

REVIEW

of the materials submitted for participation in a competition for the academic position "**professor**" in the field of Higher education 4. "Natural Sciences, Mathematics and Informatics", Professional field 4.2. "Chemical Sciences" (**Chemistry**), announced in State Gazette, issue 7 of 23.01.2024, for the needs of the Medical University Varna "Prof. Dr. Paraskev Stoyanov"

Reviewer: prof. Irina Karadjova, PhD, Faculty of Chemistry and Pharmacy at Sofia University "St. Kliment Ohridski" appointed as a member of Scientific Jury by order No P-109-94/ 21.03.2024 r. and in addition by order No P-109-134/ 05.04.2024 r of the Rector of Medical university "Prof. Dr. Paraskev Stoyanov".

The only candidate in the announced competition for the academic position "Professor" is **Assoc. Prof. Dr. Albena Vasileva Merdzhanova**.

1. Brief biographical data

Assoc. Dr. Albena Vasileva Merdzhanova completed her master's degree in the period 1989-1993 at UCTM Sofia as an engineer - biotechnologist. The scientific career of Albena Merdzhanova began at the Institute of Oceanology – BAS, Varna, as an engineer on Hyperbaric systems and there by 2005 she reached the scientific position of scientific assistant first degree. In 2005, she began her career and scientific development at the Medical University "Prof. Dr. P. Stoyanov" Varna. At the beginning, as the chief assistant at the Clinic "Occupational Diseases" and since 2008 as the chief assistant, specialty Chemistry, in the department of Chemistry. As a self-prepared PhD student, she defended her doctoral thesis in 2014 on the topic "Fatty acid composition of Black Sea and freshwater fish" with a professional field in "Bioorganic chemistry, chemistry of natural and physiologically active substances". In the period 2015-2016, she acquired a master's degree from Konstantin Preslavsky University of Shumen specialty "Organic Chemistry". In 2020, she acquired a specialty in the field of health care from the Medical University "Prof. Dr. Paraskev Stoyanov" – Varna.

Assoc. prof. Albena Merdzhanova has a successful scientific career, which includes a total of 68 publications and one monograph - in 20 of these publications she is the first author, and in 21 she is the corresponding author. Assoc. Prof. Merdzhanova is the author of four text books - two text books for Medical College and two text books for secondary schools.

She has an active project member and leader: four projects at IO BAS, one of which was recognized as a scientific and applied achievement by the Scientific Council of IO-BAS for 2004; four projects at NSF and one project to support doctoral students as well as two international projects.

2. General characteristics of the received materials.

The materials presented by Assoc. prof. Merdzhanova to participate in the competition are very well structured. A clear distinction is indicated between the materials used for the habilitation in 2004 and the materials for the current competition. The careful organization of the attached materials allows one to easily conclude that all the formal requirements of Law for development of the academic staff in Republic of Bulgaria and the regulations for its application and the recommended additional criteria for acquiring scientific degrees and occupying academic positions at Medical university-Varna for professional field 4.2 "Chemical Sciences" have been met. Associate Professor Merdzhanova has attached a list of scientific works for her entire scientific career, with the publications for awarding the educational and scientific degree of doctor, the materials for awarding the academic position of associate professor, the materials for the current competition and additional materials that characterize her research interests and achievements.

She is the co-author of a total of 68 publications, of which 36 were published in publications included in SCOPUS/Web of science. Prof. Merdzhanova is the author of 2 text books for secondary school and two text books for candidate students.

One monograph and 22 publications were submitted for participation in the current competition, 18 of which were published in publications with an impact factor or impact rank (Web of Science, SCOPUS, 1 publication was published as an indexed publication, and 3 were published in non-refereed journals with scientific review or proceedings of conferences without IF and SJR. The articles are distributed: in quartile Q1 - 4 publications, in quartile Q3 - 2 publications and in quartile Q4 - 9 publications. The monographic work is on the topic: "Biological active fatty acids in support of human health" and is in the spirit of modern ideas about functional foods. It is written on 163 pages and illustrated with 14 figures and 21 tables. 216 references are cited, about 50% of which are from the last 10 years.

The results of the research studies for current competition have been reported at more than 37 national and international forums.

Associate Professor Merdzhanova presents data on her participation in projects financed by the Ministry of Education and Science and the National Research Institute.

All presented materials are related to the topic of the competition. On the basis of the declared publication activity, the candidate has attached a report on the fulfillment of the minimum national requirements and the recommended criteria for occupying the academic position "Professor" in the field of higher education "Natural Sciences, Mathematics and Informatics", professional field "Chemical Sciences" of the University of Varna. The distribution by indicators is as follows: indicator A – 50 points; indicator B – 100 points (recommended 100).; indicator D – 298 points (recommended 200); indicator D - 104 points (recommended 100) and indicator E - 210 points (recommended 150). It is obvious that the scientometric data of Assoc. Prof. Dr. Merdzhanova meet and exceed the necessary minimum for all requirements.

General characteristics of the research activity and personal contribution of the candidate. Scientific contributions.

All publications of the candidate in the competition are collective.

The research interests of Assoc. Dr. Merdzhanova are in the extremely actual field of healthy nutrition. She looks for the correlation between the quality and safety of food and the effects on human health. Her achievements in this regard are impressive and focused on research on the fatty acid composition and lipid profile of tissues/foods of marine and plant origin and other biological species. Polyunsaturated fatty acids play a key role in human health, supporting the work of various organs and systems. Interest in them is growing last years as a link is made between the low rates of cardiovascular disease in the population with the high consumption of fish and other marine products in their diet. An important direction in the scientific contributions of Prof. Merdzhanova are the results obtained for the content of biologically active substances in Black Sea and freshwater organisms. Contributions can be highlighted in several directions:

Determination of the content of total lipids, omega-3 polyunsaturated fatty acids (EPA and DHA) in eleven fish species traditionally consumed in Bulgaria, three species of bivalves, rapans and shrimps caught from the western part of the Black Sea and a critical analysis of the obtained results, the amounts of seafood that can provide the minimum recommended intake of omega-3 polyunsaturated fatty acids was carefully evaluated. Data on the values of the ratio omega-3/omega-6 and PNMK/NMK values which are extremely important for human health are presented. The obtained results show that the chemical composition of different species varies significantly, which is due to the influence of a number of biotic and abiotic factors of the environment. In addition, the influence of seasonal dynamics on the chemical composition and fatty acid profile and the content of fat-soluble vitamins in a commercially important fish species - Black Sea cod; the seasonal changes in the sterol and fatty acid composition of the total lipids and the lipid classes (neutral and polar lipids) in the edible tissue of the Mediterranean mussel *Mytilus galloprovincialis*, cultivated in the Bulgarian Black Sea water are presented followed by a discussion of the obtained results. Of interest are the results for the content of essential elements K, Ca, Mg, Na in combination with the content of proteins, total lipids, carbohydrates and calculated energy value of tissue from the white mussel *Donax trunculus* from the Bulgarian coast of the Black Sea.

Thermal treatment was usually applied in the preparation of sea and freshwater foods in the country's. An essential direction in the candidate's scientific contributions is the result of systematic research on the influence of Thermal treatment on changes in total lipids, lipid classes, fatty acid composition, fat-soluble vitamins and carotenoids in *Mytilus galloprovincialis* and *Rapana venosa*; the effects of steam cooking on the concentrations of toxic (Cd, Ni, Pb), essential (Cr, Cu, Fe, Mn, Zn) and macronutrients (Na, K, Ca, Mg), total lipids and fatty acids in Mediterranean mussels (*Mytilus galloprovincialis*) from the Black Sea; the effects of thermal treatment on the contents of retinol, α -tocopherol, β -carotene and astaxanthin, in *Mytilus galloprovincialis* and *Rapana venosa*. The obtained results and conclusions are essential because they show what thermal treatment is most suitable for preserving bioactive substances in marine organisms.

Marine organisms are a bioindicator of environmental pollution as they bioaccumulate toxic elements, but they are also part of the human diet. Of interest are the studies on the content of toxic elements in the edible tissue of: (a) five freshwater fish species: bream (*Rutilus rutilus*), freshwater bream (*Abramis brama*), mirror carp (*Carassius gibelio*), crucian carp (*Carassius carassius*) and carp (*Cyprinus carpio*) from Burgas Lake, Mandra Reservoir (Bulgaria); (b) three species of mussels: the black Mediterranean mussel *Mytilus galloprovincialis*, and two species

of white sand mussels *Chamelea gallina* and *Donax trunculus*. The assessment is based on permissible values for safe human consumption. A number of indicators were calculated and the risk to the health of consumers was assessed. The results show that the concentrations of toxic elements in the studied marine species are below the permissible limits and do not pose a risk to human health after consumption, while the high levels of essential elements complement the characteristics of marine organisms as functional foods.

A project implemented to evaluate the biological activity and functional properties of tissue from Black Sea bivalves (*Mytilus galloprovincialis*, *Chamelea gallina* and *Donax trunculus*) can be considered as a methodical study that shows the benefit-risk ratio for human health. It is accepted that results on the ratio of concentrations of omega-3 polyunsaturated fatty acids (EPA and DHA) to those of toxic/essential elements can be used to infer the nutritional quality of organisms, important to the consumer's diet. Health risks were assessed based on the calculated non-carcinogenic risk indices, hazard index and carcinogenic risk factor. Personally I am considering the established correlation between essential trace elements and biologically active fatty acids to be a serious achievement, which allows for a synergistic effect and increased efficiency in the functional properties of these components in mussel tissue.

The monographic work is dedicated to fatty acids, presenting a detailed overview of the nomenclature of fatty acids, their physical properties, biosynthesis in the body, their physiological action and their properties as functional foods, recommendations for the intake of long-chain PNMK and the sources of long-chain PNMK with an emphasis on the sources in Bulgaria with marine and freshwater origin. The presented monograph demonstrates the serious knowledge of Prof. Merdzhanova on the subject of fatty acids and is based on modern sources and the author's own research. The author has summarized a considerable volume of information and has managed to systematize scientific hypotheses and experimental results to obtain reliable information about food quality and safety. The monograph is an informative read both for researchers working in the field of analysis of biologically active substances and their distribution and levels in marine and river organisms and researchers working in the field of healthy nutrition and functional foods.

Assoc. Prof. Merdzhanova's significant role in the commented investigations is unquestionable. In the presented statement of contributions, there is a detailed description of her leading role in publications related to the areas in which she works. At the same time, in a number of publications with other lead authors, she is an important member of the team in the design of experiments and interpretation of results.

Scientific contributions can be characterized as new scientific results such as approach and methodology for the study of fatty acid composition, studies on lipid profile of marine and plant origin and other biological samples. The results on the influence of heat treatment on the profile and concentration of essential components of functional foods are important both for scientific community and for practice. Also of interest is the assessment of the benefit-risk ratio for human health obtained on the basis of a methodical study of Black Sea organisms. Prof. Merdzhanova has managed to unite in a convincing way the scientific contributions as novelty for science and their interpretation and as results with very good practical application and potential final realization.

The reference on the contribution nature of the scientific works of Assoc. Dr. Merdzhanova is comprehensive and very correctly outlines her own contributions, which gives me a reason to

conclude that the personal contribution of the candidate in the presented research is undoubted and significant.

3. Reflection in literature

Assoc. Dr. Albena Merdzhanova has presented a list of citations of the works with which she participated in the competition and the general conclusion is that the research she conducts and publishes has found a serious response in the literature. It probably also has a significant impact on the local community.

4. Pedagogical activity

Assoc. Dr. Merdzhanova has a rich pedagogical activity. She is a lecturer on basic courses such as: "Chemistry" for students from the specialty Medicine - Bulgarian language training, 1st year; "Inorganic and organic chemistry" of students from the specialty Medical laboratory assistant, College of Medicine, 1st year; "Inorganic Chemistry" of students from the Assistant Pharmacist specialty, Medical College, 1st year. In connection with the scientific research she has prepared and she is a lecturer of the "Composition and Food Safety" elective course for students educated in Pharmacy and the elective course "Perfumes and Flavors in Cosmetic Production" for students educated in "Cosmetology". The variety of courses that associate Professor Merdzhanova has prepared and leads as a lecturer is impressive and shows her capability as university professor.

Associate Professor Merdzhanova is a supervisor of three doctoral students in professional direction 4.2 Chemical Sciences and co-supervisor of another one. She is also co-supervisor of a doctoral student in professional field 7.3 Pharmacy.

Prof. Merdzhanova is an active member of the faculty community. She is a long-standing member of the Faculty Council of the Faculty of Pharmacy, a member of the Mandate Committee of the Faculty of Pharmacy and a member of the Program Council of the Faculty of Pharmacy.

5. Critical Notes

I have no critical remarks about the research results and conclusions from the publications of Assoc. Prof. Merdzhanova.

CONCLUSION

Associate Professor Dr. A. Merdzhanova participated in the competition with a set of materials that fulfills the minimum national requirements and the recommended criteria for awarding the academic position "Professor" in the professional field 4.2 "Chemical Sciences" and the additional requirements for this position of the Medical university Varna. The presented documents show that Prof. Merdzhanova is a leading researcher with her own vision and ideas, she conducts both methodical researches related to the establishment of new facts and empirical research that has a direct application for evaluating the qualities of functional foods. The obtained

results are essential for determining a healthy diet and parameters defining not only the safety, but also the effectiveness of food. In this aspect, based on the current and prospective scientific topics, the quantity and quality of the scientific works, the echo in the literature, the scientific contributions, the guidance and participation in scientific projects, the management of doctoral students I strongly recommend that Prof. Merdzhanova be awarded the academic position of "Professor" in professional direction 4.2. Chemical sciences, scientific specialty "Chemistry" and I will vote positively at the final meeting of the Scientific Jury.

Sofia, 20.05.2024 г.

Reviewer:

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