

OPINION

by Prof. Dr. Tsonko Dekov Tsonev, pensioner, designated according to order No. 1352 /14.10.2024 of the Director of the Institute of Biophysics and Biomedical Engineering as a member of the scientific jury

Regarding: Competition for the selection of Associate Professor of biophysics, professional direction 4.3. "Biological Sciences", according to the announcement in the State Gazette, issue 69/16.08.2024, for the needs of the "Photoexcitable Membranes" section at the IBBE with candidate Senior Assistant Professor Dr. Georgi Dimitrov Rashkov

Senior Assistant Professor Dr. Georgi Rashkov participates in the announced competition for "Associate Professor" as the only candidate. The submitted documents are in accordance with the Law on the development of the academic staff in Bulgaria (LDASB) and the Regulations for the terms and conditions for acquiring scientific degrees and occupying academic positions at the Institute of Biophysics and Biomedical Engineering - BAS.

Dr. Rashkov obtained his master's degree in physics at the Faculty of Physics of the St. Kliment Ohridski University of Sofia in 2002. In 2006 he joined the Institute of Biophysics and Biomedical Engineering as a specialist physicist. In 2006 he was appointed as assistant, and in May 2019 obtained the educational and scientific degree "PhD" with the topic of the dissertation: "Possibilities of application of photosynthetic membranes as a bioreceptor for registration of pesticides".

Dr. Rashkov's scientific research is mainly focused on the influence of abiotic stress on the photosynthetic apparatus and the mechanisms of its adaptation in various plant species, cyanobacteria and green algae, as well as on the role of exogenously applied signaling molecules and nanoparticles under physiological conditions and under abiotic stress in different plant species. Modern biophysical and biochemical methods are applied, such as measurement of chlorophyll fluorescence at normal and low temperature (77K), oxidation-reduction properties of P700, photochemical activity of photosystems II and I, oxygen yields under flash and continuous illumination, antioxidant and antiradical activities etc.

As a result of these studies, a number of contributions have been made, the most important of which are the following:

- In studies on the effect of salinity on the photosynthetic apparatus of C3 (pea) and C4 (maize) plants, NaCl treatment was found to cause a decrease in the density of photosynthetic structures and the relative size of the plastoquinone pool, as well as a decrease in electron transport to the final electron acceptors of photosystem I, as well as the probability of their reduction, which is accompanied by an increase in the thermal dissipation. The observed increased energy losses after treatment with high concentrations

of NaCl in maize resulted mainly from the increase in regulated energy losses, while in peas - from the increase in unregulated energy losses. Evidence was obtained showing a lower density of photosynthetic structures, a larger relative size of the plastoquinone pool, and a higher electron transport capacity and photosynthetic rate in C4 compared to C3 plants. Salt stress was also found to inhibit the photochemical activity of photosystem II (PSII), affecting energy transfer between pigment-protein complexes, Q_A reoxidation and the function of the oxygen-evolving system, and these processes were more strongly affected in pea. compared to maize.

- As a result of studies of the effect of different levels of drought on the photosynthetic characteristics of maize and sorghum, it was found that water deficit reduces the number of open centers of photosystem II, the effective quantum yield of the photochemical conversion of energy into PSII, the rate of linear electron transport, which in turn leads to a reduction in the efficiency of the primary processes of photosynthesis, the impact being stronger in sorghum than in maize. As a result of the drought, an increase in regulated energy losses and activation of state transition of photosystems were observed in maize, while in sorghum an increase mainly in unregulated energy losses was recorded.
- To evaluate the influence of nitric oxide on the efficiency of photosynthesis, the impact of different concentrations of sodium nitroprusside (SNP) on the functions of the photosynthetic apparatus in sorghum (*Sorghum bicolor* L.) and maize (*Zea mays* L.) has been investigated. Lower concentrations of SNP (up to 150 μ M) were found to enhance the interaction of Q_A with plastoquinone in maize, while at 300 μ M SNP, electron recombination on $Q_AQ_B^-$ predominated, with S2 (or S3) states of the oxygen-evolving system in both tested plant species. The application of SNP has been shown to stimulate the flow of electrons to the acceptor side of the reaction center of photosystem I and the probability of their reduction. It was also found that foliar treatment with different concentrations of SNP on maize and sorghum reduced the negative effects of NaCl on the integrity of membranes, the functions of the photosynthetic apparatus, the protection being concentration dependent and specific, both for the plant species and for the respective variety.

The fulfillment of the minimum requirements for occupying the academic position "Associate Professor" from Dr. Rashkov are described by groups of indicators in the table below:

Group of indicators	Content	Minimum requirements in IBFBMI, BAS for "docent"	Points according to the indicators of the Senior Ass. Prof. Georgi Rashkov
A	Indicator 1	50	50
B	Indicator 3 or 4	100	100
Г	Sum of indicators from 5 to 10	220	254
Д	Sum of points in indicator 11	60	84

Regarding the indicator B.4. Scientific publications in journals that are refereed and indexed in world-renowned databases of scientific information, the candidate in the competition has submitted 4 scientific articles with Q1, published in the period 2022-2024. In 2 of these publications Dr. Rashkov is the first author and in another 2 – second. To meet the requirements under indicator Г.7. 12 scientific articles published in the period 2016-2023 are presented. Of these, 7 are with Q1, 2 are with Q2, 1 with Q3 and 2 with Q4. The total sum of the points for the indicators in group Г of the candidate is 254 points with a required minimum of 220 points, according to the requirements of IBFBMI for occupying the academic position "docent". his references are 225. For the competition for associate professor, the candidate has submitted 42 citations, which provide 84 points under indicator Д, with the required 60 points.

Results of the candidate's research have been presented in 33 poster and oral presentations at national and international scientific forums. Senior Assistant Professor Dr. Rashkov is actively involved in competitively funded scientific research projects: a participant in a total of 9 national and international scientific projects.

Conclusion:

The analysis of the presented materials, as well as personal impressions, allow me to draw a reasoned conclusion that Senior Assistant Professor Dr. Georgi Rashkov is a built scientist who works in an up-to-date field of modern science, such as biophysics. Dr. Rashkov has presented sufficient volume and content of creative materials in which he has a substantial personal involvement and which meet all the requirements of the LDASB, the Rules for its application and the Rules of the IBBE, for participation in a competition for Associate Professor. All this gives me reason, as a member of the Scientific Jury for the competition, to give a POSITIVE evaluation of his candidacy and to confidently recommend to the Scientific Jury and the Scientific Council of IBFBMI to vote positively for the election of Senior Assistant Professor Dr. GEORGI DIMITROV RASHKOV to the academic position of "ASSOCIATE PROFESSOR" in the scientific specialty of Biophysics.

18.11.2024 г.
София

Signed: ...


/Prof. Tsonko Tsonev, PhD/