Review

on a dissertation (PhD thesis) for the acquisition of educational and scientific degree "doctor" (PhD)

Author of the PhD thesis: ***Petya Boycheva Atanasova****, PhD student in full-time education at the Department of Biology at the Faculty of Pharmacy at the Medical University "Prof. Dr. Paraskev-Stoyanov "- Varna*

Topic of the PhD thesis: ***Ethnobotanical study of medicinal plants in the region of the North Black Sea coast***

Reviewer: ***Maya Petrova Stoyneva-Gärtner****, PhD, DrSc, Professor at the Department of Botany, Faculty of Biology, Sofia University "St. Kliment Ohridski"*

The presented review was prepared on the basis of orders of the Rector of MU-Varna R-109-333 / 06.08.2021 and Protocol 1 / 16.08.2021, by which I was respectively elected a member of the Scientific Jury and appointed as an official reviewer by procedure. for acquisition of educational and scientific degree **(**ONS) doctor with candidate Petya Boycheva Atanasova from MU-Varna.

The dissertation of Petya Atanasova presented to me for review covers 177 pages and is structured in 5 chapters:

Introduction (2 pages),

Literature review (30 pages, with 4 subchapters),

Material and methods (8 pages, with 5 subchapters),

Results and discussion (111 pages, with 14 subchapters),

Conclusion (1 page),

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Literature (28 pages, 193 titles in Cyrillic and 189 in Latin, ie a total of 382 sources, including 12 legislative documents and 16 websites).

The dissertation is illustrated with 68 figures and graphs and contains 14 tables and 8 appendices, and immediately after the Contents a list of the five abbreviations used is presented.

To the dissertation work as additional chapters 7-11 on 13 pages are included Publications and Participations related to the dissertation (5 and 6 issues respectively), Contributions, Recommendations and Acknowledgments.

The topic of the dissertation is very interesting and contributes to the preservation of traditional knowledge related to medicinal plants in a region not studied in ethnobotanical terms - that of the North Black Sea coast. The topicality and significance of the topic is emphasized by the PhD student in the Introduction and presented Literary Review and is motivated by current trends of globalization, loss of oral information against the background of increased use of synthetic products and wider use of foreign plant species. It is hardly necessary when discussing the relevance of the topic to comment on the role of medicinal plants in human life, especially given that according to the World Health Organization (WHO) they are used by more than 80% of the world's population. The very fact that they are the subject of this dissertation is sufficiently indicative of its significance. This importance is even greater in view of the exceptional biodiversity of Bulgaria, in which over 4100 species of higher plants have been identified, of which 842 species from 444 genera and 118 families are medicinal. Additional weight of the work is given by expanding the scope of utilization of medicinal plants as effective means not only in the treatment of various killings of humans and animals, but also for prevention and in people's lives, including interesting folk traditions and poisonous plants. The historical overview is very detailed, logically constructed and presented visually and meaningfully in the individual subsections. I believe that the doctoral student Petya Boycheva has prepared a very detailed literary analysis as she has creatively made sense of the existing scientific data and literature and has managed to present them clearly in her review.

The methods selected for the implementation of the dissertation are scientifically sound, standard and definitely lead to obtaining correct scientific results. This allows to meet the goal set for the dissertation to conduct an ethnobotanical study of the application of medicinal plants for prevention, treatment and in the lives of local residents of our North Black Sea coast and related tasks. The tasks themselves are clearly and precisely formulated, and the research period (from 2014 to 2021) is significantly longer than the standard for biological dissertations based on field research, two to three years. This is undoubtedly one of the merits of this work and has allowed the inclusion in the survey of a total of 709 inhabitants in 32 settlements (24 villages and 8 cities).

The methods used are divided into several groups and include: 1) field sociological work by the method of survey based on the technique "face to face" on a specially created questionnaire, including 4 main sections and 10 subsections and 2) in-house processing of the results. The normative documents used in determining the medicinal plants, their medicinal properties and conservation status are indicated. Ethnobotanical surveys were conducted on the basis of demographic analysis (age, sex, ethnicity, education, employment, territorial distribution). The reliability of the obtained results is determined by the application of statistical analysis by three main types of methods and two more indices and one coefficient for ethnopharmacological and ethnobotanical research. The material used for research is completely original, and the richness of the collected materials undoubtedly contributes to the value of the research conducted in the course of the dissertation.

The obtained original and reliable results are obviously personal work of the dissertation and are the result of her botanical culture, despite the fact that the reading of the presented work shows the positive role and experience of the supervisor - Prof. Dr. Dimcho Zahariev and the scientific consultant. - Prof. Dr. Dobri Ivanov. It is necessary to mark with a positive sign the uniform sequence with which the obtained results are presented, which allows their easy tracking and comparison. These results unequivocally show that there are regional and demographic differences in popular knowledge about medicinal plants and their diverse uses. The result that a significant part of the knowledge is stored by older people in small settlements is logical, but also quite alarming, proving once again the importance of the study. It is perfectly acceptable to believe that the largest number of plants used in the country in the North Black Sea region is largely determined by the lack of such in-depth studies in other parts of the country. The created up-to-date database of the used medicinal plants on various indicators and the calculated quantitative indices, proving the connection of the knowledge of the local population for this application, is valuable.

Most of the results obtained are of a contributory nature. The scientific and scientific-applied contributions, indicated by the dissertation, belong in the first place to the category of obtaining original results and proving new facts. They will inevitably become the basis for future research in connection with the conservation and rational use of the resource of medicinal plants throughout Bulgaria, and future ethnobotanical studies to document and preserve knowledge about medicinal plants and their relationship to the life of local communities in creating common database as

indicated in the labor recommendations. I fully accept the main contributions formulated by the dissertation.

The publications presented in connection with the dissertation are five (bearing 39 instead of the required 30 points, Q4 - SJR = 0.19, IF = 0.460 for Botanica Serbica, which has two publications in 2021; Q3 - SJR = 0.13 for the Research Journal of Pharmaceutical, Biological and Chemical Sciences, in which there is one publication in 2018), and the participations are in six scientific forums held in the period 2017-2019 (without specifying whether they are reports or posters).

The autoreferat is prepared according to the requirements, covers 98 pages and accurately reflects the main points and scientific contributions of the dissertation.

I have the following questions and recommendations for the future work of the doctoral student:

- Why are the descriptions of the physical-geographical and demographic characteristics of the region included in the chapter “Literary review” and not in the chapter “Materials and methods” or as a separate chapter of the dissertation?
- Why are the goals and tasks included in the chapter “Literary Review” and not separated in the dissertation?
- Why is there a difference in the number of tasks related to the set goal, described in the dissertation (9) and in the abstract (5)?
- On page 6 in the section "Taxonomic Review" is not mentioned the first real taxonomic ethnobotanical inventory of medicinal plants in our country on Ivancheva & Stancheva 2000, described under number 220. This work is citrated in the text much later. It is noteworthy that with regard to medicinal plants, the three-volume book by Petar Dimkov is not quoted, which includes numerous recipes. For the use of algae and mushrooms in our country is cited only one work describing the role of globalization, but not mentioned 4 more articles related to the actual traditional and modern use in Bulgaria. The same section includes an article on the application of lichens, which examines them on a global scale, but does not provide specific data for Bulgaria. Harschberger's work from 1895,

mentioned in the first sentence of the Introduction in connection with the use of the term "ethnobotany", is not cited.

- Lack of source for Fig. 1 – map of the studied region.
- When mentioning the development of ethnobotany in the universities of Bulgaria, the Sofia University was actually omitted.
- When writing the taxonomic status of species, subspecies, etc. Italic font is not used according to the International Code of Nomenclature of Algae, Fungi and Plants. This font only applies to generic and species names.
- Why does the chapter "Final Conclusion" precede the Obtained conclusions?
- Some bibliographic descriptions are not in place in the literature list - *e.g.*, publication 200 of Koleva et al. is among the publications of the authors Domarew et al. and Eftimov et al.
- The full article is overused throughout the dissertation, and the individual minor technical and spelling errors noticed will not be described in detail here, but will be given to the PhD student as a separate list.
- These questions and recommendations are in no way aimed at reducing the merits of the work, but are related to the important recommendation for future publication of the results and continuation of research on the selected problem.

I have no personal impressions from personal meetings with the dissertation student Petya Boycheva, but I had written contacts with her in my capacity as editor-in-chief of the Yearbook of Sofia University “St. Kliment Ohridski”, Faculty of Biology, Book 2-Botany, in which she has published.

In conclusion, I would like to note that the presented dissertation together with the publications of Petya Boycheva Atanasova meets the requirements of ZRASP in the Republic of Bulgaria and the Regulations for the development of the academic staff at MU Varna for awarding ONS Doctor, subject to all conditions for doctoral students. The whole work is written very intelligently, is designed with very well-organized graphs and tables and shows the excellent literary awareness of the dissertation, based on appropriate methods that determine the reliability of the obtained original results. Therefore, I recommend to the members of the respected Scientific

Jury to evaluate with dignity the presented dissertation by awarding Petya Boycheva Atanasova the educational and scientific degree of Doctor (PhD).

Sofia, 17.09.2021 Signature: 

(prof. M. P. Stoyneva-Gärtner, PhD, DrSc)