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REVIEW

under a competition for the academic position of "Professor" in the professional field **4.3. Biological Sciences,** scientific specialty "**Ecology and Ecosystem Protection**", for the needs of the Department **of Ecology of Communities and Conservation Biology**, Department of **Ecosystem Research, Environmental Risk and Conservation Biology** of IBER-BAS

Candidate: Assoc. Simeon Petrov Lukanov MD

Reviewer: Prof. Georgi Sashev Popgeorgiev, MD, NMNHS-BAS

In the announced competition for the academic position of "Professor" in the professional field 4.3. Biological Sciences, scientific specialty "Ecology and Ecosystem Conservation", for the needs of the Department of Ecology of Communities and Conservation Biology, Department of Ecosystem Research, Ecological Risk and Conservation Biology of the Institute of Biodiversity and Ecosystem Research, BAS (IBER-BAS), announced in State Gazette No. 63 of 01.08.2025, one candidate participates - Assoc. Dr. Simeon Petrov Lukanov, Associate Professor in the Department of Ecology of Communities and Conservation Biology.

I have 6 joint publications with the candidate, submitted for participation in the competition.

The documents submitted by Dr. Simeon Petrov Lukanov show that the procedure for its disclosure and announcement has been complied with and they are in accordance with the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria and the Regulations for its implementation, with the Regulations on the terms and conditions for acquiring scientific degrees and for occupying academic positions at the Bulgarian Academy of Sciences, as well as the Regulations on the terms and conditions for acquiring scientific degrees and for occupying academic positions at IBER-BAS.

1. General data on the candidate's career and thematic development

Chief Assistant Dr. Simeon Lukanov was born on 07.06.1984 and in 2009 he graduated from the Faculty of Biology of Sofia University "Kliment Ohridski", specialty "Biology" and professional qualification "Zoology of vertebrate animals". In the master's degree he developed a diploma thesis on the topic "Biology of the southern crested newt (*Triturus karelinii*)) from two localities near the town of Sofia. Sofia" with scientific supervisor Dr. Nikolay Tsankov. From 2011 to 2014 he developed a doctoral dissertation on "Vocal signaling and relationships in tailless amphibians of the family. Ranidae in Bulgaria", professional field 4.3. Biological Sciences (Ecology and Ecosystem Protection – Behavioral Ecology) with supervisor Assoc. Dr. Daniela Simeonovska-Nikolova. Since 2014, Dr. Simeon Lukanov has been working at IBER-BAS in the Department of Community Ecology and Conservation Biology.

The candidate's scientific interests are related to batrachology and herpetology, and in particular to research in the field of biology, ecology of amphibians and reptiles in Bulgaria, as well as their conservation. She has led 9 research projects and participated in over fifteen others focused on conservation biology, ecology and environmental protection. He is the author and co-author of more than 55 scientific publications in peer-reviewed journals, including journals with a high impact factor. His scientific activity contributes significantly to the research and conservation of biodiversity in Bulgaria. He is fluent in English at a working level and has excellent skills in working with statistical and GIS software. He has extensive experience in field research and actively participates in international scientific forums. He is distinguished by high organizational and communication skills, combined with sustainable academic development.

2. Scientometric indicators

In the current competition, the candidate participates with 21 scientific papers, of which 18 in journals with an impact factor (in addition to those from the dissertation for the acquisition of the PhD degree and the acquired habilitation for Associate Professor). The remaining 3 publications have an SJR, which meets and exceeds both the national requirements and those set out in the Regulations on the terms and conditions for acquiring scientific degrees and for occupying academic positions at IBER-BAS. All presented scientific publications are in

specialized scientific journals and correspond to the scientific specialty "Ecology and Ecosystem Protection".

The reference for the compliance of the points of Associate Professor Dr. Simeon Lukanov with the minimum scientometric requirements was made in accordance with the requirements. The articles are correctly arranged, allowing for quick and easy orientation.

The fulfillment of the minimum national requirements for indicators for occupying the position of Professor is as follows:

- The indicator from group "A" is covered by the defended dissertation for the Doctoral degree and brings 50 points;
- Group B indicator does not require points for this post;
- The indicators of group "B" are covered by 100 points (against 100 required).

Here are 4 publications from scientific journals falling within Q1 – 4 pcs. One of the submitted articles is independent, and the other 3 are co-authored with a team. An excellent impression of the good publishing skills is made by the fact that in 3 of the articles the candidate is the first author. An important clarification is that in modern studies it is very difficult to conduct a study by a small team of researchers.

- The indicators of group "G" are covered by 266 points (out of 220 needed).

Here, the candidate has included 17 publications, distributed as follows: Q1 – 2, Q2 – 3, Q3 – 6, Q4 – 3, SJR – 3. It is important to note that all articles are co-authored and in 6 of them the candidate is the first author. This shows the leadership qualities of Dr. Simeon Lukanov, as well as his good teamwork skills.

- The indicators of group "D" are covered by 328 points (out of 120 needed).

The candidate's scientific publications have been cited a total of 209 times, with 164 citations bearing points in journals referenced by SCOPUS and WEB of SCIENCE, which is proof of the significance of Dr. Lukanov's research and the significant interest in them. Citations in journals with an impact factor are 142 times. Some of the most cited publications are Lukanov et al. 2014 (10 citations), Dufresnes et al. 2019 (22 citations), Kornilev et al. 2020

(13 citations), etc. All this speaks of the significant interest in the developments of the candidate.

3. Main directions in research work and most important scientific contributions

The research activity of Assoc. Dr. Simeon Lukanov in the period 2020-2025 covers a wide range of issues in the field of population ecology, faunistics, systematics, biochemical ecology and ecotoxicology of amphibians and reptiles. The most significant contributions include:

- **Population studies** of crested newts (*T. ivanbureschi* and *T. cristatus*) – identification of factors influencing activity, seasonal migration, body condition and phenology; first evidence of winter activity in *T. ivanbureschi*; analysis of the food preferences of T. cristatus in the southern part of the range.
- **Faunal and biogeographical contributions** – identification of new localities and updating of the distribution of key species (*Triturus cristatus, Natrix spp., Bombina variegata, Podarcis erhardii* , etc.); discovery and description of a new subspecies *Bombina variegata rhodopensis*; identification of priority areas for conservation in the Kresna Gorge.
- **Systematic and methodological contributions** – development and validation of methods for non-invasive individual recognition in *Hyla arborea and Vipera ammodytes*; detailed bioacoustic and morphometric analyses distinguishing *between H. arborea and H. orientalis*.
- **Biochemical ecology** – characterization of skin secretions in *Vipera ammodytes* and 13 species of snakes and demonstrating the role of specific ketones in sexual communication in viper.
- **Ecotoxicological studies** – assessment of the ecological role of rice paddies as habitats of amphibians and the influence of pesticides; experimental data on the effects of ammonium nitrate on the growth and behavior of two species of frogs.

These contributions show systematic scientific work, significant expansion of knowledge about the herpetofauna of Bulgaria and the Balkans, development of

methodological approaches and direct applicability to nature conservation practices. His work can be summarized in five main scientific areas:

1) Population ecology

This is the most strongly represented scientific field, distinguished by long-term field observations, the use of modern methods (photoswitching, individual marking by photographic material), statistical analyses and ecological models.

Key contributions:

• New data on the population dynamics of crested newts

– The influence of key physicochemical and environmental factors of the aquatic environment (air and water temperature, dissolved oxygen, pH, oxidation-reduction potential) on the activity and abundance of *Triturus ivanbureschi has been revealed.*

– For the first time, winter activity of the species on the frozen surface of water bodies has been proven – a contribution of strong international interest.

– Seasonal movement between bodies of water and a relationship between body condition (BCI) and individual activity have been documented.

– A comprehensive analysis of the food preferences and seasonal dynamics of *Triturus cristatus* in Bulgaria has been carried out.

• Detailed clarification of seasonal activity and population structure

It includes differences between male/female individuals, age groups, seasonal activity patterns, and variations in the food spectrum.

Significance: These contributions fill large gaps in the knowledge of the population ecology of two endangered newt species in Bulgaria and Southeast Europe.

2) Faunistics, biogeography and distribution of protected species

The candidate has significant contributions to the faunistics and biogeography of amphibians and reptiles in Bulgaria. Through the systematic collection and analysis of large data sets, it expands knowledge about the distribution of a number of protected species, complements the distribution and identifies new key territories. These results have direct implications for national and regional conservation policies.

Key contributions:

• Complex phylogeographical study of *Bombina variegata*

– One of the largest studies on the species in Europe: >1200 individuals, analyses with mtDNA, nDNA, mitogenomes and ddRAD-seq. – A new subspecies *Bombina variegata rhodopensis has been described* – a contribution of fundamental importance.

• New data on the distribution of *Triturus cristatus, Natrix natrix, Natrix tessellata*

– Significant expansion of the known deposits in Bulgaria.

– A new isolated locality of *Podarcis erhardii has been* documented.

• Long-term analysis of protected species in arable land and key habitats

– Based on spatial analysis of data on the distribution of five protected amphibian species (Bombina *bombina, B. variegata, Triturus cristatus, T. ivanbureschi and T. dobrogicus*) and CORINE Land Cover, it was found that a significant part of their populations fall within agricultural territories. This result allows for an accurate risk assessment of agricultural practices (including pesticides, cultivation and aggregation of areas) and justifies the need for prioritized conservation measures.

– Through an analysis of 2834 localities in the area of the Kresna Gorge, three critical areas of distribution of key protected species (*Testudo graeca, T. hermanni, Elaphe quatuorlineata, Zamenis situla)* have been defined. Spatial models have been derived that show the dependencies between habitats, traffic corridors and threats (e.g. road traffic along the E79), which provides a basis for targeted management and planning of conservation measures.

Significance: The work has direct application in the management of protected areas, Natura 2000 and environmental impact assessments.

3) Systematics and methodology

Here, the candidate develops modern methods of individual recognition and integrative taxonomy.

Key contributions:

• Development of non-invasive methods for individual identification

– An algorithm has been created to recognize *Hyla arborea* by the lateral stripe.

– High efficiency of automatic identification in *Vipera ammodytes* through frontal photographs has been proven.

• Bioacoustic and morphometric characteristics of woodworms - *Hyla arborea* and *H. orientalis*

– Morphological and acoustic criteria: It has been found that morphometric characteristics alone do not allow a reliable distinction between the two species. In contrast, acoustic analysis of mating calls reveals clearly distinct acoustic profiles that consistently and reliably distinguish *H. arborea* from *H. orientalis.*

– Volume and significance of the data: Some of the largest and most detailed acoustic sets for the two species in the Balkans have been collected, including hundreds of marriage calls and multiple populations.

Significance: The results provide a reliable basis for the determination of species boundaries by non-invasive methods. This is in full line with current trends in ecology and conservation biology, where maintaining minimal stress for animals is a key priority.

4) Biochemical Ecology and Chemical Communication

This direction is particularly innovative because the chemical ecology of snakes is poorly studied in Bulgaria.

Key contributions:

• Determination of the composition of skin secretions in *Vipera ammodytes* and other species of snakes

– >80 chemical compounds have been identified; Key ketones involved in sexual communication have been identified.

– The combination of two ketones has been shown to cause the strongest reaction in male individuals.

Significance: These are the first such data on herpetofauna from the region and have the potential for the development of new research areas.

5) Ecotoxicology and Impact of Pollutants on Amphibians

Key contributions:

• Assessment of rice paddies as important habitats for tailless amphibians

– The first detailed data on the simultaneous study of bioacoustic activity and the presence of chemical pollutants (pesticides and metals) in rice fields in Bulgaria are presented.

– It has been found that all registered amphibian species show higher vocal activity in rice paddies than in a natural body of water. This shows that rice paddies function as significant breeding habitats, which has a direct relevance for pesticide regulations and agroecosystem management.

• Toxic effects of ammonium nitrate on early development of two species of frogs

– Specific species reactions have been identified, including behavioural disorders and stunted growth.

– Sensitivity levels have been defined that are relevant for risk assessment.

Relevance: Data are important for environmental standards and the assessment of impacts on wetlands.

OVERALL ASSESSMENT OF SCIENTIFIC CONTRIBUTIONS

The presented contributions of Assoc. Dr. Simeon Lukanov demonstrate consistent, well-structured and highly effective research activities, covering a wide range of areas in bathurcology, herpetology, ecology and conservation biology. His work combines field research, laboratory analysis, phylogenetic methods, chemical analyses and modern approaches to automated identification, which shows a pronounced interdisciplinarity and methodological maturity.

His contributions are of high originality, and a number of them represent the first evidence or the first comprehensive analyses for Bulgaria or Southeast Europe – such as the documented winter activity of newts, the discovery of a new subspecies, the expansion of protected species ranges or methodological developments for individual identification. They have not only fundamental scientific value, but also direct relevance for conservation practice, habitat management, monitoring of protected species and impact assessment.

The scientific production is voluminous, high-quality and based on large empirical arrays – long-term field data, complex phylogenetic sets, chemical profiles and extensive spatial databases. This sustainability and depth of research demonstrate high scientific autonomy and lasting establishment in the national and international scientific community.

4. Participation in research projects, preparation of expert assessments, participation in editorial boards

Dr. Simeon Lukanov has been the head of 6 successfully completed projects. He has taken part in more than 15 projects with national and international funding, mainly in the field of research and conservation of amphibians and reptiles in Bulgaria. My direct impressions of the candidate's work on the projects are that he is very organized, correct, efficient and purposeful.

5. Teaching activity and training of PhD students

The candidate was the supervisor of 1 PhD student, providing methodological and scientific support throughout the entire process of research and writing of the dissertation. Under his leadership, one doctoral dissertation in the field of amphibians and reptiles was successfully defended:

- Blagovesta Simitrova Dimitrova, a full-time PhD student at IBER - BAS, successfully defended her dissertation on the topic: "Influence of pesticides on amphibian species from water bodies with varying degrees of anthropogenic influence". Leader: Assoc. Dr. Simeon Lukanov

The teaching activity of the candidate also includes conducting exercises at Sofia University "St. Kliment Ohridski", Faculty of Biology.

6. Editorial activities

The editorial activity of Dr. Simeon Lukanov is also impressive and emphasizes his high professional authority. The candidate is the editor-in-chief of the journal "*Acta Zoologica Bulgarica", published by IBER-BAS*, as well as the editor-in-chief of herpetology in the "*North-Western Journal of Zoology*". In addition, he has over 50 reviews of articles in established international scientific journals, which testifies to his high expertise, scientific competence and active contribution to maintaining the quality in scientific publication activities.

7. Candidate's scientific profile and professional skills

The candidate has a clearly established scientific profile in the field of amphibians and reptiles, population ecology, biogeography and conservation biology, supported by a solid volume of their own empirical data and the use of modern analytical methods. Characteristic of his work is the skillful combination of field expeditions, laboratory analyses and quantitative methods, which allows the study of complex ecological processes in natural conditions.

His professional skills include:

– planning and conducting large-scale field studies;

– application of modern monitoring methods (photo documentation, bioacoustics, GIS analyses);

– working with genetic and phylogenetic data;

– statistical modeling and interpretation of multivariate environmental dependencies;

– systematic processing of large data sets;

– skills for interinstitutional cooperation and work in international research groups.

His scientific profile shows pronounced research independence, ability to generate original scientific questions and a sustained interest in significant topics. The candidate demonstrates qualities characteristic of an established and recognizable scientist in the field.

8. Questions and recommendations

I have no critical remarks to the candidate.

CONCLUSION

The candidate Assoc. Dr. Simeon Petrov Lukanov covers all scientometric indicators (1133 points), significantly exceeding them in each criterion. Based on the materials submitted under the competition, I am convinced that it fully complies, and in a number of indicators exceeds, the national criteria for occupying the academic position of Professor, defined by the Law on the Development of the Academic Staff in the Republic of Bulgaria and the Regulations for its Implementation, as well as by the Regulations on the Terms and Conditions for Acquiring Scientific Degrees and for Occupying Academic Positions at the Bulgarian Academy of Sciences and the Regulations on the Terms and Conditions for Acquiring Scientific Degrees and for occupying academic positions at IBER-BAS. I have known the

candidate for many years of joint work and I can confidently state that the colleague is a motivated, efficient and established scientist, with a clearly defined scientific profile and with proven scientific and applied scientific contributions.

On the basis of the above, I strongly recommend the members of the scientific jury to support the choice of Assoc. Prof. Simeon Lukanov, PhD for the academic position of Professor in the professional field 4.3. Biological Sciences, scientific specialty "Ecology and Ecosystem Protection", for the needs of the Department of Ecology of Communities and Conservation Biology, Department of Ecosystem Research, Environmental Risk and Conservation Biology of IBER-BAS.

Sofia: Prepared by:

25.11.2025 /G. Popgeorgiev/