

STATEMENT

Maria Prokopova Geneva – associate professor IPPG-BAS

For promotion procedure to the academic position "professor"
at the Institute of Biophysics and Biomedical Engineering (IBPhBME), BAS
in the professional field 4.3. Biological sciences, scientific specialty "Biophysics" published in the
State Gazette, №108/22.12.2020

For participation in the announced promotion procedure in the State Gazette issue 108 of 22.12.2020 and on the website of IBPhBME-BAS, for a professor for the needs of the Department "Photoexcitable Membranes" has submitted documents only one candidate Assoc. Prof. Dr. Anelia Georgieva Dobrikova from IBPhBME-BAS. The set of materials presented by associate professor Dobriciva fully meets the requirements of the Rules of the Academic Staff Development in the Republic of Bulgaria and the Regulations on the Conditions for Procedures for Acquisition of Academic Degrees and Occupation of Academic Positions at IBPhBME -BAS.

Assoc. Prof. Dobrikova started working at the Institute of Biophysics - BAS in 1991 as a specialist biotechnologist. In 1999 she successfully defended his PhD thesis with title: "Surface electrical properties of thylakoid membrane fragments". From 2001 to 2010 she was a research associate II, and from 2010 until now she has been an associate professor at IBPhBME -BAS.

The scientific publications of Assoc. Prof. Dobrikova, presented for participation in the promotion procedure are in the field of biophysical research of the reactions of the photosynthetic apparatus and key photosynthetic complexes to abiotic stress, which can be used to create more sustainable and adaptive cultivated plant species in stress conditions. The data from the candidate's research throughout her scientific career have been published in full text in a total of 50 scientific papers, for which 276 citations have been noticed in specialized international publications indexed in Scopus. This is a good indicator of the quality of scientific production. For participation in the competition, Assoc. Prof. Dobrikova has applied a total of 24 scientific papers, in 10 of which she is the first author. In group B - publications that are referenced and indexed in world-recognized databases of scientific information (Web of Science and Scopus), which are equated to habilitation work, 6 scientific papers with a total IF 20.455 are applied, and in 2 of them, the candidate is indicated as the first author. From them, 4 publications are with Q1 and 2

with Q2 factors. In group D, the candidate has applied 15 scientific publications in editions that are referenced and indexed in world-recognized databases of scientific information (Web of Science and Scopus), other than habilitation thesis, as well as 3 chapters of books. The distribution of scientific papers on the respective Q factors is - 10 publications are with Q1, 3 with Q2, 2 with Q3, as well as 3 chapters of books, as the total IF is 36.904. Many of the presented publications are in world-renowned scientific journals such as: Plant Physiology and Biochemistry, Materials, Ecotoxicology and Environmental Safety, International Journal of Molecular Sciences, Nitric Oxide, Sensors & Actuators: B Chemical, Physiologia Plantarum and others.

Assoc. Prof. Dobrikova has led a scientific youth project at the NSF and a research project (EBR) between BAS and Aristotle University of Thessaloniki, Greece. She has participated as a member in 3 research projects funded by the NSF-MES, in two research projects on bilateral cooperation with the NSF (Bulgarian-Indian and Bulgarian-Slovak project) and one project funded by the MES at the National Science Program. She has participated in 4 International Scientific Cooperation in the framework of inter-academic agreements (EBR): 3 with the Hungarian Academy of Sciences and one with the University of Cairo, Egypt

In my opinion, the scientific interests of Assoc. Prof. Anelia Dobrikova is dedicated to a very relevant and important field. Her studies are grouped into several interconnected areas. The first direction includes research on elucidating the mechanism of action of mutant Rht-B1 alleles and their product (modified DELLA proteins) in wheat plants subjected to Cd stress and salinization of soil on the functional activity of the photosynthetic apparatus. An important contribution in this direction is that the greater tolerance of the wheat mutant (Rht-B1c) to Cd stress is not due to the restriction of Cd transport to the photosynthetic parts of the plant, but includes a protective mechanism in the photosynthetic apparatus. In mutant plants, a reduction in the Cd and salt stress-induced decrease in the leaves pigment content and the inhibitory effect on the activities of the PSII and PSI in thylakoids membranes was observed compared to wild-type wheat Rht-B1a thylakoids membranes. The PSI cyclic electron transport in mutant plants is higher.

Another significant contribution of the candidate is that for the first time two methods have been combined to characterize the influence of Cd stress on the PSII photochemistry and the defence mechanisms of the Cd tolerant medicinal plant *Salvia clarea*. Using chlorophyll-fluorescence imaging analysis (CA-IA), the spatial heterogeneity of photochemical efficiency was

recorded and was compared how the reduced PSII values corresponded to a high accumulation of Cd in the same part of the leaf obtained by laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS). When *Salvia clarea* is exposed to Cd, initially for a short time, and then for a longer time (8 days), the so-called hormetic response is observed. Initially, with a short exposure to Cd, the effect of an "adaptive response" is manifested by activating tolerance mechanisms by increasing PSII photochemistry without disrupting chloroplasts. Prolonged exposure to Cd has a "toxicity" effect in which inhibition of PSII functionality is observed.

An important hypothesis has been developed for the mechanism of the protective effect of quercetin, naringin and ascorbate on the oxygen-evolving complex against UV-B-induced damage to the thylakoid membranes. It has been established that their protective effect is a consequence not only of their direct antioxidant action and direct absorption of UV-B rays but also of induction of structural changes in thylakoid membranes, leading to changes in energy distribution between the two photosystems and modifications of the Mn-cluster of the oxygen-evolving complex

An important direction in the research of assoc. prof. Dr Dobrikova is the study of the influence of phenyl-urea (DCMU and isoproturon), phenolic (ioxynil) and triazine (atrazine) type herbicides on the photosynthetic apparatus of green algae and cyanobacteria. A higher sensitivity of the oxygen-evolving reactions parameters of *Chlorella vulgaris* cells measured by a high-speed polarographic oxygen electrode to Q_B-binding herbicides was found compared to the parameters of chlorophyll fluorescence and compared to those measured in pea thylakoid membranes. Applying the method of measurement with a high-speed polarographic oxygen electrode gives grounds to use *Chlorella* cells as biological receptors in the development of biosensors. Phenylurea-type herbicides more significantly inhibit the cyanobacteria and green algae PSII activity than phenolic-type herbicides.

Associate professor Dr Anelia Dobrikova has been the supervisor of a postgraduate student at Sofia University "St. Kl. Ohridski", Faculty of Biology, Project: Student Internships, 2013. She has been the Scientific Supervisor of the Master Thesis of the student from the University of Chemical Technology and Metallurgy, Sofia, 2017. She has been a Scientific Consultant of a successfully defended PhD Thesis in 2020.

Conclusion

The documents and materials presented by Associate Professor Anelia Dobrikova fulfil all the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDASRB), the Regulations for the implementation of the LDASRB, the Regulations for the implementation of the LDASRB of the BAS and the Rules of the IBPhBME-BAS. The candidate applied a sufficient number of scientific papers, published after the materials used in the defence of the Doctor's thesis and selection of academic position associate professor. The applicant's works have original scientific and applied contributions that have received international recognition by being published in international scientific journals with high IF. The scientific qualification of the applicant is undoubtedly undeniable.

After getting acquainted with the materials and scientific works presented in the competition, analysis of their importance and the scientific and scientific-applied contributions contained therein, I find it justifiable to give my positive assessment and to recommend to the Scientific Jury to prepare a report proposal to the Scientific Council of IBPhBME-BAS for the selection of associate Profesor Anelia Georgieva Dobrikova at the academic position of Professor at IBPhBME-BAS in the professional field 4.3. Biological Sciences, scientific speciality "Biophysics".

22.04.2021

София

Prepared the statement:

/assoc. prof. M. Geneva/