SCIENTIFIC STATEMENT

from **Prof. Maria Angelova, DSc,** The Stephan Angeloff Institute of Microbiology, Bulgarian Academy of Sciences

on the competition for the occupation of the academic position “Professor” in professional field: 4.3. Biological Sciences, scientific specialty (General and Food Microbiology), presented to a Scientific Jury formed by order of the Rector of Sofia University "St. Kliment Ohridski” № RD-38-570/03.12.2020

The only candidate in the competition for "Professor" announced in the State Gazette, issue 88 of October 13, 2020 is Associate Professor Petya Kojcheva Hristova, PhD from the Department of General and Industrial Microbiology at Faculty of Biology.

I. General presentation of the procedure and the applicant

The set of materials and documents presented by Assoc. Prof. Petya Hristovaq PhD in electronic form for participation in the competition, fully complies with the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (ZRASRB), and Rules of Sofia University.

Assoc. Prof. Hristova graduated from the Biological Faculty of Sofia University “St. Kliment Ohridski”, specialty “Molecular and functional biology”, specialization “General and Industrial Microbiology”. In 1996 she received the scientific and educational degree of "Doctor" and began working as an assistant in the Department of General and Industrial Microbiology, where he passed successively through the positions of "Senior Assistant" and "Chief Assistant". Since 2012, the candidate held the positions of Associate Professor in the same department. The specializations and post-doctoral position in several foreign laboratories (Aberdeen, Scotland and Nantes, France), as well as teaching abroad (Nantes, France) contributed to her growth as a scientist.

Assoc. Prof. Hristova also has serious administrative experience, she actively participates in the administrative activities of the Faculty of Biology and the Department. Since 2016 she is the head of the Department of General and Industrial Microbiology and the head of the Master's Programme “Food Quality and Safety” at the specialty Agrobiotechnologies. In the period 2016-2020 she was Deputy Dean of the Faculty of Biology. She speaks English and has excellent computer skills.

The scientific career of the applicant is entirely related to the topic of the competition and reflects current and promising areas of General Microbiology, Molecular Biology, Molecular Taxonomy and Food Microbiology.

II. Characteristics of the applicant's activity

Assoc. Prof. Petya Hristova is a co-author of 65 scientific papers, of which 1 monograph, 1 chapter of a book (published abroad), 2 textbooks and 61 scientific papers. Forty-eight of the articles are in journals, indexed and referenced in global databases with a total IF 30.712, 3 are in scientific and applied journals and 10- in non-indexed journals. The results of the applicant have received a wide response among the international scientific community, they are cited 529 times (SCOPUS: 262) and form an h-index 9.

Twenty-two scientific materials are outside the competitions for the acquisition of the scientific and educational degree "Doctor" and the academic position "Associate Professor", which are subject to review - 1 monograph, 14 papers in refereed journals, 5 in journals without SJR and 2 textbooks. The results of Assoc. Prof. Hristova have been published in renowned specialized journals such as Polar Biology, Biotechnol. Biotechnol. Eq., J. Plant Pathology, Z. Naturforsch. and others.

The report on the fulfillment of the minimum requirements for the academic position "Professor" shows that the applicant covers and exceeds the required points, gaining 1143 instead of the required 600:

- Group A indicators - PhD Autoreferat – 50;
- Group C indicators - habilitation thesis, monograph – 100;
- Group D indicators - 14 scientific papers (Q1 - 1; Q2 - 1; Q3 - 6; Q4 - 6) – 207;
- Group E indicators - 283/total 529 citations (SCOPUS - 127/total 262) outside the other competitions – 566;
- Group F indicators – 5 PhD students; participation in 5 projects funded by the NSF and the National Program "Healthy Foods for a Strong Bioeconomy and Quality of Life"; participation in 3 international educational projects; attracted funds for projects managed by the applicant; 2 university textbooks – 220.

Educational activity

Teaching work is one of the main activities of the applicant and is entirely in the field of competition. She has been teaching students since 1996, when she was appointed an assistant at the Department of General and Industrial Microbiology at Sofia University. He is currently an Associate Professor in the same Department and lectures as follows:

- "Microbiology" and "Pathogenic microorganisms" from the Bachelor Program in specialty Molecular Biology.
- "Microbiology and Virology" for the specialty Pharmacy, FHF, Sofia University.
- "Molecular biology of prokaryotes and eukaryotes" and "Food microbiology" from the Master Program in specialty "Microbiology and microbiological control".
- "Microbiological control of food and food products" and "Biological hazards in food" from the Master Program in specialty "Food quality and safety".
- "Cellular pathogens" from the Master Program in specialty "Cellular Biology and Pathology".

The average classroom workload for the period 2015-2020 of Assoc. Prof. Hristova is 448 hours, and the average total study workload - 711 hours. At the same time, Assoc. Prof. Hristova is very intensively involved in the training of young staff. She is the supervisor of 5 doctoral students and 35 graduates of bachelor's and master's programs. This activity also includes the 2 textbooks presented by the candidate, which can be used by students in several universities, by teachers in secondary schools and specialists in microbiological practice.

Research activity and achievements

The scientific works of Assoc. Prof. P. Hristova fully cover the topic of this competition, namely "General and Food Microbiology". They include the applicant's activity in very relevant fields of microbiological science - food safety and quality, structure and dynamics of microbial communities and their role in this process. There are 4 scientific directions in which important scientific and applied contributions are formulated.

1. **The role of cross-pathogens as new biological hazards in plant foods** (№ 44, monograph). The strategies used by cross-pathogens to infect unrelated hosts are of particular interest due to differences in distinctive physical barriers and protective responses. Interactions between them at the molecular level are diverse and complex and can have a critical impact on human and animal health and safety. The monograph focuses on cross-pathogens that use plants as vectors to transmit disease to humans.

➢ Information on the molecular mechanisms of cross-pathogenicity is presented, based on literature data and own research; the gene profiles of the bacterial pathogens that carry out the colonization of plants are described.

➢ Explanations for the preconditions of the emergence of new cross-pathogens and the creation of evolutionary models are proposed.

➢ The problems for food safety in connection with the presence of cross-pathogens are considered; own research is also presented.

➢ Perspective guidelines for work in this multidisciplinary field of Biology in theoretical and applied aspect are formulated.

2. Antibiotic resistance to opportunistic pathogens. This direction (papers №№ 44, 50, 52, 54) is focused on one of the most current problems today - antimicrobial resistance (AMP). Despite the enormous efforts of scientists and clinicians, it is deepening and becoming a multifaceted global challenge that affects the health of people and the economy of each country. The focus of the candidate's research is on the producers of extended-spectrum beta-lactamases (ESBL), carbapenemases (KPC) and metallo-beta-lactamases (MBL) among *Enterobacteriaceae* species and the genera *Pseudomonas* and *Acinetobacter*.

➢ The most effective and rapid tests for the detection of ESBL, KPC and MBL producers have been proven, which can be crucial for antibiotic treatment of patients with opportunistic infections. The new information obtained on the cross-resistance of these bacteria can be a contribution in the same direction.

3. Molecular identification and typing of microorganisms in food. This direction includes papers №№ 9, 12, 13, 17, 48, 49, 57, 59, 60 and 61. The activity of Assoc. Prof. Hristova was aimed at creating and proving the effectiveness of diagnostic approaches applicable to rapid and accurate identification of microorganisms in dynamic microbial communities and phytopathogenic bacteria of the genus *Xanthomonas*.

➢ Using the polyphasic-taxonomic approach, a detailed characterization of the microbiota in mixed biocenoses (rye dough, bees, mollusks, probiotic food supplements) has been achieved.

➢ For the first time the dynamic changes in the structure of the intestinal bacterial community of edible snails of the species *Cornu aspersum* depending on the climatic seasons and their life cycle have been proven. The lactic acid microflora in the intestinal tract of these snails at different physiological stages of their life cycle has been proven and characterized.

➢ A fast method for typing bacteria in food has been developed. For the first time, species of *Lactobacillus spicheri*, *Lactobacillus paralimentarius*, *Lactobacillus kimchii* and *Lactobacillus sanfranciscensis* were isolated and identified from Bulgarian rye leaven.

➢ By applying a combined molecular genetic approach, the biodiversity of the lactic acid microbiota in the intestinal tract of bees *Apis melifera* has been established.

➢ A rapid method for amplification with species-specific primers has been developed for the successful identification of three species of phytopathogens (*Xanthomonas vesicatoria*, *Xanthomonas euvesicatoria* and *Xanthomonas gardneri*), which cause bacterial scab on tomatoes and peppers.

➢ The spread of phytopathogens of the genus *Xanthomonas* in Bulgaria and the region has been proven. Genetic maps of the species *Xanthomonas euvesicatoria*, *Xanthomonas vesicatoria* and *Xanthomonas gardneri* have been created, which contributes to their rapid identification and determination of penetration pathways.

➢ For the first time, the genetic diversity of the phytopathogenic species of the genus *Xanthomonas* isolated from different varieties of *Solanum lycopersicum* L. and weeds from 11

geographical regions in Bulgaria for the period between 1985 and 2012 was traced by molecular typing of the genotype.

4. Microbiological control of probiotic products (papers №№ 57 and 59). The topicality and perspective of the direction are indisputable. Probiotics are the new key word in the health portfolio of 21st century people. They are the focus of attention of scientists, manufacturers and consumers due to their huge health potential. This in turn inspires researchers' efforts to improve methods for assessing their quality.

- A strategy for molecular identification of lactic acid bacteria up to our level in food supplements has been developed.

5. Preparation of biologically active substances with antimicrobial action (work № 53). This area is characterized by research in a modern field - the search for new antibacterial agents to replace antibiotic therapy.

- New data on the antimicrobial activity of hemocyanin from *Eriphia verrucosa* and five of its structural glycosylated units have been obtained. The level of antibacterial properties has been shown to be a function of the degree of glycosylation of hemocyanin.

III. Participation in research projects

Assoc. Prof. Hristova has participated in the development of 34 projects, and for the period after the habilitation - 12 research projects (in 3 she is a supervisor), 4 of which are funded by the EU. All of them are in the field of Microbiology and concern the main directions of its research and teaching activity.

IV. Conclusion

Assoc. Prof. Dr. Petya Hristova is an established lecturer and promising scientist in the field of this competition, distinguished by her own scientific profile and modern approach to research. Her teaching activity corresponds to the current requirements of higher education. She is the author and co-author of textbooks, actively works with PhD students and graduates. The results of Assoc. Prof. Hristova have been published in renowned international journals and have become known to our and the international scientific community. The formulated scientific and applied achievements contribute to the increase of knowledge in microbiology and are potential for use in further developments.

The overall activity of Assoc. Prof. Hristova on scientometric indicators meets the requirements of the ZRASRB and requirements specified in the Rules of Sofia University "St. Kliment Ohridski" for holding the academic position "Professor".

In view of all mentioned above, I strongly recommend to the Scientific Jury, formed by order № № RD-38-570/03.12.2020 of the Rector of Sofia University "St. Kliment Ohridski", to prepare a report-proposal to the Faculty Council for election of **Assoc**. **Prof**. **Dr**. **Petya Koycheva Hristova** to the academic position "**PROFESSOR**" in the professional field 4.3. Biological sciences (General and food microbiology).

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Sofia

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/Prof. Maria Angelova, DSc/