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REVIEW

for a 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 **Community Ecology and Conservation Biology** Section, Department of **Ecosystem Research, Ecological Risk and Conservation Biology** at the Institute of Biodiversity and Ecosystem Research – Bulgarian Academy of Sciences (IBER-BAS)

Candidate: Assoc. Prof. Dr. Borislav Yasenov Naumov

Reviewer: Prof. Dr. Georgi Sashev Popgeorgiev, National Museum of Natural History – Bulgarian Academy of Sciences

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 Community Ecology and Conservation Biology Section, Department of Ecosystem Research, Ecological Risk and Conservation Biology at the Institute of Biodiversity and Ecosystem Research of the Bulgarian Academy of Sciences (IBER-BAS), published in *State Gazette* No. 21 of 14.03.2025, there is one applicant – Assoc. Prof. Dr. Borislav Yasenov Naumov, from the Community Ecology and Conservation Biology Section.

I have 10 joint publications with the candidate, which are included in the materials submitted for the competition.

The documents submitted by Dr. Borislav Naumov demonstrate that the procedure for announcing and initiating the competition has been duly followed and that the documentation complies with the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria and its Implementing Regulations, as well as with the Regulations on the Conditions and Procedures for Awarding Academic Degrees and Academic Positions at BAS, and the Regulations of IBER-BAS for the same purposes.

1. General Information on the Candidate's Career and Thematic Development

Assoc. Prof. Dr. Borislav Yasenov Naumov was born on February 22, 1971. In 1995, he completed a Master's degree at the Faculty of Biology of Sofia University "St. Kliment Ohridski", specializing in Biology, with a professional qualification in Vertebrate Zoology. Between 2009 and 2012, he prepared a doctoral dissertation on the topic "Taxonomy and Distribution of the Species of the Genus Triturus Rafinesque 1815 (Amphibia: Salamandridae) in Bulgaria", under the academic supervision of Assoc. Prof. Dr. Valko Biserkov. Since 2007, Dr. Borislav Naumov has been working at the Institute of Biodiversity and Ecosystem Research – BAS, initially as a biologist (2007–2011), then as a chief assistant (2012–2016), and currently as an associate professor (2017–present) in the Community Ecology and Conservation Biology Section.

The candidate's scientific interests are focused on batrachology and herpetology, in particular research related to the biology and ecology of amphibians and reptiles in Bulgaria, as well as their conservation.

2. Scientometric Indicators

In the current competition, the candidate participates with 49 scientific publications, 33 of which are in impact factor journals (excluding those from his PhD dissertation and his habilitation for the academic position of Associate Professor). All submitted publications are published in specialized scientific journals and correspond to the scientific specialty "Ecology and Ecosystem Conservation."

The report on the compliance of Assoc. Prof. Dr. Borislav Yasenov Naumov's point score with the minimum scientometric requirements has been prepared in accordance with the regulations. The articles are properly organized, allowing for quick and easy navigation.

The fulfillment of the minimum national requirements by indicator groups for the position of Professor is as follows:

- Group A indicator – fulfilled;
- Group B indicator – not required for this position;
- Group C indicators – fulfilled with 153 points (with 100 required).

This group includes 11 publications in scientific journals that, at the time of publication, fell into the following quartiles:
Q2 – 2 articles, Q3 – 3 articles, Q4 – 4 articles, SJR – 2 articles.
The publications are co-authored, with the candidate listed as first author in 6 (55%) of them.

It is important to note that in contemporary research, it is often difficult to conduct studies with a small research team.

- Group D indicators – fulfilled with 511 points (with 220 required).

This group includes 38 publications, distributed as follows: Q1 – 2, Q2 – 2, Q3 – 12, Q4 – 8, SJR – 13, Book chapter – 1.

- Group E indicators – fulfilled with 360 points (with 120 required).

The scientific publications submitted by the candidate have been cited a total of 180 times, all in journals indexed in SCOPUS and Web of Science, which testifies to the significance of Dr. Naumov's research and the substantial interest it has generated. Some of the most cited publications are Mollov et al. (2010) and Stojanov et al. (2011), each with more than 20 citations.

3. Main Research Areas and Key Scientific Contributions

Dr. Borislav Naumov has grouped his main contributions into the following areas:

(1) Ecology and Faunistics,

(2) Morphology and Methodology,

(3) Chemical Communication,

(4) Pathology.

The candidate's contributions are numerous, diverse, significant, and fully fall within the scope of the announced competition.

Ecology and Faunistics

A significant portion of the candidate's publications (and corresponding contributions)—a total of 23—fall within this area. Each of these publications includes both original and confirmatory contributions.

From a faunistic perspective, several contributions (items 1–9) are of particular interest. For example, the distribution of the six distinct taxa within the *Lissotriton vulgaris* species

complex (*L. vulgaris s.l.* and *L. montandoni*) across Europe has been clarified. As a result, the distribution of each species in the complex has been mapped at the continental level using a 50 km UTM grid. Contact zones have also been identified that warrant further research.

The national-level distribution of several other species has also been determined using UTM grid mapping: *Natrix natrix*, *N. tessellata*, and *Ichthyosaura alpestris*. The species composition of the herpetofauna in the Bulgarian section of the Danube River basin has been documented. The locations of individual species have been mapped using a 10 km UTM grid, and major threats to local populations have been identified.

A brief faunistic overview of the Danube island Tsibar has been provided, along with a general assessment of the biodiversity of Atanasovsko Lake.

The first verified records in Bulgaria of two alien gecko species have been presented: the Moorish gecko (*Tarentola mauritanica*), recorded in Sofia and the Sunny Beach resort (2020 and 2021), and the Turkish gecko (*Hemidactylus turcicus*), recorded in Sofia (2024). These are likely incidental sightings of individuals unintentionally introduced from abroad via goods, luggage, etc. It is hypothesized that both species are highly adaptable to new environments, and their potential establishment in the country cannot be ruled out.

A detailed analysis was conducted on the spatial distribution of known localities for five amphibian species with the highest conservation status in Bulgaria (*Triturus cristatus*, *T. dobrogicus*, *T. ivanbureschi*, *Bombina bombina*, and *B. variegata*), in relation to major land cover types.

The spatial niches and habitat preferences of six lizard species were studied in two model territories in Western Bulgaria. The highest species richness was found in ecotones between meadows and oak forests. Niche breadth was greatest for *Podarcis muralis* and *Lacerta viridis*, while the other four species exhibited specific habitat preferences.

One noteworthy publication investigates the relationship between body temperature and ambient conditions in two reptile species (*Vipera ammodytes* and *Lacerta agilis*) based on measurements taken in natural environments. In *V. ammodytes*, individuals maintain body temperatures within a defined range (28–34 °C) using behavioral thermoregulation, such as changes in activity and microhabitat selection. In *L. agilis*, intra-population differences were

observed—for example, juvenile males showed the highest dependence on air and substrate temperatures, while adult males showed the lowest.

Using opportunistically collected data, the seasonal activity of two snake species (*Dolichophis caspius* and *Malpolon insignitus*) in Southwestern Bulgaria was characterized. The analysis revealed that *D. caspius* is active from late March to early November, with peaks in mid-April to mid-May and early June. *M. insignitus* appears active from February to November, with a peak in May/June.

Particularly valuable are the targeted studies and detailed characterization of the seasonal and diel activity patterns of the nose-horned viper (*Vipera ammodytes*), accounting for variations related to age, sex, and microhabitat, along with various other biological and ecological parameters. The results have been published in five scientific articles.

Another interesting research direction involves studies on the trophic niches of one species of newt (*Triturus cristatus*) and six lizard species (*Zootoca vivipara*, *Darevskia praticola*, *Lacerta viridis*, *Podarcis tauricus*, *P. muralis*, and *Ablepharus kitaibelii*) from several localities in Bulgaria. The diet composition of local populations was described, with quantitative ratios of recorded food items presented. Intra-species comparisons between sexes and age groups were made in terms of dietary diversity. A comparison was made between the realized and fundamental trophic niches in the habitat, allowing some food components to be classified as preferred, avoided, or neutral. All findings were published in seven scientific articles.

Taxonomy and Phylogeny

The candidate presents two main contributions in this area.

The genetic differentiation of the collared racer (*Platyceps collaris*) was studied based on cytochrome b sequences, including specimens from the type series of the taxon (*Coluber rubriceps thracius*). The results show that within *Platyceps collaris* there are two distinct genetic clades: one located in the eastern Balkan Peninsula, western and southern Asia Minor, and the other in the Eastern Mediterranean. All specimens from the type series of *Coluber rubriceps thracius* are genetically identical and belong to the Balkan-Asia Minor clade. Based on paleoclimatic models, it is hypothesized that two refugia existed: one in western Asia Minor (from where the species spread to the Balkans) and another in southern Asia Minor (from where

colonization of the Eastern Mediterranean occurred). The subspecific taxonomy of *Platyceps collaris* was revised, and a new combination was proposed for the Balkan-Asia Minor clade (including Bulgarian populations), namely *Platyceps collaris rubriceps*, while the previously used subspecies name *Coluber rubriceps thracius* was designated as a junior synonym.

Another significant contribution is the candidate's involvement in sequencing mitochondrial DNA (a fragment of the COI gene), resulting in the creation of an extensive species-specific DNA barcode library for amphibians of the Western Palearctic. This library reliably includes barcodes for 133 species, which accounts for over 90% of the current species diversity of the class Amphibia in this region.

Morphology and Methodology

This section groups the candidate's contributions related to morphology and methodology. Based on morphometric data for 16 snake species from the territory of Bulgaria, a comparison was made between the documented maximum sizes of these species in the country and those from other parts of their range. It was established that most species in Bulgaria do not reach the known maximum sizes, with the exception of the Dahl's whip snake (*Platyceps najadum*), for which the largest specimen in the entire species range originates from Bulgaria. A total of 2916 individuals from 16 snake species were measured, with an interesting note that only three specimens exceeded two meters, all of which belonged to the Caspian whipsnake (*Dolichophis caspius*).

Another targeted study was related to tracking changes in body proportions and coloration in sexually mature individuals of the Danube crested newt (*Triturus dobrogicus*), reared under laboratory conditions for five years. Allometric growth of the body and a decrease in the value of the Wolterstorff index (considered a key diagnostic trait for the genus *Triturus*) with increasing age were established. A clear and noticeable change in the ventral coloration was also recorded, expressed as a gradual expansion and merging of the black spots. This calls into question the effectiveness of the widely used method for individual recognition of crested newts based on ventral coloration in long-term population studies.

An interesting methodological contribution is related to the development of a combined method for marking and individual recognition of the nose-horned viper (*Vipera ammodytes*),

which includes the following steps: 1) marking (with a permanent marker) an individual number laterally on the mid-body; 2) frontal macro photography of the nasal horn; 3) additional photographing of the dorsal surface of the head and the back. Testing results of the method show that it is effective in both short-term and long-term studies.

Chemical Communication

In this group of contributions, the candidate presents two studies related to the chemical composition of skin secretions in snakes. For the first time in Bulgaria, the chemical composition of skin secretions of the nose-horned viper (*Vipera ammodytes*) was analyzed. A total of 59 chemical compounds were identified, six of which are ketones. Two of these ketones (2-pentacosanone and 2-heptacosanone) were present in many of the samples and are likely involved in the species' sexual pheromone composition. Significant differences in chemical composition were found between extracts obtained from snakes captured immediately after hibernation and those captured during the reproductive period.

In another study, results on the chemical composition of skin secretions from 13 snake species from Europe, North Africa, and Western Asia are presented, based on analyses of samples from 171 individuals by gas chromatography and mass spectrometry. A total of 88 chemical compounds were identified.

Pathology

Here, the candidate presents two contributions related to the pathology of amphibians and reptiles. An interesting case of pathological swelling of the body and head was described in Ivan Bures' crested newt (*Triturus ivanbureschi*). Laboratory observations on the individual showed gradual reduction and disappearance of the edema within three months without intervention or treatment with medications.

Another pathological case involved an abnormal pregnancy in the nose-horned viper (*Vipera ammodytes*), expressed by the “birth” (observed under laboratory conditions) of formless mucous matter, probably the product of gradual degradation of eggs or embryos, resulting in the snake losing about 50% of its body mass. It was suggested that this case of unsuccessful pregnancy was due to low nutritional reserves of the female at the beginning of vitellogenesis, though other explanations, such as parasitic infestation or internal disease, cannot be excluded.

It is noteworthy that the candidate collaborates with established teams of leading specialists and employs appropriate methods in his research, enabling him to obtain reliable results and publish in leading scientific journals. The analytical part in the publications submitted for review is thorough and comprehensive.

4. Participation in Research Projects, Preparation of Expert Assessments, and Membership in Editorial Boards

Dr. Borislav Naumov has been the principal investigator of one research project. He has participated in more than 14 nationally and internationally funded projects, mainly focused on the study and conservation of amphibians and reptiles in Bulgaria. My direct impressions of his work on these projects are that he is very organized, reliable, hardworking, and goal-oriented.

5. Teaching Activity and Supervision of Doctoral Students

The candidate has acted as scientific supervisor and consultant for several doctoral students, providing methodological and scientific support throughout the entire process of research and dissertation writing. Under his supervision, two doctoral dissertations in the field of amphibians and reptiles have been successfully defended:

- Angel Dyugmedzhiev, full-time doctoral student at the National Museum of Natural History - BAS, defended his dissertation on June 11, 2020, titled: “Spatial ecology of the nose-horned viper *Vipera ammodytes* (Linnaeus, 1758) in Western Bulgaria.” Supervisors: Assoc. Prof. Dr. Nikolay Tsankov, Prof. Dr. Pavel Stoev, and Assoc. Prof. Dr. Borislav Naumov.
- Emilia Vacheva, full-time doctoral student at the National Museum of Natural History - BAS, defended her dissertation on May 11, 2021, titled: “Interactions among representatives of three lizard families – Anguidae, Lacertidae, and Scincidae (Reptilia: Squamata: Sauria), regarding their spatial and trophic niches in Western Bulgaria.” Supervisors: Assoc. Prof. Dr. Nikolay Tsankov, Prof. Dr. Pavel Stoev, and Assoc. Prof. Dr. Borislav Naumov.

6. Questions and Recommendations

I have no critical remarks about the candidate.

What does he consider to be the main scientific problem for the Bulgarian herpetofauna?

What are the main problems for the conservation of the Bulgarian herpetofauna?

Conclusion

The candidate, Associate Professor Dr. Borislav Yasenov Naumov, meets all scientometric indicators (1267 points), significantly exceeding them in every criterion. Based on the materials submitted for the competition, I confidently consider that he fully complies with, and in several indicators surpasses, the national criteria for holding the academic position of "Professor," as established by the Law on the Development of the Academic Staff in the Republic of Bulgaria and its implementing regulations, as well as the Regulations on the conditions and procedures for acquiring scientific degrees and holding academic positions at the Bulgarian Academy of Sciences (BAS) and the Institute of Biodiversity and Ecosystem Research (IBER-BAS).

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

On the basis of the above, I categorically recommend that the members of the scientific jury support the appointment of Associate Professor Dr. Borislav Naumov to the academic position of "Professor" in Professional Field 4.3. Biological Sciences, scientific specialty "Ecology and Conservation of Ecosystems," for the needs of the Section "Community Ecology and Conservation Biology," Department of "Ecosystem Research, Environmental Risk and Conservation Biology" at IBER-BAS.

Plovdiv: Prepared:

17.06.2025 /G. Popgeorgiev/