

## STATEMENT

by Prof. Elena Stephanova, DSc, PhD

with reference 4.3 Biological Sciences (Cell Biology), issued in State newspaper/SG no. 32 on 09.04.2024, Sofia University "St. Kl. Ohridski", regarding academic competition for the position Professor of Cell Biology.

**Biographical data:** Dr. Tanya Hristova Topouzova, Associate Professor of Cell Biology in the Faculty of Biology at the SU "St. Kliment Ohridski", is the only candidate in the competition to be appointed as a professor, for the needs of the Department of "Cell Biology and Developmental Biology". In 1994, Dr. T. Topouzova graduated from Sofia University. "St. Kl. Ohridski" with a Degree in Biology, followed by Master's specialization course in Cell Biology. After graduating, she worked as a biology teacher until 1995. Since 1996, she has been working as an assistant at the Department of Cytology and Histology and conducts practical classes in cytology, biology, cell culture and cell nucleus.

From 2004 to 2014, she was successively senior assistant, chief assistant and in November 2014 she was elected Associate professor in Cell biology, in the Cytology and Histology Department, Faculty of Biology, Sofia University "St. Kliment Ohridski". In parallel with the teaching activity, she conducted successful research on current scientific topics in the department and in 2008 successfully obtains Ph.D on the topic "Influence of halogenated inhalation anesthetics on the integrity and reparative abilities of lung cells", and was awarded the scientific and educational degree "doctor"/Ph.D. Assoc. prof. Topouzova has conducted successful collaborations with various scientific teams and universities in the country and a 6-month specialization at the University of Seville-Spain. In parallel with the enviable teaching activity, she is a successful leader of many students and graduates in the department, and she is also an active member of the National Commission for the Olympiads in Biology and Health Education for over 20 years.

**Scientific activity:** While competing for the professorial position, Dr. T. Topouzova presented a total list of **74** scientific publications, **31** of which have an impact factor of **88.213**, cited **239** times in renowned international journals, and the list of publications for participation in the competition for the title of "professor" covers a total of **25** publications, as to - **B 4**. Habilitation thesis - scientific

publications in publications that are referenced and indexed in world-famous databases with scientific information (Web of Science and Scopus) are **7** with an impact factor of **23.089**, and in non-refereed journals on the subject there are 5 publications, and to **D 7**. Scientific publication in publications that are referenced and indexed in world-famous databases with scientific information (Web of Science and Scopus), outside of the habilitation work, there are **11** with an impact factor of **34.53**, and without an impact factor there are 2 publications, or a total of **18** publications with an impact factor of **57,619**, which have been cited 179 times in scientific international publications. The reference to implementation of the minimum national requirements under Art. 2b of LDASRP - Law on the Development of the Academic Staff in the Republic of Bulgaria, for scientific field 4. Natural sciences, mathematics and informatics; professional management 4.3. Life Sciences shows full compliance of the included data with the criteria in Appendix 1 as follows:

✓ Indicators from group A: dissertation work - **50 points** (Dissertation on the topic Influence of halogenated inhalation anesthetics on the reparative abilities of lung cells, defended in 2008)

✓ Indicators from group B: habilitation thesis - scientific publications in publications that are referenced and indexed in world-famous databases with scientific information (Scopus) - **140 p.** (with a minimum of **100 p.**). Of the presented articles, two are in the Q1 quartile; four are in the Q2 quartile and one is in the Q3 quartile.

✓ Indicators from group D: scientific articles in international refereed and indexed journals - **240 p.** (with a minimum of **200 p.**). Eight of the articles included in this category are in the Q1 quartile, two are in the Q2, and one is in the Q3.

✓ Indicators from group D: cited works – **358 p.** (with a minimum of **100 p.**) included out of a total of **179** citations in Scopus. The citations found significantly exceed the required minimum of **50** citations.

Associate prof. Topouzova's scientific interests, her intellect, modern approaches, methods and awareness, determine her participation as a desired member or leader of 15 scientific projects at the Scientific Research Institute of Ministry of Education and Science in the field of cellular and molecular biology and 7 educational projects at Sofia University "St. Kliment Ohridski", which have been completed with successful developments. These achievements, as well as the

scientific guidance of doctoral students and graduate students and the co-authorship of a number of study aids, allow the awarding of a total of **281** points from group E indicators: (with a minimum of **150** points) of which guidance for a doctoral student - **50** points (In addition, T. Topouzova is currently the supervisor of a full-time doctoral student and was the supervisor of another 13 graduate students); head of two national projects - **40** points; participant in **13** national scientific projects (x 10 points for each) – **130** points (in addition, the candidate also participates in 7 study projects with European funding); from attracted funds – **31** items and from co-authorship in teaching aids – **30** items.

The wide international response of assoc. prof. Topouzova's publications shows enviable competence, high qualification and indisputable quality of her scientific developments. I am convinced that the publication activity of assoc. prof. Topouzova fully meets and covers the profile of the announced competition, as the general scientific interests in all her research are focused in the field of cellular and molecular biology, biochemistry, biophysical chemistry and medical-biological **research**. It is quite logical that the main contributions are directed in these directions.

1. Contributions to the study of the biological effects of plant secondary metabolites (potential phytopharmacological preparations) on cultured bacterial and eukaryotic cells:

Today, more and more research is focused on the various biological effects of both total extracts and important plant secondary metabolites from unique endemic medicinal plants that our country is rich in. The contributions of assoc. prof. Topouzova in these studies are determined not only by establishing the specific biological effect, but also in the search for the mechanism of action determining these effects.

**Contributions in group A) Phytopharmacological - in vitro tests to study the pharmacological potential of Bulgarian medicinal plants.** This direction is very relevant due to the growing interest in using the wealth of secondary metabolites in medico-biological research and their therapeutic effect. Original results are presented with a promising application of various secondary metabolites with antitumor activity on plant cell cultures, such as white dead nettle (**Lamium album L.**). Regardless of the established different activity of extracts from wild and in vitro cultivated plants, in the latter, better antitumor activity has been proven, and also groups of phytochemicals have good antimicrobial activity, which

is a contribution to conventional therapeutic approaches. The perspectives in the use of representatives of 9 species of plants of the **genus Inula** (Oman), and both the main groups of secondary metabolites with the potential for application in medicine, as well as the critical concentrations of cytotoxicity in various cancer and non-cancer cell lines, with the potential for an antitumor effect, were established. Another significant contribution is related to **Haberlea rhodopensis** extracts, as a candidate for use in the complex treatment of pathological dermatological conditions, including psoriasis. The significance of these studies is related to clarifying the mechanism of action of the active component **miconoside** in the so-called resurrecting plants, which can directly affect fluidity, i.e. the reorganization and arrangement of membrane lipid components in normal and cancer cells, which reflects on their vitality and proliferative activity.

**Contributions in group B) In vitro tests for the study of biological activity of pharmacological preparations.** Today, it is known that not only membrane receptors, but fluidity and lipid organization are extremely important for the complex cascade of signaling pathways in cells and the response of cells to various external signals. In support of this fact are studies with secondary metabolites, as well as other pharmacological antitumor preparations, which can directly interact and change the arrangement of membrane lipids. The main contributions of these studies are based on the role of lipid rafts in sequestering activated ERK1/2 in cells, to reduce proliferative activity, internalizing alkylphospholipids through the raft domains to influence lipid-dependent signaling pathways in a cell-specific manner, as well as the involvement of vipoxin (phospholipase A from snake venom), in modeling the cytoskeleton, induction of apoptosis, induction of cell death, or high genotoxicity.

2. Development of new polymer nanosized drug carriers and study of the mechanisms of internalization and release of biologically active material in cells. In this direction, the contributions are related to the development of new polymeric nano- and macro-sized drug carriers, their delivery into eukaryotic cells, as a reliable and modern approach with low toxicity, with good internalization in cells and release of the biologically active substance in the relevant cellular compartment. The research in this prospective direction proves the successful synthesis of homogeneous coamorphous micro sponge-type structures with excellent drug loading capacity. Titanate nanocomposites with broad-spectrum antimicrobial activity, as well as cell-specific cytotoxicity, demonstrated for

various eukaryotic cells (osteosarcoma, fibroblast and keratinocyte cells) are an important contributor. In this aspect, collagen-RGO nanocomposites, active against gram-positive microorganisms and *Candida lusitanae*, are also highlighted, which makes them a promising antimicrobial biomaterial for various biomedical applications, including tissue engineering. Another significant contribution related to new technologies is the use of polyplex nanoparticles and vector systems based on polymers with a dense structure, which can be considered as promising systems for gene transfection in eukaryotic cells – a reliable modern approach in gene therapy. Also a broad and reliable approach is the use of nanocapsules of amphiphilic triblock copolymer cationic micelles with DNA, with extremely low cytotoxicity and negligible damage to the cell membranes of human cells, which makes them suitable for carrying medicinal preparations. An undoubtedly promising applied contribution is the creation of conjugates of nucleic acids and polymer nanoparticles, called spherical nucleic acids, with good colloidal stability, increased resistance to nucleases, low cytotoxicity and increased cellular internalization.

I want to emphasize that all contributions and those with promising application in medical practice have both fundamental and scientific-applied nature.

Assoc. prof. Topouzova successfully combines her intensive scientific research with broad, active and significant teaching experience in the department. She is the lead of compulsory Cell Biology lecture courses that are part of BSc curriculum delivered to full-time undergraduate students, enrolled to study Biology; lectures on Biology for specialty Pharmacy; lectures on General Biology for a spec. teacher of natural sciences in the basic level of education; lectures on Control mechanisms of cell proliferation in MP studying Cell Biology and Pathology and Developmental Biology; lectures and practical classes in Cytology at the Faculty of Medical Physics; lectures on Cytology and Cell Biology for bachelors from Biotechnology, EEA and Biology majors in part-time study (until 2018); lectures on cytology, histology and embryology for bachelors by special biology and English teachers (until 2020)

In conclusion: I have known Associate Professor Topouzova since her student years, and later as a master's student in our department. I have always been impressed by her ambition, active participation, constant search and thirst for knowledge, with an abiding interest in the problems of cellular and molecular

biology. Her initiative, ambitions, competence and high-quality scientific production cited and evaluated with dignity in the international scientific community is an indisputable argument, to recommend to the distinguished members of the scientific jury to award assoc. prof. Tanya Topouzova the academic position of "Professor", which I will firmly and categorically support."

07/08/2024

Signature:

/prof. Elena Stephanova, DSc/