

# The Orthoptera fauna of the Villány Hills (South Hungary)

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NAGY, A. & NAGY, B.: The Orthoptera fauna of the Villány Hills (South Hungary)

**Abstract.** Based on earlier papers and collections 45 species (21 *Ensifera* and 24 *Caelifera*) – among them 7 are protected by law – were detected in the hills. This fauna can be characterised by high ratio (65.6%) of the southern (e.g. Mediterranean, Ponto-Mediterranean) elements, because of the strong submediterranean effect on this region. Most of these species are endangered by different habitat disturbances (mining, surface-fire, agriculture).

## Introduction

Although there are some publications and collected (untreated) materials on the Orthoptera fauna of the Villány Hills which is the southernmost situated hills in Hungary, and those were not summarised up to the present. The purpose of this paper is to give a summary on the Orthoptera fauna of this region based on this material presented by a number of researchers as detailed below.

One of the earliest data mentions the presence of *Myrmecophilus acervorum* at Nagyarsány (CSIKI 1905). The second author of this paper made several collecting-surveys in 1958, 1964, 1965, 1966, 1981 and 1985 on the Szársomlyó, the Fekete and the Tenkes hills. These results were published on the *Isophya modesta* (NAGY, B. 1974) and *Saga pedo* (NAGY, B. et al. 1983) but the rest of his data are unpublished. RÁCZ & VARGA (1985) studied the Orthoptera fauna between 1968 and 1971. They made a comparison between the Mecsek and the Villány Hills. They found only 19 species, because of the relatively late collections (September). Their sampling sites were destroyed by the mining since then. J. MAJER made repeated collections on the Szársomlyó in 1988 (and partly in 1991) and he put his material at our disposal. The first author of this paper have been studying the Orthoptera fauna of 15 sampling sites (Fig. 1) since 1997 regularly. The first part of these results were already published (NAGY, A. 1999).

## Material and methods

The Villány Hills is situated in South Hungary, close to the Hungarian-Croatian border. It represents the southernmost isolated member of the Hungarian Middle Mountains. It is East-West oriented low range, about 23 km long and 2-3 km wide. The highest peaks are about 400-450 m (Fig. 1). The Szársomlyó (Hársány Hill) and the Fekete Hill are protected areas of the Duna-Dráva National Park. The geographical, geological and climatic situation can be found at MAROSI & SOMOGYI (1990), MARGITTAI (1977), LOVÁSZ (1977) and HORVÁTH & PAPP (1964).



Fig. 1. Map of the Villány Hills with the location of the 15 sampling sites investigated by NAGY, A.

The most important habitats for the Orthoptera species are on the southern slopes. The steep slopes built of limestone and dolomite are covered by open rocky grassland (*Sedo sopiana*-*Festucetum dalmaticae*). The *Chrysopogono-Festucetum dalmaticae* association is situated on less steep dolomite slopes of the Tenkes and the Csukma. These rocky grasslands are often mixed with shrubs. *Inulo spiraeifoliae-Brometum panonicum* rocky grassland can be found only on the top of the Szársomlyó in northern exposure (DÉNES 1998). Steppe grassland (*Cleistogeni-Festucetum rupicola*) is situated on the hillfoots and plateaus on loess soil. The southern slope of the Szársomlyó is partly covered by karst shrubforest (*Inulo spiraeifoliae-Quercetum pubescentis*) that is mixed with rocky grassland. The closed plant association of the southern slope of the Fekete Hill, the Tenkes and the Csukma is oak forest (*Orno-Quercetum pubescentis*). Shrubforest can be found also on the Fekete Hill (DÉNES 1995). It is worth mentioned that the most of this area have been planted by vineyards for centuries.

The collector works had two main sources. There were several occasional samplings through the years mentioned in the Introduction, which resulted in some valuable faunistic data. Systematic samplings were made on the Szársomlyó by J. MAJER in 1988 (unpublished) and mostly by the first author of this paper in 1997-1998 (NAGY, A. 1999) and 1999-2000.

Samplings were made predominantly by sweep-netting supplemented by capturing single specimens. We followed HARZ (1969, 1975) for identification and HELLER et al. (1998) for nomenclature. In order to defend the populations the living specimens collected especially in the last years were released at site after the identification.

The collected material was investigated on various ways according to the researchers. Larvae collected in the early season (April, May) were reared up to imagoes in order to make determination easier and more certain. The dried (prepared and pinned) and wet materials are preserved partly at the Plant Protection Institute (Budapest) and partly at the Department of Zoology and Human Biology (University of Debrecen).

## Results and discussion

### The Orthoptera fauna

45 Orthoptera species of two orders (21 *Ensifera* and 24 *Caelifera*) have been found up to the present (Table 1). This number – in comparison with other members of the Hungarian Middle Mountains – is relatively low according to the limited number of habitats with small dimensions. The nearly total missing of wet and semi-wet grasslands is the most important character of this region. For this reason the number and relative frequency of the species living in such habitats are low. The sampling of the grasslands of the hillfoots and the northern slopes may result in some hygrophylous species too.

The areas of the steppe grasslands and the rocky grasslands are getting smaller according to the expanding weedy shrubs on the hillfoots. Some of the species known earlier are disappeared (e.g. *Acrida ungarica* and *Acrotylus insubricus* from the Szársomlyó).

The occurrence of *Chorthippus eisentrauti* seems to be uncertain. It could be *Chorthippus biguttulus hedickei* as well because the males of the two species are hardly differentiable so it needs further investigations.

### Biogeographical analysis

Most of the Orthoptera species of the region can be divided into two major faunistic types: the Siberian and the Mediterranean spreading circles. South-western boundaries of the area of Siberian elements tend to the southern boundary of the steppe zone, and these are the northern boundaries of the Mediterranean elements and the Mediterranean climatic zone (Adamovic line) (RÁCZ 1998a, NAGY, A. 1999). This idea substantially corresponds to the concept of UVAROV (1929) concerning the origin of Orthoptera fauna of the Palearctic and Europe. These boundaries cross through Hungary, therefore elements of both major faunistic types can be found. The ratio of the Mediterranean elements is the highest in South Hungary, because of the strong submediterranean climatic and faunistic effects on this region. These effects are observable e.g. on Mollusca (SÓLYMOS 1996), Noctuidea (VARGA & GYULAI 1978) and higher plants (DÉNES 1995). The ratio of southern elements (Ponto-, Holo-, Extra-, Nord-, European-Mediterranean, Balcanic, Balcanic-Moesian, Dacian and Ponto-Caspian) of the Orthoptera fauna – considering relative frequency of species – is 65.6 % in the average of the last four years (Fig. 2). The most important members of this biogeographical type are the Ensiferan *Isophya modesta*, *I. modestior*, *Phaneroptera nana*, *Poecilimon fussi* (Fig. 4), *Saga pedo*, *Rhacocleis germanica* and the Caeliferan *Acrida ungarica*, *Pezotettix giornae*, *Odontopodisma decipiens* (Fig. 3), *Ailopus strepens*, *Acrotylus insubricus*. Some of these species might occur even in the northern regions of the Hungarian Middle Mountains, but their ratio is much lower [e.g. in the Aggtelek Karst 47.1% (RÁCZ et al. 1996), in the Bükk Mountains about 40.0% (NAGY, B. & RÁCZ 1996) and in the Bakony Mountains 47.5% (RÁCZ 1979)].

The Siberian spreading circle is represented by Angarian faunal elements (e.g. *Caliptamus italicus*, *Stenobothrus lineatus* etc.). Besides this two major groups there are other faunal groups (Siberian- and European-Polycentric and Polycentric) as well, but the ratio of these are very low.

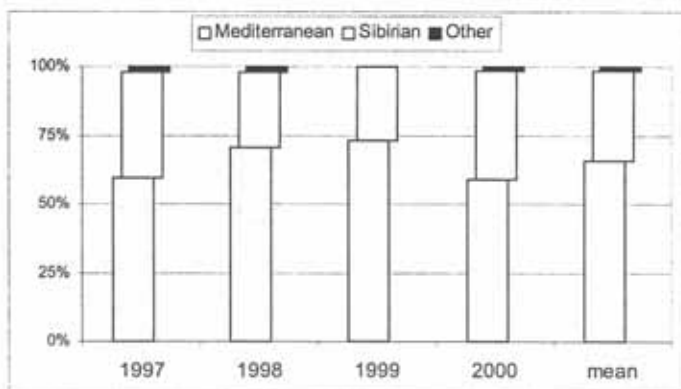


Fig. 2 The distribution of faunal types from 1997 to 2000. The data was calculated on the basis of relative frequencies of the species.

The Mediterranean (southern) circle is represented by Ponto-, Holo-, Extra-, Nord-, European-Mediterranean, Balcanic, Balcanic-Moesian, Dacian and Ponto-Caspian, the Siberian is represented by Angarian and Siberian-Polycentric and the others are European-Polycentric and Polycentric



Fig. 3 *Odontopodisma decipiens* (male), one of the Mediterranean elements in the Villány Hills.  
Photo by Nagy, A.

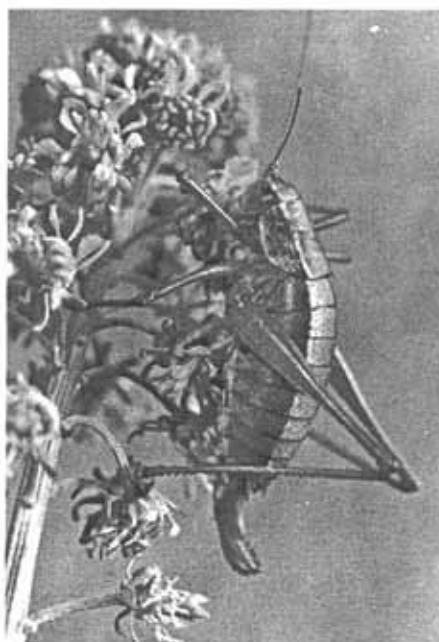


Fig. 4 *Poecilimon fussi* (male), other example of the Mediterranean elements in the Villány Hills.  
Photo by Nagy, B.

## Orthoptera assemblages

The Orthoptera assemblages of different habitats are hardly determined on account of the difference between the climate of consecutive years and the quick phenological changes. The low number of captured individuals makes the quantitative analyses false. Contrary to these difficulties Orthoptera assemblages can be established on the basis of the available data and field experiences (Table 2).

The Orthoptera assemblages of the different habitats changed during the time of investigation. Namely, some species (e.g. *Acrotylus insubricus*, *Acrida ungarica*, *Oedealus decorus*) became rare or seems to be totally disappeared in the latter years.

## Phenology

We could not give a complete picture of the phenology of all species occurring in the Villány Hills, however an approximate sketch is possible. The most of the species can be divided into three groups: species overwintering as imagoes, early species and late species (Table 3). Early species hatch out in March and April, while late species hatch in May and June.

## Relation to the surrounding mountainy areas

The investigation of the Orthoptera fauna of the surrounding regions of the Villány Hills are far not complete.

Disregard the Drávaszög, where mesohygrophyllous and hygrophyllous elements play important role (PONGRÁCZ 1944), an obvious comparison can be made between the Villány Hills and the Mecsek Mountains as RÁCZ & VARGA (1985) made it in their paper. On the basis of the Orthoptera assemblages they demonstrated the separation of the Villány Hills.

Until now not a single distinctive species was found characteristic to the Villány Hills but there are some for the Mecsek Mountains (Table 4).

## Relation to the nature conservation

In spite of the relatively low number of Orthoptera species in this area, there are numerous zoogeographically valuable elements among them. The number of law protected Orthoptera species in Hungary is 24. Seven of them occur in the Villány Hills which takes 29.2% of all the protected grasshoppers and 15.6% of the Orthoptera fauna of the Hills. These species are the followings: Ensiferans: *Isophya modestior*, *Isophya modesta*, *Isophya brevipennis*, *Poecilimon fussi*, *Saga pedo* and Caeliferans: *Ailopus strepens*, *Acrida ungarica*.

Further zoogeographically valuable Mediterranean, Ponto-Mediterranean and/or Balcanic species – which are not penetrating to northward from the Carpathian Basin – are: Ensiferans: *Pachytrachys gracilis*, *Rhacocleis germanica* and Caeliferans: *Pezotettix giornae*, *Oedealus decorus*, *Acrotylus insubricus*.

The Szársomlyó is a conservation area since 1944, mainly because of the exclusive occurrence of the *Colchicum hungaricum* (Janka) in Hungary. The establishment of other conservation areas (the Tenkes and the Csukma hills) are going on.

The main threats for most of the Orthoptera species are the parcelling of the fields by agriculture (especially vineyards) and the occasional burning down of the grasslands and shrubs (e.g. the Szársomlyó was partly burned twice in 2000). Grasshoppers (and other insects) laying their eggs in plant stem are mainly destroyed by these fires. Until now there have not been exact data on the effect of large-scale using of insecticides in the vineyards. The cultivated areas are often make mosaic with natural and/or seminatural habitats (grasslands, shrubforests) and accidental insecticide pollutions can diminish and even destroy insect populations.

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**Table 1 The Orthoptera species of the Villány Hills arranged according to the time of samplings and collectors.**

For the sequence of species and nomenclature RÁCZ (1998b) and HELLER et al. (1998) were followed. NB1: NAGY, B. in 1958 (on the Szársomlyó and the Fekete Hill), NB2: NAGY, B. in 1964-66 (on the Fekete Hill), NB3: NAGY, B. in 1985 (on the Szársomlyó); R&V: RÁCZ & VARGA (1985) in 1968-71 (on the Szársomlyó); NA: NAGY, A. since 1997 (in the Villány Hills),

\*: collected by VADKERTI, E. in 2000; \*\*: CSIKI (1905); \*\*\*: see the text about this.

	NB 1	NB 2	NB 3.	R&V	MJ	NA
<b>Ensifera</b>						
<i>Phaneroptera falcata</i> (Poda, 1761)	+	-	-	-	-	-
<i>Phaneroptera nana</i> Fieber, 1853	+	+	-	+	-	+
<i>Isophya modestior</i> Brunner von Wattenwyl, 1882	-	+	-	-	-	+
<i>Isophya modesta</i> (Frivaldsky, 1867)	-	+	-	-	-	+
<i>Isophya brevipennis</i> Brunner von Wattenwyl, 1878	+	+	-	-	-	-
<i>Barbitistes serricauda</i> (Fabricius, 1798) *	-	-	-	-	-	-
<i>Leptophyes albovittata</i> (Kollar, 1833)	+	+	-	-	+	+
<i>Poecilimon fussi</i> Brunner von Wattenwyl, 1878	-	+	-	-	-	-
<i>Meconema thalassinum</i> (DeGeer, 1773)	-	-	-	-	-	+
<i>Tettigonia viridissima</i> Linnaeus, 1758	-	-	-	-	+	+
<i>Decticus verrucivorus</i> Linnaeus, 1758	-	-	-	-	+	-
<i>Platycleis grisea</i> (Fabricius, 1781)	+	+	+	+	+	+
<i>Metrioptera bicolor</i> (Philippi, 1830)	-	-	-	-	+	+
<i>Pholidoptera fallax</i> (Fischer, 1853)	-	-	-	+	-	+
<i>Pholidoptera griseoptera</i> (DeGeer, 1773)	+	+	-	-	-	+
<i>Pachytrachys gracilis</i> (Brunner von Wattenwyl, 1861)	+	+	-	-	-	+
<i>Rhacocleis germanica</i> Herrich-Schaeffer, 1840	+	+	+	-	+	+
<i>Saga pedo</i> (Pallas, 1771)	-	+	-	-	-	+
<i>Ephippiger ephippiger</i> (Fiebig, 1784)	-	+	-	-	-	+
<i>Myrmecophilus acervorum</i> (Panzer, [1799]) **	-	-	-	-	-	-
<i>Oecanthus pellucens</i> (Scopoli, 1763)	+	+	-	+	+	+
<b>Caelifera</b>						
<i>Pezotettix giornae</i> (Rossi, 1794)	+	+	+	+	+	+
<i>Odontopodisma decipiens</i> Ramme, 1951	+	+	-	-	-	+
<i>Calliptamus italicus</i> (Linnaeus, 1758)	+	-	+	+	+	+
<i>Oedaleus decorus</i> (Germar, 1826)	+	-	-	-	+	-
<i>Oedipoda caerulea</i> (Linnaeus, 1758)	+	-	+	+	+	+
<i>Acrotylus insubricus</i> (Scopoli, 1786)	+	-	-	+	-	-
<i>Aiolopus strepens</i> (Latrielle, 1804)	-	-	-	-	-	+
<i>Acrida ungarica</i> (Herbst, 1786)	+	-	-	+	-	-
<i>Euthystira brachyptera</i> (Ocskay, 1826)	-	-	-	-	-	+
<i>Stenobothrus lineatus</i> (Panzer, 1796)	+	+	-	+	+	+
<i>Omocestus rufipes</i> (Zetterstedt, 1821)	+	-	+	+	-	+
<i>Omocestus haemorrhoidalis</i> (Charpentier, 1825)	-	-	-	+	+	+
<i>Omocestus petraeus</i> (Brisout, 1855)	+	-	-	-	-	-
<i>Chorthippus biguttulus hedickei</i> (Ramme) 1942	+	-	+	+	+	+
<i>Chorthippus brunneus</i> (Thunberg, 1815)	+	-	-	+	-	+
<i>Chorthippus mollis</i> (Charpentier, 1825)	+	-	+	+	+	+
[ <i>Chorthippus eisentrauti</i> (Ramme, 1931)] ***	-	-	-	+	-	-
<i>Chorthippus dorsatus</i> (Zetterstedt, 1821)	+	-	-	-	-	+
<i>Chorthippus parallelus</i> (Zetterstedt, 1821)	+	+	-	+	-	+
<i>Euchorthippus declivus</i> (Brisout de Barneville, 1849)	+	-	+	-	+	+
<i>Gomphocerippus rufus</i> (Linnaeus, 1758)	+	-	-	-	-	+
<i>Tetrix subulata</i> (Linnaeus, 1758)	-	-	+	-	-	+
<i>Tetrix bipunctata</i> (Linnaeus, 1758)	-	-	-	-	-	+
<i>Tetrix tenuicornis</i> Salberg, 1893	-	+	-	-	-	-



Table 2 Approximate occurrence and distribution of Orthoptera species among the different habitats in the Villány Hills. The species bracketed were not sampled in the latter years.

	Karst shrubforest mixed with rocky grassland	Steppe grassland	Rocky grassland	Disturbed habitats
Common	<i>Pezotettix giornae</i> <i>Stenobothrus lineatus</i>		<i>Calliptamus italicus</i> <i>Oedipoda caerulescens</i>	
Scattered	<i>Euchorthippus declivus</i>			
			<i>Platycleis grisea</i>	
	<i>Oecanthus pell.</i> , <i>Rhacocleis ger.</i>		<i>(Acrotylus insubricus)</i>	
		<i>(Acrida ungarica)</i>	<i>Chorthippus brunneus</i> , <i>C. biguttulus h.</i>	
Rare	<i>Isophya modesta</i> <i>Leptophyes albovittata</i> <i>Omocestus rufipes</i> <i>Chorthippus paralellus</i>			
	<i>(P. falcata)</i> <i>P. nana</i> <i>I. modestior</i> <i>(I. brevipennis)</i> <i>(P. fussi)</i> <i>M. thalassinum</i> <i>T. viridissima</i> <i>P. griseoaptera</i> <i>P. gracilis</i> <i>E. ephippiger</i> <i>O. decipiens</i> <i>E. brachyptera</i> <i>G. rufus</i> <i>T. subulata</i> <i>T. bipunctata</i>	<i>Metrioptera bicolor</i>  <i>Saga pedo</i>	<i>Chorthippus mollis</i> <i>Chorthippus dorsatus</i> <i>(Oedaleus decorus)</i> <i>(Tetrix tenuicornis)</i>	
Occasional	<i>Pholidoptera fallax</i> <i>(B. serricauda)</i> <i>(M. acervorum)</i>	<i>Omocestus petraeus</i>		
		<i>Omocestus haemorrhoidalis</i>		

Table 3 Rough sketch of the phenology of some Orthoptera species in the Villány Hills. Species not listed in the table belong to the "medium" group and hatch out in April / May. (\*: based on indirect examination)

Species overwintering as imagoes	Early species	Late species
<i>Myrmecophyla acervorum</i> <i>Acrotylus insubricus</i> <i>Allopus strepens</i> * <i>Tetrix subulata</i> * <i>Tetrix bipunctata</i> * <i>Tetrix tenuicornis</i> *	<i>Poecilimon fussi</i> <i>Isophya modesta</i> <i>Isophya modestior</i> <i>Isophya brevipennis</i> * <i>Tettigonia viridissima</i> <i>Decticus verrucivorus</i> * <i>Pholidoptera griseoaptera</i> * <i>Platycleis grisea</i> <i>Euthystira brachyptera</i> * <i>Stenobothrus lineatus</i> <i>Omocestus rufipes</i> <i>Chorthippus brunneus</i> *	<i>Phaneroptera nana</i> <i>Rhacocleis germanica</i> <i>Pezotettix giornae</i> <i>Calliptamus italicus</i> <i>Chorthippus biguttulus h.</i> <i>Chorthippus mollis</i> <i>Gomphocerippus rufus</i>

Table 4 Distinctive and characteristic Orthoptera species of the Villány Hills and the Mecsek Mountains.

Characteristic species of the Villány Hills	Characteristic joint species	Characteristic species of the Mecsek Mountains
No characteristic species	<i>Isophya modesta</i> <i>Isophya modestior</i> <i>Isophya brevipennis</i> <i>Poecilimon fussi</i> <i>Saga pedo</i> <i>Odontopodisma decipiens</i> <i>Allopus strepens</i>	<i>Leptophyes boschi</i> <i>Leptophyes punctatissima</i> <i>Poecilimon intermedia</i> <i>Stenobothrus eurasius</i>

## A Villányi-hegység egyenesszárnyú (Orthoptera) faunája

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A Villányi-hegység Orthoptera faunájára vonatkozó ismereteket korábbi irodalmi és gyűjtési adatok, valamint az 1997 óta rendszeresen végzett, egész hegységre kiterjedő vizsgálatok eredményei alapján összegeztük. Az eddigi kutatások során 45 faj (21 Ensifera és 24 Caelifera) előfordulását sikerült bizonyítani.

A fajok közül 7 (15,6%) törvényileg védett. Az adatok biogeográfiai értékelése során a déli (mediterrán, ponto-mediterrán stb.) faunaelemek átlagos aránya különösen jelentősnek (65,6%) bizonyult, ami a területen érvényesülő erős szubmediterrán hatásnak köszönhető. A jelenleg védett és biogeográfiai szempontból kitüntetett fajok (pl.: *Isophya modesta*, *I. modestior*, *Poecilimon fussi*, *Odontopodisma decipiens*, *Allopus strepens*) magas aránya a viszonylagosan kis fajszám ellenére is jól mutatja az Orthoptera fauna és egyben a Villányi-hegység természetvédelmi értékét. A vizsgálatok ideje alatt az élőhelyek feldarabolása, a nyílt területek becserjésedése, a bányászat, a szőlőművelés és az emberi gondatlanság (pl.: tüzek, taposás stb.) hatására több védett egyenesszárnyú faj (pl.: *Acrida ungarica*, *Acrotylus insubricus*) eltűnt korábbi élőhelyéről.

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