OPINION

by

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Subject: Competition for the academic position of "Associate Professor" at the Institute of Molecular Biology "Acad. Rumen Tsanev" – BAS, announced in the State Gazette, issue 24/21.03.2025 for the needs of Department "Regulation of Gene Activity".

Scientific Jury: Formed in accordance with Order No. 64-OB/31.03.2025 of the Director of IMB-BAS.

Field of Higher Education: 4. Natural sciences, mathematics and informatics.
Professional Field: 4.3. Biological sciences.
Scientific Specialty: Molecular biology.

The only candidate for the announced competition is **Assistant Professor Dr. Kiril Todorov Kirilov**.

The materials submitted by the candidate meet the requirements of the Law for the Development of the Academic Staff in the Republic of Bulgaria (LDASRB) and the Regulations, Terms and Procedures for Acquiring Scientific Degrees and Holding Academic Positions of the Institute of Molecular Biology "Acad. Rumen Tsanev" - BAS.

Career development and thematic focus of the candidate

Assistant Professor Dr. Kiril Todorov Kirilov was born in 1974 in the town of Slivnitsa. In 2001, Kiril Kirilov obtained a Master's degree in "Biotechnology" at the University of Chemical Technology and Metallurgy, Sofia. In 2014, he successfully defended his PhD thesis "Codon Usage in Bacteria and Animal Mitochondria" at the Institute of Molecular Biology "Acad. R. Tsanev" - BAS and obtained the scientific and educational degree "Doctor" in Molecular Biology. At the time of the announcement of the competition, Assist. Prof. Kiril Kirilov is a member of the team of the "Regulation of Gene Activity" Department at the Institute of Molecular Biology "Acad. R. Tsanev" - BAS. It is noteworthy that in addition to his research activities, Dr. Kirilov is intensively engaged in teaching at the Technical University of Sofia and the New Bulgarian University, where in the period 2014 - 2025 he delivered a number of lecture courses in the field of bioinformatics and bacterial genetics. Over the past 10 years, Dr. Kirilov has participated in 5 research projects funded by the National Scientific Fund. In his career so far, Dr. Kirilov has published 28 scientific papers and is a co-author of 2 supported patents. His research has been cited over 100 times. He

specialized at the International Center for Genetic Engineering and Biotechnology, Trieste, (Italy) and Carleton University, Ottawa (Canada).

The main scientific interests of Dr. Kirilov are directed in the field of bioinformatics. He is an expert in molecular modeling, molecular docking, virtual screening of biopharmaceuticals, quantum chemical calculations, and the study of the "chemical structure - physiological activity" relationships - areas of science that are of particular importance for the study of new structures with high potential for application in the treatment of a number of socially significant diseases such as Alzheimer's, Parkinson's, influenza, COVID-19, and cancer.

Compliance of the presented materials with the minimum national requirements of the LDASRB and the Regulations, Terms and Procedures for Acquiring Scientific Degrees and Holding Academic Positions of IMB-BAS

For participation in the competition, Assist. Prof. Kirilov presented 12 scientific publications, 3 book chapters and 2 patents of the Republic of Bulgaria, which do not repeat those specified for the acquisition of his "Doctor's" degree. According to the brief reference and the summarized detailed reference submitted by the candidate for fulfillment of the minimum national requirements of the LDASRB and the Regulations, Terms and Procedures for Acquiring Scientific Degrees and Holding Academic Positions of IMB-BAS regarding the academic position "Associate Professor", it is evident that Dr. Kirilov collects the necessary points for all groups of indicators as follows:

Group of indicators A – the candidate has 50 points (50 points required for a defended dissertation for the educational and scientific degree "Doctor").

Group of indicators B – the candidate scores 100 points (out of the minimum required 100 points), which are formed by 5 publications equivalent to a habilitation thesis, and are distributed as follows: three publications falling into the Q1 quartile; one publication with the Q3 quartile and one publication referenced in Scopus.

Group of indicators D – Asst. Prof. Kirilov has 220 points out of the required 220 points. In this group, he has included 7 experimental publications (carrying 125 points), 3 book chapters (45 points) and 2 patents (50 points). The distribution of articles by quartiles according to the reference submitted by the candidate is as follows: Q1 – 1 issue; Q2 – 2 issues; Q3 – 4 issues.

Group D (citations in scientific publications), referenced and indexed in the world's databases of scientific information – the candidate has presented 30 citations of his works, carrying 60 points, with 60 points required.

The science metric data show that the points with which Dr. Kirilov presents himself in the competition meet the requirements for occupying the academic position of "Associate Professor" at IMB-BAS.

Main areas in the candidate's research investigations and scientific contributions

I will note some of the main areas of research of Dr. Kirilov, as well as some scientific contributions which in my opinion are impressive:

Computational bioinformatics methods for developing therapeutic agents for socially significant diseases

Through molecular docking, computer models have been developed for the rapid and effective identification and optimization of molecules with potential biological activity against diseases such as Alzheimer's, Parkinson's and Covid-19. New physiological properties of known drugs such as favipiravir and deferiprone have been investigated.

Development of specialized bioinformatics applications

The wide range of programming languages and specialized software (Java, Perl, Python, Visual Basic, Molegro Virtual Docker, SeeSAR, jFATCAT, etc.) that the candidate successfully applies in his research is impressive.

Dr. Kirilov has developed algorithms and applications such as "Gene Triplet Analysis" and "DNA Size Finder". It is important to note that the scripts developed by Dr. Kirilov are freely available to the scientific community.

Research on non-enzymatic glycosylation of macromolecules

The research on non-enzymatic glycosylation of proteins is of considerable interest - a process of essential importance for the development of some diseases.

For the first time, it has been established that phosphoglucose isomerase exhibits deglycating activity towards Amadori products.

It has been established that the amino acid L-lysine and uric acid enhance glycation processes, while the purine analogues theophylline, theobromine, xanthine and hypoxanthine significantly reduce the formation of advanced glycation end products (AGEs).

Creation of a set for practical training in chemistry and environmental protection for students at the high school level of education

Two sets of tools and manuals for practical training of students in chemistry and environmental protection have been developed. These are patented and supported with a term of activity of 2026 and 2027. These materials are of a scientific-applied nature and further emphasize the active pedagogical activity of the candidate.

Overall, in his research, Dr. Kirilov successfully combines theoretical and experimental models, forming a solid set of interdisciplinary approaches that have a significant contribution to expanding the scientific information in the field of biomedicine and biotechnology.

Comments and recommendations

I have no concerns regarding the scientific value of the materials submitted for the competition. I would recommend that the candidate, in his future research, also directs his attention at plants as model systems. For example, there are already proven excellent 3D models of the receptors of some of the phytohormones and through molecular docking, a field in which Dr. Kirilov is an undoubted expert, new structures with high growth-regulating properties and potential for application in agribusiness can be discovered.

Conclusion

After reviewing the scientific activity of Assist. Prof. Dr. Kiril Kirilov, I believe that the candidate meets the profile of the announced competition for the needs of the section "Regulation of Gene Activity". He participated with sufficient volume and quality of scientific production. The science metric indicators presented by the candidate meet the requirements of the Law for the Development of the Academic Staff in the Republic of Bulgaria and the Regulations, Terms and Procedures for Acquiring Scientific Degrees and Holding Academic Positions of IMB-BAS for occupying the academic position of "Associate Professor". Dr. Kirilov has a definitely distinguished scientific profile, and his research is focused on a scientific field which is important for the society.

The abovementioned gives me reason to confidently recommend to the esteemed members of the Scientific Jury and the Scientific Council of IMB-BAS, Assistant Professor Dr. Kiril Todorov Kirilov to be elected to the academic position of "Associate Professor" in professional field 4.3. Biological Sciences, specialty "Molecular Biology".

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Sofia /Prof. Dr. Iskren Sergiev/