

Contribution to the knowledge of the ant-fauna (Hymenoptera, Formicidae) of the Crişul Repede river valley

Bálint Markó

Abstract

In the present paper the author offers new data to the knowledge of the ant-fauna of the Crişul Repede river valley, summarizing and increasing the number of known species to 34, including the *Formica balcanina* and the *Myrmica hellenica* species which were reported for the first time in Romania. By classifying the ant-fauna of the different sample-sites on the basis of the ecofaunistical types, the bank of the river is characterized through the composition of the ant-fauna. Regarding the *F. balcanina* the author proposes the idea that the river valley could have served as an ecological corridor for this species.

Keywords: ant-fauna, Crişul Repede river valley, ecological corridor

Introduction

Although continuous research on the ants of Romania have been carried out since the 1950's (Paraschivescu, 1978) the checklist of the species hasn't been accomplished yet as there are a lot of regions still to be searched by specialists.

We can say that Transylvania constitutes more or less an exception to these conditions, as the first studies in this region were carried out at the end of the XIX century by Müller and Worrel and later Mocsáry and Rösler. More recent studies of to the ants of Transylvania were carried out by Paraschivescu and additionally by Knechtel (Paraschivescu, 1983).

The valley of the Crişul Repede river is one of the previously studied regions of Romania. Mocsáry collected here and later Paraschivescu & Arcaşu published a checklist of the species occurring in the valley (Paraschivescu & Arcaşu, 1976). In this paper new data is offered to add to the knowledge of the valley's myrmecofauna.

Materials and methods

The sampling was carried out July 20-27 during the Crișul Repede Expedition. Eight sample-sites were chosen along the river from its spring to the Romanian-hungarian border, including one of its main affluent, the Drăgan Creek.

The sampling was made by collecting specimens from the ground and from nests. The specimens collected were preserved in 70° ethanol.

We considered it very important to deal in this study with the data of Paraschivescu & Arcașu (1976) and of Mocsáry (in Paraschivescu & Arcașu 1976) in order to produce a more precise checklist of the ants of the valley. We used only those data which refer strictly to the riverbank - sample-sites as Ciucea, Șuncuiuș, Vadu Crișului, Oradea - and we excluded those obtained elsewhere, far from the river - sampling sites Calata, Baile 1 Mai, Baile Felix (Paraschivescu & Arcașu 1976). Thus we now have data from 11 sample-sites situated along the river.

For determination of the species we used the keys of Collingwood (1979), Petrov & Collingwood (1993) and Seifert (1988, 1992).

Results and discussions

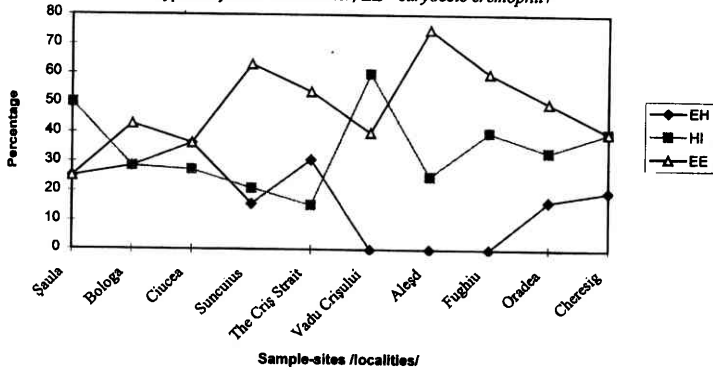
In this study 20 ant-species were recorded from the river valley, among them the *Formica balcanina* (Petrov & Collingwood 1993) and the *Myrmica hellenica* (Forel 1913) which were reported for the first time in Romania. Considering the checklist of the species presented by Paraschivescu & Arcașu (1976) which consists of 28 species occurring only along the river, 7 species are new for the fauna of the valley, increasing the number of species to 35. The *F. balcanina* species was possibly recorded by Paraschivescu & Arcașu as *Formica cinerea* Mayr since the former species was separated only in 1993 from the *F. cinerea* group, and according to our studies it is very common along the river, while the *F. cinerea* wasn't found by us. Considering this the total number of the known species is only 34 (Table 1.).

In order to characterize the riverbank of the Crișul Repede on the basis of the ants, we classified the species using Pittioni's ecofaunistical classification (in Móczár 1948) applied by Móczár (1948, 1953) to hymenopterans as ecological types. This classification was used by Gallé (1966, 1967, 1969) and Gallé & Gausz (1968).

The ecofaunistical types are as follows:

1.) stenoecic eremophil (SE) - mostly Mediterranean, rare species that prefer steppe-like, xerothermous habitats, up to 200 m.

Fig. 1.: The distribution of the different ecological types along the Crișul Repede river - excluding the Drăgăș Creek /EH - euryoecic hylophil, HI - hyperureyoecic intermediar, EE - euryoecic eremophil/

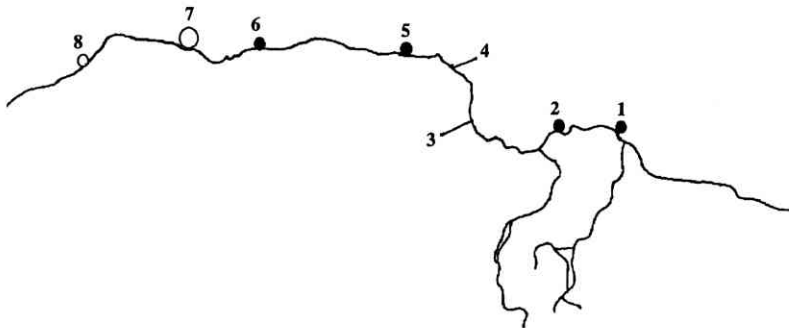


2.) euryoecic eremophil (EE) - species preferring warm and dry habitats, they are not so widespread, generalists in the planes and on the hillsides up to 600 m.

3.) hyperureyoecic intermediar (HI) - species with wide habitat-preferences, they occur approximately everywhere except the mountain forests;

4.) euryoecic hylophil (EH) - they prefer the pastures of the highlands, below 200 m they occur only in forests with raised humidity along the riverbanks or in swamps, they are not so frequent.

Fig. 2.: The distribution of the *F. balcanina* along the Crișul Repede river



1 - Bologa / 2 - Ciucea / 3 - the beginning of the Strait / 4 - the end of the Strait / 5 - Alcsd / 6 - Fughiu / 7 - Oradea / 8 - Cheresig (country border) / the dotted points + 3-4 - points where the *F. balcanina* was found

· 5.) stenoecic hylophil (SH) - species occurring mainly in mountains, or in habitats with raised humidity, from 300 m up.

Nevertheless the reliability of such categories could be questioned. For example, as the *Formica truncorum* is present (a typical stenoecic hylophil species) in a few forests of the Great Hungarian Plain (Gallé 1986, Markó 1997 unpubl.) which supposes the eremophil character of this species, we considered it to be useful in forming an adequate picture on the riverbank as the habitat of the species. The number of species collected doesn't allow us to precisely characterize the valley of the river on the basis of the ants' habitat preferences. However, we can still form a close picture on the changes in the composition of the myrmecofauna (Fig. 1.) determined by the changes of the riverbank.

Thus, due to the mountain character of valley of the Drăgan Creek the hylophil category is well represented (Table 2.). Here we have found the only stenoecic hylophil species, the *F. truncorum*. Nevertheless the eremophil and intermediary ecological types dominate. Close to the spring of the river we encounter the dominance of the eremophil and intermediar categories, but their presence slightly falls back as the river enters the Carpathians where the hylophil category strengthens. It is interesting how the hylophil species partly or entirely disappear at the two endpoints of the Crișul-Repede Strait, but between these, in the Strait itself, their presence gets stronger. Moreover, the Strait has one of the richest ant-faunas of the sample sites. Certainly it is the wide range of habitats that explains the richness of the Strait.

On leaving the Strait the riverbank gets its final plane-character and as such the proportion of the hylophil species decreases. Of course this is caused mostly by the open, woodless character of the riverbank.

As our study shows there is a slight inversion in the composition of the ant-fauna of the riverbank: while at the spring and at the end of the river the fauna is strongly dominated by eremophil and intermediar species which inhabit mostly the hillsides and the plane, the middle part of the river is characterized by the noticeable presence of the hylophil, mostly mountain or woodland species, although they still don't dominate.

Referring to the *F. balcanina*, which was reported for the first time in Romania, the five sample-sites (Fig. 2.) where the species' presence was observed currently constitutes the most northern points of its area. Formerly the species' presence was only reported from Serbia, Bulgaria, Greece and Turkey, but as it was described and separated from the *F. cinerea* species only in 1993 it could have been recorded in Romania under the name of *F. cinerea*, as possibly happened in the case of the Crișul Repede river valley (Paraschivescu & Arcașu, 1976).

The location of the five sample-sites on each side of the Carpathians brings up a possible explanation for the way it migrated from the Balkans to Transylvania. This species could easily spread from the Balkans to Oradea owing to the plane lying in between, and in its migration it could have used the riverbank of the Crișul Repede as a corridor when entering Transylvania. This could support Paraschivescu's idea (1976, 1978) that the Mediterranean species entered Transylvania using the banks and valleys of the rivers which

Table 1.: The ant-fauna of the Crişul Repede river-valley (summarized data) / * - sample-sites searched only by Paraschivescu & Arcaşu / ** - species collected by Paraschivescu & Arcaşu too / * - species collected only by Paraschivescu & Arcaşu.**

Ecological types	Species	The Drăgan Creek	Şaulia	Bologa	Ciucea	Şuncuiuş*	The Criş Strait	Vadu Crişului*	Aleşd	Fughiu	Oradea*	Chereşig
EH	<i>Myrmica rubra</i> ** (Linné)	X	X	X	X	X	X					
EH	<i>Myrmica ruginodis</i> Nyl.						X					X
EE	<i>Myrmica hellenica</i> Forel						X					
EH	<i>Manica rubida</i> *** (Latr.)					X						
EE	<i>Messor structor</i> *** (Latr.)				X			X			X	
HI	<i>Solenopsis fugax</i> *** (Latr.)					X		X				
EE	<i>Leptothorax unifasciatus</i> *** (Latr.)					X						
HI	<i>Tetramorium caespitum</i> ** (Linné)	X	X		X	X		X	X	X	X	X
HI	<i>Tetramorium forte</i> *** Forel										X	
HI	<i>Tetramorium semilaeve</i> ***, André										X	
EE	<i>Tapinoma erraticum</i> *** (Latr.)					X						
EE	<i>Plagiolepis pygmaea</i> *** (Latr.)					X						
EH	<i>Camponotus ligniperda</i> ** (Latr.)	X			X							
EH	<i>Camponotus herculeanus</i> *** (L.)				X							
EE	<i>Camponotus piceus</i> *** (Leach)					X					X	
EE	<i>Camponotus aethiops</i> *** (Latr.)										X	
EE	<i>Lasius alienus</i> ** (Foerst.)			X	X	X	X					
EE	<i>Lasius brunneus</i> ** (Latr.)					X	X				X	
HI	<i>Lasius niger</i> ** (L.)	X	X	X	X	X	X	X		X	X	X

Ecological types	Species	The Drăgan Creek	Șaulia	Bologa	Ciucea	Șuncuiuș*	The Criș Strait	Vadu Crișului*	Aleșd	Fughiu	Oradea*	Chereșig
EH	<i>Lasius platythorax</i> Seifert	X		X	X		X					
EE	<i>Lasius emarginatus**</i> (Ol.)	X				X	X		X	X	X	
EE	<i>Lasius umbratus***</i> (Nyl.)					X						
HI	<i>Lasius flavus**</i> (F.)	X				X						
HI	<i>Lasius fuliginosus**</i> (Latr.)			X	X		X					
EH	<i>Formica exsecta**</i> Nyl.					X	X					
EE	<i>Formica sanguinea</i> Latr.	X										
EE	<i>Formica rufibarbis**</i> Fabr.	X		X	X	X	X		X	X		X
EE	<i>Formica cunicularia**</i> Latr.		X			X	X					X
EE	<i>Formica cinerea***</i> Mayr				X	X		X			X	
EE	<i>Formica balcanina</i> Petrov & Collingwood			X	X		X		X	X		
EH	<i>Formica fusca***</i> L.										X	
SH	<i>Formica truncorum</i> Fabr.	X										
EE	<i>Formica pratensis**</i> Retz.	X				X						
EH	<i>Formica rufa***</i> L.										X	
EE	<i>Polyergus rufescens</i> (Latr.)	X										

Table 2.: The distribution of the ecological types on the different sample-sites on the basis of the summarized data. *ISH* - *stenoecic hylophil*, *EH* - *euryoecic hylophil*, *HI* - *hypereuryoecic intermediar*, *EE* - *euryoecic eremophil*

percentage	Șaula	Bologa	The Drăgan Creek	Ciucea	Șuncu- iuș	The Criș Strait	Vadu Crișului	Aleșd	Fughiu	Oradea	Chere- sig
SH%	–	–	8.3	–	–	–	–	–	–	–	–
EH %	25	28.5	25	36.3	15.7	30.7	–	–	–	16.6	20
HI%	50	28.5	25	27.2	21	15.3	60	25	40	33.3	40
EE%	25	42.8	41.6	36.3	63.1	53.8	40	75	60	50	40
number of species	4	7	12	11	19	13	5	4	5	12	5

cross the Carpathians. The bank of the river with its open, sun-exposed character could easily offer a perfect habitat to the *F. balcanina*.

This hypothesis of the *F. balcanina*'s migration also brings up the theory that under these conditions the river valley could have served as an ecological corridor for this species. As Gallé et al. (1995) defined: ecological corridors are habitat strips, which promote the exchange of flora and fauna elements by migration between quasi-natural habitats ("core areas"). Nevertheless the usage of this term in the case of the Crișul Repede river valley could be argued against, as we of yet have no evidence that West Transylvania is a core habitat for this species, and according to this it remains to be proven in the future whether the river valley acts as a real ecological corridor for the *F. balcanina* or it is just a simple habitat strip.

References

- Collingwood, C. A. (1979): The Formicidae (Hymenoptera) of Fennoscandia and Denmark. - Fauna Entomologica Scandinavica 8., Klampenborg, Denmark.
- Gallé, L. (1966): Ecological and zoocenological investigation of the Formicoidea fauna of the flood area of the Tisza river. - Tiscia (Szeged) 2: 113-118.
- Gallé, L. (1967): Ecological and zoocenological conditions of the Formicoidea fauna at Tiszakürt. - Tiscia (Szeged) 3: 68-73.
- Gallé, L. (1969): Myrmecological investigations in the environs of Kisköre. - Tiscia (Szeged) 5: 87-95.

- Gallé, L. (1986): The Ant Fauna of the Kiskunság National Park (Hymenoptera: Formicoidea).- in the Fauna of the Kiskunság National Park ed. by S. Mahunka.
- Gallé, L. & Gausz, J. (1968): Data for knowledge of the entomology of the Upper-Tisza district (Orthopteroidea and Formicoidea). - Tiscia (Szeged) 4: 83-101.
- Gallé, L., Margóczy, K., Kovács, É., Györffy, Gy., Körmöczy, L. & Németh, L. (1995): River valleys: are they ecological corridors? - Tiscia 29: 53-58.
- Móczár, L. (1948): Die Seehöhe und die ökologischen Gesichtspunkte in der Bezeichnung zoogeographischer Gebietseinheiten. - Fragm. Faun. Hung. 11: 85-89.
- Móczár, L. (1953): Bátorliget hártáyásszárnyú-faunája (Hymenoptera). - in Bátorliget élővilága ed. by Székessy Vilmos.
- Paraschivescu, D. (1978): Elemente balcanice în mirmecofauna R. S. România. -. Nymphaea (Oradea) 6: 463-474.
- Paraschivescu, D. (1983): Cercetări mirmecologice în unele localități din Munții Apuseni (Brad, Râsculița, Câmpeni, Abrud, Gârda). - Nymphaea (Oradea) 10: 255-262.
- Paraschivescu, D. & Arcașu, C. R. (1976): Mirmecofauna văii Crioului Repede. - Nymphaea (Oradea) 4: 161-167.
- Petrov, I. Z. & Collingwood, C. A. (1993): Formica balcanina sp. n. a new species related to the Formica cinerea-group (Hymenoptera: Formicidae). - Eur. J. Entomol. 90: 349-354.
- Seifert, B. (1988): A Taxonomic Revision of the Myrmica Species of Europe, Asia Minor, and Caucasia (Hymenoptera, Formicidae). - Abh. Ber. Naturkundemus. Görlitz 62, 3: 1-75.
- Seifert, B. (1992): A Taxonomic Revision of the Palearctic Members of the Ant Subgenus Lasius s. str. (Hymenoptera: Formicidae). - Abh. Ber. Naturkundemus. Görlitz 66, 5: 1-67.

Bálint Markó
Dept. of Ecology and Genetics
Babeş-Bolyai University
3400 Cluj
Romania