

REVIEW

By **Prof. Ivan Georgiev Ivanov**, D.Sc., IMB-BAS

Evaluation of candidates for **Full Professor** position in the Area of higher education: 4. Natural sciences, Mathematics and Informatics; Professional field 4.3. Biological Sciences; Scientific specialty **Biochemistry**

1. Common part

The competition for Full Professor in higher education 4. Natural sciences, mathematics and informatics, professional field 4.3. Scientific specialty Biochemistry was declared for the needs of the Department of Biochemistry at the Faculty of Biology, University of Sofia "St. Kl. Ohridski" in the State Gazette no. 32/16.04.2021. The only candidate is Assoc. Prof. Dr. Jordan Atanasov Dumanov of the same department. The examination of the documents shows that the procedure for opening and announcing the competition has been followed and the documents have been prepared in accordance with the Law on Development of the Academic Staff in the Republic of Bulgaria (LDASRB), the Rules for its implementation and the internal rules of the University of Sofia "St. Kl. Ohridski.

2. Brief biographical information

Assoc. Prof. Dr. Jordan Atanasov Dumanov was born on September 5, 1973 in the town of Bansko, Bulgaria. In 1994 he entered the Sofia University as a full-time student, graduating in 1999 with a master's degree in Cell Biology and Developmental Biology and a second degree in Biology Teacher. Subsequently, he acquired the specialty ITC in Education (2011). Until 2001, J. Dumanov worked briefly as a researcher in human genetics at the University of Greifswald, Germany and at the Institute of Biochemistry in Aachen, Germany, and since 2001 he has been a full-time doctoral student at the University of Hohenheim, Stuttgart, Gourmet. In 2006 he obtained a doctorate in biology and in the same year he was elected Assistant Professor of biochemistry in the Department of Biochemistry at the Faculty of Biology, Sofia University. Here he successively holds the positions of Senior Assistant (2007-2011), Chief Assistant (2011-2014) and Associate Professor (since 2015). During his career development, Dr. Dumanov has specialized in CABIMER, Seville, Spain for 4 months and at the Institute of Vision at the Marie Curie University, Paris, France for 23 months.

3. Scientific works

3.1. *An overview of the applicant's scientific works*

Assoc. Prof. J. Dumanov is the author of 47 scientific papers and 2 textbooks. Of these, 18 have been published in journals with IF (total IF 80,408) and have been cited (according to Scopus) 100 times. In addition, he found 24 more citations, and my search in the Research Gate database showed 190 citations. In 19 of the publications he is a leading (first or last) author. Dr. Dumanov has reported his scientific results at 78 national and international scientific forums.

According to the submitted documents, Assoc. Prof. Dumanov participates in this competition with 20 scientific papers and 1 textbook, beyond those included in his doctoral dissertation and his promotion for associate professor. Of them 14 have been published in periodicals with total IF 43.131, and the rest in no IF journals, monographs (a chapter in a

book) and in proceedings of scientific conferences. In 8 of them the candidate is leading (first or last) author. A list of abstracts (46) of reports and posters from national and international scientific forums are also presented.

Four articles in IF journals (№ 1, 2, 3, 4) are grouped as "articles equivalent to habilitation work", whereby Dr. Doumanov covers the criteria for indicators in Group B according to the Implementing Regulations of the LDASRB.

The impact of scientific activity of Assoc. Prof. J. Doumanov in fulfillment of the minimum national requirements under Art. 26 of the LDASRB for the scientific field 4.3. (Biological Sciences) are as follows:

- Indicators of group A: dissertation - 50 p.
- Group B indicators: habilitation work - 100 p.
- Group C indicators (in points): publications in journals Q1-Q4 – 235 p.
- Group D indicators: Citations - 150 p.

I accept for review all the 20 scientific papers, which will be referred in my review with their original numbering according to the list of publications. I will not review the abstracts of the reports and posters (as they do not meet the criteria for a scientific publication), but they will be taken into consideration in formulating my final assessment.

3.2. Evaluation of the scientific papers

The papers to be reviewed can be divided into three subject categories: *a) Studies on bestrophin-1* (№ 1, 2, 3, 4, 14, 15); *б) Studies on new nanoparticles* (№ 7, 9, 10, 11, 13, 17); *c) Studies on natural biologically active substances* (№ 5, 6).

a) Studies on bestrophin-1 (hBest1)

Bestrophin-1 (hBest1) is a transmembrane protein that acts as a Ca^{2+} -dependent ion channel associated with the vision process. It is encoded by the *BEST1* gene, which is linked to Best's disease (manifested as damage to the retinal pigment epithelium). To date, more than 200 mutations in the *BEST1* gene have been identified, which are associated with various bestretinopathies, including viteliform macular retinal degeneration. According to recent studies, bestrophin-1 is associated also with other socially significant neurodegenerative diseases such as Alzheimer's, Parkinson's, epilepsy and others.

Dr. Dumanov's research on bestrophin-1 has been inspired by his specialization at the Institute of Vision, Marie Curie University, Paris and became his main scientific topic after his return to Bulgaria. As a biochemist and molecular biologist he has investigated the bestrophin at both molecular and cellular levels. To this aim he developed original cellular and cell-free models, as well as a new recombinant method for its large scale production. As an original approach I should mention the Langmuir monolayers used for investigation of hBest-1 surface characteristics and secondary structure applying infrared spectroscopy and Fourier transformation.

Analyzing the isotherms and hysteresis curves in the presence and absence of Ca^{2+} , Glu and GABA (№ 1, 15), the author convincingly proves that the addition of Ca^{2+} leads to a shift of the π / A isotherms to lower areas, and of Glu and GABA to higher. Examining the morphology of the monolayer by Brewster-angle microscopy (BAM), he reveals homogeneity in hBest1 and hBest1-GABA films and heterogeneity in hBest1- Ca^{2+} and hBest1-Glu (№ 2, 3, 15). The atomic force microscopy helps Dr. Dumanov to visualize hBest1 as well as to determine its molecule size at monomeric, dimeric and oligomeric level, and the influence of Ca^{2+} , Glu and GABA on the oligomerization process (№ 1, 3,

15). He used the same approach to study also the effect of various lipid components such as 1-palmitoyl-2-oleoylglycerol-3-phosphocholine, sphingomyelin and cholesterol on the surface behavior, structure and oligomerization of hBest1 both in pure form and in complex with other ligands (№ 3). π / A isotherms, hysteresis and BAM have been used to study the structure and oligomerization of binary hBest1 / SM films, which are affected by the presence of Ca^{2+} , Glu and GABA too (№ 4). Measuring the surface pressure of Langmuir monolayers containing hBest1, hBest1/POPC and hBest1/SM at different concentrations of cholesterol, Dr. Doumanov revealed a well-defined condensing effect (№ 4, 14).

b) Studies on new nanoparticles

A part of Dr. Doumanov's papers (№ 7, 9, 10, 11, 13, 17) are dedicated to the investigation of new nanoparticles as nucleic acid carriers intended for transfection of eukaryotic cells. The research was conducted jointly with the Institute of Polymers at the Bulgarian Academy of Sciences, where the nanoparticles were created, and the biological research was carried out at the Faculty of Biology. The new nanoparticles are based on: comb-like polyplexes; polyethyleneimines; polyethylene glycol methacrylate; polylysine diblock copolymer; poly- (2-dimethylaminoethyl methacrylate) - (ϵ -caprolactone) -poly- (2-2-dimethylaminoethyl methacrylate); spherical nucleic acids. All nanoparticles are complexed with plasmid DNA expressing a specific protein, and their cytotoxicity and internalization have been examined by biochemical methods. The obtained results show that the nanoparticles having the form of cationic micelles or capsules are non-cytotoxic (№ 10). Tracing the fluorescence of acridine-stained DNA and the green protein expressed by the plasmid vector it has been found that the nanoparticles penetrate the cell directly through the plasma membrane (rather than the endosomal pathway) and release functionally active expression plasmids (№ 9). Spherical nucleic acid nanoparticles are also non-toxic, biocompatible and penetrates the cells without any need of transfection agents.

c) Studies on natural biologically active substances

The last group of publications includes those devoted to the biological activity of natural substances of animal (№ 5, 6) and plant (№8, 12, 16, 18, 19, 20) origin. The animal products include vitoxin contained in the snake venom, and the products of plant origin includes extracts from *Haberlea rhodopensis*, *Inula* and *Lamium album* L. Studies have shown that vipoxin does not affect the vitality of the target cells, but exhibits significant genotoxicity, which is dependent on the interaction between the vipoxin subunits (№ 5, 6). The extracts of *Haberlea rhodopensis* demonstrate a number of beneficial effects on keratinocytes, and those of *Inula* and *Lamium album* show antitumor activity.

4. Pedagogical activity

As a full-time lecturer at the Faculty of Biology at Sofia University, Dr. Doumanov is a holder of the obligatory lecture courses *Fundamentals of Biochemistry* for Bachelor's Degree students (BS) - specialization "Optometry", *Biological Membranes* for BS in Molecular Biology and *Fundamentals of Biochemistry* for Master's Degree students (MS) in "Optometry" and "Medical physics". For MS in "Biochemistry" and "Cell Biology and Pathology" he teaches *Protein Sorting and Cell Polarization*, and for MS in "Biochemistry" he gives lectures on *Model Membranes*. In addition, the candidate conducts a summer internship of *Biochemistry* for BS in "Molecular Biology".

Apart from lecturing, Assoc. Prof. Dumanov also participates in the training of doctoral students and graduates. He has supervised 4 doctoral students, 2 of whom have already defended their theses. He has been also a supervisor of 6 undergraduates from BF, a member of state examination commissions and scientific juries for the selection of assistant professors in BF of the Sofia University. Dr. Doumanov is co-author of a "Biochemistry Textbook" published by the Department of Biochemistry.

5. Scientific projects

Assoc. Prof. Dumanov has been a principle investigator of 18 research projects funded by different sources.

6. Expert, organizational and representative activity

Assoc. Prof. Y. Dumanov is a member of the Management Board of the Scientific research sector at the University of Sofia, a member of the Council of Specialties EOS (at BF) and Optometry (at FzF) and a member of the section Biochemistry, Biophysics and Molecular Biology at the Union of Bulgarian Scientists.

7. Summary assessment

The summarized assessment in accordance with the regulations for the application of the LDASRB in the field of Natural Sciences for the academic position of Full Professor is presented in the table below.

Indicator	Required minimum	Presented number of points
A	50	50
B	100	100
C	200	235
D	100	150
E	150	193.3
Общо	600	728.3

Conclusion: Assoc. Prof. Dr. Jordan Atanasov Dumanov is an established researcher and lecturer in the field of Biochemistry. Since the beginning of his scientific career, he has published 48 scientific papers in renowned international journals in the field of biochemistry and molecular biology with a total **IF of 80,408**, which have been cited more than 100 times. As the above table shows, the summary assessment of his scientific and teaching activity according to the criteria of LDASRB is higher than the recommended minimum for the academic position "Full Professor" in Natural Sciences. All this gives me a reason to recommend to the distinguished Scientific Jury as well as to the Faculty Board of the Faculty of Biology at the Sofia University "St. Kl. Ohridski" to award to Dr. Doumanov the Academic Position "Full Professor" in Biochemistry.

Sofia, 16.07.2021

Reviewer:

/Prof. Ivan Ivanov
Academician/