

БЕЛТАСЪТ НА АКАДЕМИЯТА НА НАУКИТЕ
ИНСТИТУТ ЗА ЛЕСОУЧЕБНАТА ТЕОРИЯ
РЕГИСТРАЦИОНЕН БРОЙ И ДАТА
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## REVIEW

on a dissertation for acquiring the degree Doctor of Philosophy (Ph.D.) in field of higher education 6. Agricultural sciences and veterinary medicine, professional direction 6.5. Forestry, scientific specialty „Forest Melioration, Forest Protection and Special Forest Uses“

**Author of the thesis:** Pavel Yordanov Topalov

**Title of the thesis:** Species composition, distribution and biocological features of the longhorn beetles (Coleoptera, Cerambycidae) on Vitosha Mt.

**Author of the review:** Professor Danail Doychev, Ph.D. – University of Forestry, Sofia

### 1. Brief presentation of the Ph.D. student

Pavel Topalov was born in 1975. He completed his higher education with a master's degree in "Zoology of Vertebrates (Herpetology)" at the Faculty of Biology of Sofia University "St. Kliment Ohridski" in 2001, and before that (1999) he received a bachelor's degree in "Biology" at the same institution. In the period 2001 – 2015 he was engaged in pedagogical work as a primary school teacher, biology teacher and head of extracurricular activities in primary and secondary schools in Sofia. Since 2015 he has been the manager of the company "Legba" EOOD, trading in spare parts for electrical appliances. In 2017-2018 he was an expert in educational projects at the "Give away a book" Foundation. Since 2021 he has been the chairman of the boards of directors of the "Natural Science Society "Acad. Ivan Buresh" Association and the "Friend in Need" Foundation. In the period 2022 – 2025 he is a doctoral student in independent training at the Institute of Forestry - BAS (Sofia).

The doctoral student's areas of scientific interests include: Herpetology (regional studies on the species composition and distribution of reptiles) and Entomology (regional studies on the species composition and distribution of the Cerambycidae family).

### 2. General characteristics of the PhD thesis – volume and structure

The dissertation consists of 200 pages (without the literature review – 182 pages). It contains an introduction, four separate chapters (1. Aim and objectives; 2. Literature review; 3. Material and methods; 4. Results and discussion), "Conclusions and recommendations", "Contributions" and "References". The largest part in terms of volume is taken up by chapter 4. Results and discussion (130 pages). The main text of the dissertation contains a total of 11 tables and 140

figures, presenting schemes, maps, graphs and photographs. The dissertation is submitted in paper form, as well as on a digital medium, in PDF format.

### **3. Relevance of the researched problem**

The species of the family (Cerambycidae) are some of the most popular and attractive representatives of the Coleoptera. They are the subject not only of scientific interest (faunistic and applied), but also of interest from many nature lovers, including collectors. In the last twenty years, publications on this group of insects in Bulgaria have significantly increased. Articles for the species composition and their distribution in some mountains (Strandzha, Rila, Pirin, West Balkan Range, Eastern and Western Rhodopes, Sredna Gora, Belasitsa, etc.) have been published.

The proximity of Vitosha Mt. to the Sofia and its easy accessibility until recently make it an interesting object for such studies. The specific physiographic characteristics of the mountain create conditions for the formation of diverse natural habitats, ensuring the development of a large number of plant species (over half of the higher flora of Bulgaria), which are food base for many phytophagous insects, including longhorn beetles. The last significant attempt to summarize the data on the family Cerambycidae from the region dates back 15 years ago.

The above defines the topic of the dissertation as relevant and significant.

### **4. Awareness of the literature**

The list of literature used is 18 pages long and contains a total of 318 titles, of which 87 are in Cyrillic and 231 in Latin. The literature review is divided into two main parts – a characterization of the longhorn beetles, including morphology and biology, and an analysis of the studies on the group, both for the country as a whole and specifically for the selected site (Vitosha Mt.).

The detailed review of the literature on the research of Cerambycidae in Bulgaria is extremely valuable - practically all scientific data on the topic are reflected (over 200 publications), and for a very long period of time - since the 1830s, when the first information about the group in our country dates back to. The review analyzes data on the species composition and distribution of Cerambycidae in the country and in particular on Vitosha, the currently established trophic relationships with various plants, as well as on entomophagous organisms associated with these beetles.

As a result of this literature review, the basis for good planning of work tasks, methodology and research sites in Vitosha Mt. was created.

## **5. Methods**

The main physical and geographical features of the Vitosha Mt. are presented in detail. Various methods for studying the species composition of the longhorn beetles in the region are described - through a review of existing entomological collections; collections of adults by flowers on different plants, as well as larvae and other stages in wood; use of pheromone traps, cross-section and soil traps; isolation of insects from plant parts. Some of the mentioned methods also allow for the establishment of trophic relationships at the "host - parasitoid" level. The determinants used are both for adult representatives of the Cerambycidae family and for their larvae. It can be concluded that the selected methods and routes for examining and collecting biological material correspond to the tasks set.

## **6. Significance of the results, interpretations and conclusions**

A total of 131 species and subspecies of the target group have been identified. For each, detailed information is given on the previous (according to literature data) and current finds – data that are reflected in 118 figures with their location in the mountain. These results build on previous knowledge (until 2014) about the cerambycids of the Vitosha Mt., of which 116 species and subspecies were known (the increase is 13%). Among the 15 taxa (species and subspecies) newly identified for the mountain, there are also six separate genera, of which only four are highlighted in the work.

A detailed description of the distribution by altitude, zoogeographic categories and food plants of the Cerambycidae from Vitosha has been made. Seven species and subspecies have been determined as rare taxa for our country and, accordingly, the new data on them are a contribution to the studies of Cerambycidae for Bulgaria as a whole.

The greatest species diversity (115 taxa) was found in the belt of xeromesophilic and mesophilic oak-hornbeam forests as a direct result of the dominance of broad-leaved woody and shrub vegetation there.

Trophic relationships of 24 taxa of Cerambycidae with 37 woody and shrub plants of Vitosha have been established. Twenty-four of these relationships are new for the country.

The study identified a total of 6 species of parasitoids from the families Braconidae, Ichneumonidae and Tachinidae on Vitosha beetles. The parasite-host relationship *Billaea triangulifera* – *Prionus coriarius* is new for Bulgaria.

A comparison was made of the number of identified species and their distribution by arealographic complexes with other mountainous regions of Bulgaria.

Nearly two-thirds of the identified species for the mountain fall into the Red List of European saproxylic beetles. This group is dominated by representatives of the subfamily Cerambycinae (37 species). The status of the populations of five species from the categories vulnerable and near threatened was analyzed in depth.

The main results are summarized and the relevant contributions are formulated.

## 7. Contributions of the dissertation

The contributions made by the doctoral student can be grouped as scientific and applied science, as follows:

### Scientific contributions:

1. The prepared complete literature review of the previous studies of the Cerambycidae family in Bulgaria (in particular, for Vitosha Mt.) reflects the efforts of a large number of entomologists (both domestic and foreign) to study various aspects of the distribution and biology of this group of beetles, and also creates a basis for expanding the scope of such studies to other regions of the country.
2. The data on the species composition of the Vitosha Mt. have been supplemented, with 15 new species and subspecies identified for the mountain: *Aegosoma scabricorne* (Scopoli, 1763), *Pedostrangalia revestita revestita* (Linnaeus, 1767), *Stictoleptura pallens* (Brullé, 1832), *Stictoleptura scutellata scutellata* (Fabricius, 1781), *Cortodera humeralis humeralis* (Schaller, 1783), *Chlorophorus figuratus* (Scopoli, 1763), *Isotomus speciosus speciosus* (Schneider, 1787), *Xylotrechus antilope antilope* (Schoenherr, 1817), *Xylotrechus rusticus* (Linnaeus, 1758), *Trichoferus pallidus* (Olivier, 1790), *Hylotrupes bajulus* (Linnaeus, 1758), *Leiopus taeniatus* (Gmelin, 1790), *Dorcadion pedestre pedestre* (Poda, 1761), *Mesosa nebulosa nebulosa* (Fabricius, 1781), *Mesosa curculionides* (Linnaeus, 1761). Six genera are new to Vitosha (*Aegosoma* Audinet-Serville, 1832, *Hylotrupes* Audinet-

Serville, 1834, *Isotomus* Mulsant, 1862, *Mesosa* Latreille, 1829, *Pedostrangalia* Sokolov, 1897 and *Trichoferus* Wollaston, 1854.

3. Twenty four new trophic relationships for Bulgaria of species from the Cerambycidae family with woody and shrubby plants have been identified: *Prionus coriarius* – *Quercus dalishampii* Ten. and *Prunus avium* L.; *Rhagium bifasciatum* – *Quercus dalishampii*; *Rhagium inquisitor inquisitor* – *Pinus peuce* Griseb.; *Rhagium mordax* – *Quercus cerris* L., *Q. dalishampii* and *Prunus avium*; *Rutpela maculata maculata* – *Fagus sylvatica* L., *Prunus avium* and *Salix* sp.; *Saphanus piceus ganglbaueri* – *Fagus sylvatica* and *Prunus avium*; *Cerambyx scopolii scopolii* – *Quercus dalishampii* and *Prunus avium*; *Chlorophorus figuratus* – *Prunus avium*; *Xylotrechus rusticus* – *Populus tremula* L. and *Salix caprea* L.; *Trichoferus pallidus* – *Quercus dalishampii*; *Acanthocinus griseus* – *Pinus peuce*; *Mesosa curculionoides* – *Prunus avium*; *Mesosa nebulosa* – *Betula pendula* Roth and *Quercus cerris*; *Saperda scalaris scalaris* – *Prunus avium* and *Pyrus communis* L.
4. A new parasite-host relationship for Bulgaria has been established between *Billaea triangulifera* (Zetterstedt, 1844) (Diptera: Tachinidae) and *Prionus coriarius* (Linnaeus, 1758).

#### **Scientific and applied contributions:**

1. For the first time in Bulgaria, cerambycids have been captured using funnel traps and an 8-component experimental mixture of pheromones synthesized by the National Institute for Agronomic Research in France (INRAE). The combination of pheromones used may find application for early detection and monitoring of invasive species of Cerambycidae.

#### **8. Critical notes and recommendations**

- When writing the full scientific names of the longhorn beetles, their subgeneric names were also unjustifiably and unnecessarily indicated.
- Not all cited authors are listed in the reference list – e.g. Deyrup (1975) (p. 167).

## 9. Assessment of the quality of scientific publications

Five scientific publications by the doctoral student related to the topic of the dissertation are presented as follows:

1. Topalov P., D. Doychev, N. Simov, V. Sakalyan, G. Georgiev. 2014. New records of longhorn beetles (Coleoptera: Cerambycidae) from Vitosha Mt. *Nauka za gorata*, 1/2, 95-102. [in Bulgarian] (WoS).
2. Doychev D., P. Topalov, G. Zaemdzhikova, V. Sakalian, G. Georgiev. 2017. Host plants of xylophagous longhorn beetles (Coleoptera: Cerambycidae) in Bulgaria. *Acta zoologica bulgarica*, 69 (4), 511-528. (IF: 0.369).
3. Doychev D., G. Zaemdzhikova, P. Topalov, Z. Hubenov, G. Georgiev. 2019. New parasitoids on longhorn beetles (Coleoptera: Cerambycidae) in Bulgaria. *Acta zoologica bulgarica*, 71 (2), 175-182. (IF: 0.278). (IF: 0.369).
4. Topalov P. 2018. A check list and areography of longhorn beetles (Coleoptera: Cerambycidae) in Vitosha Mountain. *Silva Balcanica*, 19 (3), 21-40. (WoS).
5. Doychev D., P. Topalov, G. Zaemdzhikova, V. Sakalian, G. Georgiev. 2018. Additions to xylophagous longhorn beetles (Coleoptera: Cerambycidae) host plants in Bulgaria. *Silva balcanica*, 19 (2), 47-54. (WoS).

The publications are in three Bulgarian scientific journals - "Nauka za gorata" (1), "Silva balcanica" (2) and "Acta Zoologica Bulgarica" (2). The last edition has an impact factor, and the others are referenced in Web of Science.

One of the publications is independent, and the other four are co-authored, with P. Topalov as the lead author in two of them.

The presented articles publish results reflecting various researched aspects of the Cerambycidae family of Vitosha Mt. - species composition and distribution, trophic relationships with plants and "parasitoid-host" relationships.

This fulfills the scientometric requirements of the ZRASRB and the Regulations on the conditions and procedure for acquiring scientific degrees and for holding academic positions at the Bulgarian Academy of Sciences in relation to the required publications by the doctoral student.

## **10. Personal contribution of the doctoral candidate**

The personal participation of the doctoral student is confirmed by his authorship in the submitted publications containing the main contributions of the dissertation work.

### **CONCLUSION:**

Based on the various research methods mastered and applied by the doctoral student, the processing of the results, the summaries and conclusions made, I believe that the presented dissertation meets the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria (ADABRB) and the Regulations on the Terms and Procedures for Acquiring Scientific Degrees and Holding Academic Positions at the Bulgarian Academy of Sciences, which gives me reason to evaluate it POSITIVELY.

I propose to the esteemed Scientific Jury to vote positively and award Pavel Yordanov Topalov the educational and scientific degree "Doctor" in the field of higher education "6. Agricultural Sciences and Veterinary Medicine", professional direction "6.5. Forestry" and scientific specialty "Forest Reclamation, Forest Protection and Special Uses in Forests".

**Date:** 30.05.2025 r.

**Author of the review:**

**/Professor Danail Doychev, Ph.D./**