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Caddisflies (Trichoptera) of the Mecsek Mts., a low, isolated mountain range in South Hungary

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Abstract: Caddisflies (Trichoptera) of the Mecsek Mts., a low, isolated mountain range in South Hungary. A total of 89 species occur in the mountains. The fauna has an isolated character. An endemic taxon is *Chaetopteryx schmidi mecsekensis* NÓGRÁDI 1986 having relatives in the SE Alps and the Southern Carpathians. Balkanian and Alpin zoogeographical connections are shown besides the Central European and Palaearctic ones. 59 of all species are endangered, at different degrees. Two of them are protected by law.

Key words: caddisfly, Hungary, Mecsek Mountains, isolation, zoogeography, nature conservation.

Introduction

Mecsek Mountains is a low, isolated mountain range of South Hungary stretching over 350 square kilometres. Its maximum elevation does not exceed 700 metres, as the two highest peaks are 682 and 612 metres, respectively. It is surrounded by plains of the south, and low rolling regions in other directions, the latter do not reach 200-300 metres above sea level. The mountain range is geologically quite varied, it consists of mostly Jurassic and Cretaceous rocks: limestone, volcanic rocks at a few places, and slate. The most ancient parts developed in the Permian age: in these parts of the Western Mecsek Mountains there are red or grey sandstones. The surface has formed since the mesozoic.

The water network of limestone surfaces is not dense, elsewhere it is moderately dense. The water output of springs and streams is very low, many of them dry out in long, dry periods, owing to the relatively low annual precipitation (600...650 mm). [For example: the summer of the year 2003 was rather poor in rain, besides the temperature and evaporation was extremely high, thus more than half of the springs dried out, many larger streams also had a dry bed.]

The greatest part of the water network of the mountains belongs to that of Danube, and these streams mostly run to the north. Only a few small streams run to the south and belong to the Dráva watershed.

Examination of caddisflies in the Mecsek Mts.

Earlier only few, basically erroneous data were known on the caddisflies of the mountains, and their close environs were totally unknown. The systematic studies started only in the early eighties by the authors, and we have already published part of the results. First, Sára Nógrádi collected with lamp and by hand along a smaller brook running to the north in a deep valley, and found only 34 species there (NÓGRÁDI 1984).

Later we collected several times in the Eastern Mecsek Mountains with lamp, by hand and light trap, where we found altogether 66 species (NÓGRÁDI 1987, NÓGRÁDI & UHERKOVICH 1991). Besides, we also visited other parts of the mountains using lamp or light trap; results of these collections were published only in parts (NÓGRÁDI et al. 1985). In our book (NÓGRÁDI & UHERKOVICH 2002) presenting all the caddisflies of Hungary we took into consideration all known data from the Mecsek Mountains in the general distribution and ecology of species.

Results: list of collected species

In this chapter we present all the collected species in Table 1. No detailed data and sites are given, but the numbers of localities known from literature and from unpublished sources. We also give their general frequencies in Hungary (applying scores, see explanation under table) and the endangerment of species. Original field data were given by NÓGRÁDI (1984a, 1987), NÓGRÁDI et al. (1985), and NÓGRÁDI & UHERKOVICH (1990, 1991), respectively. Basically, we apply the system and nomenclature of BOTOSANEANU & MALICKY (1978), with some minor changes (NÓGRÁDI & UHERKOVICH 2002).

Table 1. Summary of caddisflies in Mecsek Mountains

Species	number of localities		*freq. in Hung.	endangerment
	literature	unpubl.		
<i>Rhyacophila fasciata</i> HAGEN 1859	12	4	2	endangered
<i>Rhyacophila hirticornis</i> MCLACHLAN 1879	3	4	5	**actually
<i>Rhyacophila tristis</i> PICTET 1834	4	4	4	endangered
<i>Synagapetus krawanyi</i> (ULMER 1938)	3	3	5	actually
<i>Synagapetus moselyi</i> (ULMER 1938)	7	3	4	endangered
<i>Orthotrichia costalis</i> (CURTIS 1834)	-	2	3	★
<i>Orthotrichia tragetti</i> MOSELY 1930	-	1	3	★
<i>Hydroptila dampfi</i> ULMER 1929	-	1	4	endangered
<i>Agraylea sexmaculata</i> CURTIS 1834	3	2	3	★
<i>Philopotamus variegatus</i> (SCOPOLI 1763)	4	1	5	endangered
<i>Wormaldia occipitalis</i> (PICTET 1834)	5	5	4	vulnerable
<i>Hydropsyche angustipennis</i> (CURTIS 1834)	5	3	2	★
<i>Hydropsyche bulbifera</i> MCLACHLAN 1878	2	-	3	vulnerable

Species	number of localities		*freq. in Hung.	endangerment
	literature	unpubl.		
<i>Hydropsyche bulgaromanorum</i> MALICKY 1977	6	4	1	★
<i>Hydropsyche contubernalis</i> MCLACHLAN 1865	11	7	1	★
<i>Hydropsyche fulvipes</i> (CURTIS 1834)	5	-	5	endangered
<i>Hydropsyche guttata</i> ULMER 1834	1	-	5	vanished
<i>Hydropsyche modesta</i> NAVÁS 1925	2	2	2	★
<i>Hydropsyche ornata</i> MCLACHLAN 1878	2	2	3	vulnerable
<i>Hydropsyche pellucidula</i> (CURTIS 1834)	1	-	2	★
<i>Hydropsyche saxonica</i> MCLACHLAN 1884	8	4	2	endangered
<i>Neureclipsis bimaculata</i> (LINNAEUS 1758)	6	6	1	★
<i>Plectrocnemia brevis</i> MCLACHLAN 1871	6	3	4	endangered
<i>Plectrocnemia conspersa</i> (CURTIS 1834)	12	10	3	vulnerable
<i>Plectrocnemia minima</i> KLAPÁLEK 1899	1	1	5	actually
<i>Holocentropus picicornis</i> (STEPHENS 1836)	2	3	4	★
<i>Polycentropus irroratus</i> CURTIS 1834	2	3	5	actually
<i>Cyrnus crenaticornis</i> (KOLENATI 1859)	-	1	3	★
<i>Lype phaeopa</i> (STEPHENS 1836)	3	-	3	vulnerable
<i>Lype reducta</i> (HAGEN 1868)	5	6	4	vulnerable
<i>Tinodes pallidulus</i> MCLACHLAN 1878	2	1	5	endangered
<i>Tinodes unicolor</i> (PICTET 1834)	4	2	4	endangered
<i>Ecnomus tenellus</i> (RAMBUR 1842)	4	7	1	★
<i>Agrypnia varia</i> (FABRICIUS 1793)	3	2	3	vulnerable
<i>Phryganea grandis</i> LINNAEUS 1758	6	1	3	vulnerable
<i>Hagenella clathrata</i> (KOLENATI 1848)	1	-	5	endangered
<i>Brachycentrus subnubilus</i> (CURTIS 1834)	1	-	4	endangered
<i>Ironoquia dubia</i> (STEPHENS 1837)	5	-	3	vulnerable
<i>Limnephilus affinis</i> CURTIS 1834	9	6	4	★
<i>Limnephilus auricula</i> CURTIS 1834	11	6	4	★
<i>Limnephilus bipunctatus</i> CURTIS 1834	7	3	3	★
<i>Limnephilus decipiens</i> (KOLENATI 1848)	3	-	4	★
<i>Limnephilus extricatus</i> MCLACHLAN 1865	3	2	3	vulnerable
<i>Limnephilus flavicornis</i> (FABRICIUS 1787)	9	2	2	★
<i>Limnephilus griseus</i> (LINNAEUS 1758)	6	2	3	★
<i>Limnephilus hirsutus</i> (ULMER 1834)	3	2	4	vulnerable
<i>Limnephilus ignavus</i> MCLACHLAN 1865	6	3	2	vulnerable
<i>Limnephilus incisus</i> CURTIS 1834	1	4	3	★

Species	number of localities		*freq. in Hung.	endangerment
	literature	unpubl.		
<i>Limnephilus lunatus</i> CURTIS 1834	12	7	1	★
<i>Limnephilus rhombicus</i> (LINNAEUS 1758)	6	2	2	★
<i>Limnephilus sparsus</i> CURTIS 1834	9	3	3	vulnerable
<i>Limnephilus vitatus</i> (FABRICIUS 1798)	10	4	2	★
<i>Limnephilus xanthodes</i> CURTIS 1834	-	1	5	endangered
<i>Grammotaulius nigropunctatus</i> (RETZIUS 1783)	13	4	2	★
<i>Glyptotaelius pellucidus</i> (RETZIUS 1783)	7	7	2	★
<i>Anabolia furcata</i> BRAUER 1857	6	6	3	★
<i>Potamophylax luctuosus</i> (PILLER & MITTERPACHER	3	-	5	actually
<i>Potamophylax nigricornis</i> (PICTET 1834)	9	4	3	vulnerable
<i>Potamophylax rotundipennis</i> (BRAUER 1857)	4	2	3	vulnerable
<i>Halesus tessellatus</i> (RAMBUR 1842)	5	2	2	vulnerable
<i>Stenophylax meridionalis</i> MALICKY 1980	15	8	3	vulnerable
<i>Stenophylax permistus</i> MCLACHLAN 1895	11	4	1	vulnerable
<i>Micropterna lateralis</i> (STEPHENS 1837)	-	1	2	endangered
<i>Micropterna nycterobia</i> MCLACHLAN 1875	-	2	4	vulnerable
<i>Micropterna sequax</i> MCLACHLAN 1875	6	1	4	vulnerable
<i>Chaetopteryx fusca</i> BRAUER 1857	-	1	4	endangered
<i>Chaetopteryx major</i> MCLACHLAN 1876	20	9	3	vulnerable
<i>Chaetopteryx schmidi mecsekensis</i> NÓGRÁDI 1986	12	6	4	actually
<i>Lithax obscurus</i> (HAGEN 1859)	14	13	3	vulnerable
<i>Silo pallipes</i> (FABRICIUS 1781)	5	1	3	endangered
<i>Crunoecia irrorata</i> (CURTIS 1834)	1	-	4	endangered
<i>Athripsodes aterrimus</i> (STEPHENS 1836)	1	1	3	★
<i>Athripsodes bilineatus</i> (LINNAEUS 1758)	1	-	5	endangered
<i>Ceraclea alboguttata</i> (HAGEN 1860)	3	2	3	vulnerable
<i>Ceraclea annulicornis</i> (STEPHENS 1836)	-	1	4	endangered
<i>Ceraclea dissimilis</i> (STEPHENS 1836)	5	7	1	★
<i>Ceraclea fulva</i> (RAMBUR 1842)	-	2	5	actually
<i>Ceraclea senilis</i> (BURMEISTER 1839)	1	-	3	vulnerable
<i>Mystacides niger</i> (LINNAEUS 1758)	-	1	3	vulnerable
<i>Oecetis furva</i> (RAMBUR 1842)	1	3	2	★
<i>Oecetis lacustris</i> (PICTET 1834)	-	3	2	vulnerable
<i>Oecetis notata</i> (RAMBUR 1842)	-	2	2	vulnerable
<i>Oecetis ochracea</i> (CURTIS 1825)	3	5	1	★

Species	number of localities		*freq. in Hung.	endangerment
	literature	unpubl.		
<i>Setodes punctatus</i> (FABRICIUS 1793)	4	3	3	vulnerable
<i>Leptocerus tineiformis</i> CURTIS 1834	2	4	2	★
<i>Notidobia ciliaris</i> (LINNAEUS 1761)	1	1	4	endangered
<i>Beraea pullata</i> (CURTIS 1834)	5	2	4	endangered
<i>Beraeodes minutus</i> (LINNAEUS 1761)	-	5	5	vulnerable
<i>Ernodes articularis</i> (PICTET 1834)	1	1	4	actually

Actually endangered and vanished species are shown in *bold italics*.

* frequency in Hungary: 1 = common (1001-5000 Hungarian data); 2 = very frequent (501-1000); 3 = frequent (151-500); 4 = not rare (51-150); 5 = rare/very rare (1-50 data); ** actually = actually endangered, ★ = not endangered in Hungary

Discussion

- Up to recent days we have known the occurrence of 89 caddisfly species from Mecsek Mountains. Thus, we may consider a region relatively poor in caddisflies. For example, we have to mention that 97 species are known from the small Kőszeg (Günser) Mountains (NÓGRÁDI & UHERKOVICH 1992); while 108 species from the Bükk Mountains and from Aggtelek National Park (both in North Hungary, NÓGRÁDI et. al. 1996, 1999). The number of species can be very high in some lower regions, e.g. along the Dráva (Drau) river we found 107 species (NÓGRÁDI & UHERKOVICH 1998), while in the Szigetköz (NE Hungary) we have captured 88 species until recently (UHERKOVICH & NÓGRÁDI 2001 and unpublished). The Szatmár-Bereg Plain (NE Hungary) proved to be the richest region of the Great Hungarian Plain, with 74 species occurring there (UHERKOVICH & NÓGRÁDI 1988).
- As early as in the beginning of our trichopterozoological examinations it came to light that a formerly undescribed taxon lives in Mecsek Mountains. It was introduced under the name *Chaetopteryx schmidi mecsekensis* NÓGRÁDI 1986 (MALICKY et. al 1986). This taxon – a subspecies of a very dynamically developing species occurring in the Southeastern Alps and in the Southern Carpathians – survived in an isolated place and it developed as an independent subspecies. The population of this flightless species cannot be related with the others, thus it developed in its own way and has adapted to the factors of this environment: small, cool, permanent afforested valley mostly on limestone. Quite probably, a very close relative (or the same taxon) was found in recent years in Croatia; as revealed by Malicky's personal communication not long ago. Maybe these two populations had a common area in the past, but some thousand years ago it was divided into two parts by the change of climate and vegetation. It could have got isolated from other subspecies (*Ch. schmidi schmidi* BOTOSANEANU 1957, *Ch. schmidi noricum* MALICKY 1976) earlier.

The survival of this endemism was possible due to the high adaptation capacity of these populations, the continuous forest cover, the relatively cool and moderate, balanced climate. Recently this species is strictly protected, the nature conservation

authority tries to be careful about its biotopes. Many small metapopulations live in the area, and during our last visit (November 2003) we still saw many adults crawling along the brooks and springs.

Since it is an endemism, we consider it to be the most valuable member of the Hungarian caddisfly fauna.

3. Besides the above taxon, further three species were found for the first time in the Mecsek Mountains. The first Hungarian *Synagapetus krawanyi* adults were swept here (NÓGRÁDI 1984b), and later it was collected in the Kőszeg Mountains (NÓGRÁDI, UHERKOVICH 1989). The first Hungarian *Potamophylax luctuosus* and *Plectrocnemia minima* individuals were collected also in Mecsek Mountains (NÓGRÁDI 1984b, 1992). While *P. luctuosus* was found later in the Kőszeg Mountains, moreover along the Dráva (Drau) river (cf. NÓGRÁDI & UHERKOVICH 1998), the extremely rare, Eastern Balkanian *P. minima* was collected again after eight years, again only a male, in another site not far from the first catch (NÓGRÁDI 1998).
4. Many species live in Mecsek Mountains which are well distributed in other mountainous regions, but they do not occur in any site of South Transdanubia. Such species are: *Rhyacophila hirticornis*, *Rhyacophila tristis*, *Synagapetus mosely*, *Philopotamus variegatus*, *Wormaldia occipitalis*, *Hydropsyche fulvipes*, *Hydropsyche guttata*, *Plectrocnemia brevis*, *Tinodes unicolor*, *Silo pallipes* and *Athripsodes bilineatus*: old data). The majority of them lives in other mountains of Hungary (Bükk, Mátra, Bakony, Kőszeg, Börzsöny, Zemplén Mountains), but not in lower elevations and in plains.

These 11 enumerated species – together with further three species presented in the previous chapters – show the faunal isolation of the mountain.

5. We collected many caddisflies by light traps on the southern, dry slopes, far from all waters during the last two decades. The mobility (active or passive ability of displacement) of certain caddisfly species is illustrated by the fact that we detected 35 species in such sites. Some of the species were on wing in the beginning or in the end of the summer diapause (aestivation): these species belong to the limnephilids and phryganeids. Many species are incapable of longer, active flight, but they can be swept by the wind from their hatching biotope (leptocerids, hydropsychids, polycentropodids). We collected in another, small mountainous range, in Villány Hills (south of Mecsek) which does not have its own water courses; there we found 50 species. Many of these species, too, were immigrant (NÓGRÁDI 2000).

The widespread forests and caves of Mecsek Mountains provide important shelter for species which have a summer diapause. Some of these species – mostly limnephilids – develop in the low elevations far from the mountains, but during the summer they can only survive the hot, dry weather in forests and caves.

6. The extension, height and environments of the mountains do not allow for a rich fauna. The water courses in its environments are regulated and polluted, and thus has rather poor caddisfly assemblages. The chance of immigration from these waters is rather small. Most water courses of Mecsek have maintained their original condition. Some larger springs of the northern parts have been captured for the urban drinking-

water network, the bed of the streams under these springs is often dry (e.g. Nagy-Mély-völgy – see NÓGRÁDI 1984a – or Orfű, Vízfő Spring). The smaller brooks of the southern slopes of Central Mecsek Mountains have disappeared as a consequence of the intensive expansion of the inhabited area of Pécs.

Zoogeographical connections

Most of the species living in the Mecsek mountains are Palaearctic, West-Palaearctic or Central European elements. The majority of them lives all over the country and they are not characteristic from a zoogeographical aspect.

However, some species are very characteristic. Two species – *Rhyacophila hirticornis* and *Synagapetus krawanyi* – show southeastern Alpin connection. They do not occur between the Alps (Kőszeg Mountains) and Mecsek Mountains and they have their southeasternmost occurrence here. *Plectrocnemia minima* has another typical connection: it is an Eastern Balkanian species, here it has its northwesternmost, very isolated occurrence. Another characteristic species is *Potamophylax luctuosus*, which has an Illyrian (West Balkanian)–Southeastern Alpin area. Some of the MALICKY's (1983) "dinodal" species also occur here, these are characteristic elements of Central European mountainous streams.

Table 2. Zoogeographic connections of the caddisfly fauna of Mecsek Mts.

Influences	Endemic	Balkanian	S, SE Alpin	C. European or wider distribution
Examples	<i>Chaetopteryx schmidi mecsekensis</i>	<i>Plectrocnemia minima</i> <i>Potamophylax luctuosus</i>	<i>Synagapetus krawanyi</i> <i>Rhyacophila hirticornis</i>	all other species belonging to various distribution types

About the nature conservation of caddisflies of the Mecsek Mountains

Earlier we have already dealt with the endangerment of Hungarian caddisflies (NÓGRÁDI & UHERKOVICH 1999). Since that time we have somewhat modified the content of those categories. In Mecsek Mountains one species has become extinct, as suggested by the fact that it was not collected during the past twenty years. Eight species have small and actually endangered populations, some of them having isolated occurrence in the mountains. Further 21 species are endangered, and 29 are vulnerable (Table 2).

Two taxa are protected by law. *Chaetopteryx schmidi mecsekensis* is an endemic taxon of the mountains, it has some isolated occurrences in northern, afforested valleys. Very probably it is a postglacial relict having relatives (other subspecies) in the Southeastern Alps and the Southern Carpathians. As it is the single endemic caddisfly of Hungary, it is strictly protected.

Plectrocnemia minima has a relatively small area in Romania and Bulgaria, with minor populations. In Hungary it lives only in the Eastern Mecsek Mts., where only two males were found.

Table 3. The number of caddisfly species of Mecsek Mountains, sorted by their endangerment

degree of engangerment	number of species	some examples
extinct, or vanished	1	<i>Hydropsyche guttata</i>
actually endangered	8	<i>Plectrocnemia minima</i> , <i>Polycentropus irroratus</i> , <i>Potamophylax luctuosus</i> , <i>Synagapetus krawanyi</i>
endangered	21	<i>Plectrocnemia brevis</i> , <i>Crunoecia irrorata</i> , <i>Hydropsyche fulvipes</i>
vulnerable	29	<i>Hydropsyche bulbifera</i> , <i>Lype reducta</i> , <i>Limnephilus hirsutus</i>
not threatened	30	<i>Orthotrichia costalis</i> , <i>Limnephilus affinis</i> , <i>Ceraclea dissimilis</i>

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