REVIEW

by Prof. Dr. Zdravko Hubenov,
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of the PhD thesis for acquisition the academic position of **Doctor**
in the field of higher education **4.** Natural Sciences, Mathematics and Informatics
Professional area **4.3.** Biological Sciences
Science major: Zoology – 10602
PhD program in Zoology, Department of Zoology – Faculty of Biology at the Plovdiv University Paisii Hilendarski

Author: **Svetlozara Boyanova Kazandzhieva, MSc**

Theme: **Biodiversity and distribution of the families Bolitophilidae, Diadocidiidae, Ditomyiidae, Keroplatidae and Mycetophilidae in the Oriental region**

Scientific advisor: Prof. Dimitar Nicolaev Bechev, DBSc, Department of Zoology – Faculty of Biology at the Plovdiv University Paisii Hilendarski

1. General presentation of the submitted materials

By order No. PD-21-703 from 30.03.2023 of the Rector of the Plovdiv University Paisii Hilendarski (PU) I was appointed as a member of the scientific jury to ensure a procedure for the defense of the PhD thesis entitled "Biodiversity and distribution of the families Bolitophilidae, Diadocidiidae, Ditomyiidae, Keroplatidae and Mycetophilidae in the Oriental region" for acquisition of the educational and scientific degree "doctor" in the field of higher education 4. Natural Sciences, Mathematics and Informatics; Professional area 4.3. Biological Sciences; PhD program in Zoology. The author of the dissertation is Svetlozara Boyanova Kazandzhieva, MSc - a full-time doctoral student at the Department of Zoology, with a scientific supervisor Prof. Dimitar Bechev, DBSc from the Department of Zoology, Faculty of Biology, Plovdiv University Paisii Hilendarski.

The presented by Svetlozara Kazandzhieva, MSc a set of materials is in accordance with an Article 36 (1) of the Regulations for the Development of the Academic Staff of the PU and include the following documents: 1) Application form to the Rector of the Plovdiv University Paisii Hilendarski for opening a procedure for the defense of a dissertation work; 2) Curriculum Vitae in European format; 3) Protocol of the Department, stating the readiness to open the procedure and the preliminary discussion on the PhD thesis; 4) Abstract of 36 pages in Bulgarian and English; 5) Declaration of originality and authenticity of the attached documents; 6) Certificate of compliance with the minimum national requirements; 7) List of the publications; 8) Dissertation work; 9) Copies of the publications on the topic of the dissertation; 10) Document for paid fee; 11) Set of documents in paper format; 12) Set of documents on elecronic files.

2. Brief biographical data

Svetlozara Kazandzhieva has a BA in Cultural Studies (since 2014) and a Msc in Biodiversity, Ecology and Conservation (since 2017). She graduated from the Faculty of Philosophy of the Sofia University "St. K. Ohridski" and Faculty of Biology of the Plovdiv University "P. Hilendarski". From 2019 to 2022, she is a PhD student at the Department of Zoology at the PU "P. Hilendarski". From 2017 until now, she has been working as a "Public Relations" specialist and tour guide at the Regional Natural History Museum - Plovdiv. She was a Bulgarian language teacher for foreigners at the Discovery Learning Center (2916-2919); Senior Access Management Specialist and Technical Support Consultant at Allianz Global Corporate & Specialty (2012-2017). From 2017 to 2022 she has been worked on 9 projects: assessment of the ecosystem services; study of species and natural habitats; biodiversity of the Maritsa River; festival for youth creativity; learning aids and video tutorials; bat guano in the river ecosystems; educational materials for RNHM – Plovdiv, etc. She presented 2 publications with an impact factor and 2 participations in scientific forums with materials from the dissertation. Characteristic of Sv. Kazandzhieva, MSc is her active research work, both in field research to collect material and in the processing and interpretation of the obtained data. She participated in the enrichment of the national scientific fund with a collection of interest to foreign specialists.

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

From the introduction of the dissertation, it can be seen that the knowledge of the Oriental Mycetophiloidea, the poor study of this vast territory and the importance of the group for separate directions in the biology and zoogeography make the author's research relevant. The faunistic data on Mycetophiloidea from the Oriental region concern 825 species. Such studies appear rarely and are of great interest to specialists. The review that was made shows the level of research compared to the other zoogeographical areas. The study is relevant for the fundamental areography and for some ecosystem services related to the specific communities in the studied territory. The aim and tasks of the dissertation include summarizing of the all faunistic data, clarifying the distribution of taxa, their zoogeographical attachment to certain territories and the faunistic similarity of these territories. The data presented in the dissertation corresponds to the set goal and the listed tasks. The obtained results support the need for research on Mycetophiloidea in the Oriental region.

4. Knowledge of the problem

From the precise literature review, physico-geographical characteristics of the studied territory and the applied geographical data for the mycetophyllids, it is seen that Sv. Kazandzhieva, MSc is very familiar with the problems and her ability to critically evaluate and use the existing information. This is also seen in the following chapters of the dissertation, where the literature is used critically in the interpretation of the own data and conclusions. The literary analysis provides useful, comprehensive and up-to-date information that can be used by various professionalists. The contacts of Sv. Kazandzhieva, MSc with leading specialists in Mycetophiloidea from Bulgaria and

abroad are a guarantee for the good awareness of the PhD student and the entry into the problems related to the difficult study of this group.

5. Methodology of the study

Classical and new methods adapted to the needs of the research were used in the collection and processing of the material. The joint work with the best specialists, the improvement of the methods of collecting samples and the use of modern methods have allowed Sv. Kazandzhieva, MSc to accumulate a material suitable for comparative studies. Photographic technique and software products necessary for modern documentation and analytical interpretation of data were used. A number of analyzes are included that convincingly present the results obtained. Specific methods for taxonomic, faunistic and zoogeographical studies are applied. The selected methods for field and laboratory work and the amount of the processed material allows achieving the set goal and obtaining the adequate answer to the tasks included in the dissertation work.

6. Characteristic features and evaluation of the thesis

The dissertation is written on 264 pages, of which 5 – Introduction, 6 – Studies of the mushroom mosquitoes in the Oriental region so far, 2 – Aim and tasks, 6 – Brief physicogeographical data for the researched region, 11 – Material and methods, 185 – Results and discussion, 3 – Summary results, 2 – Conclusions, 2 – Contributions, 20 – References of 295 titles (5 in Cyrillic and 290 in Latin). Attached are 9 tables, 71 figures, 4 appendices of a total of 18 pages and a declaration of originality and reliability. A total of 825 species and 116 genera of Mycetophiloidea were analysed for the Oriental region. All localities and the publications in which they are reported have been identified. The history of the study of the superfamily in the area is presented. Four species new to science are described. Definition tables have been made for two genera. Seven taxa (probably new to science) are differentiated. A specific variability in the wing venation of *Stenophragma borneense* has been described. Nomenclature problems with some species are solved. Synonymy of the taxa from the area is presented. New species have been established from Indochina, the Himalayas, Malesia and China. A faunistic characterization of the separate sub regions of the Oriental region was made. Comparative zoogeographical analyses with other areas are presented. A scheme for systematization of the faunistic data from the Oriental region has been created. Contributions of a confirmatory and scientific-applied character are presented. The attached figures and tables support the presented material. A number of specific problems that hinder the research on this group have been solved and substantial scientific results have been achieved.

7. Contributions and significance of the study for science and practice

The dissertation work contains fundamental contributions of a faunistic, taxonomic and zoogeographical character, which enrich the existing knowledge, are new to the science, correct ideas or complete gaps in knowledge about this group. These contributions are substantial, original

and fundamentally theoretical. The contributions of the research presented in the dissertation are in several directions.

Faunistic contributions. The use of specific modern methods has allowed the description of new taxa. Thus, new species for science were established and the fauna was appended. The distribution of Mycetophiloidea in the separate regions of the Oriental area has been expanded. New localities have been established in the territory of the region. The faunistic similarity between the studied territories has been clarified. These contributions are accepted for the creation of a new direction in the Bulgarian faunistics.

Taxonomic contributions. Specific natural landscapes are studied. New taxa for science are described. Original determination tables were made. New species are differentiated. Specific morphological variability in wing venation was found. Nomenclature problems with some species are solved. These contributions constitute the proof by new means of substantial new aspects of the existing scientific fields and the establishment of a number of new facts.

Zoogeographical contributions. Zoogeographical analysis was used for zoogeographical characterization of the taxa. In it, on the basis of the data on the distribution of the species and the results of the faunistic studies, complexes of species with different zoogeographical character are formed. They contain information about the taxonomic groups, which, combined with the origin of the areas, determines the zoogeographical character of the fauna. The areographical structure of the mycetophilous fauna in the Oriental region (contains 22 zoogeographical categories) was determined and compared with the other zoogeographical regions.

Other contributions. There are methodological contributions to the study of Mycetophiloidea in terms of methods for accumulating and processing of the faunistic data. A scheme has been created for the systematization of the geographical information and their connection with the localities. The analysing and summarising the literature on Mycetophiloidea from the Oriental region (including a number of hard-to-find publications) is of interest to the specialists and a contribution to the faunistic history. The separation of Oriental and Palaearctic taxa in southern China represents a substantial contribution related to a good knowledge of the rare and hard-to-access literature data.

8. Evaluation of the publications based on the dissertation

From the literature at the end of the dissertation work and the abstract, the author's participation in 2 publications (in English) on the topic of the dissertation in a journal with an impact factor (Zootaxa – IF 1.026 for 2021-2022) can be seen. The two publications are co-authored with another specialist, and in one, Sv. Kazandzhieva, MSc, is the first author. Two independent participations in scientific forums with materials on the topic of the dissertation are presented.

9. Personal contribution of the PhD student

The achievements, conclusions and contributions presented in the dissertation and the abstract are a personal work of Sv. Kazandzhieva, MSc. The main part of the scientific contributions reflected in the collective articles are also a work of the PhD student. In relation to

these papers (in Zootaxa with one co-author) the contribution of Sv. Kazandzhieva, MSc is clearly outlined and related to the thesis research. Due to this, new taxa from the island of Borneo collected by the PhD student are described.

10. Abstract

The abstract (presented in Bulgarian and English) is made precisely and correctly reflects the main achievements, conclusions and scientific contributions of the dissertation. It includes a resume of the dissertation chapters, conclusions, contributions, a list of the publications and participation in scientific conferences of the author. A literature list of 75 titles cited in the abstract, is also presented. Summary results are missing.

11. Critical remarks and recommendations

At the preliminary discussion of the dissertation work, some notes and recommendations were mentioned, which were taken into account by the PhD student and the corresponding corrections were made.

At the beginning of chapter 6.2. (Faunistic part) there are 3 methodical pages (pp. 50-52) that should be included in the Material and Methods section.

In chapter 6.2. (Faunistic part), pages 64, 70, 96 and 195 (figures) the southern part of the Arabian Peninsula is referred to the Oriental region. It is accepted this territory to be considered as part of the Afrotropical region.

The abstract is accepted as a summary of the dissertation and no literature list is given in it. The figures and tables in the abstract must have identical numbering to those in the dissertation. The summary results must be included in the abstract.

It would be better if Appendix 2 (Genera, established in the Oriental region and their distribution in the zoogeographical regions) to be included in the chapter "Results and discussion" where it presents well the respective studies. Nothing requires its separation from the main text of the dissertation.

12. Personal impressions

It is impressed the active research work of Sv. Kazandzhieva, MSc both in the field research for the collection of material and in the processing and interpretation of the obtained data. Due to her activity, regardless of her great official commitment, the national scientific fund is enriched with a collection of Mycetophiloidea, which is of interest to specialists.

13. Recommendations for future utilization of the PhD contributions and results

The research on Mycetophiloidea needs to continue. The rare opportunity to have a specialist in Southeast Europe (with opportunities to work on the Paleotropical mycetophilous fauna) should not be missed. It is clear from the dissertation that there are also data that have not been published yet. They should find their place in the scientific literature of Mycetophiloidea. More recently, such

studies are used to assess the state of the environment, communities of high conservation value and some of the ecosystem services that the communities provide.

CONGLUSION

The dissertation contains **scientific and scientific-applied results that represent an original contribution to science and are in accordance** with the Act for the Development of the Academic Staff in the Republic of Bulgaria (ADASRB), the Rules of Application of the ADASRB and the corresponding Rules of the University of Plovdiv Paisii Hilendarski. The presented materials and results **are in accordance** with the specific requirements of the Faculty of Biology, accepted in connection with the Rules of Application of the ADASRB of the PU Paisii Hilendarski.

The dissertation work shows that Svetlozara Boyanova Kazandzhieva, MSc, **has** exhaustive theoretical knowledge and professional skills in the science major Zoology (10602) as well as an **ability** to conduct independent scientific research.

After getting acquainted with the presented dissertation work, abstract, achieved results and contributions, analyzing their significance as well as the scientific and scientific applied contributions, I give a **positive** assessment and **recommend** the Scientific Jury to award the educational and scientific **PhD degree to Svetlana Boyanova Kazandzhieva, MSc**, in the field of higher education **4.** Natural Sciences, Mathematics and Informatics; Professional area **4.3.** Biological Sciences (Science major **Zoology**).

30.04.2023

Reviewer:

/Prof. Dr. Zdravko Hubenov/