation in the Competition have been met. The documentation submitted for participation is very well organized, and contains all the information necessary for evaluation.

I participate in the composition of the scientific jury according to Order No. I-142/01.10.2026 of the Director of the Institute of Microbiology -BAS, on the basis of Art. 4 (3), (4) of the Law on the Development of Academic Staff in the Republic of Bulgaria (ZRASRB), the Regulations of the Bulgarian Academy of Sciences and the Regulations of the Institute and the decision of the Scientific council at the Institute of Microbiology and Microbiology-BAS, according to Protocol No. 10 of the Scientific council meeting held on 30.09.2025.

I have been elected Chairman of the scientific jury on the regular meeting, held on 15.10.2025. In my capacity as a Reviewer, I declare that I have no joint articles, projects or conflict of interest of any other nature within the meaning of para. 1, items 3 and 5 of the Law the Republic of Bulgaria (ZRASRB), with the candidate.

2. CAREER DEVELOPMENT AND PROFESSIONAL QUALITIES OF THE CANDIDATE

The only candidate who submitted documents for participation in the competition for the academic position of "Associate Professor" in Professional Field 4.3. Biological Sciences, specialty Infectious Microbiology, is Dr. Lyudmila Dimitrova, currently a senior assistant in the unit for whose needs the competition was announced. She holds a Bachelor's degree in Ecology and Environmental Protection and a Master's degree in Ecology from the Faculty of Biology at Sofia University "St.

Kliment Ohridski". She is a graduate of Bachelor of Ecology and Environmental Protection and Master of Ecology at the Faculty of Biology of Sofia University "St. Kliment Ohridski". She immediately started working at the Institute and successfully defended in 2019 a dissertation on the topic: "Biological activity of extracts and compounds isolated from *Geum urbanum* L." at the Department of Infectious Microbiology - Institute of Microbiology "Stefan Angelov", Bulgarian Academy of Sciences. Her academic career began immediately after receiving the ONS Doctor of Microbiology, with code 01.06.12, as an assistant in the Laboratory "Bacterial virulence, resistance and new antimicrobial agents".

In the course of her education and professional development, Dr. Dimitrova acquired knowledge, skills and competence of a microbiologist and young researcher seeking new scientific challenges. Proof of this are the numerous awards from presentations at our and international scientific forums; for participation in a successful project funded by the National Science Foundation; and for publications of a young scientist. Professional realization, within 9 years and 5 months of internship in the specialty at IMicB-BAS (according to the official note), to date has been entirely related to the topic of the competition.

3. FULFILLMENT OF THE LEGAL REQUIREMENTS FOR OCCUPATION OF THE ACADEMIC POSITION "ASSOCIATE PROFESSOR" IN A PROFESSIONAL DIRECTION 4.3. BIOLOGICAL SCIENCES

3.1. Characteristics and assessment of scientific and publication activity

Dr. Lyudmila Dimitrova has presented a list of 38 scientific publications as a complete scientific production for her academic career with a high total IF = 84.068. Eighteen are outside the current competition, including the 2 presented for the acquisition of the ONS "Doctor" and are not subject to the current assessment, according to the instructions of the ZRASRB and the Regulations thereto.

The candidate presents in the competition for the academic position of "associate professor" 20 papers published in the period 2018 - 2025, in prestigious international journals, 14 of which with high IF/SJR. A detailed list of 21 participations is presented, of which 13 posters and 8 reports at national and international scientific forums. The scientific output is distributed as follows:

- 11 articles in international refereed journals - Q1
- 3 articles in international refereed journals - Q2
- 4 articles in international refereed journals - Q3
- 2 articles in international refereed journals - Q4

Overall, the publication activity is intensive and systematic. The presented papers testify to intensive research work on the topic of the competition. The wide spectrum

of scientific topics is impressive, covering various current problems of modern microbiology from pathogens and zoonotic agents, and the search for antimicrobial agents, through microbes involved in biodegradation to beneficial microbes in space missions, and mainly the biological activity of medicinal plants. Despite the fact that the works are collective, the candidate's personal participation as the first author in 7 publications is evident.

3.2. Evaluation of citations of scientific works

The candidate presents a list of 24 works cited in international databases. The detailed reference from the SONIX system of BAS is for 491 citations without self-citations, found in the databases of Scopus, ISI Web of Knowledge, Google Science. Of these, 458 are related to the publications in the competition for "associate professor" for the period in which the participating works are 2018-2025. This citations in prestigious international journals is an objective assessment of the quality of the scientific production of Dr. Lyudmila Dimitrova and proves international resonance and their recognition beyond the borders of the country. Confirmation of the latter is the h factor - 10 (according to Scopus <https://www.scopus.com/authid/detail.uri?authorId=57197848917>) and the fact that even the articles published in 2024-2025 are cited.

3.3. Assessment for the fulfillment of the minimum national requirements of the Law (ZRASRB) of the Republic of Bulgaria for the relevant scientific field and the additional requirements of the Institute of Microbiology-BAS

Regarding the minimum national criteria according to the Law, Senior Assistant Prof. Lyudmila Dimitrova participated in the competition with the following scientometric indicators:

By indicator A: She successfully defended a PhD thesis for the award of the educational and scientific degree "Doctor" on the topic: "Biological activity of extracts and compounds isolated from *Geum urbanum* L." (**indicator A - 50 points**). her scientific career as a doctoral student of Acad. Hristo Naidenski, DVM, Head of the Department of Infectious Microbiology at the Institute of Microbiology - BAS and of Acad. Vasya Bankova, DSc, Laboratory "Chemistry of Natural Substances", Institute of Organic Chemistry with the Center for Phytochemistry (IOCCF) - BAS. During her dissertation work, she gained experience in applying various methods for extraction and recovery of biologically active substances from plants, as well as testing their antimicrobial activity and studying their mechanism of action with microbiological and molecular biological approaches.

Indicator B: 135 points were presented. with a required 100 points. The candidate appears with 7 scientific publications, with impact rank – SJR, of which in scientific journals Q1=3; 1 in Q2 and 3 in Q3.

For Indicator D, evidence for 279 points was presented. They are formed by 13 articles in international refereed scientific journals (cited by Scopus or WOS), 8 of which are in quartile Q1. By the unanimous decision of the jury, one of these 8 articles will not be evaluated due to co-authorship. The adjusted total by indicator D is finally **254** with a required minimum of **220 points**.

The candidate exceeds many times the required 60 points under indicator E, "Citations in scientific publications, monographs, collective volumes and patents, referenced and indexed in world-renowned databases with scientific information" by presenting a reference for a total of 1066 points. They are formed by 491 citations in international scientific publications with IF/impact rank and 42 reviews, according to the candidate's reference.

The detailed reference presents only citations from the Web of Science and Scopus databases. Good citations are impressive, including new articles from the last 3 years, which is a good certificate of their significance.

For Indicator E: Dr. Dimitrova presents evidence for 324.1 points. They are formed as follows:

- Participation in 26 projects $\times 10 = 260$ points.
- Management of 3 national projects $\times 20 = 60$ points.
- Total 20,500 BGN (1 point for every 5,000 BGN) = 4.1 points.

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 ZRASRB, the candidate forms a total of **1859.1 points** instead of the **required 430 points** for "Associate Professor":

The only candidate in the Competition exceeds many times the additional requirements according to the Regulations of ImikB-BAS as follows:

- By number of citations, with the requirement of 100 for the entire scientific career, the candidate presents 491.
- The condition for 20 publications (after the ONS "Doctor") is fulfilled in 5 of them 1st or corresponding author, with evidence presented for 20 (after "Doctor") and in 6 of them 1st author.
- The works of Dr. L. Dimitrova, instead of IF -20, have an IF -84.068
- Twice as high as required, according to the ImikB Regulations, is also the h factor -10,
- The number of projects -26, in which the candidate has participated for 9 years of academic career, with requirement of only 3.

4. EVALUATION OF THE CANDIDATE'S RESEARCH ACTIVITY and ORIGINAL SCIENTIFIC CONTRIBUTIONS

The scientific research of Senior Assist. Prof. Dr. Lyudmila Dimitrova is in the field of ecology, microbiology, molecular biology and biotechnology, with a focus on the study of the antimicrobial activity of biologically active substances and their toxicological profile. Starting with the development of a diploma thesis at the Faculty of Biology-SU in the Department of Ecology, she actively works on establishing the microbial diversity in various ecological niches - water, soil and animals, as well as their potential for application in biotechnology, such as the isolation of cellulose-degrading microorganisms and optimization of environmental conditions.

The main topic, that can be indicated is the study of the antimicrobial activity of various extracts and compounds of natural origin, including the assessment of their quorum quenching potential (inhibition of the bacterial quorum sensing mechanism responsible for a number of key processes and communication in the microbial population) and testing their influence in animal models with different directions - from harmlessness to benefits for therapy, etc. applications. The works submitted for evaluation in the competition contain a lot of new data in this field, some of which indeed represent important scientific contributions in the thematic area of the competition. Dr. Dimitrova formulates seven contributions without distinguishing between original scientific contributions, which prove something for the first time, and methodological contributions, which are original and confirmatory in nature. In her future work, this critical self-assessment is recommended and would be very useful for the candidate's scientific career. My comment in no way diminishes the scientific results achieved. Thematically, they are the result of interrelated and complementary extensive scientific research. The contributions are scientific, methodological, and scientific-applied, original and confirmatory in nature (some of them) and can be summarized as follows:

Contribution 1. related to the optimization of methodological approaches for obtaining extracts from Bulgarian medicinal plants in search of an assessment of the appropriate form for extraction and their biological activity, toxicity and the prospects for respective application.

- In this regard, I highly appreciate the methodological contributions for extraction and the obtained new data on biological activity and toxicological profile, as follows:

- New data and comparative evaluation of the cytotoxic profile of methanolic, petroleum ether, ethyl acetate, butanolic, aqueous and 20% ethanolic extracts from aerial parts and roots of *Geum urbanum* L. on tumorigenic and non-tumorigenic cell lines with practical significance.

- New data and comparative evaluation of methanolic, ethyl acetate and butanol extracts for their antiviral activity against Herpes simplex (HSV-1), Human adenovirus (HAdV-5) and Coxsackie B (CVB1) viruses.

- For the first time, the chemical composition of a non-toxic ethyl acetate extract of aerial parts was studied by high-performance liquid chromatography and mass spectrometry (UHPLC–HRMS), which showed strong redox-modulating capacity and activity against phenotypic inhibition of the LasI/Rhl quorum-sensing system of

Pseudomonas aeruginosa (biofilm formation, motility and gene expression), a model of bladder carcinoma, Human adenovirus (HAdV-5) and Coxsackie B (CVB1) viruses.

- For the first time, the *in vivo* toxicological profile of the ethyl acetate extract of aerial parts of the plant was evaluated, characterized by the absence of pathological changes in the liver, kidneys, spleen and Peyer's patches of albino mice, which makes it a suitable candidate for application as a dietary supplement.

- Experimental demonstration of the potential of butanol extracts as a better cytotoxic agent against Burkitt lymphoma, compared to ethyl acetate extracts of aerial parts and roots, as inducers of cell apoptosis suppressing the “oncogenic” superoxide.

- Evaluation of the higher antimicrobial activity in combination with low toxicity and genotoxicity of extracts of propolis, plantain (*Plantago major*) and buckthorn (*Sideritis scardica*), obtained using combinations of natural deep eutectic solvents such as choline chloride and 1,2-propanediol, choline chloride and glycerol or citric acid and 1,2-propanediol, compared to 70% ethanol extracts.

- New data on the antimicrobial effect, cytotoxicity and activity of six commonly used volatile organic solvents against malignant melanoma and epidermoid carcinoma, which would facilitate the selection of scientists for an appropriate solvent in *in vitro* experiments, related to the use of test cell lines and reference microorganisms. Comparison of their manifested effects with the CystiCran® extract and evidence that a preliminary assessment of the solvent used is necessary when planning biological studies.

- Comparative summary evaluation of the biological activities of essential oils, hydrolates, extracts and compounds from *Rosa damascena* Mill., *Rosa alba* L., *Rosa centifolia* L., and *Rosa gallica* L. and their utility in the prevention and treatment of various diseases in the form of respiratory antiseptics, anti-inflammatory agents, mucolytics, expectorants, decongestants and antioxidants, capable of acting as symptomatic prophylactics and drugs.

- The antioxidant and antiherpetic activity of wastewater after distillation of the four oil-yielding Bulgarian roses *Rosa damascena* Mill., *Rosa alba* L., *Rosa centifolia* L., and *Rosa gallica* L., as well as their favorable cytotoxic profile, has been proven.

Contribution 2. New data and comparative evaluation between the photodynamic efficacy of a new palladium phthalocyanine with peripheral methylpyridyloxy groups (pPdPc) and the effective photosensitizer - zinc phthalocyanine complex (ZnPcMe) against *Aeromonas hydrophila*, one of the fish pathogens.

Contribution 3. Development of a modern mathematical approach to evaluate the cytotoxicity of micellar curcumin and erufosine on tumorigenic cells. Their combination enhanced anti-staphylococcal activity by inhibiting biofilm formation and inducing apoptosis in cutaneous T-cell lymphoma.

Contribution 4 Assessment of biodiversity in anaerobic bioreactors and their role in biogas formation processes

- The dominant species in bacterial communities from bioreactors and their role in the release of hydrogen and methane were assessed and compared.

- The aerobic and anaerobic cellulose-degrading activity of communities isolated from a methanogenic bioreactor was evaluated and compared. Their potential application in terrestrial conditions and in long-term space missions was demonstrated.

Contributions 5. New data on the spread of resistant and multi-resistant microorganisms in Bulgaria.

- The low prevalence of *Yersinia enterocolitica* 4/O:3 in the tonsils of healthy pigs in seven pig farms and one slaughterhouse has been proven, which does not underestimate the possible contamination of pork as a potential risk to the health of consumers.

- The spread from pig farms through wastewater and lagoons to soils of resistant and multi-resistant strains of *Escherichia coli*, some of which form healthy biofilms, has been proven, which indicates that the prescription of antibiotics for prophylactic purposes must be carefully monitored and regulated in order to reduce antimicrobial resistance in the food industry in Bulgaria.

- The prevalence of resistant and multi-resistant strains of twelve Gram (-) microorganisms has been demonstrated: *Escherichia coli*, *Yersinia enterocolitica*, *Yersinia kristensenii*, *Hafnia alvei*, *Serratia liquefaciens*, *Serratia marcescens*, *Serratia proteamaculans*, *Pseudoescherichia vulneris*, *Klebsiella pneumoniae* ssp. *ozaenae*, *Enterobacter cloacea*, *Pantoea agglomerans*, *Pseudomonas fluorescens* and five Gram-(+) bacteria - *Enterococcus faecium*, *Enterococcus faecalis*, *Enterococcus hirae*, *Bacillus thuringiensis* and *Lysinibacillus sphaericus*. Their biotechnological potential as producers of insecticides and antibiotics, ferments in the dairy industry, for protection against plant pathogens and for bioremediation, respectively, has been assessed.

5. EVALUATION OF THE CANDIDATE'S PERSONAL CONTRIBUTION

A thorough review of the submitted scientific papers and the accompanying documentation gives me reason to assume that the personal contribution to the experimental development, analysis, interpretation and publication of the submitted scientific achievements is proven. Active publication activity, citation, national project activity are the indicators with which Senior Asst. L. Dimitrova fully meets both the minimum requirements of the ZRASRB and those in the Regulations of ImikB for holding the position of "associate professor". I would like to make a recommendation to the candidate for a more structured assessment of the indisputable scientific contributions, which will be a prerequisite for the development of this promising scientific direction.

6. CONCLUSION:

I highly appreciate the scientific and research activities of Senior Asst. Prof. Lyudmila Lyudmilova Dimitrova.

Based on the above, I strongly suggest that the esteemed scientific jury and the members of the Scientific Council at the Institute of Microbiology "Stefan Angelov" - BAS, evaluate her candidacy on merit by voting positively for her appointment to the scientific position of "Associate Professor" in the professional field 4.3. Biological Sciences, Specialty Infectious Microbiology.

Sofia

Reviewer:.....

23.11.2025

(Prof. Dr. Svetla Danova, DSc.)