OPINION

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Subject: Competition for the academic position of "Associate Professor" in Professional field: 4.3 Biological Sciences, in the scientific specialty "Animal and Human Physiology - Physiology of Excitable Structures"

1. Information about the competition:

The competition was announced in the State Bulletin, No. 32 of 15 April 2025, for the needs of the Faculty of Biology, Sofia University "St. Kliment Ohridski". The only participant in the competition is Senior Assistant Professor Dr. Iliana Vasileva Sazdova. The candidate has submitted all the necessary documents in accordance with the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria and the Regulations on the Conditions and Procedures for Acquiring Academic Degrees and Occupying Academic Positions at Sofia University "St. Kliment Ohridski."

2. Brief information about the candidate in the competition:

Senior Assistant Professor Dr. Iliana Vasileva Sazdova completed her higher education with a Master's degree in 2005 at Sofia University "St. Kliment Ohridski", Faculty of Biology, majoring in Molecular Biology – Master's degree in Animal and Human Physiology. In 2013, she defended her dissertation at Sofia University "St. Kliment Ohridski," Faculty of Biology, on the topic: "The peptides KART and obestatin as regulators of heart contractions in Rana sp.," under the supervision of Prof. Hristo Gagov, PhD, and obtained a"Doctor" degree in the professional field 4.3 Biological Sciences, in the scientific specialty "Animal and Human Physiology." Since 2005, she has been working at Sofia University "St. Kliment Ohridski" as an assistant until 2009, senior assistant until 2011, and chief assistant to the moment. Senior Assistant Professor Dr. Iliana Sazdova speaks English, Russian, and German, has skills related to working with specialized equipment and software, and has completed numerous additional courses to acquire competencies in various fields.

3. Fulfilment of the requirements for the academic position of "Associate Professor":

Senior Assistant Professor Iliana Sazdova has submitted the necessary documents and evidence to meet the requirements of the ZRASRB and PPZRASRB and the Regulations on the conditions and procedures for acquiring academic degrees and occupying academic positions at Sofia University "St. Kliment Ohridski." The submitted reports show impressive involvement in teaching activities – classroom teaching, preparation ostudy programmes, textbooks, supervision of graduate students: two for the acquisition of a bachelor's degree and six for the acquisition of a master's degree. Senior Assistant Professor Dr. Iliana Sazdova has participated in 13 scientific forums (9 international and 4 national) and in 17 scientific projects funded by: National Scientific Fund, MES - 1 project; NSF-SU-12 projects, 3 of which she led; 2 funded by the European Commission, 1 under the Operational Program “Human Resources Development” and 1 funded by the Employee Assistance Program – NATO. The total number of publications by Senior Assistant Professor Iliana Sazdova is 23, 22 of which are published in refereed and indexed journals.

Senior Assistant Professor Iliana Sazdova participated with a total of 19 publications, referenced and indexed in the world-renowned Web of Science and Scopus databases. Their distribution in journals with a Q index is as follows: seven with quartile Q1; four with quartile Q2; three with quartile Q3; and five with quartile Q4. A total of 74 citations are presented.

The information in Table 2 and the review of the submitted materials indicate that the candidate meets the scientometric indicators in Scientific Field 4. Natural Sciences, Mathematics, and Informatics, Professional Direction 4.3 Biological Sciences, in the following subcategories:

Group of indicators A – Dissertation for the award of a Doctorate degree – 50 points out of the required 50 points

Group of indicators B4 -Habilitation thesis – scientific publications in journals that are referenced and indexed in world-renowned scientific information databases (Web of Science and Scopus): 7 publications (two of which are review articles), which carry **116 points out of the required 100 points**.

Group of indicators G7 - Scientific publications in journals that are referenced and indexed in world-renowned scientific information databases (Web of Science and Scopus), includes a total of 12 publications – **239 points out of the required 200 points**.

Group of indicators D11- Citations in scientific publications, monographs, collective volumes, and patents referenced and indexed in world-renowned scientific information databases (Web of Science and Scopus) – includes 74 citations, respectively **148 points, out of the required 50 points**.

I accept the scientometric data presented by Senior Assistant Professor Dr. Iliana Sazdova for participation in the competition as satisfying the minimum national requirements, as well as the requirements of the Regulations on the conditions and procedure for acquiring scientific degrees and occupying academic positions at Sofia University "St. Kliment Ohridski".

4. Characteristics of the contributions in the presented scientific papers

The contributions in the scientific research of Assoc. Prof. Dr. Iliana Sazdova are summarized in four areas:

1. Neurohormonal regulation of the frog heart;
2. Physiological effects of algae toxins and nanoparticles on frog heart activity;
3. Mechanisms of oxidative and reductive stress and their consequences for metabolism;
4. Physiological changes associated with aging and the possibilities for slowing down this process with natural and synthetic products.

The publications presented in Group B, Indicator 4 of the report on the implementation of the minimum national requirements, include studies related to the investigation of neurohumoral mechanisms of cardiovascular system regulation (2, 4, 5, 7) and results from studies on the physiological effects of algal toxins and nanoparticles (1, 3, 6). Two of the publications presented are reviews (4, 5), one of which discusses and compares the physiological role of catecholamines in vertebrates – from fish to mammals, while the other examines the pharmacological potential of catecholamine signaling for the treatment of socially significant diseases such as depression, Parkinson's disease, hypertension, etc.

The mechanism by which the gastrointestinal hormone obestatin exerts a positive inotropic effect on the frog heart has been established (2). The experimental results obtained prove that the positive inotropic effect of obestatin is mediated by the activation of adrenaline secretion from the autonomic nerve endings in the ventricular muscle of the frog heart. It is interesting to note that the isolated frog heart is not a denervated organ; it retains functionally active projections of autonomic neurons, whose terminals can secrete neurotransmitters under the action of applied substances. I consider the model developed by Assoc. Prof. Sazdova for identifying the target tissue and the mechanisms of action of neurotransmitters and hormones in in vitro studies of heart preparations to be a significant contribution.

The studies on the effects of dimethyl sulfoxide on cardiac function (7) also represent an original scientific contribution. On an isolated frog heart. It was found that in low concentrations, dimethyl sulfoxide exhibits its own pharmacological effects—it increases the strength of heart contractions in a dose-dependent manner. It has been established that the inotropic effect of dimethyl sulfoxide is mediated by DAG-sensitive activation of TRP cation channels (transient receptor potential channels) and, in part, by stimulating the influx of Ca^{2+} through the reverse mode of the Na^{+}/Ca^{2+} exchanger. These results have a significant contribution to experimental practice, as dimethyl sulfoxide is widely used as a solvent for water-insoluble pharmacological agents. On the other hand, this study shows that the use of dimethyl sulfoxide as a cryoprotectant in various fields poses potential risks to human health.

This group of publications (B) also includes studies on the physiological effects of nanoparticles used in biomedical practice (1, 6). A study of the effect of silver nanoparticles (6) with different coatings—starch (AgNPs/Starch) or trisaccharide raffinose (AgNPs/Raff) on in vitro preparations of isolated hearts from Rana ridibunda frogs, it was found that the starch coating of silver nanoparticles reduces their reactivity compared to raffinose-coated nanoparticles. This can be explained by the denser coating of the metal core of the nanoparticles by starch. The positive inotropic effect of unpurified AgNPs/Raff nanoparticles is partially

blocked by prazosin (a blocker of postsynaptic alpha-1 adrenergic receptors) and propranolol (a non-selective blocker of beta-1 and beta-2 adrenergic receptors), while purified AgNPs/Raff have a weaker effect on cardiac activity due to their higher tendency to aggregate in the environment used.

A complex approach was applied to assess the impact of graphene oxide (GO) and its modified form with polyethylene glycol (GO-PEG) at the organ, cellular, and subcellular levels (1). The results obtained show that GO and GO-PEG exhibit: a negative effect on cardiac activity, causing more pronounced arrhythmias in the heart of a frog; increased ROS production in C2C12 myoblasts; both types of nanoparticles significantly stimulate DAO activity in rat liver; GO does not disassemble intact mitochondria from rat liver, but causes a concentration-dependent decrease in ATPhase activity in frozen/thawed mitochondria. This comprehensive study provides essential data on the potential of graphene oxide for various biological applications.

Research into the physiological effects of nanoparticles is of great importance for the development of targeted therapy drugs and for the application of approaches for the restoration and treatment of various diseases at the cellular level.

Results related to studies of the effects of the algal toxin (3) cylindrospermopsin (CYN) on the permeability of the inner mitochondrial membrane in rats, the activity of mitochondrial ATP synthase (ATPase) activity, and diamine oxidase (DAO, EC 1.4.3.22) activity in rat liver, the contractile force of isolated frog heart preparations, and the viability of a human intestinal epithelial cell line (HIEC-6) show that oralintake of CYN leads to a decrease in the reverse (hydrolase) activity of liver ATPhase in rats, while its short-term application in vitro has no significant effect on mitochondria, DAO activity, heart contractions, and their neuronal regulation. It has been found that the application of CYN reduces the viability of HIEC-6 cells in a dose-dependent manner, leading to the conclusion that cylindrospermosin is moderately toxic to human intestinal epithelial cells and may suppress epithelial regeneration, thereby causing pathological changes in the human gastrointestinal tract. Unlike cylindrospermosin, which does not affect heart rate, studies of β-N-methylamino-L-alanine, another algal toxin (Г9), show an inhibitory effect on the vegetative regulation of heart contractions.

The algotoxins studied are of public and ecological importance, as they can affect aquatic organisms in the ecosystem and/or enter the human body through bathing in these water bodies, through algae-based food supplements, or through the consumption of contaminated food and beverages.

The publications included in Group B, Indicator 4, correspond to the field of the announced competition, and present results from studies with a significant contribution to the elucidation of neurohumoral mechanisms related mainly to the regulation of cardiac activity, as well as the physiological effects of nanoparticles and algae toxins, which contribute to the elucidation of innovative approaches to influencing various diseases.

The publications included in Group G, Indicator 7, are conditionally and thematically systematized in the areas indicated by Senior Assistant Professor Dr. Iliana Sazdova under numbers 3 and 4, respectively: "Mechanisms of oxidative and reductive stress and their consequences for metabolism" and "Physiological changes associated with aging and the possibilities for slowing down this process with natural and synthetic products." The review

articles numbered 1, 2, 4, 5, 8, and 9 in group G summarize literature data related to the signaling pathways involved in oxidative and reductive stress and aging, as well as the relationship of these processes to socially significant diseases. Possible effective methods for treating redox stress-related diseases such as cardiovascular pathologies, cancer, diabetes, other metabolic disorders, and endocrine disorders with natural products or their synthetic analogues are discussed.

Knowledge of the regulatory mechanisms responsible for redox stress-related diseases and aging provides opportunities for the development of innovative therapies and alternative methods to influence the development of these pathological processes.

In conclusion, the scientometric data for participation in the competition presented by Senior Assistant Professor Dr. Iliana Sazdova comply with the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria and the Regulations on the conditions and procedures for acquiring scientific degrees and occupying academic positions at Sofia University "St. Kliment Ohridski". I recommend that the members of the scientific jury, appointed by Order RD-38-275 of 03.06.2025 of the Rector of Sofia University "St. Kliment Ohridski," vote "FOR" the appointment to the academic position of "Associate Professor" in the professional field: 4.3 Biological Sciences, in the scientific specialty "Animal and Human Physiology - Physiology of Excitable Structures" for the needs of the Faculty of Biology, Sofia University "St. Kliment Ohridski," by Senior Assistant Professor Dr. Iliana Vasileva Sazdova.

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