



Hubenov Z. 2021. Species Composition and Distribution of the Dipterans (Insecta: Diptera) in Bulgaria. Pensoft & National Museum of Natural History, Sofia, 276 p. ISBN 978-619-248-050-9 (paperback), ISBN 978-619-248-051-6 (e-book), Pensoft Series Faunistica No 223

In 2021, Pensoft published the book *Species composition and distribution of the dipterans (Insecta: Diptera) in Bulgaria* by Professor Zdravko Hubenov, an outstanding Bulgarian entomologist, taxonomist and zoogeographer. The book is a summary of the Diptera from the territory of Bulgaria and presents the fauna, distribution according to the vegetation belts as well as zoogeography of the species of this

group in Bulgaria. The order Diptera is a group widespread in our country. Dr Hubenov presents the importance of the various families for medicine and plant pest control in an impressive way. Totally, there are data about 61 pest species in forestry and agriculture and 75 species of importance for human and veterinary medicine. Of the suborder Nematocera, 26 species have a human or veterinary significance and 40 species are pests on the forestry or agriculture. Most representatives of medical significance belong the family Culicidae, followed by Ceratopogonidae, Psychodidae and Simuliidae. Most of the plant pests belong to the Cecidomyiidae. Of the suborder Brachycera, 49 species are significant for the human or veterinary medicine and 20 species are pests in forestry or agriculture. Larvae of few families (Chironomidae, Simuliidae, Culicidae, etc.) are widespread in aquatic ecosystems. Some larvae of them are the most abundant group of insects in fresh or brackish waters. They are a suitable indicator group for understanding and monitoring the impact of contaminants in freshwater ecosystems. The larvae of species belonging to some families (Culicidae, Chironomidae, Drosophilidae, etc.) possess excellent salivary gland chromosomes, which structural and functional peculiarities make these families prospective subject for genetic, biochemical and molecular studies. However, to understand the full potential of various dipteran families and species, their precise identification as well as knowledge of their distribution, zoogeographical characteristics and biology are required. All these data can be found in the offered book represented at a high scientific level.

The book includes *Introduction, Material and Methods, Results, Discussion and Conclusion*. The references include both Bulgarian and foreign authors and contain 1372 sources. The chapter *Introduction*, written in clear and precise scientific style, presents brief historical data on the dipteran studies in Bulgaria. Many plant pests and species of medical significance have been identified. Numerous catalogues of dipteran families have also been published. Foreign experts worked on the taxonomy and fauna of the group, too. Numerous hydrobiological studies have been published on water-related dipteran groups. The series *Fauna of Bulgaria* has also devoted volumes to the dipteran families. The vertical distribution of the families in Bulgaria has been examined in detail.

The chapter *Material and Methods* presents a number of methodological approaches applied in the book. The classification of the order is presented based on the widely accepted classification worked out by outstanding specialists. Some weaknesses in the dipterological literature have been pointed out correctly. These include the lack of habitat data for some species, gaps in knowledge on the vertical distribution, insufficient research of certain fami-

lies, faunal comparisons based on data from different periods, zoogeographical characteristics of some taxa poorly studied, insufficient reports of anthropogenic pressures, etc. It is emphasised that many researchers have focused on ecological changes and medical or economic significance of certain groups but the faunistic studies of many dipteran groups remain neglected.

There are six vegetation belts in Bulgaria; between them, however, the borders are not well delineated due to peculiarities in the relief, climate, human impacts, etc. The vertical distribution is shown according to the vegetation belts. Zoogeographical characteristics are also represented. Based on published faunistic data and the distribution of the species, information has been obtained on the types of species complexes with different zoogeographical characters. The abbreviations used by the author are very well explained, which facilitates the use of the book and obtaining the necessary information for each species.

Four very informative tables are presented. The first table contains the distribution of the Diptera in natural geographical territorial units in Bulgaria. Totally, 5038 dipteran species have been identified in Bulgaria. The Nematocera are 1672 and the Brachycera are 3348 species. They are analysed also by regions. The Rila-Rhodope Massif is extremely rich in nematoceran taxa (813) but harbours also a large number of species of the Brachycera (1871). Totally, 110 families have been found in our country. Of the 132 families found in Europe, 22 families have not been recorded in Bulgaria. Of the 32 known families of the Nematocera for Europe, six are not found in Bulgaria. For the Brachycera, out of the 100 families known in Europe, 16 are not found in Bulgaria. The poorly studied families in Bulgaria are also mentioned. One of the families, the family Chironomidae, is quite problematic, as its larval stage, which is used in hydrobiology, is very difficult to determine. The information about two recently recorded families (Cremifaniidae and Diopsidae) in Bulgaria is quite interesting. The most species-rich families in Bulgaria are three families of the suborder Nematocera [Chironomidae (327 species – 6.5%), Mycetophilidae (263 species – 5.2%) and Cecidomyiidae (262 species – 5.2%)] and three families of the suborder Brachycera [Tachinidae (425 species – 8.4%), Syrphidae (303 species – 6.0%) and Muscidae (267 species – 5.3%)].

Table 2 shows the distribution of the Diptera according to vegetation belts. For each family, the total number of species and their distributions in the six vegetation belts are represented. Table 3 shows the similarity of the dipteran fauna according to the vegetation zones of the highest Bulgarian mountains Rila and Pirin.

Based on their current distribution, zoogeographical categorisation of the species has been developed. The dipteran species are divided into 150 categories. A classification based on the species' individual geographical areas is presented. The total number of species for each area is indicated as well as their distribution in vegetation belts. Most of the species are found in xerothermic oak forests (66.7%). The dipteran fauna is divided into two large groups: (1) Species with Mediterranean type of distribution: thermophilic species occurring mainly in the southern Palaearctic and a small part of them in the mountains; South-European and Southeast-European forms are the most numerous in this group. (2) Species with Palaearctic and Eurosiberian type of distribution, which are eurybiontic and widely distributed in the Palaearctic. This group includes northern species occurring in the Palaearctic and beyond it. A total of 2.5% of endemic species were found, representing both Nematocera (3.6%) and Brachycera (2%).

Much of the book is devoted to the Nematocera and Brachycera families and species belonging recorded in Bulgaria. Each species is represented by its valid scientific name and author as well as synonymous names, the geographical latitude at which it occurs, distribution in Bulgaria, vegetation belts and reference to the relevant literature. The reader can get complete information about the species of interest, which is of great benefit and importance. The chapter *Conclusion* contains a summary of the analyses of the dipteran fauna in our country.

The book is of great importance for the study and conservation of biodiversity in Bulgaria. It can be successfully used by both specialists and everyone interested in the diversity of the Diptera in Bulgaria.

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