REVIEW

by Assoc. Prof. Dimitar Borisov Iliev, PhD, Institute of Molecular Biology – BAS

on the competition for the academic position of "Associate Professor"

in the professional field 4.3. Biological Sciences, scientific specialty Molecular Biology

for the needs of the Institute of Molecular Biology "Acad. Roumen Tsanev", BAS

By Order No. 23-OB/28.01.2025 of the Director of the Institute of Molecular Biology "Acad. Roumen Tsanev" at BAS (IMB-BAS), I was appointed a member of the academic committee in connection with the competition for the academic position of "Associate Professor" in the professional field 4.3. Biological Sciences, specialty Molecular Biology.

At the subsequent meeting of the academic committee held on 19.02.2025, I was tasked with preparing a report on the procedure.

The competition was announced in the State Gazette, issue 104 dated 10.12.2024, and has a single applicant – Dr. Radoslav Alexandrov.

The documents submitted by the candidate meet the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria and the Regulations for the Development of the Academic Staff at BAS, and they fulfill the criteria of IMB-BAS for acquiring the academic position of "Associate Professor." According to the summary provided in Table 1, the candidate fully meets the minimum required points for the position of "Associate Professor" in groups A, B, and C, and significantly exceeds the requirements in groups D and E, collecting a total of 1918 points out of the required 430.

Table 1. Minimum required points by indicator groups for the academic position "Associate Professor":

Group indicators	Minimum Required	Submitted by the Candidate
A	50	50
B	100	100
C	220	220
D	60	1060
E	-	488
Total	430	1918

Education

The candidate holds a Bachelor's degree in Molecular Biology from the Faculty of Biology, Sofia University.

In 2014, he obtained a Master's degree in Biochemistry from the same faculty.

In December 2018, Dr. Alexandrov defended a dissertation titled "Dynamics and Sequence of Protein Binding in DNA Repair" for PhD degree in Molecular Biology at the Institute of Molecular Biology, BAS (Diploma No. 001105 dated 21.01.2019).

Professional Experience

Between 10/2014 and 10/2016, the candidate worked as a biologist specialist in the Laboratory of Genome Stability, Institute of Molecular Biology, BAS.

From 10/2016 to 01/2022, he worked as an assistant, and since 02/2022 he has been a chief assistant in the same laboratory.

Publication Activity

Currently, Dr. Alexandrov is a co-author of 15 scientific publications in journals indexed in Scopus/Web of Science. He has submitted 4 publications as his habilitation work (Indicator B. from Table 1) and 10 additional publications (Indicator C from Table 1).

It is particularly impressive that the four articles in group B.4 and seven of those in group C.7 have been published in Q1 journals, reflecting the high quality of the candidate's scientific output. Even more striking is the total **impact factor (113.227)** of the submitted publications, including papers published in the prestigious journals **Cell (impact factor 45.5) and Cell Reports (impact factor 7.5)**

In 2018, 2021, and 2024, publications in which Dr. Alexandrov was the first or last author were selected as top scientific achievements of the Institute of Molecular Biology.

In 2019, he received the **"Marin Drinov" award** for young scientists from BAS and a prize for best scientific publication by a young scientist in the competition marking the 150th anniversary of BAS. That same year, he also received the **'Roumen Tsanev" award** from the Institute for young researchers.

In summary, given the candidate's age and short scientific career, Dr. Alexandrov's publication record is remarkable.

Citations

According to the detailed report on the fulfillment of the minimum requirements for academic degrees and positions at IMB-BAS, Dr. Alexandrov has 530 citations in Web of Science and Scopus-indexed journals. This high number of citations further highlights the significance and quality of his scientific work.

Participation in Scientific Projects

Dr. Alexandrov has participated in 11 national and 1 international scientific project and is the principal investigator on 2 national and 1 international project.

The current international project he leads – "Deciphering DNA Damage Response Dynamics in Living Cells" – is funded by the Swiss National Science Foundation (SNSF) under the Promotion of Young Scientists in Central and Eastern Europe (PROMYS) program, with a duration of 5 years and an impressive total budget of 1,300,000 BGN.

Supervision of Students

So far, the candidate has supervised four students – three undergraduate students (Faculty of Biology, Sofia University) and one Master's student (Maastricht University).

Conference Participation

To date, the candidate has participated in 14 national and international conferences, presenting 6 posters and delivering 8 oral talks, including invited talks at the Genome Architecture and Function Workshop in Sofia (2024) and the iPoLS Annual Meeting – Physics of Living Systems in Houston, USA (2018).

Scientific and Applied Contributions

The scientific contributions of Chief Assistant Professor Dr. Radoslav Alexandrov are grouped into five research areas:

I. DNA Repair Dynamics in Living Cells

- A unified model has been proposed for the mechanism of PARP inhibitors, showing how their easily measurable characteristics (via live-cell microscopy) define their effectiveness.
- It was demonstrated that PARP1 not only detects and binds to DNA breaks but also holds DNA ends together for rapid ligation. This newly discovered function depends on its catalytic activity and the accumulation of the PAR-binding protein FUS.
- A unique open-access database, DNARepairK, was created containing kinetic data on 70 DNA repair proteins.
- An open-access image analysis software, CellTool, was developed for the modeling of protein dynamics at DNA damage sites in live cells.

- The mechanism of ATM-dependent H2AX phosphorylation and MDC1 accumulation in a region far exceeding the damage site was uncovered.

II. DNA Replication Dynamics in Living Cells

- An experimental approach for measuring the dynamics of individual replication foci was developed.
- Dynamics of PCNA and RPA1 proteins were studied under normal and replication stress conditions.
- The roles of ATM and ATR kinases in replication dynamics were also investigated.
- The protein Dia2's role in the cell cycle and morphology of S. cerevisiae was explored under stress and non-stress conditions.

III. Etiology of Chronic Rhinosinusitis

- A strong correlation was found between bacterial biofilm formation in the nasal mucosa and the development of chronic rhinosinusitis.

IV. Metabolic Differences in Embryogenic vs. Non-Embryogenic Plant Cells

- Key differences were revealed in proliferation levels, enzyme activity, metabolic pathways, and oxygen consumption in plant cell cultures with the same genetic origin.

V. Mechanism and Properties of the Neurotoxin Vipoxin

- The sPLA2 subunit of Vipoxin (from Vipera ammodytes meridionalis) was studied, identifying key amino acids for catalysis and substrate binding.
- A set of scFv clones was developed that neutralize the toxic sPLA2 subunit.
- Cytotoxic effects of sPLA2 on various cell lines and its impact on membrane integrity were analyzed.

Future Professional Development Prospects

In his extended habilitation report, Dr. Alexandrov outlines the following future research directions, also embedded in the SNSF-funded project:

1. **Study of PARG inhibitors (PARGi) mechanisms**
2. **Study of ATM inhibitors (ATMi) mechanisms**
3. **Ubiquitin-dependent organization of DNA damage sites in live cells**
4. **Creation of an atlas of protein exchange dynamics at complex DNA damage sites in live cells**

Beyond their high scientific value, these studies have strong translational potential, possibly leading to more effective and targeted cancer therapies.

Recommendations

I can only recommend that Dr. Alexandrov continues to maintain the high level of his research work and the fast pace of his scientific career development.

Conclusion

After reviewing the competition materials and scientific works and analyzing their significance and contributions, I confirm that Dr. Alexandrov's achievements meet and in some respects significantly exceed the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, its implementation rules, and the respective BAS regulations for appointment to the position of "Associate Professor" in the relevant scientific area.

Based on the above, I **strongly recommend** that the academic committee approve Dr. Radoslav Alexandrov for the academic position of "Associate Professor" at the Institute of Molecular Biology "Acad. Roumen Tsanev", BAS.

Date: 30.04.2025

Prepared by:

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(Assoc. Prof. Dimitar Iliev)