

Ecological factors in the distribution of Carpathian elements in Poland

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ABSTRACT

One of the distinctive zoogeographical elements in Polish fauna is the Carpathian one. It is distributed through the whole chain of the Carpathian Mountains as well as some neighbouring highland and, to some extent, in the Świętokrzyskie Mountains. Among a great number of species that belong to three main arachnid groups, there are 16 following species of exclusively Carpathian distribution: *Mundochthonius carpaticus* Rafalski, 1948, *Chthonius heterodactylus* Tömösvary, 1882, *Neobisium carpaticum* Beier, 1935, *Neobisium polonicum* Rafalski, 1936, *Neobisium brevidigitatum* (Beier, 1928), *Roncus transsilvanicus* Beier, 1928 (Pseudoscorpiones); *Siro carpaticus* Rafalski, 1956, *Paranemastoma kochi* (Nowicki, 1870), *Ischyropsalis manicata* L. Koçh, 1869 (Opiliones); *Kaestneria torrentum* (Kulczyński, 1882), *Lepthyphantes monticola* (Kulczyński, 1882), *Lepthyphantes varians* (Kulczyński, 1882), *Peponocranium praeceps* Miller, 1943, *Acartauchenius longus* (Kulczyński, 1882), *Oedothorax gibbifer* (Kulczyński, 1882), *Xysticus alpicola* Kulczyński, 1882 (Araneae). The main habitats they live in are: deciduous mountain forest, mixed forest, coniferous forest and mountain meadows.

INTRODUCTION

Almost 1/3 of Polish territory is covered by mountains of which the Carpathians are the most spectacular and rich from zoogeographical and ecological point of view. During the glacial periods, the Carpathian Mountains were a place of refuge for a great number of plant and animal species and the region where the postglacial flora and fauna came from.

The main body of the Carpathians in Poland is divided into several chains of different geological structure, altitude and climate. However, because of numerous transition zones between the chains, there is only a small difference in the distribution of zoogeographical elements through the Carpathians in Poland. It seems, that ecological factors play an important role in the species distribution.

(Jędrzykowski 1988, 1996a, b) (Fig. 1). The most expansive group are Pseudoscorpiones since there are 3 Carpathian species, that reach Roztocze and Świętokrzyskie Mountains (Tab. 1). There is a question: why are they distributed as far north as the Świętokrzyskie Mountains without having a transition zone, that could link to the Carpathian region.

Tab. 1. Distribution of the Carpathian elements in investigated regions

Species	Carpathian Mts.	Świętokrzyskie Mts.	Roztocze
Pseudoscorpiones			
<i>M. carpaticus</i>	+	+	-
<i>C. heterodactylus</i>	+	-	+
<i>N. carpaticum</i>	+	-	+
<i>N. polonicum</i>	+	-	-
<i>N. brevidigitatum</i>	+	-	-
<i>R. transsilvanicus</i>	+	-	-
Opiliones			
<i>S. carpaticus</i>	+	-	-
<i>P. kochi</i>	+	-	-
<i>I. manicata</i>	+	+	-
Araneae			
<i>K. torrentum</i>	+	-	-
<i>L. monticola</i>	+	-	-
<i>L. varians</i>	+	-	-
<i>P. praeceps</i>	+	-	-
<i>A. longus</i>	+	-	-
<i>O. gibbifer</i>	+	-	-
<i>X. alpicola</i>	+	-	-

Several years of botanical investigations carried out in the three regions confirmed, that there are several plant communities of Carpathian origin, which cover vast territory of the regions. So we know why it is possible for some Carpathian species to live so far north. The next question is why only few of them could spread off the centre of main distribution.

Table 2 contains a list of investigated species together with a list of typical plant communities in which they are abundant. All biotops, except for mountain meadows, are present in the Carpathians, in the Roztocze and the Świętokrzyskie Mountains. It is obvious that most Pseudoscorpiones and Opiliones live in a variety of biotops. Spiders seem to prefer open area, living in the mountain meadows. So for them it is more difficult to spread out from the high picks, where such meadows exist.

Tab. 2. Biotope preferences of Carpathian species.

Species	deciduous mountain forest	mixed forest	coniferous forest	mountain meadows
Pseudoscorpiones				
<i>M. carpaticus</i>	+	+	+	-
<i>C. heterodactylus</i>	+	+	-	-
<i>N. carpaticum</i>	+	+	+	-
<i>N. polonicum</i>	+	+	-	+
<i>N. brevidigitatum</i>	+	+	+	+
<i>R. transsilvanicus</i>	+	+	+	+
Opiliones				
<i>S. carpaticus</i>	+	-	-	-
<i>P. kochi</i>	+	+	+	+
<i>I. manicata</i>	+	+	+	+
Araneae				
<i>K. torrentum</i>	+	-	+	+
<i>L. monticola</i>	-	-	+	+
<i>L. varians</i>	-	-	+	+
<i>P. praeceps</i>	?	?	?	?
<i>A. longus</i>	-	-	-	+
<i>O. gibbifer</i>	-	-	+	-
<i>X. alpicola</i>	-	-	-	+

All species of pseudoscorpions mentioned in the Tab. 2 are leaf litter dwellers. They occupy a special kind of niches, that perfectly isolate them from small climatic changes. It helps to colonise new territories and to spread at a high rate. Such an explanation needs some more investigation, especially a statistic analysis, to confirm the link of Carpathian species to special sort of biota. There is a project under preparation, so in a short time more complete results can be expected.

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