

REVIEW

Subject: Competition for the academic position "Professor" in a professional field 4.3. Biological sciences, specialty Microbiology (Lactic acid bacteria and probiotics), announced in a State newspaper no. 47/22.05.2020 for the needs of the Laboratory "Microbial Genetics", Department of General Microbiology, Institute of Microbiology "Stephan Angeloff", BAS

Candidate: Assoc. Prof. Dr. Svetla Trifonova Danova, DSc.

**Reviewer: Prof. Margarita Kamburova, DSc,
Institute of Microbiology "Stephan Angeloff" (IMicB), BAS**

By an Order № I-80 / 01.07.2020 of the Director of the Institute of Microbiology, BAS I am assigned as a member of a scientific jury for "professor" competition, announced in a State newspaper no. 47 of 22.05.2020. The only candidate submitted documents for participation in the competition is Svetla Trifonova Danova, currently a head of the Laboratory of Microbial Genetics and Associated Professor in the Department of General Microbiology in IMicB. As a member of the jury, I declare that I have not common papers with the candidate. Seventy six articles published in the period 2006-2020 after the candidate habilitation are a subject of this review; sixty four of them have been included in a dissertation for the scientific degree "Doctor of Sciences", defended in 2015.

A brief review of the candidate career

Svetla Trifonova Danova graduated in 1987 from the Faculty of Biology at Sofia University "St. Kl. Ohridski" with a specialization in General and Industrial Microbiology. In 1992 she acquired a second specialty from the same faculty - a teacher in biology and chemistry. In 1997 she

defended her PhD thesis "Studies on some aspects of primary metabolism in *Streptomyces albogriseolus* 444 and its low-productivity version in connection with the regulation of antibiotic production" in the Department of General and Industrial Microbiology, Faculty of Biology, Sofia University "St. Kliment Ohridski". She worked as a specialist and assistant in the Department of General and Industrial Microbiology, Faculty of Biology at Sofia University "St. Kliment Ohridski" until 1999. In 2000 she won a competition for a research degree Chief Assistant in the Department of Microbial Genetics, IMicB, BAS and became Assoc. Prof. in the same Department in 2005. In 2015 she defended a dissertation for Doctor of Biological Sciences: "Biodiversity and probiotic potential of lactic acid bacteria from different ecological niches." She has worked in several laboratories abroad: six and four months of specialization and one year of post-doc in Nant, France; 3 months as a visiting researcher in Stellenbosch, South Africa. A demonstration of her research level is Fulbright grant on the latest aspects of probiotics funded by US Congress and awarded by Bulgarian-American Fulbright Commission.

Description of the presented scientific works and scientometric criteria

The total scientific production of Assoc. Prof. Danova comprises 125 publications, among them 76 were published after her habilitation for "Associated Professor". They are distributed as follows:

- six chapters of books, including one published abroad and one in print abroad; two chapters in the jubilee books of the institute, one chapter in the book of NACID and one chapter in an electronic edition of the Bulgarian representative of EFSA.
- manual and exercise guide for students
- 68 refereed scientific publications, 28 of which in international journals with Impact Factor / Impact Rank and two without Impact Factor; 16 in Bulgarian journals with Impact Factor and 12 without Impact Factor; 4 in foreign and 6 in Bulgarian Proceedings from congresses and conferences. Her works have been published in such prestigious international journals as: Journal of Photochemistry and Photobiology B: Biology (IF 3.035), Bioelectrochemistry (IF - 2.652), Beneficial Microbes (IF 2.614), Colloids and Surfaces B: Biointerfaces (IF 2.593), Journal of Applied Microbiology (IF 2.501), Anaerobe (IF 2.479), International Dairy Journal (IF 2.409), Inflammation (IF 2.208), Biochimica et Biophysica Acta (IF 2.024).

All scientometric criteria of Assoc. Prof. Danova exceed several fold the minimal national criteria for the scientific degree "Professor" according to the Law for the development of the academic staff in the republic of Bulgaria (ZRASRB) (Table 1) - from 2 fold for item B (Habilitation thesis - scientific publications in editions referred to Web of Science and Scopus) up to more than 12 fold for E (Citations in scientific editions in Scopus).

Table 1. Minimal national criteria for the scientific degree "Professor"

Group of indicators	Contents	Requirement for Professor	Assoc. Prof. S. Danova, DSc
A	Indicator 1	50	50
B	Indicator 2	-	100
C	Indicators 3 or 4	100	210
D	Sum of indicators from 5 to 10	100	613
E	Sum of points in indicator 11	100	1238
F	Sum of the indicators from 12 to the end	150	964

A similar ratio is observed when the additional criteria of IMicB are analyzed – while the required works are 20, Assoc. Prof. Danova has 36 works in international journals with IF/IR), chapters from books and monographs. The candidate's criteria for citations, Impact Factor and H-Index are 1.5 fold higher than required. The total Impact factor of the publications is 66.290, as that of the publications considered in this competition is 52.829 (after habilitation). Assoc. Prof. Danova is first or leading author in half of the works in international journals with IF / IR, book chapters and manuals. Scopus overview shows 619 citations of 50 of her scientific works and H-index 13 (without auto-citations of all authors), demonstrating the international significance of her research. The indicators for project leader and defended doctoral students are twice as high.

Table 2. Additional criteria of IMicB for “professor”

Scientific degree or academic position	Number of publications in IF journals, monographs, chapters of monographs, proceedings from international forums, published in full text, patents	Citations*	IF*	H-index*	Additional requirements*
<i>Professor</i>	<i>20 (after “Associated Professor”) in 16 of them leading or corresponding author</i>	<i>400</i>	<i>40</i>	<i>10</i>	<i>Leader of 3 projects and 2 successfully defended PhD students</i>
S. Danova	36 (after Assoc. Prof.) in international journals with IF/IR), chapters from books, monographs. First or corresponding author - in 17.	619 in Scopus (without self citations of all authors)	66.290	13 (Scopus)	Leader of 6 projects. Supervisor of two and co-supervisor of three defended PhD students

*for the whole scientific career

The candidate has participated in 105 national and international scientific events, 26 of which have been abroad, including three times invited lecturer in Portugal, oral presentations in the United States, Serbia, Italy, poster presentations in Romania, Croatia, South Africa, France, Russia, the Netherlands, Scotland and others. A demonstration of her organizing ability is her participation in the organizing committees of three congresses and two workshops.

In 2009 she received an award by the Union of Bulgarian Scientists for high scientific achievements in the field of biodiversity and molecular characteristics of lactic acid bacteria.

Main directions in the research work of the candidate and the most important scientific contributions

The research work of Assoc. Prof. Danova is characterized by achievements in four main scientific areas, mainly in the field of lactic acid bacteria (LAB) and probiotics as a constant source of new scientific challenges and new technologies in dairy product industry. These bacteria are a basis of modern microbial production of healthy functional foods, which determines the relevance of her scientific interest. The candidate has a clearly defined scientific profile of international renown in the field of LAB. Her studies are original in the predominant part.

Area 1: Characterization of the biodiversity and phylogeny of LAB from different ecological niches, according to the requirements of modern polyphasic taxonomy.

Molecular genetic studies of LAB from yoghurt (4, 5, 13, 41), white brined cheese (5, 6, 35, 42, 67), yellow cheese (36), katak (4, 41, 48, 63) , 73), Bulgarian rye sourdough (40, 71), homemade sausages (44), vaginal microbiota (9, 12, 15, 39, 54) have been performed. The works have a scientific contribution to the characterization of LAB biodiversity, in unison with the latest understandings of the taxonomic characteristics of the genus *Lactobacillus*. For the first time in Bulgaria LAB in traditional Bulgarian dairy products have been characterized. The dominant species of non-starter microflora have been identified and over 150 original Bulgarian strains of LAB have been genotyped. For a first time a composition of the vaginal microbiota in women from Southeast Europe has been revealed by polyphasic-taxonomic characteristics of vaginal lactobacilli in healthy Bulgarian women. Among the most important methodological contribution is PCR analysis with total DNA and a combination of species-specific primers for an effective assessment of LAB biodiversity in microbial communities and differentiation of closely related species from the group of *L. plantarum*.

Area 2: Functional characteristics and probiotic potential of LAB

The probiotic potential of LAB, isolated from white brined cheese (16, 18), katak (29, 32, 45, 47) and Bulgarian rye sourdough (40, 71), has been proven. Beneficial metabolic activities of LAB (10) and their mechanisms for influence on human health (20, 23, 25) and physiological processes (34) have been characterized. The probiotic activity of the various strains has been tested in vitro (16) and in vivo (30, 31, 33) and candidate probiotics (32, 53) have been selected. Probiotic activity has also been observed in vaginal strains (12, 14). Producers of active peptides,

proteins and bacteriocins with a pronounced broad spectrum of antibacterial and antifungal activity (11, 14, 29) have been found among the isolated strains (14, 16, 40). Studies on the antibiotic susceptibility of LAB from different habitats have shown a diverse strain-specific spectrum of antibiotic resistance (16, 40, 61, 67). Significant contributions in this direction are the created algorithm for complex assessment of newly isolated LAB as candidate probiotics; the established ability of LAB to colonize mucosal surfaces in the urogenital and gastro-intestinal tract, counteracting pathogenic and undesirable microflora (3, 12), as well as the revealed strain-specific biological activity of LAB from different ecological niches (3, 14, 18, 26, 27, 32, 38, 40, 42, 50, 53, 60).

Area 3: Assessment of technological significance and application of LAB isolated from Bulgarian niches

The technological applicability of LAB, with probiotic potential has been evaluated by in vitro and in situ laboratory tests (1, 2, 4, 6, 16, 18, 26, 28, 29, 42, 43, 46, 47, 49, 52, 67, 71, 77). An important impact of her research in this direction is the established strain-specific compatibility with commercially available starter culture for yogurt. The added probiotic bacteria and prebiotic ingredients in the yoghurt have contributed to the improved characteristics of the products and different taste determining a real opportunities for practical application on the market of functional dairy foods. *L. plantarum* strains with potential for probiotic supplements in production of novel functional foods have been selected. A significant practical impact is the established longer shelf life and positive effect on the rheological and sensory properties of yogurt-type products when newly characterized Bulgarian strains have been used. A new strain of *Lactobacillus delbrueckii* subsp. *bulgaricus* has been determined as a promising starter culture in the development of synbiotics and functional foods due to its broad-spectrum antimicrobial activity, good potential for survival and colonization in GIT, active participation in anti-inflammatory processes and technological compatibility with other lactic acid bacteria.

Area 4: Study of the impact of benign microorganisms / opportunistic pathogens on human health and longevity.

Scientific interest of Assoc. Prof. Danova toward the complex mechanisms for influence on human health determines the research on selected probiotic Bulgarian LAB against commensal *Escherichia coli* (19, 22, 24, 55) and *Candida albicans* (20, 23, 51) as well as the role of other beneficial biologically active substances and metabolites (34, 37). The scientific impact of these

studies is related to the development of model systems for an evaluation of probiotics in conditions in which they are placed as a potential part of the human microbiome, in the norm and in pathology. A demonstration of her large scientific interest is a publication of already two papers (65, 66) devoted to therapy and prevention of Covid 19 pandemic.

Project activity

Assoc. Prof. Danova has significant experience as a leader and participant in national and international research projects. Her scientific career is characterized by active search and provision of financial support for the research of her team. She has led two international and four national projects and participated in 23, nine of which international and 14 national. Currently, the laboratory is performing one international and four national projects, which provides a financial support of the research conducted in the laboratory for which the competition was announced.

Teaching activity

During her scientific career Assoc. Prof. Danova has actively participated in teaching of young scientists. She is a supervisor of two successfully defended PhD students from IMicB and co-supervisor of three PhD students from Sofia University "Kliment Ohridski" and University of Chemical Technology and Metallurgy (UCTM). She is currently supervising a full-time doctoral student in IMicB. Twenty four master's theses have been defended under her supervision, 16 of them been after her election as an "Associated professor". She has been a supervisor of the diploma theses of four bachelors and has participated in the training of five students and probationers. In the period 2019-2020 she conducted two student practices.

Assoc. Prof. Danova has been lecturer for four academic years in the specialty "Biotechnology", UCTM and six academic years with several courses at the Faculty of Biology of Sofia University "Kliment Ohridski".

CONCLUSION

Based on the submitted documentation for participation in the competition and the analysis of the scientific activity of Assoc. Prof. Danova, I believe that the scientific-metric indicators not only cover, but also several times exceed all requirements for the academic position of "professor" of both, ZRASRB and IMicB, BAS. She is internationally recognized scientist in the field of LAB,

with a wide profile of technologies and approaches used, a very ambitious and dedicated researcher, a successful mentor to young scientists. Based on the above, I confidently support her candidacy and recommend to the scientific jury to propose to the Scientific Consult of IMicB, BAS to choose Assoc. Prof. Danova as a "professor" in the professional field 4.3. Biological sciences, specialty Microbiology, for the needs of the laboratory Microbial Genetics at IMicB, BAS.

24.08.2020

Sofia

Reviewer:

(Prof. M. Kambourova, DSc)