

## STATEMENT

by **Prof. Dr. Svetlana Temelkova Bancheva-Nikolova, Director of the Botanical Garden of BAS and Professor at IBEI - BAS,**

of a thesis submitted for awarding of PhD degree

Professional Field: 4.2. "Chemical Sciences",

Scientific Specialty: "Bioorganic Chemistry, Chemistry of Natural and Physiologically Active Substances"

**Author: Viktoriya Svetlinova Ivanova**

**Subject:** PHYTOCHEMICAL CHARACTERIZATION OF SPECIES OF GENUS *INULA* GROWING IN BULGARIA

**Supervisor:** Prof. Antoaneta Trendafilova, PhD – IOCCP – BAS

**Scientific consultant:** Assoc. Prof. Milka Todorova, PhD – retired

### 1. General presentation of the procedure and the PhD student

The author of the PhD thesis is Victoria Svetlinova Ivanova - PhD student in self-study at the section "ChNP" with supervisor Prof. Dr. Antoaneta Trendafilova - IOCCP – BAS and scientific consultant: Assoc. Prof. Dr. Milka Todorova - retired.

The set of paper materials presented by Victoria Svetlinova Ivanova is in accordance with the Regulations for development of the academic staff of IOCCP, and meets the criteria of IOCCP -BAS for obtaining the scientific and educational degree "Doctor".

PhD student attached 6 publications in IF journals, a list of 16 noticed citations on the publications included in the PhD thesis and a list of 7 participations in scientific conferences.

The documents submitted by Victoria Ivanova are in accordance with the requirements of the Academic Staff Development Act in the Republic of Bulgaria and the Regulations for its implementation, as well as with the Regulations on the terms and conditions for obtaining scientific degrees and holding academic positions at BAS and the Regulations for the conditions and the order for acquiring scientific degrees and for holding academic positions in IOCCP-BAS.

Victoria Ivanova born on November 2, 1989. In the period 2008-2013 she graduated successively as a Master Bachelor - Biotechnologist and then as a Master - Fine Organic Synthesis

at University of Chemical Technology - Sofia. Immediately after graduation he started working at ǝ-BAS, where he continues to work to this day. From 01.10.2020 - enrolled as a PhD student in in self-study at " ChNP ".

## **2. Relevance of the topic**

The topic of the PhD thesis is undoubtedly relevant. In recent years, there has been a growing interest in the discovery of new substances with interesting chemical and biological properties, new sources for the production of known substances or new compounds used as models for synthetic production. The selection of the objects of the dissertation, 3 species of the genus *Inula*, is also very successful. Representatives of this genus, which includes more than 100 species, are widely used in folk medicine or are components of commercial herbal products. At the same time, the number of species of the genus (mainly of Asian origin) that have been the subject of detailed phytochemical and / or biological studies is insignificant. However, more than 400 secondary metabolites have been identified to date, with 100 of them showing good biological activity.

## **3. Knowledge of the problem**

The depth of knowledge of the problem by the PhD student makes a very good impression. The literature review presents the known data on the botanical characterization, application, chemical composition and biological activity of the three studied species, *Inula britannica* L., *Inula oculus-christi* L. and *Inula aschersoniana* Janka var. *aschersoniana*.

## **4. Research methodology**

The methods used to isolate, separate and purify secondary metabolites are suitable. Under the experienced guidance of her supervisor and consultant, the PhD student has mastered the specific methods and applied them correctly, which is a guarantee for good and reliable results.

## **5. Characteristics and evaluation of the PhD thesis and contributions**

The PhD thesis contains 122 pages, 36 figures and 13 tables. The bibliography covers 159 titles. The goal is well formulated. The set tasks are precise and clear. Congratulations on a well-organized and extremely labor-intensive but necessary work on isolation, separation and purification of secondary metabolites! As a result of the study, a total of 52 natural compounds were identified - sesquiterpenoids, triterpenoids and sterols, flavonoids and phenolic acids, 9 of which are new to science. The observed differences in the flavonoid profile of the studied taxa may shed additional light on the taxonomy of the genus *Inula*. I find it very sensible to make a comparative study of the secondary metabolites of one of the species (*I. britannica*) from several

populations, with a view to studying the intraspecific diversity and identifying promising populations rich in target components.

The contributions are original and are the personal work of the PhD student. I am impressed by the newly discovered natural compounds - 9 in number: four sesquiterpene lactones, four pseudoguaiane sesquiterpenoids and one flavonoid. Two of the compounds, ashersonianone-A and ashersonianone-B, are a serious contribution to the chemistry of natural compounds as there have been only six compounds with a cyclopropanone ring isolated from natural sources so far. Along with them, a new chemotype of *I. britannica* was found. As a taxonomist, I am satisfied with the possibility that the differences in the terpenoid and flavonoid composition of the target taxa can be used as chemotaxonomic markers. The data obtained on the antioxidant potential of leaf and flower extracts of the species are promising. The phytochemical analysis of 11 populations of *I. britannica*, which led to the selection of promising populations, could find adequate practical application.

#### **6. Assessment of the publications and personal contribution of the doctoral student**

The PhD student has applied 6 publications, all in journals with IF, 1 with Q1, three with Q2 and 2 with Q4. All publications are co-authored, and in 3 of them (50%) the PhD student is the first author. Sixteen citations were also noted. The documents also include a list of participations in scientific forums for presenting the results of the PhD thesis - a total of 7. All these data testify to the relevance of the topic, its good response in the scientific community and the serious scientific activity of Victoria Ivanova.

#### **7. Abstract**

In my opinion, the abstract was prepared with the necessary attention and professionalism. It reflects in a synthesized form and very well all the main chapters of the PhD thesis. It is made in compliance with the requirements of the relevant regulations, reflecting well the main results achieved in the PhD thesis.

#### **8. Recommendations for future use of dissertation contributions and results**

I recommend to the PhD student to use the obtained results as a basis for expanding her research on other representatives of the genus *Inula* in Bulgaria.

#### **CONCLUSION**

The PhD thesis contains scientific and scientific-applied results, which represent an original contribution to science and meet the requirements of the Law for Development of the Academic

Staff in the Republic of Bulgaria (LDASRB), on. the specific requirements of the Regulations of IOCCP -BAS for application of LDASRB.

The PhD student has in-depth theoretical knowledge and professional skills in the scientific specialty " Bioorganic Chemistry, Chemistry of Natural and Physiologically Active Substances ", which would allow her to conduct independent research.

Due to the above, I confidently give my positive assessment of the research, presented by PhD thesis, abstract, results and contributions, and I invite the esteemed scientific jury to award the PhD degree to Victoria Svetlinova Ivanova in "Natural Sciences, Mathematics and Informatics", Professional Field: 4.2. "Chemical Sciences", Scientific Specialty: "Bioorganic Chemistry, Chemistry of Natural and Physiologically Active Substances".

23.06. 2022 г.

**Prepared the statement:** .....

Prof. Svetlana Bancheva-Nikolova, PhD