

Vertical Distribution of Species of the Subfamily Aphidiinae (Hymenoptera: Braconidae) from the Southwestern Bulgaria

Ognyan B. Todorov*

Regional Natural History Museum – Plovdiv, BULGARIA

* Corresponding author: ogi_lion@abv.bg

Abstract. The vertical spreading of some species of the subfamily of Aphidiinae (Braconidae) from Southwest Bulgaria was investigated during the period 2002 – 2005. The research was carried out for four out of the six vegetation zones which are typical for this region: Xerothermic oak woods, Mesophyll oak woods, Beech woods, Coniferous woods, Subalpine sparse woods.

Key words: Aphidiinae, Braconidae, Hymenoptera, aphid, biological control, parasitoid.

Introduction

Until 2002, 43 species have been reported from Bulgaria, which parasitise 12 families (ATANASOVA, 1997; KOLAROV, 1997; STARY, 1962) and until the present moment 63 species from 21 families have been reported (TODOROV, 2008). A large number of species from different vegetation zones have been included in the research.

The recent research shows the distribution of the parasitoids for the Southwest of Bulgaria. The explored territory was chosen because of its high level of diversity of different types of habitats which is a premise for a larger range of species that can be included in the analysis.

Material and Methods

The material for the research was collected on the territory of Southwest Bulgaria (Slavyanka Mt., Belasitza Mt., Ograzhden Mt., Maleshevska planina Mt., Rila Mt., Pirin Mt. and from the riverside of Struma) in the period 2002 – 2005. The

parasitoids were collected with Malaise traps, fall-pit traps, entomological nets and the material brought out from between 200 and 1980 meters altitude. Because the definite tables are formed only on the basis of female representatives, from all the 3656 only the female individuals were singled out. From the defined 1213 specimen 50 species were determined from 14 genera.

The mountainous nature of the most of the explored territory determines the vertical climate changes and the respective changes in the vegetation communities on different altitudes. On the territory of Southwest Bulgaria there are six clearly differentiated vegetation zones: xerothermic oak woods belt (100- 300 m.), mesophyll oak woods belt (300- 900 m.), beech woods belt (900- 1600 m.), coniferous woods belt (1600- 2300 m.), subalpine and alpine belt (2300 - 3000 m.).

The terminology used in description follows STARY (1970). The studied and identified material is deposited in the collection of the author.

Results

From the six examined vegetation zones in the study there are not any detected species in the alpine belt from the studied group, in the subalpine sparse woods belt there have been found only 3 species. That is why these two mentioned zones are not included in the analysis. Each one of the vegetation communities, developed in different climatic conditions, determines the distribution of animal communities, in particular, of the representatives of the examined group. The results of studying the vertical distribution are presented in Table 1 and Fig. 1.

Table 1. Distribution of species defined by vegetation zone in Southwestern Bulgaria during the period 2002-2004.

Belts	Number of species
Xerothermic oak woods	23
Mesophyll oak woods	22
Beech woods	30
Coniferous woods	11
Subalpine sparse woods	3

The analysis shows that with the increasing of the altitude the species diversity is decreasing. This result demonstrates the connection between the optimum conditions for the development of the species from the examined group and the ecological factors exerting influence on them in the different vegetation zones of the explored region. The beech belt is an exception, where the number of species is the highest (30 species or 34% of total amount) because of its highest level of humidity in comparison with the other belts. The number of *Aphidiidae* is a direct result of the dependence of aphids on the humidity of the environment.

Twenty three species or 26% of the total amount are registered in the xerothermic oak woods belt which is characterized by presence of drought-resistant and heat-resistant vegetation.

In the mesophyll oak woods belt are registered 22 species (25%), in the coniferous

woods belt 11 species or 12% of the total amount are to be found. In the subalpine sparse woods only 3 species are registered.

The presented data confirm the fact that *Aphidiinae* find a bigger number of host organisms (polyphags) as a whole within the borders of the deciduous and mixed woods, in comparison with the other vegetation zones.

Depending on the distribution of the vegetation belts the *Aphidiinae* are classified in three zonal groups (Table 2). Stenozonal (found only in one of the zones), Mesozonal (found in 2 or 3 zones) and Evryzonal (found in all vegetation belts).

Table 2. Number of species registered in the period 2002-2004 in Southwest Bulgaria classified in zonal groups.

Zone groups	Number of species	% of total amount
Stenozonal	33	62
Mesozonal	8	15
Evryzonal	12	23

The distribution of species by zonal groups in the area is as it follows: stenozonal - 33 species or 62% of the total amount; mesozonal- 8 species or 15%; evryzonal - 12 species or 23% of the total amount.

The stenozonal species present the biggest percentage of distribution in the zonal groups. They are presented in each of the vegetation zones (Fig. 3.) as it follows: in the xerotherm oak belt - 8 species or 8,29 % of the total amount; in the mesophyll oak belt - 9 species or 9.32%, in the beech belt - 9 species or 9,32 %; in the coniferous belt - 2 species or 2,7 % of the total amount. No stenozonal species have been found in the subalpine belt. The majority of these species find their host organisms in the corresponding vegetation zones and this is an after-effect of their overall distribution in the explored region.

Forty-one of the registered *Aphidiinae* species from the region participate in the formation of the mesozonal group (15 %) and evryzonal group (23 %). Representatives

with a larger number of host organisms (polyphagus) or having as host organism's species with a larger scale of vertical spread

are also related to this group. Migrations and exchange of fauna between the belts are not excluded as well.

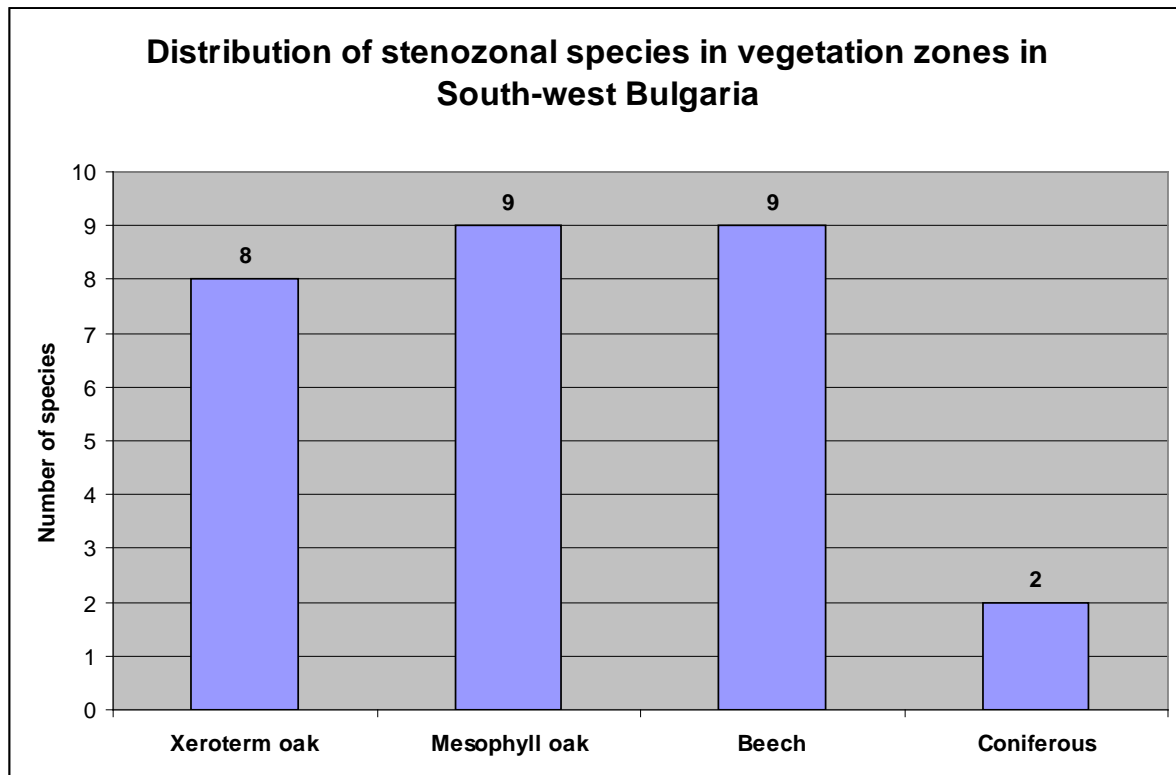


Fig. 3. Distribution of stenozonal species in vegetation zones in Southwest Bulgaria.

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