

REVIEW

by Assoc. Prof. Dr. Tsenka Georgieva Chasovnikarova
Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences
of the materials submitted for participation in the competition
for the academic position of “**associate professor**”
at the Institute of Biodiversity and Ecosystem Research (IBER), BAS

In: field of higher education **4.3 “Biological Sciences”**
professional field: “**Genetics**”

In the competition for the position of “**associate professor**,” announced in the State Gazette, Issue No. 25 of March 10, 2026, and on the website of the Institute of Biodiversity and Ecosystem Research (IBEI), BAS, for the needs of the “**Biomonitoring and Environmental Risk**” Section within the “**Ecosystem Research, Environmental Risk, and Conservation Biology**” Department at IBEI, BAS. The candidate is Senior Assistant Professor **Dr. Tsvetelina Zhanova Gerasimova** from the “Biomonitoring and Environmental Risk” Section of the “Ecosystem Research, Environmental Risk, and Conservation Biology” Department at the Institute of Biodiversity and Ecosystem Research (IBEI), BAS.

1. General Overview of the Submitted Materials

By Order No. 24 of May 7, 2026, issued by the Director of the Institute of Biodiversity and Ecosystem Research (IBEI), Bulgarian Academy of Sciences (BAS), I have been appointed as a member of the scientific jury for the competition to fill the academic position of “associate professor” at IBEI, in the field of higher education 4.3 “Biological Sciences,” professional field “Genetics,” announced for the needs of the “Biomonitoring and Environmental Risk” Section within the “Ecosystem Research, Environmental Risk, and Conservation Biology” Department at the Institute of Biodiversity and Ecosystem Research (IBEI), BAS. One candidate submitted an application for the announced competition: Senior Assistant Professor Dr. Tsvetelina Zhanova Gerasimova from the Institute of Biodiversity and Ecosystem Research (IBEI), BAS.

The complete set of materials in electronic format submitted by Dr. Gerasimova, as well as the report on the minimum requirements under Article 24 of the Law on the Development of Academic Staff in the Republic of Bulgaria for the scientific field 4.3. Biological Sciences, indicate that the candidate meets the minimum national requirements for holding the relevant academic position of “associate professor” in accordance with the ZRASRB and Article 53 of the Regulations for its Implementation. The minimum requirements of the Regulations on the Conditions and Procedures for the Awarding of Academic Degrees and for Holding Academic Positions at the Bulgarian Academy of Sciences (BAS) and the Regulations on the Conditions and Procedures for the Awarding of Academic Degrees and for Holding Academic Positions at the Institute of Biodiversity and Ecosystem Research (IBER), BAS have also been met.

2. Brief biographical information about the candidate

Tsvetelina Gerasimova was born on October 22, 1976, in Vratsa. In 1994, she graduated from Hristo Botev High School in Vratsa. In 1997, she graduated from the Medical University of Sofia, Prof. Dr. Ivan Mitev Medical College in Vratsa. That same year, she was admitted to Sofia University “St. Kliment Ohridski,” Faculty of Biology, majoring in “Ecology and Environmental Protection.” She earned her master’s degree in 2002 with a thesis titled “Adaptations in the Metabolic Levels of the Rock Mouse (*Apodemus mystacinus* Danford & Alston, 1877) from the Northern Limit of Its Range,” under the supervision of Prof. Dr. Rumyana Mecheva (Institute of Zoology, Bulgarian Academy of Sciences). She began working as a specialist biologist in 2003, first at the Institute of Botany, BAS, and in 2004 moved to the Institute of Zoology, BAS. In 2006, she enrolled as a part-time doctoral student at the Institute of Zoology, BAS. In 2010, she was appointed as an assistant at the Institute of Biodiversity and Ecosystem Research (IBEI) of the BAS. She defended her dissertation titled “A Comparative Study of the Sensitivity of the Karyotype of Small Mammal Indicator Species to the Effects of Environmental Chemical Mutagens” under the supervision of Assoc. Prof. Dr. Margarita Topashka-Ancheva in 2012. Since 2013, Dr. Gerasimova has been a senior research associate at the IBEI, BAS. Dr. Gerasimova’s entire professional career has been associated initially with the Institute of Zoology and later with the merged IBEI. Dr. T. Gerasimova is a long-standing member of the Union of Scientists in Bulgaria and has received an award for Best Poster at the 11th Anniversary Scientific Conference with International Participation: Biology—Traditions and Challenges, held in 2009. All of this demonstrates that the candidate has shown systematic and consistent development within the scientific community, which has led to her logical professional growth.

3. General Description of the Candidate’s Work

3.1. Evaluation of the Candidate’s Scientific and Applied Research Work

According to the attached files 5_ “Compliance Report,” 6_ “List of Scientific Works,” and the “Publications” folder containing copies of the scientific papers, the candidate has submitted a total of 38 scientific works, including 1 book chapter and 37 research publications. Twenty-two scientific works, which are outside the scope of the dissertation and are taken into account in the final evaluation, and 14 research projects are accepted for review. Three scientific works related to the dissertation and 13 scientific works outside the scope of the competition or published in conference proceedings are not reviewed.

A total of 22 scientific works are being evaluated for the competition, including 21 scientific publications and 1 book chapter. Under Criterion B, equivalent to a habilitation thesis, 6 of the scientific publications are presented, and under Criterion C, outside the scope of the habilitation thesis, 16 are presented, of which 15 are scientific publications under Criterion G7 and one book chapter under Criterion G8. All 21 scientific publications appear in journals that are cited and indexed in world-renowned scientific databases (Web of Science and/or Scopus). Of these, only 2 publications don’t have an impact factor but do have an SJR factor. In 4 publications (18%), Dr. Gerasimova is the first author; in 1 (4.5%), the second author; and in 3 (13.6%), the third author.

Overall, based on indicators B and G, the distribution of scientific publications by quartile is as follows: 8 articles in Q1 (36.4%), 2 in Q2 (9.1%), 4 in Q3 (18.2%), and 7 in Q4 (31.8%). This indicates that nearly half (45.5%) of the candidate’s scientific output appears in high-ranking journals (Q1 and Q2). The 21 scientific publications submitted for the competition were

published in 12 peer-reviewed journals, with the highest numbers appearing in “Biotechnology & Biotechnological Equipment” (4), “Bioorganic & Medicinal Chemistry” (3), and “Acta Zoologica Bulgarica” (3). The impact factors of the journals range from 4.8 to 0.232, with “Pharmaceuticals MDPI” (4.8), “Molecules MDPI”, and “Life MDPI” (3.2) being the highest-ranked journals. Upon reviewing the compliance report, I found some discrepancies in the listed SJR and impact factors (JCR-IF) of the journals. Article G8 (8) has a JCR-IF (2012) of 0.604 instead of 0.276, and article G8 (9) has a JCR-IF (2013) of 0.793 instead of 0.75. Errors were also found in the SJR (Scopus) values for articles B4 (4), B4 (6), G7 (5), G7 (8), and G7 (9).

In addition to her scientific publications in high-impact journals, the candidate has demonstrated impressive activity in participating in scientific conferences (21 national and 46 international) and numerous projects (10 national and 4 international). In these, she has developed and presented a number of fundamental and applied scientific problems related to classical cytogenetics and karyology, molecular biology, and biodiversity. A significant portion of her project work involves the biological evaluation of numerous medicinal substances, including low-molecular-weight and polymeric aminophosphonates with antitumor and antiviral activity. A significant portion of the project’s activities is devoted to studying the biological activities of Bulgarian rose oils and to developing approaches to valorising the waste generated during their production. She develops projects focused on assessing biodiversity in model vertebrate species, studies genetic markers in the brown bear, participates in several biomonitoring studies, and more. This demonstrates Tsvetelina Gerasimova’s comprehensive expertise as a scientist, clearly recognized both nationally and internationally.

3.2. Scientific and Applied Scientific Contributions and Citations

Based on the scientific works presented, the candidate, Senior Assistant Professor Dr. Tsvetelina Gerasimova, demonstrates in-depth research expertise in applied cytogenetics and genotoxicology. The presented results are clearly systematic in nature and go beyond the scope of isolated empirical descriptions. The contributions can be logically synthesized into three main areas:

I. Methodological Contributions: Development and Implementation of Multisystem Approaches for Genetic Monitoring

- **Conceptualization and application of a multisystem screening approach:** Dr. Gerasimova has successfully implemented a comprehensive approach (combining plant test systems, in vitro human lymphocytes, and in vivo animal models) that allows for a comparative assessment of genotoxic risk at various hierarchical levels of biological organization. This approach demonstrates the critical importance of in vivo models for avoiding one-sided conclusions based solely on in vitro data.
- **Validation of new alternative models for biomonitoring:** The applicability of the wild species *Mus spicilegus* (steppe mouse) as a highly sensitive and reliable bioindicator for genetic monitoring in agroecosystems following exposure to industrial chemical agents (using tetrahydrofuran as an example).
- **Optimization of non-invasive approaches:** A method for extracting metaphase plates from bone marrow cells in dogs has been optimized, enabling precise cytogenetic analysis with minimal impact on the animal’s well-being.

II. Scientific and Applied Contributions: Assessment of the Toxic, Mutagenic, and Genoprotective Potential of Biologically Active Compounds

- **Identification of the antimutagenic and genoprotective potential of *Rosa spp.* products:** For the first time, a systematic comparative analysis of products derived from oil-bearing roses (including those obtained by subcritical water distillation) was conducted. Their strong protective effect against the direct-acting mutagen N-Methyl-N'-Nitro-N-Nitrosoguanidine (MNNG) by reducing the level of MNNG-induced chromosomal aberrations and micronuclei (in many cases by more than twofold) as well as partially restoring mitotic activity, with the degree of the effect depending on the product type, concentration, and experimental treatment protocol. This establishes products derived from *Rosa spp.* as safe and promising for pharmaceutical and cosmetic applications (B4: publications 2, 3, 6; G8: publication 16).

- **Investigation of the cytotoxic and genotoxic activity of hydrosols, essential oils, and wastewater obtained by conventional steam distillation, as well as extracts obtained by subcritical water distillation from species of *Rosa spp.* (*Rosa damascena* Mill., *Rosa alba* L., *Rosa centifolia* L., and *Rosa gallica* L.):** For the first time, a low, dose-dependent cytotoxic effect was observed in a concentration range (6–20%) and a slightly increased genotoxic effect in plant and lymphocyte test systems, whereas in the *in vivo* model-laboratory mouse strains-lower or absent clastogenic activity was observed under the same experimental conditions. This classifies these extracts as safe at the concentrations studied and suitable for use in the medical, food, and cosmetics industries (B4: publications 1, 3, 4, and 5; G8: publication 16).

- **Biological safety screening of newly synthesized aminophosphonates and their derivatives:** A large-scale *in vivo* evaluation of the clastogenic and antiproliferative activity of a broad spectrum of newly synthesized aminophosphonates and their polymeric derivatives was conducted as a key component of the screening for their biological safety and the selection of candidate molecules for the development of new antitumor agents and polymeric drug forms. A key relationship has been established between the chemical structure of the molecules and their toxicity to normal somatic cells, and it has been demonstrated that the polymeric analogs exhibit lower cytotoxicity. Different structural modifications lead to varying degrees of genotoxicity, antiproliferative effect, and antitumor activity. For a significant portion of the aminophosphonates and their analogs, a combination of pronounced antitumor activity *in vitro* and relatively low genotoxicity *in vivo* has been observed. This provides a scientific basis for developing safer polymeric drug formulations (G7: publications 1, 2, 5, 7–11).

- **Characterization of the genotoxic effects of industrial solvents:** Interspecies variability has been observed in the sensitivity of mammals to industrial pollutants such as tetrahydrofuran (THF), demonstrating a moderate clastogenic effect *in vivo*. The differences observed between laboratory and wild small rodent species highlight the need to use multiple animal models in ecotoxicological studies and when extrapolating results to humans (G7: pub. 14).

III. Ecological and Conservation Contributions: Assessment of Anthropogenic Pressure and Preservation of Genetic Resources

- **Ecotoxicological Assessment of High-Mountain Ecosystems:** Joint international research has demonstrated the suitability of the snow vole (*Chionomys nivalis*) as a bioindicator for lead pollution in alpine regions (Tatra Mountains, Rila Mountains, Vitosha Mountain). The

significant regional differences observed (three times higher levels in the Tatra Mountains) provide valuable information on the long-term bioaccumulation of heavy metals (G7: pub. 12).

- **Ecological Utilization of Industrial Waste:** Cytogenetic testing of wastewater from rose production. The low genotoxic potential identified provides a scientific framework for assessing their environmental safety and defines opportunities for their safe industrial recycling (G8: publication 16).

- **Initial genetic characterization of an autochthonous breed:** The first-of-its-kind cytogenetic characterization and assessment of the karyotype stability of the Karakachan dog (*Canis familiaris*) in Bulgaria has been conducted, which is a fundamental contribution to the conservation of our national genetic resources (G7: pub. 3, 4).

At first glance, the data presented for *Rosa* spp. products reveal an apparent paradox—they exhibit weak, concentration-dependent genotoxicity on their own, yet demonstrate a potent (more than twofold) genoprotective effect against the direct mutagen MNNG. This result is, in fact, an excellent illustration of the well-known phenomenon in toxicology of dose-dependent dualism (hormesis) and the pro-oxidant/antioxidant capacity of polyphenolic complexes. The candidate's achievement lies in using a multisystem approach and *in vivo* models to successfully distinguish between these effects, demonstrating that, when administered systemically in a living organism, the protective potential of the extracts clearly dominates, thereby establishing them as safe and applicable in clinical practice.

According to the compliance report (file 5_Compliance Report), Senior Assistant Professor Gerasimova is participating in the competition for the position of “associate professor” with 100 citations across 18 scientific publications. Forty-four of these are in journals in the Q1 quartile (Scopus), and 27 are in journals classified in the Q2 quartile (Scopus); that is, 71% of the candidate's citations are in high-ranking journals. This is evidence that Dr. Gerasimova's research has gained recognition within the international scientific community; according to her profiles on Scopus and Web of Science, she has an h-index of 6 and a total of 151 citations (Scopus) <https://www.scopus.com/authid/detail.uri?authorId=35728557800> and an h-index of 5 and 55 citations (Web of Science) <https://www.webofscience.com/wos/allldb/citation-report/ef4d05d5-39f8-498a-961c-87efd48e30f2-01ba56807b>.

The candidate's scientometric indicators meet and even exceed the minimum requirements set forth in Article 26 of the Law on the Development of Academic Staff in the Republic of Bulgaria and the Regulations on the Conditions and Procedures for Awarding Scientific Degrees and Titles and for Holding Academic Positions at the Bulgarian Academy of Sciences (2018): for Indicator **A**, the candidate has **50** points out of the required 50 points; for Indicator **B4**, she has a total of six articles, of which: four articles in Q1, one article in Q2, and one article without an IF but with an SJR, totaling **130** points out of the required 100 points; under criterion **G7**, she has a total of fifteen articles, of which: four articles in Q1, one in Q2, four in Q3, five in Q4, and one article with only an SJR, totaling **250** points out of the 220 required points according to the Bulgarian Academy of Sciences' (BAS) higher minimum requirements for associate professor; Under criterion **G8**, there is one book chapter, which earns a total of **15** points; under criterion **D11**, the candidate presents **100** citations in peer-reviewed publications, which amounts to **200** points out of the required 60 points, according to the Bulgarian Academy of Sciences' (BAS) higher requirements. Thus, Dr. Gerasimova earns 50 points under criterion A, 130 points under criterion B4, 265 points under criterion G, and 200 points under criterion D11,

for a total of **645** points, which far exceeds the 430 points required under the Bulgarian Academy of Sciences' (BAS) stricter criteria.

All of the cited scientometric indicators support two important conclusions: 1. Dr. Gerasimova is a distinguished specialist in the field of assessing the toxic, mutagenic, and genoprotective potential of biologically active compounds, as well as anthropogenic pressure and the conservation of genetic resources. She has a diverse, rich body of scientific work that fully meets the requirements for the position of “associate professor”; 2. She is a renowned researcher, both nationally and internationally, in the aforementioned fields, as evidenced by the significant number of projects and citations. Her expertise is highly regarded within the Bulgarian and international scientific communities, as evidenced by the number and quality of the research projects in which she participates. The overall impression from the documentation submitted for the competition, following a detailed analysis, is that Dr. Gerasimova's comprehensive scientific activity is diverse and meets the necessary scientometric indicators.

4. Critical Comments and Recommendations

My main comment concerns how the scientific contributions are presented and structured in the authors' reference list. In some places, they are presented in a rather summary-like manner, as descriptions of specific experiments conducted on specific subjects, with citations to the relevant publications, rather than being elevated to a higher level of scientific generalization. The contributions should be defined in terms of broader conceptual and methodological categories.

While research areas 1 and 2 (rose extracts and aminophosphonates) represent large-scale, systematic, and multi-year studies, research areas 3 (tetrahydrofuran), 4 (lead pollution), and 5 (karyotype of the Karakachan dog) appear to some extent fragmented. They are based on a limited number of publications (only one or two per research area). My observation is that these studies have not been fully developed and, at this stage, are of a rather preliminary or incidental nature within the candidate's scientific portfolio.

Studies of *Rosa spp.* products conclusively demonstrate their genoprotective potential. However, the research is limited to the observation that the protective effect “is likely associated with the presence of antioxidant and free-radical-scavenging compounds.” The presented materials lack more detailed biochemical or molecular analyses (such as tracking the expression of specific DNA repair genes or of enzymes involved in antioxidant defense), which would enhance the scientific work's fundamental value.

I recommend that Senior Assistant Professor Dr. Gerasimova, in her future research, shift from classical cytogenetic methods (micronuclei, chromosomal aberrations), which she has mastered excellently, to modern molecular genetic and transcriptomic analyses. Investigating the mechanisms of genoprotection at the gene expression level (RT-qPCR, RNA-seq) would lead to a more significant breakthrough in prestigious international journals with very high impact factors.

The results of studies on aminophosphonates with low *in vivo* genotoxicity and high antitumor activity, as well as the safety data on subcritical water extracts of rose, have enormous potential for application in the pharmaceutical and cosmetics industries. I recommend that the candidate seek closer collaboration with the biotechnology and pharmaceutical industries to patent and implement these developed polymeric forms and extracts in practice.

The study of wild mammals (snow vole and steppe mouse) as bioindicators is extremely promising. I recommend that the candidate expand this line of research into a comprehensive, long-term program for national genetic monitoring of anthropogenically polluted and high-mountain ecosystems in Bulgaria.

The comments and recommendations are entirely advisory and aim to outline possible directions for further development of the candidate's scientific research. They in no way diminish the high value of the results obtained or the significant contribution of Senior Assistant Professor Dr. Tsvetelina Gerasimova to the development of modern Bulgarian cytogenetics and genotoxicology.

CONCLUSION

The documents and materials submitted by Senior Assistant Professor Dr. Tsvetelina Zhanova Gerasimova meet all the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria (ZRASRB), the Regulations for the Implementation of the ZRASRB, and the requirements of the Regulations on the Conditions and Procedures for Obtaining Academic Degrees for Academic Positions at the Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences.

The candidate has submitted a sufficient number of scientific papers published after the materials used in the doctoral dissertation defense. The candidate's works contain original scientific and applied contributions that have received international recognition, as evidenced by the publication of a representative selection in journals and scientific collections from international academic publishers. The theoretical developments have practical applicability. Dr. Gerasimova's scientific qualifications are beyond doubt. The results she has achieved in her research activities fully meet the minimum national requirements and the additional requirements of the Bulgarian Academy of Sciences (BAS), adopted in connection with the implementation of the Law on the Development of Academic Staff in the Republic of Bulgaria (ZRASRB).

After reviewing the materials and scientific papers submitted for the competition, and analyzing their significance and the scientific, applied scientific, and applied contributions they contain, I find it appropriate to give my positive assessment and to recommend that the Scientific Jury prepare a report-proposal to the Scientific Council of the Institute of Biodiversity and Ecosystem Research (IBEI), BAS, for the appointment of Senior Assistant Professor Dr. Tsvetelina Zhanova Gerasimova to the academic position of "Associate Professor" at the Institute of Biodiversity and Ecosystem Research (IBEI), in the field of higher education 4.2. Biological Sciences, in the professional field of "Genetics."

June 19, 2026

Reviewer:

(Assoc. Prof. Dr. Tsenka Chassovnikarova)

