TO
THE SCIENTIFIC COMMITTEE
APPOINTED BY ORDER № P-109-651/28.12.2023
OF THE RECTOR OF MEDICAL UNIVERSITY "PROF. DR. PARASKEV STOYANOV" - VARNA

OPINION

of
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Appointed by order No. P-109-651/28.12.2023 of the Rector of MU-Varna
as a member of the Scientific Committee under the procedure for acquiring a PhD degree
by Dr. Yavor Hristov Chenkov, full-time doctoral candidate,
with the topic of the dissertation "Pollution of the Varna region of the Black Sea with plastic waste and possible risks to human health",
in the field of higher education "7. Health care and sports", professional field "7.1. Medicine", in the doctoral program "Hygiene" (incl. Occupational, communal, school, radiation, etc.)"

1. General description of the materials presented in the procedure

Participant in the procedure for acquiring a PhD degree is Dr. Yavor Hristov Chenkov, Assistant Professor at the Department of Hygiene of the Department of Hygiene and Epidemiology at the Health Ministry of the University of Varna. The documentation officially provided to me in electronic format includes:

- Dissertation thesis;
- Author’s summary of the thesis in Bulgarian and English;
- Abstract of the dissertation thesis;
- Rector's order for enrolling the doctoral candidate;
- Protocol for passed doctoral minimum exam;
- Minutes of the Departmental Council and Rector's order for allowing the doctoral candidate to defend his thesis;
- Order for the appointment of a Scientific Committee;
- Declarations of originality, credibility, registration of profiles in scientific databases;
- List of publications related to the dissertation thesis;
- Official note on similarity between the text of the dissertation and Internet sources;
- Diploma of completed higher education;
- Curriculum vitae of the doctoral candidate.

The materials presented are clearly arranged, the references between them are easy to follow and do not complicate their review.

2. Biographical data and profile of the doctoral candidate

Dr. Chenkov was born in 1989 in the town of Dupnitsa. He graduated with a master's degree in "Medicine" from MU-Varna in 2016. He worked as a paramedic (2016-2017), and currently specializes in UMBAL "St. Marina" EAD, Varna, and since 2016 has been an Assistant Professor in the Sector of Hygiene of the Department of Hygiene and Epidemiology at the FPH of the Medical University of Varna. In his autobiography, he states that he has a good command of written and spoken English and French languages. He is a member of BMU, Bulgarian Psychiatric Association, Bulgarian Association of Aviation, Marine and Space Medicine.

3. Relevance of the topic of the dissertation and appropriateness of the set goals and tasks

As a result of mechanical, chemical or physical fragmentation, macroplastics can release micro- and nanoplastic particles, which in turn can contain substances harmful to biological systems and organisms. Some of these substances are involved in the synthesis of the parent plastics (e.g., bisphenol A, phthalates), and others are absorbed from the environment (e.g., toxic metals, persistent organic pollutants). Once having entered the body through water, food or air, these particles circulate and accumulate in internal organs, the brain, even in the placenta, and adverse effects such as metabolic and endocrine disorders, neurodevelopmental and reproductive disorders and even carcinogens can be associated with them.

Given the few studies on the problem along the Bulgarian Black Sea coast, its pollution with plastic waste represents a serious ecological problem for ecosystems and human health and is a **suitable choice of topic for a dissertation**.

4. Knowledge of the subject

The doctoral candidate has prepared an in-depth narrative review of the literature regarding the contamination of water bodies with microplastics. The terminological apparatus used in this field is briefly presented. The spread of pollution in different regions of the world, as well as along the Danube River and the Bulgarian Black Sea coast, has been examined. Both empirical studies and previous literature reviews from the last decade are cited and their main findings are presented. In addition, the doctoral candidate has extensively examined the biological effects of exposure to microplastic pollution for living organisms and humans. It would be appropriate to draw parallels with the results of a project relevant to the topic by a team from MU-Varna - "Investigation of priority chemical pollutants and biotoxins for assessment of the state of the marine environment".

5. Characterization and evaluation of the dissertation thesis

The dissertation is written on 157 pages and is structured in the following parts - introduction (4 pages), literature review (44 pages), goal and tasks (1 page), methods (7 pages), results (22 pages), discussion (20 pages), limitations of the study (1 page), recommendations and future directions (11 pages), conclusions (1 page), conclusion (4 pages), contributions (2 pages) and appendices to the text (10 pages). The text is illustrated with 2 tables and 21 figures.

The Introduction presents the significance of the problem under study. The scale of the problem of plastic and microplastic pollution around the world and in our country and the resulting harm to humans and ecosystems are described. The degradation processes as well as the ways of distribution in the biosphere are considered.

The literature review is divided into 7 subchapters. The terminology, classification and types of plastic waste products and their composition have been presented. Historical notes tracing the evolution of this type of pollution in the course of human development are presented. Data from

studies of the pollution of marine and river water areas and coastlines in different regions of the world have been consistently synthesized. It makes a good impression that the doctoral candidate does not overestimate the scope or depth of the review, noting that he presents some summary results from studies of plastic pollution on beaches around the world. I also appreciate that the doctoral candidate describes the risks to living organisms and humans, even though he states that biomonitoring was not conducted in his study. However, the structure of the exposition would have benefited if the biological effects of pollution had been presented more succinctly.

The aim of the dissertation is "to contribute to a better understanding of the current problem with plastic pollution, taking into account the scarce, in many places missing, data on the quantities, types and dynamics of this type of pollution in the Bulgarian water area of the Black Sea and adjacent coastal areas", and for its implementation, 5 resulting specific objectives have been formulated. The last objective, to make recommendations and a conceptual model for ecological monitoring of pollution in the Varna region, I would recommend to be given as a part or sub-task, and not as an independently presented one.

A sampling by volunteers was carried out according to a harmonized methodology for the collection of plastic waste from several sections of the beaches in Varna. A descriptive analysis of the frequency of different types of waste was made, and subsequently, microscopy of part of the waste was carried out. The doctoral candidate also applied a sociological sampling method of volunteers for whom data on socio-demographic profile and pro-environmental behaviour and knowledge about plastic pollution were collected. As a third component, the doctoral candidate conducted a pilot study to initially assess potential microplastic particles in commercially available personal care products. Finally, a conceptual model is proposed to explore the different aspects of the problem of plastic pollution in the environment and the potential risks to ecosystems and humans.

The Results follow the objectives set, but this part of the work would benefit from the introduction of subsections in order to better structure the text. In summary, the most common category of plastic waste found is unidentified debris, and the most common categories of plastic waste with identified origin and use are packaging materials, plastic bottles, straws, caps and various other debris. There is a varying degree of fragmentation and degradation of some of the debris found in coastal areas. The doctoral candidate concludes that, based on the assumed polymer composition, according to the observed category of debris, a part of it can be expected to pose risks of a toxic and epidemiological nature for aquatic ecosystems, and indirectly for the human population. The survey shows that in the sample, the respondents do not have a complete idea of the most common categories of plastic waste on the beaches. In some of the commercially available personal care products, the doctoral candidate believes that the presence of polymeric ingredients and other substances of unconfirmed but suspected polymeric origin is found.

The interpretation of the attached photographic material would be facilitated by adding annotations to it.

The literature reference list contains a total of 337 sources, mostly in English, from the last 10 years.

6. Contributions and significance of the work

As the main original contribution, I consider the idea of combining different methodologies - ecological, sociological, general scientific logic. The work also has confirmatory contributions compared to other studies around the world and in our country. Although the study itself has its limitations, it shows a broader consideration of the various aspects of the studied issue and can serve as a basis for future larger and more representative scientific research.

7. Publications in connection with the dissertation thesis

Dr. Chenkov has listed 3 full-text scientific publications in connection with the dissertation thesis and three participations in scientific forums. I will take into account only the full-text publications - one in the Journal of Biomedical and Clinical Research, one in the Proceeding of the ninth candidate scientific conference "Ecology and environment" and one in the Journal of Social Medicine. I would like to note that I did not find the texts of the articles included in the document set that I received on a USB drive, but I was able to find them on my own. I found no information that these publications were made in journals indexed in Scopus/WoS, so I take them to be publications and reports published in non-indexed peer-reviewed journals, according to the "Regulations for the Development of Academic Staff at MU-Varna". They provide the doctoral student with a sufficient number of points, and this **satisfies the minimum scientometric requirements** for obtaining a PhD degree at the MU - Varna.

8. Personal involvement of the doctoral student

I have no direct observations on the doctoral student's work in conducting the scientific research, but given his profile of interests, academic and extra-academic activities, as well as the specificity of the chosen topic of the dissertation work, there are grounds to assume that he has a personal contribution to the idea, the organization, conduct and interpretation of the results of scientific research.

9. Author's summary of the thesis

The author's summary of the thesis is written on 83 pages and covers in a reduced format the main parts of the dissertation work. The Discussion section could have been presented more succinctly.

10. Critical remarks and recommendations

The doctoral student shows self-criticism by having a separate section in his work devoted to the limitations of the study. As he points out, the collected waste samples give a snapshot and can hardly be interpreted in the light of the temporal dynamics of this type of pollution along the Varna coastline. Greater time, human, and financial resources would be required for large-scale sampling, which I recommend to be done in the future when continuing this line of research. Also, future studies should include biomonitoring, which was not possible in the present one. In terms of determining potential microplastic particles in commercially available personal care products, the results are also not generally representative, as the doctoral student notes. The survey was conducted among self-selected individuals, with a relatively small sample size and is not representative of the general population of Varna. In describing the results and discussing them, the narrative could have been better structured in subsections. Some of the conclusions and recommendations could be refined.

11. Personal impressions of the doctoral student

I do not know the doctoral student personally, but I consider it a positive fact that he took into account many of my preliminary comments on the dissertation and reflected them in its final version.

12. Compliance of the candidate with the minimum national and MU-Varna-specific requirements for obtaining the PhD degree

Table 1 presents a comparison between the requirements of MU-Varna for the acquisition of a PhD degree and the points awarded to Dr. Chenkov. It can be seen from it that **Dr. Chenkov has achieved the minimum required number of points, as well as covered the mandatory indicators from the individual groups.**

Table 1. Minimum scientometric requirements for candidates to acquire the doctor's degree at Medical University - Varna, district "7. Health care and sports", professional field "7.1. Medicine", according to the "Regulations for the development of the academic staff at MU-Varna" Adopted by the AC of MU - Varna on 29.10.2018, ... amended and supplemented on 21.11.2022, in force from 21.11.2022 (protocol No. 57/21.11.2022).

Indicator group	**Content**	**Requirements for a PhD**	**Dr. Yavor Chenkov**
А	PhD thesis	50 p.	50 p.
Б	DSc thesis	-	-
В	Habitation monograph	-	-
Г	Publications, reports, monographs, and chapters in monographs	30 p.	Total of 60 p. from 3 publications
Д	Citations	-	-
Minimal number of points		80 p.	110 p.

13. Conclusion

The dissertation thesis **contains the author's scientific, scientific-applied and applied results,** which satisfy the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria (LDASRB), the Regulations for the Implementation of LDASRB and the relevant Regulations of the MU-Varna.

The dissertation thesis shows that Dr. Yavor Chenkov **has theoretical knowledge and applied skills, demonstrating qualities for independent conduct of scientific research**.

Given the above, **I give my positive assessment** of the conducted research, presented by the above-reviewed dissertation thesis, author's summary, achieved results and contributions, and **I suggest to the other members of the Scientific Committee to vote positively** for awarding a PhD degree to Dr. Yavor Chenkov in the field of higher education "7. Health care and sports", professional field "7.1. Medicine", scientific specialty "Hygiene".

13.02.2024 г. **Opinion by:**
Plovdiv / Assoc. Prof. Angel M. Dzhambov, MD, PhD, DSc /