

REPORT

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About the competition for the academic position " Assoc. Professor "in professional field 4.3. "Biological Sciences" (Genetics) from the Department "Ecosystem Research, Environmental Risk Assessment and Conservation Biology", Institute of Biodiversity and Ecosystem Research, BAS announced in the State Gazette issue 110/31.12.2024

This review was prepared according to Order 18/28.02.2025 of the Director of IBEI -BAS for a member of the Scientific Jury for holding a competition for the academic position of "Assoc. Professor" in the field of higher education: code 4. "Natural Sciences, maths and IT"; Professional direction: 4.3. "Biological Sciences" (Genetics) at the Department "Ecosystem Research, Environmental Risk Assessment and Conservation Biology", " for the needs of IBEI-BAS, announced in State Gazette issue 110/31.12.2024. The only candidate in the competition is Assis. Prof. Petya Parvanova, PhD.

The candidate graduated from the Southwestern University "Neofit Rilski" - Blagoevgrad in 2003 with a degree in Ecology, and in 2005 she completed a Master's degree in Ecology at the Faculty of Biology, Sofia University "St. Kliment Ohridski". Since 2006 she has been appointed as a biologist at the Central Laboratory of General Ecology, Bulgarian Academy of Sciences, where in 2010 she defended her PhD Thesis as a full-time doctoral student and since 2011 she has been a Assoc. Professor at the Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences.

The review of the certificate for compliance of the applicant with the national minimum state requirements for the academic position of Assoc. Professor of the Law on the Development of the Academic Staff of the Republic of Bulgaria, the following was established: under indicator A1, the candidate has the required 50 points, under indicator B, with the required 100 points, - 110 points, under indicator D, the candidate collects 225 points, with the required 200 points, under indicator G, the candidate collects 104 points, with the required 50. The total number of points from indicators A+B+G+D of the candidate is 489, which exceeds the minimum requirements for the administrative position "associate professor".

In the competition, Assoc. Prof. Parvanova presents 21 publications, 12 of them were published in journals with IF and 3 book chapters. Her published works have been cited 52 times in world literature so far. 27 citations have also been noted in other sources, 6 of them are in PhD thesis and 3 of them are in scientific books. Assoc. Prof. Parvanova was a part-time lecturer at the Faculty of Biology, Sofia University "St. Kliment Ohridski," and at the University of Forestry. She was the supervisor of a graduate student at the Faculty of Biology of Sofia University and an adviser to a full-time doctoral student at IBEI-BAS.

Her active scientific activity is evidenced by her participation in 23 scientific projects, in some of them she was the leader of two scientific tasks. She was also the leader of 2 scientific projects. Her specializations in a number of international scientific centers related to her scientific field contributed to her growth as a researcher. She was a participant in several international scientific forums, where she presented her scientific results. Her recognition as a scientist in the field of genetics is also evidenced by her invitations as a reviewer of publications in scientific journals. She is an active participant in the organization of the annual Ecology Seminar and editor of the published book of reports from the seminar.

Her main scientific achievements are related to the development of test systems for the areas that are being developed in the Department "Environmental Mutagenesis", such as : Prevention of induced mutagenesis through exogenous application of natural products; Assessment of the mutagenic and commutative properties of environmental xenobiotics by using a complex of *in vivo* tests and criteria with different permission options: microbiological, biochemical and molecular; analysis of the mechanisms of genotypic and induced resistance and study of the potential of the adaptive response of genome resistance.

In my opinion, the candidate's most significant achievements are in the following areas:

1. Prevention of induced mutagenesis (antimutagenesis) by exogenous application of natural products. Author have established that the response of cells to oxidative stress depends on the method of application of biologically active products. These studies have contributed to the clarification of the mechanisms of antimutagenesis and the role of experimental design. It has been proven that the DNA protective potential of natural plant products depends mainly on their antioxidant potential and the accelerated repair of double-strand breaks in DNA.
2. Assessment of the genotoxic potential of environmental xenobiotics by the aid of a complex of *in vivo* tests with different permissive capabilities: microbiological, biochemical and molecular. The author established a well-expressed genotoxicity and DNA damaging capacity of narcissus leaf extract and oregano essential oil. After the determination of the main active substances in these extracts that lead to the observed response and proves that the main component of the methanol extract of oregano - carvacrol is the active ingredient that causes genotoxicity and DNA damaging effect in the model system of *Chlamidomonas reinhardtii*. Another reliable marker for the extent of induced oxidative stress in plant test systems was proven - the levels of lipid peroxidation and intracellular peroxides. The author has developed two complexes of test systems and criteria for assesment the damage from xenobiotics that are present in the environment. Special attention was paid to chlorpyrifos, a widely used pesticide with genotoxic, mutagenic, phytotoxic effects, which damages DNA and exhibits recombinogenic and clastogenic effects. Through genotypic differences of representatives of different classes of organisms, the author proved that green algae are a very sensitive test system for detecting low concentrations of PbCL2 and it has been established that this compound damages photosynthetic pigments and DNA through induced oxidative stress.
3. The study of the mechanisms of genotoxic resistance based on morphometric, physiological, biochemical and molecular methods of different types of higher plants, algae, yeasts has obtained information about the role of the developmental phase, the mitotic cycle and DNA repair capacity in the formation of genotypic resistance. It has been proven that the physiological state, the

phases of the mitotic cycle and the repair potential of cells play a major role in the occurrence of the stress response and genotypic resistance to chemical inducers of oxidative stress, which is a contribution to the establishment of the mechanisms in the formation of genotypic resistance. Through various mutant lines of *Phaseolus vulgaris* L. and studying a complex of indicators, it has been established that the strength of the induced stress depends to a great extent on the genome.

4. Assessment of the effect of anthropogenic pollutants and environmental factors through a test system of higher plants, in relation to ecotoxicology and agriculture. These studies have contributed to the evidence that antioxidant enzyme activity can be used as an indicator for assessment of the impact of pollutants in the atmosphere. Using hydroponically cultivated corn plants, the effect of cadmium and paraquat was studied through chemical, physiological and biochemical tests and data were obtained on the accumulation properties of plants to cadmium. Considering the impact of cadmium on plants, these results can be used for the purposes of ecotoxicology and phytoremediation. An ecotoxicological assessment of the plant-soil-water system was carried out when the plants were treated with wastewater from a metallurgical complex and it was proven that it cannot be used for irrigation of arable land. Using several varieties of green salads, by physiological parameters such as photosynthesis, transpiration and water use efficiency, it has been proven that these plants exhibit very good adaptability to low temperatures and shading and can be grown over a very long time period.

Everything said so far is an indication that Assistant Professor Petya Parvanova has a clearly defined scientific field, which she is developing successfully, considering the number of publications in reputable international journals. The citations of her publications in the international database show the great interest of the world scientific community.

Her results contribute to the mechanisms of genotypic resistance formation, as well as to genotoxicology, ecotoxicology and agroecology. In addition, the results obtained can explain a number of observed effects in the presence of anthropogenic pollutants and environmental factors. I would like to note that the candidate successfully transfers her experience to young scientists, taking into account the supervision of a successfully defended master student and her participation in the development of the PhD thesis of a successfully defended PhD student, as well as her teaching activities as a supervisor of practical training at the Faculty of Biology of Sofia University and at the Forestry University.

Conclusion:

Assoc. Prof. Petya Parvanova has focused her scientific research in a very interesting area such as the study of the mechanisms of genotoxicology, which are widely used in ecotoxicology and agroecology. Her scientific results have received a wide response in the world scientific literature. All her scientific activity exceeds the requirements of the Law for the Development of the Academic Staff of the Republic of Bulgaria and the relevant regulations for its implementation of Bulgarian Academy of Sciences as well as of the Institute of Biodiversity and Ecosystem Research, BAS for the academic position " Assoc. Professor" therefore I strongly recommend to the Scientific jury and the Scientific Council of the Institute of Biodiversity and Ecosystem Studies - BAS the election of Assist.. Prof. Petya Parvanova for the academic position of "Associate Professor" in the professional field 4.3."Biological Sciences" (Genetics).

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