

Statement

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for the dissertation work of the full-time doctoral (PhD) student Antonia Khubancheva entitled "Sound Based Predator-Prey Interactions Between European Bats and Bush-Crickets" for awarding the Doctor of Science (D.Sc.) degree in the scientific discipline of "Ecology"

The dissertation work is presented in the form of bound publications and includes a total of 80 written pages in English, including figures and tables. It also includes the mandatory sections, such as Introduction, Aim and objectives, Literature review, Materials and methods, Abstract, Conclusions, Reference list, and Statement of originality and reliability.

The dissertation is dedicated to research on one of the main driving forces in the evolution and functional mechanisms of organisms and ecosystems: predator-prey relations, studied on the basis of acoustic interactions between the Greater mouse-eared bat and the Lesser mouse-eared bat (*Myotis myotis* and *Myotis blythii*) and their prey: the bush-crickets of the family Tettigoniidae.

The aim of the dissertation is to elucidate the sensory and behavioural mechanisms of prey detection by the mouse-eared bats and defence strategies in katydids. This aim is achieved with three well-formulated and executed research tasks, namely: identification of the dietary spectrum of the two studied species of bats by determining their faeces composition using an integrated approach; an acoustic study of the mating calls in katydids used by the bats to detect their

prey; and an investigation of the sensory and defence behavioural mechanisms in katydids against bats.

The appropriately selected modern and innovative research approaches (i.e. metabarcoding, monitoring and behavioural experiments) show that the doctoral student has acquired important knowledge and practical skills in the field of ecological studies and experimental approaches. The methods employed help to obtain convincing and reliable results, which are an undisputed scientific contribution in the field of biology, ethology and ecology of the studied subjects in the predator-prey system. In the process of the development of the dissertation, Khubancheva demonstrated crucial qualities of a scientist: motivation, diligence and teamwork. The dissertation is clearly a personal achievement of the doctoral student.

The well-formulated contributions fully reflect the achievements of the doctoral student in several ways. They include elucidating the food preferences of the Greater and the Lesser mouse-eared bats in Bulgaria using metabarcoding of faecal samples; obtaining new information about the pursuit strategies of the Greater mouse-eared bat and the role of its habitat on its hunting success; and determining the insect prey consumption capacity of a single bat. For the first time, evidence has been presented for the hypothesis that bats which capture their prey on the ground use the mating calls of katydids to locate and seize the insects. New information about the behaviour of katydids, including their defence strategy and mating calls have been collected.

The abstract is formatted according to the requirements and reflects the results and conclusions presented in the dissertation.

The doctoral student has presented the results of her research at eight international scientific forums (i.e. three conference talks and five posters), and received a Best Poster award at one of them. The three dissertation publications correspond to the research tasks and include their main results. Two of those

have been published in reputable journals with a Journal Impact Factor (Q1, IF 7.7; Q1, IF-3.24).

Conclusion

This dissertation corresponds to the requirements of The Law on Academic Staff Development in the Republic of Bulgaria, the regulations for its application, and covers the requirements of the IBER Regulations. The hereby scientific study demonstrates originality and high quality, while applying modern methodology. The results are analysed, discussed and supported by convincing arguments. The study also provides several fundamental contributions to the ethology and biology of two interacting groups of organisms: predator and prey. Therefore, I would strongly recommend to the respected scientific jury to vote positively and award the Doctor of Science (D.Sc.) degree to Antonia Khubancheva.

Prof. Dr. Lyubomir Penev

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