

## REPORT

Professor Violeta Borisova Velikova, DSc

Institute of Plant Physiology and Genetics – Bulgarian Academy of Sciences

Assessor, mandate No. 77 / 16.02.2021

**Regarding:** Competition for academic position “professor” in 4. Life Science, mathematics and informatics, professional field 4.3. Biological Sciences, scientific specialty “Biophysics” at the Institute of Biophysics and Biomedical Engineering, Bulgarian Academy of Sciences (IBPhBME-BAS), published in the State Gazette, issue 108/22.12.2020.

One candidate, assoc. prof. Dr. Anelia Georgieva Dobrikova, is currently taking part in the competition for the academic position of "professor" at the department “Photoexcitable Membranes”, at the IBPhBME-BAS. The submitted documents have been prepared in accordance with the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (ZRASRB), the Regulations for its implementation, as well as the regulations for the conditions and the procedure for acquiring academic degrees and occupying academic positions in the Bulgarian Academy of Sciences and IBPhBMI - BAS.

### **Applicant's career profile**

Anelia Georgieva Dobrikova acquired her Master Degree in Biotechnology, specializing in Biophysicochemistry at the Faculty of Biology at Sofia University “St. Kliment Ohridski” in 1991. In 1999 she obtained her PhD degree (dissertation topic: Surface electric properties of thylakoid membrane fragments) at the Institute of Biophysics, BAS. In the period 2001-2010, Dr. A. Dobrikova holds the academic position of "senior assistant" at the Institute of Biophysics, BAS, and in 2010 she was elected "associated professor" at IBPhBME, BAS.

Assoc. prof. Anelia Dobrikova is a co-author in 45 articles published in international journals and number of citations 524, her h-index is 11, excluding self citations (Scopus, up to 27.04.2021).

### **Submitted documents**

In the current competition for the academic position of "professor", the applicant participates in a total of 22 scientific publications and 3 book chapters. The articles have been published in leading specialized scientific journals in Q1 - 14, in Q2 - 5 and in Q3 - 2. One paper has been printed in a journal without IF or SJR. The presented articles are distributed as follows: in indicator B.4. "Habilitation work - scientific publications referenced in Web of Science and Scopus" - 6, 4 of them in Q1 and 2 in Q2; in indicator Г -

18, of which 3 published book chapters, and 15 scientific publications distributed as follows: Q1 - 10, Q2 - 3 and Q3 - 2. Evidences are provided for 190 citations, all of which are in Web of Science and / or Scopus. Assoc. prof. Dobrikova co-supervised one student successfully obtained PhD degree. She coordinated one project funded by the NSF and of one bilateral cooperation project between BAS and Aristotle University of Thessaloniki, Greece. Assoc. prof. Dobrikova was a team member of 6 international and 4 national scientific projects. She is a guest editor of 2 special issues at Plants (MDPI) and a member of the editorial board of 2 international journals (Acta Scientific Agriculture and International Journal of Plant Biology & Research).

The submitted information on the fulfillment of the minimum national and specific requirements shows that the number of points formed in each indicator significantly exceeds the minimum number of points.

The applicant has clearly defined scientific profile. Her research is focused on the study of current and prospective scientific problems in the fields of plant biology and biophysics. The experimental results obtained contribute to deepening and expanding knowledge on the effects of a variety of abiotic factors (high light intensity, high temperature, UV-B radiation, salting, heavy metals, herbicides) on the functional characteristics of photosynthetic membranes and mechanisms of adaptation and protection, as well as to clarify the role of various signaling (nitric oxide, 24-epibrasinolide, salicylic kyrgios, DELLA proteins) and antioxidant molecules in the protection of photosynthetic membranes against adverse environmental factors.

The scientific achievements can be divided into two main areas. The first is related to the study of the structural organization and stability of photosynthetic apparatus in higher plants and cyanobacteria, experiencing a variety of stresses. The following achievements could be highlighted as more important:

- For the first time modifications in the content of the cyanobacteria light-harvesting complexes (phycobilisomes) have been found to provoke changes in cell morphology and surface electric properties and functions of the thylakoid membranes.
- It has been proven that increased oligomeric forms of light-harvesting complexes of photosystem II (LHCII), decreased amount of anionic lipids and increased content of MGDG are essential for higher resistance of plants to abiotic stress.
- Higher nitrogen supply alleviates the toxic effects of cadmium on the photosynthetic apparatus of two varieties of wheat and the proper nutrition conditions can limit the uptake of toxic metals from the soil.
- For the first time chlorophyll-fluorescent imaging analysis and laser ablation inductively coupled plasma mass spectrometry were successfully combined to monitor spatial heterogeneity of cadmium accumulation pattern and PSII photochemical efficiency.

The other field of investigation is focused on the role of various signaling and antioxidant molecules in plant protection against adverse environmental factors.

- For the first time, experimental evidence has been provided about the protective role of DELLA proteins in wheat mutant experiencing cadmium stress. The contribution of DELLA proteins to the alleviation of salt-induced damages of the photosynthetic apparatus has also been demonstrated.
- For the first time, it has been shown that the protective effect of salicylic acid in cadmium-induced stress is associated with the prevention of Mn-cluster from damage or modifications, and with stimulation of cyclic electron transport around PSI. It was also found that nitric oxide affects the efficiency of electron transport and the oxido-reduction state of the Mn-cluster on the donor side of PSII.
- Exogenous 24-epibrassinolide induces alterations in the structural organization of the thylakoid membranes, which is associated with its protective role in plants.
- Quercetin, naringine and ascorbate have been found to effectively protect the oxygen-evolving complex, which is associated not only with their direct antioxidant activity, but also with the structural changes in photosynthetic membranes and modifications of Mn-cluster.

The applicant also has a clear vision for her future research. She will focus on the use of nanotechnology to support plant growth and to improve photosynthetic activity under salt stress. Studies on the protective mechanisms of nitric oxide will continue. Investigations are envisaged on the drought tolerance of different varieties of winter wheat. New plant species suitable for phytoremediation will be tested.

**In conclusion**, the documents and materials presented at the competition show convincingly the valuable scientific achievements of assoc. prof. A. Dobrikova. According to the analysis and evaluation of her scientometric indicators it is clear that she completely cover and exceed the minimum national criteria for acquiring the academic position of "professor" set out in the ZRASRB, as well as the specific conditions of IBFBMI-BAS. All this gives reason to strongly support the awarding of the academic position of "professor" to assoc. prof. Dr. Anelia Georgieva Dobrikova.

27.04.2021

Sofia

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/Prof. DSc Violeta Velikova/