REVIEW

by Prof. Stephka Georgieva Chankova-Petrova PhD, Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, retired, supernumerary

On the materials submitted for

application in the procedure for Associate professor in higher education area 4. "Natural sciences, mathematics and informatics", professional field 4.2. Chemical sciences, scientific discipline "Bioorganic chemistry, chemistry of natural and physiologically active compounds" for the needs of Laboratory "Chemistry of Natural Compounds", announced in the Bulgarian State Official Journal, 43/31.05.2019

The only candidate in this procedure is Chief Assistant Kalina Moneva Danova, PhD from the Laboratory of Chemistry of Natural Substances - IOCCP-BAS.

Kalina Danova was born on 02.07.1975. During the period 1995 - 2000 she studied at the Faculty of Pharmacy of the Medical University, Sofia and she graduated with a Master's Degree in Pharmacognosy. From 2001 to 2003 she worked at a pharmacy and at the Drug Executive Agency as a chief expert in chemical and pharmaceutical analyses of synthetic medications.

In the period of 2006 – 2010, she was PhD student in Sofia University "St. Kl. Ohridski ". She graduated successfully in the scientific area 01.06.16 " Plant Physiology " – PhD thesis: "*In vitro* cultivation and secondary metabolites in species of the genus Hypericum and Pulsatilla, cryopreservation of *Hypericum rumeliacum* Boiss" with supervisor Prof. Veneta Kapchina - Toteva.

In 2010 she started to work as a chemist at IOCCP-BAS, and since 2011 till now she has been a Chief Assistant at the same institute.

The documentation submitted by Chief Assistant Kalina Danova is in accordance with the Rules for the Development of the Academic Staff of IOCCP-BAS and meets the criteria required for occupation of the academic position of "Associate Professor". I have no comments on the documents presented.

In this competition, Chief Assistant Kalina Danova PhD participates with a total of 21 scientific papers, distributed as follows: habilitation reference for scientific contributions, based on 7 scientific articles, as well as 3 chapters in 3 books and 11 scientific articles, outside the habilitation report and the PhD thesis. She has 98 participations in national and international scientific forums. Kalina Danova has been a participant and/or coordinator in 14

scientific national, bilateral or international projects. Following the rules for the occupation of the academic position of "Associate professor" the information concerning the funds obtained under the projects is not required.

The working language of scientific papers of Kalina Danowa - articles, chapters of books, posters and reports is English. Based on the accepted Q rang-list, the distribution of articles involved in habilitation report is as follows: Q1 -2, Q2- 1 и Q3 -4, with a total IF=4.111. 11 papers not included in habilitation report could be separated in the following way: Q1- 3, Q2-4, Q3-1 и Q4 – 3, with a total IF=16.819. She is an author of 3 chapters in 3 books.

In the period of 2011-2019 Chief Assistant Kalina Danova took part with posters, 5 plenary reports and 9 oral presentations in national and international scientific forums in Austria, Albania, Bulgaria, Germany, Egypt, Spain, Italy, China, Morocco, Poland, Portugal, Romania, Serbia, France, Croatia, Switzerland.

Scientific investigations of Chief Assistant Kalina Danova are relevant to two National and European priorities: Biodiversity Conservation (National Biodiversity Conservation Strategy) and the development of "green" biotechnology for the purposes of different branches of industry - cosmetic, food, pharmaceutical and agricultural, in accordance with programmes "Quality of life" and nature-friendly biopesticides for agriculture.

The huge number of both scientific forums and projects she has participated in or coordinated could be considered as an illustration for the importance of her scientific investigations.

I agree with the proposed by Chief Assistant Kalina Danova habilitation reference for scientific contributions, written correctly in consistence with the accepted requirements. In a logical way three main problems are analyzed: measures for the conservation of the biodiversity of medicinal and aromatic plants in Bulgaria, *in vitro* cultivation as one of the strategies for biodiversity conservation and the consequent need for quantitative and qualitative characterization of the biosynthetic potential of medicinal and aromatic plants grown under biotechnological conditions. The importance of problems mentioned above, pathway for overcoming them, the main scientific contributions of Kalina Danova and the future scientific intentions during next 3 years are described.

The scientific contributions of Chief Assistant Kalina Danova are in three main aspects: biodiversity conservation, scientific and scientific-applied. In short I'm going to discuss the main achievements:

Conservation aspect: *In vitro* technics are considered as one of the main strategies for conservation of biological and genetical diversity at the situation of global climate changes and increased anthropogenic impact – direct utilisation and over utilisation of valuable species, medicinal plants etc. This human activity can put at risk different ecosystems, habitats and individual taxa.

Modern conditions and methodologies for *in vitro* cultivation of medicinal and aromatic plants have been created /developed at the Laboratory of Natural Products Chemistry, IOCCP-BAS: *Hippophae rhamnoides* (B-Q2-1), *Clinopodium vulgare (*B-Q3-3), genus Hypericum (B-Q3-3 и 4), *Artemisia alba* Turra (B-Q1-1). Based on the results obtained (B-Q2-1) the protected status of *Hippophae rhamnoides* has been moved form "Endangered" to "Critically Endangered" (Red List of Medicinal Plants in Bulgaria). Such fact could be considered as an illustration of the importance of these studies.

During the years, large *in vitro* stock collection of medicinal and aromatic plants from different habitats in Bulgaria and abroad has been created and maintained. This is a contribution to the strategy of genome protection.

Scientific and scientific-applied aspects: fundamental and interdisciplinary investigations have been performed due to large *in vitro* collection as well as optimized conditions for cultivation and maintaining of plants species.

The relationship among modifications in cultivating conditions, physiological status and metabolite profile of extracted plants biomass has been analyzed. New data have been obtained in support of present state of knowledge that genetically determined plant's metabolite profile is both quantitatively and qualitatively dynamic and changeable and depends on the relationship between the genotype and environmental conditions (B-Q2-1).

It was also established that the production of secondary metabolites *in vitro* systems depends on anatomical and physiological characteristics of genotypes used, as well as depends on the modifications of nutrition media applied. Based of this finding **new sources for targeted and controlled extraction of secondary metabolites** with well known phytotherapeutic capacity have been developed (B-Q1-1; B-Q1-2; B-Q3-1 B-Q3-2)..

Possessing very high NO – antiradical scavenging activity, extracts isolated from *Clinopodium vulgare* and *Hypericum* species can be specified as robust candidates in further investigations of their DNA protective, anti-mutagenic and anti-carcinogenic potential for the purposes of anti-mutagenesis (B-Q3-3).

Scientific articles not included in habilitation report (11) could be split in the following way: 1) Targeted biosintesis of biomass with intended/ /desired properties and

comparative analysis of secondary metabolites produced at conventional and biotechnological cultivation (Г- Q1-1; Г- Q1-2; Г- Q4-2; Г-Book_Ch-1,3). Here, an important finding should be mentioned, related to the genetically determined over-production of hypericin in some species of *Hypericum* and the perspective these species to be used in biotechnological practices in a future for the producing of naphthodianthrones; 2) Genetics – karyotyping of *Hypericum rumeliacum* BOISS (Г- Q4-1); 3) Phytochemical analyses and evaluation of bioactivity of main components and constituents for the aims of ethnopharmacology (Г-Q1-3; Г- Q2-1; Г- Q2-2; Г- Q2-3; Г- Q4-2; Г- Q3-1; Г- Q4-3).

At least three criteria are commonly used for the evaluating the importance and value of scientific investigations: the position in rang-list of journals where results have been published, citations and the complementary competences of the working team, including number of joint research / projects with national and international collaborators.

The total IF of the scientific articles of Chief Assistant Kalina Danova is IF=20.93 and h-index 5. As a whole, her articles have been cited 81 times. In this competition, she participates with 56 citations, mentioned in Scopus and Web of Science systems. The number of citations varies between 1 and 16 per article.

In most cases, articles summarize and discuss data obtained as a result of interdisciplinary investigations in the scope of aspects shown in her monographic report. It's easy to distinguish the personal contribution of Chief Assistant Kalina Danova due to at least 2 main factors: the different competencies of the authors and the well known scientific profile of Kalina Danova – a specialist with good experience in the field of *in vitro* methodology, optimization of the productivity of medicinal and aromatic plants, spectrophotomethric evaluation of total quantity of different classes secondary metabolites, preparing of extracts, fractions and individual components.

She is the sole author of 3 books chapters. Authors' team in other articles varies between two and more than 3 Bulgarian and foreign partners. The simple explanation of this fact is the interdisciplinarity of scientific investigations performed and/or good experimental experience and scientific background of Kalina Danova for which she is preferred for collaborative research. Kalina Danowa is the first or corresponding author in 13 articles from total number of 21, included in this competition - 7 in group B and 3 in group Г and the three chapters of three books.

Given the high scientific experience of Kalina Danova, I have expected a more global outline of the scientific topic perspectives for the following three years. The one presented here is more similar to a working plan. It would be nice to go deeper in the future plans.

I know Kalina Danova since her years as a PhD student at SU ”St. Kl. Ohridski”, being a participant in the Annual Seminars of Ecology, organised by Section Biology, UBS and IBER-BAS. Even in those early years, she impressed with her interests and knowledge. Kalina Danova takes part in the activity of Section “Biology”, UBS. She is a member of the Organizing Committee of annual Seminar of Ecology and member of Editorial Board of the Proceeding of the Seminar.

Conclusion

The documentation and materials presented by Chief Assistant Kalina Danova are in consistence with requirenments of The Law on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for the Implementation of the Law, the Regulations for the Implementation of the Law in BAS and the Regulations of IOCCP - BAS.

Chief Assistant Kalina Danova takes part in this competition with a sufficient amount of high quality scientific papers, published after her PhD graduation.

The scientific fundamentals and applied achievements are well described. The results have been published in scientific journals recognized by Scopus and Web of Science involved in Q-rang list and IF system.

Chief Assistant Kalina Danova is a well known scientist, possessing indisputable qualification. Scientific and applied achievements of Chief Assistant Kalina Danova fully correspond to specific requirenment of the Regulations of IOCCP- BAS, The Law on the Development of the Academic Staff in the Republic of Bulgaria and the Regulations for the Implementation of the Law.

Being familiar with the documents and materials submitted by Chief Assistant Kalina Danova PhD, as well as after evaluating the significance of the main results and scientific/ scientific - applied achievemnts, I am fully convinced, and I would like to express my positive evaluation and to recommend to the Scientific Jury to prepare a report – proposal to the Scientific Councel of IOCCP, BAS for the election of Kalina Danova PhD in an academic position of Associate professor in higher education area 4. “Natural sciences, mathematics and informatics”, professional field 4.2. Chemical sciences, scientific discipline “Bioorganic chemistry, chemistry of natural and physiologically active compounds” for the needs of Laboratory “Chemistry of Natural Compounds”.

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