R E V I E W

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Of the materials submitted for participation in the competition for the occupation of the academic position "Assistant Professor" at the Institute of Organic Chemistry with Center of Phytochemistry (IOCCP), BAS in the field of Higher education 4. Natural sciences, mathematics and informatics, Professional field: 4.2.Chemical Sciences, scientific specialty "Bioorganic chemistry, chemistry of natural and physiologically active substances".

1. General overview of the submitted materials

A single candidate has applied for the Contest for Associate Professor, published in State Gazette, no. 43 of 31.05. 2019 and on the website of IOCCP, BAS, namely senior assistant professor Kalina Danova, PhD, affiliated at the Institute of Organic Chemistry with a Center of Phytochemistry (IOCCP).

The presented in printed and electronic formats set of documents is in full compliance to the IOCCP's Academic Development Policy Regulation, and conversely meets the IOCCP-BAS's institutional criteria for lending academic position of associate professor.

A comprehensive list and copies of publications and reports that have been classified in accordance with the relevant regulatory framework as follows - publications affiliated with the habilitation work, respectively publications outside the formal habilitation work, book chapters and abstracts of scientific papers presented at conferences, as well as a list of scientific projects are presented. Seven of the submitted publications are included in the habilitation report in list "B" (i.e. habilitation work - scientific publications in publications that are referenced and indexed in world-renowned scientific information databases in which the candidate is listed as author of correspondence. In addition to the habilitation work, there are also 11 publications

from List D (Scientific publication in publications that have been referenced and indexed in world-renowned databases of scientific information, outside the habilitation work).

The seven full-text publications included in the habilitation work all have an impact factor and regarding the quartile (Q) classification are distributed as follows: 2 in Q1, 1 in Q2, and 4 in Q3, respectively. Ten of the 11 submitted articles outside of the applicant's habilitation work have a Thomson Reuters/Clarivate Analytics IF. The distribution of these publications among the quartiles is as follows - Q1 (3), Q2 (4), Q3 (1), Q4 (3). The cumulative impact factor of publications is 20.93. Also presented are 3 book chapters of which Senior Assistant Prof. Kalina Danova is the sole author. All publications are within the thematic profile of the scientific specialty of the competition, which makes an excellent impression. The applicant's research work is disseminated also in the form of a significant number (given the relatively short period of time) of scientific reports presented at conferences and congresses - a total of 98 in Bulgaria and abroad.

Kalina Danova has also submitted a reference for participation in 14 research projects, including some reputable international projects; in 6 of them she is the team leader or coordinator.

Reference is also made to the citations of the scientific works of Senior Assistant Prof. Kalina Danova, Ph.D. The set of documents contains also other materials in compliance to the formal requirements of the relevant regulations.

2. Brief biographic data for the candidate

The candidate was born in Sofia on July 2nd, 1975. She graduated her higher education at the Faculty of Pharmacy, Medical University of Sofia within the period 1995 – 2000. She obtained the Degree MSc in Pharmacy after defending a Diploma thesis in the field of Phytochemistry at the Department of Pharmacognosy.

Kalina Danova worked as a pharmacist during the period 2000- 2001 in a community pharmacy and as a Chief Expert of Chemical and pharmaceutical analysis of synthetic medicinal preparations at the Bulgarian Drug Agency from 2001-2003.

From 2006 till 2010 she was a PhD student at the Faculty of Biology, “St. Kliment Ohridski” University of Sofia, where under the supervision of Prof. Veneta Kapchina-Toteva she defended her thesis entitled “*In vitro* culture and secondary metabolites in *Hypericum* and *Pulsatilla* species, cryopreservation of *Hypericum rumeliacum* Boiss ” in the scientific specialty 01.06.16 “Plant physiology”

She started work at IOCCP-BAS in 2010 as a chemist specialist and since 2011 has been a Senior Assistant Professor at the Institute.

3. General overview of the candidate’s activities

The results of the research projects realized with the participation of Kalina Danova have been appropriately disseminated in the scientific literature, in the form of both real full-text scientific publications in peer-reviewed scientific journals and in the form of an impressive number of scientific reports presented at specialized conferences and congresses.

The quartile distribution pattern of the publications was summarized in the previous section of the review. What is striking is the impressive number (given the relatively short period of time) of scientific reports presented at conferences and congresses - a total of 98, in Bulgaria and abroad.

The applicant's scientific developments presented in the publications and scientific communications provided are focused in several areas, which can be summarized as follows:

• Conservation approaches and concepts regarding the biodiversity of the Bulgarian flora;

• In vitro cultivation of plants and respectively study of the culture conditions and search for opportunities to assess and optimize the biosynthetic capacity of medicinal and aromatic plants under biotechnological conditions;

• High-troughput screening of the biological activity of the extracts under evaluation;

• Complementary studies on the ecology, ethnobotany and pharmacology of some medicinal plants.

For its part, the large-scale research program underlying the scientific reports presented by the applicant focuses on several plant taxa, characterized by the production of different classes of plant secondary metabolites by chemical composition and biological activity, incl. condensed anthraquinones (naphtodianthrones), phenolic acids, aryltetralin lignans, flavonoids, mono- and sesquiterpenes, essential oils, *etc*.

The studies can be classified according to the relevant plant taxa in the following main directions, summarized in brief.

The capacity to produce flavonoids in the wild type *Hippophae rhamnoides* was monitored and compared to its introduced population. From surface sterilized stem explants, an in vitro culture of aboveground parts of the plant was started while optimizing the conditions and culture media. A study has also been conducted on the revision of the natural populations and respectively the conservation status of the species in Bulgaria, with a formulation of a recommendation for changing the status from "Endangered" to "Critically Endangered".

Cultures from aboveground parts of *Clinopodium vulgare* have been developed as well. The prepared methanol extract was evaluated in a model of NO-antiradical activity as an *in vitro* test system for modulating nitrosative stress in biological systems.

Considerable work has been done with species of the genus Hypericum (St. John's wort) – more specifically *in vitro* cultures have been developed, started by sterilized stem explants of *H. tetrapterum, H. rumeliacum, H. richeri,* optimizing the cultural conditions of the species according to their characteristics. The methanolic extracts of *H. tetrapterum, H. rumeliacum* and *H. richeri* obtained by ultrasonic extraction have been studied for anti-radical activity against NO radical using ascorbic acid as a reference antioxidant. In *H. calycinum*, the relationship between the content of phenolic compounds and the activities of some key elements of cellular antioxidant systems was also monitored, namely the activities of the enzymes phenylalanine ammonia-lyase, glutathione reductase, ascorbate peroxidase; catalase and superoxide dismutase, as well as the content of the non-enzymatic antioxidants (ascorbate and dehydroascorbate, oxidized and reduced glutathione).

Another area of research has been focused on *Artemisia alba* Turra. *In vitro* culture of aboveground parts of the plant was started and elaborated. Growth regulators - benzyl adenine and indolyl butyric acid - have been used as morphogenesis modifiers. The production of

secondary metabolites as well as the endogenous content of cytokinins and chloroplast architecture in both white wormwood morphotypes were studied.

In the presented scientific report abstracts, which are almost 100, a number of other studies have been summarized in other areas of phytochemistry in relation to plant species of interest, as well as the relevant classes of secondary metabolites, which I do not find necessary to discuss in detail.

As evident from the citation report submitted by Senior Assistant Prof. Kalina Danova, her works have been cited 56 times (without the self-citations).

4. Assessment of the candidate's personal contribution

Based on the number of publications in which the applicant is a sole, first author or correspondent author, as well as from the several large-scale projects of which she is the coordinator, for me it is clearly convincing that Senior Assistant Prof. Danova is an ambitious young scientist with a leading or significant contribution to the presented scientific developments and the potential for coordinating collaborative research projects, generating ideas and designing experiments in the scientific profile of the competition.

5. Critical notes and recommendations

In my opinion the submitted set of documents has been compiled and presented in an excellent form and, in addition, practically all of the presented scientific research data, incl. publications, abstracts of congresses and projects are in the profile of the professional field and scientific specialty of the contest.

6. Personal impressions

I know personally Kalina Danova mainly as her lecturer in pharmacology and pharmacotherapy from the Faculty of Pharmacy at the Medical University of Sofia. Reviewing

the documents presented in the competition reinforces my positive impression of the candidate as a hardworking, ambitious and capable young scientist.

CONCLUSION

On the basis of the submitted materials from the candidate, Senior Assistant Prof. Kalina Danova, I believe that she meets the quantitative criteria for occupying the academic position of "Associate Professor", as defined in the relevant regulatory framework, namely the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDASRB), the General regulation on the implementation of the LDASRB and the Institutional regulations for the application of the aforementioned law at BAS and IOCCP.

The applicant is an established researcher who demonstrates a high level of methodological and theoretical expertise in the field of phytochemistry, in vitro cultivation and biochemical and pharmacological screening of extracts or purified biologically active substances isolated from various plant species. Senior Assistant Professor Kalina Danova undoubtedly has a leading contribution to the submitted scientific projects, reports and publications, convincingly presenting herself as an authoritative and promising young researcher with interests in the field of phytochemistry, and the allied fields of pharmacognosy and the studies of the biological activity of plants with established ethnobotanical use.

On the basis of the materials and scientific papers submitted by the applicant, the analysis of their importance and the reference to the relevant scientific, applied and applied contributions, I find it reasonable to give my positive opinion and to recommend to the Scientific Jury to prepare a report proposal to the Scientific Council of IOCCP-BAS for the inauguration of Kalina Danova in the academic position of Associate Professor in the Professional field 4.2. Chemical Sciences, Scientific specialty "Bioorganic chemistry, chemistry of natural and physiologically active substances".

Sofia, September 9th 2019 г. Reviewer: ….....

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