

ORTHOPTERA (INSECTA) OF THE HÁDY HILL NEAR BRNO: RESULTS OF FAUNISTIC SURVEY AFTER 35 YEARS

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Abstract: During the 2011–2012, the Orthoptera fauna was investigated at four localities on Hády Hill near Brno, in the SE part of Czech Republic. Altogether 29 species are reported, four of which, *Phaneroptera nana* Fieber, 1853, *Euchorthippus declivus* (Brisout de Barneville, 1848), *Chrysocraon dispar* (Germar, 1834) and *Sphingonotus caeruleus* (Linnaeus, 1767), are the first records for the area. The record of *E. declivus* represents the northernmost published locality in Central Europe. Results are compared with data on Orthopteran insects collected in this area during the period 1969–1976. We did not confirm the continued presence of the following species: *Modicogryllus frontalis* (Fieber, 1844), *Myrmecophilus acervorum* (Panzer, 1779), *Tetrix bipunctata* (Linnaeus, 1758), *Stenobothrus nigromaculatus* (Herrich-Schäffer, 1840), *S. rubicundulus* Kruseman & Jeekel, 1967 and *Myrmeleotettix maculatus* (Thunberg, 1815).

Key words: Czech Republic; faunistics; Hády; Orthoptera.

INTRODUCTION

Hády Hill is situated in the southernmost part of the Moravský kras karst, merging in the south to the Dyjsko-svratecký úval lowland, a pathway for Panonian animal and plant species to Moravský kras. To the north, Moravský kras joins the Dražanská vrchovina hills, a mountain area of more than 700 m a. s. l. of a clearly montane character and belonging to the Hercynian subprovince. The xerothermophilic flora and fauna on the southern slopes of Hády Hill is connected with steppe-forest habitats with *Quercus pubescens* Willd., gradually turning to broadleaved deciduous forest with *Quercus robur* L., *Quercus petraea* (Matt.) Liebl. and *Carpinus betulus* L., and have been the subject of studies of many naturalists for some time (e.g. ROZKOŠNÝ & VAŇHARA 1993, DVOŘÁK et al. 2008).

The first Orthopteran records from the Hády Hill area are from the early 20th century (CZIŽEK 1905,

1915, 1917). Later, GINTER (1925) cited Czižek's findings, whereas DOBŠÍK (1950) provided some original data on Orthoptera from the Hády Hill area. A more thorough study of the Orthopteran fauna was carried out by CHLÁDEK (1977) in the Hádecká planinka NNR, part of the Hády Hill area, and its immediate surroundings during the period 1969–1976. He recorded a relatively rich Orthoptera fauna comprising 30 species, mostly thermophilous steppicoles of Euro-Siberian origin.

In this study, we aimed to reinventory the Orthopteran fauna of the Hády area, compare the results with those of CHLÁDEK (1977), and draw conclusions with respect to the development of specific diversity and estimative relative abundance of all recorded orthopteran species. It is also aimed to evaluate the effects of industrial exploitation and nature protection and discuss possible influence of climate change during the last decades.



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MATERIAL AND METHODS

Specimens were collected individually with help of an entomological net during sampling on whole areas of selected localities, see below. Later, specimens were killed with ethylacetate in polyethylene vials and mounted for identification (altogether 140 adult specimens).

Sampling of Orthopteran insects was performed from June 2011 until September 2011 and in June 2012 at four sites in the area of Hády Hill (Fig. 1).

Abbreviations: NNR: National Nature Reserve, NM: Nature Monument, PLA: Protected Landscape Area, HP: Hádecká planinka, VK: Velká Klajdovka, KY: Kavky, ML: Městský lom

Hádecká planinka National Nature Reserve (HP) (Fig. 2)

N 49°13.2', E 16°40.5'; 407 m a. s. l. (midpoint of area; area size approx. 5 ha)

The locality lies at an altitude of 390–420 m and it is formed by a karstic lime plateau, a part of the Ochoz plateau, and a slope situated on the border of the Maloměřice quarter of Brno and Kanice village. Most of HP is covered with deciduous forest (*Quercion pubescenti-petrae*) (MACKOVČIN et al. 2007), only the southern margin supports a steppe-forest habitat with scattered shrubs (*Corno-Quercetum petraeae*). A national nature reserve was established there in 1950.

Velká Klajdovka Nature Monument (VK) (Fig. 3)

N 49°13.0', E 16°40.6'; 360 m a. s. l. (midpoint of area; area size approx. 2,4 ha)

The locality lies at an altitude of 320–390 m on the southern Hády hillside east of the Růženin lom quarry. Whereas the northern part of the slope is formed of lime bedrock, the southern part is formed of granodiorite bedrock supporting a steppe-forest vegetation (*Corno-Quercetum petraeae*) merging into *Primuloveris-Carpinetum betuli* (MACKOVČIN et al. 2007). The vegetation cover in VK differs moderately from that of the other three localities. The nature monument was established there in 1987.

Kavky Nature Monument (KY) (Fig. 4)

N 49°13.0', E 16°40.2'; 326 m a.s.l. (midpoint of area; area size approx. 2,3 ha)

The locality is situated between two former quarries (Džungle and Růženin lom) at an altitude of 300–340 m, and it is formed by refugia of primeval steppe-forest vegetation (*Corno-Quercetum petraeae*) (MACKOVČIN et al. 2007) on lime bedrock. In the past, it was a mosaic of rurally exploited plots and primeval to semi-primeval steppe-forest. The nature monument was established there in 2000.

Městský lom quarry (ML) (Fig. 5)

N 49°13.1', E 16°40.1'; 343 m a. s. l. (midpoint of area; area size approx. 2,5 ha)

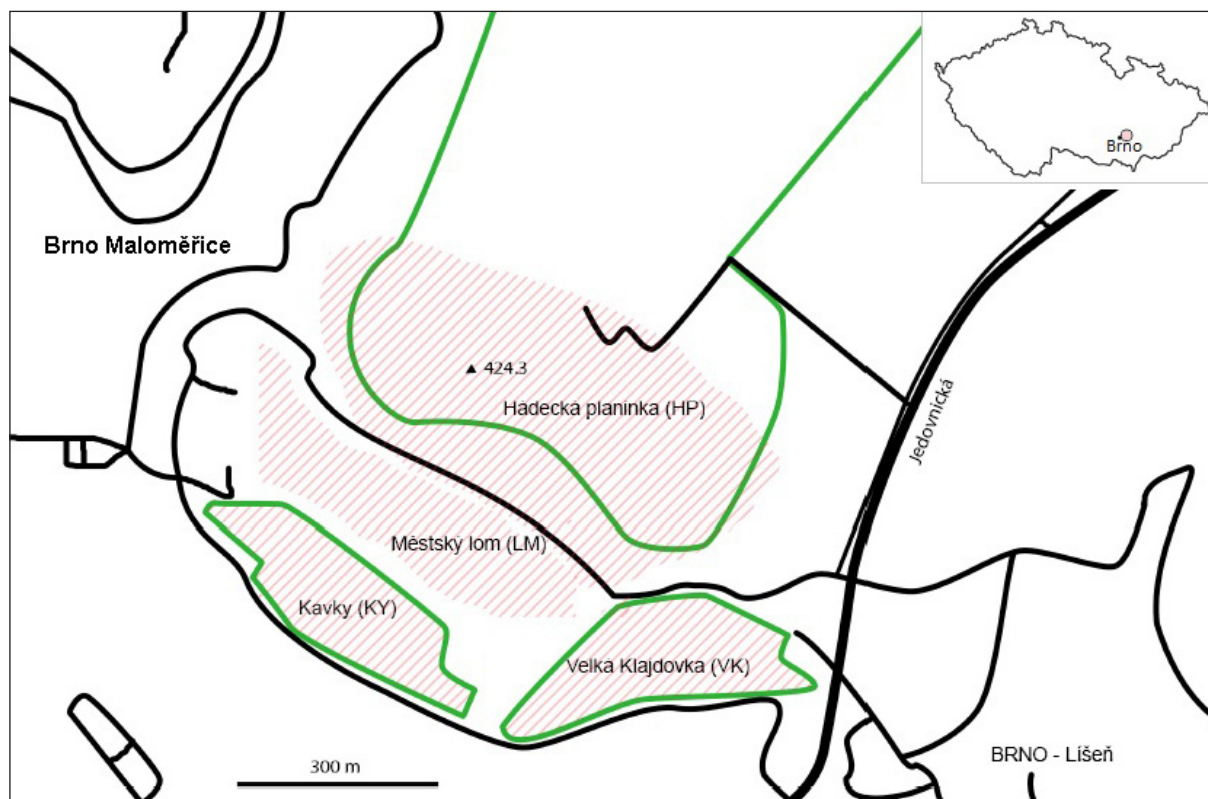


Figure 1. Map of investigated localities of the Hády Hill (2011–2012).

green line = limits of nature protected areas, red hatched = investigated localities

The locality is situated on the plain part of a large limestone quarry, about 600 m long and 80 m high (the collecting site lies at an altitude of 335–345 m), which was established around 1960 and closed in 1997. During this period, mining destroyed more than half of the southern Hády Hill slope. The rocky ground supports various successional stages of ruderal vegetation.

Altogether eight collecting trips (seven times sampling at all four localities) and one additional sampling only at HP on 21. 6. 2012 were conducted on following days: 13. 6. 2011, 1. 7. 2011, 13. 7. 2011, 28. 7. 2011, 14. 8. 2011, 28. 8. 2011, 30. 9. 2011. Weather during collecting days (cca from 10 AM to 2 PM) except for 28. 7. 2011 and 30. 9. 2011 when temperature was about 5°C lower, was clear to partly cloudy with temperatures between 25 and 30°C. Insects were collected by sweeping with a standard entomological net of 38 cm diameter. No specific sweeping transects were defined. Additionally, collecting by hand, individual collecting with the net and acoustic detection were used. The additional trip on 21. 6. 2012 to HP was focused on arboricolous species of bush-crickets, by beating and sweeping of bushes, lower tree branches and taller herbage in the forest and on its margins.

Generic and infrageneric taxa are quoted alphabetically and follow the nomenclature of KOČÁREK et al. (2013). Phytosociologic nomenclature was unified according to CHYTRÝ et al. (2010).

RESULTS

We found a total of 29 species of Orthoptera at the four investigated localities of the Hády Hill area (Tab. 1): 10 species of bush-crickets (Tettigoniidae), 3 species of true crickets (Gryllidae), 1 groundhopper (Tetrigidae) and 15 species of grasshoppers (Acrididae). This number represents 30 % of the 96 Orthopteran species reliably reported from the Czech Republic (HOLUŠA et al. 2013).

Hádecká planinka National Nature Reserve (HP)

HP was, with 25 species of Orthoptera, the most species-rich locality. The most common species here were *Euthystira brachyptera*, *Stenobothrus lineatus* (during the whole season), *Chorthippus biguttulus*, *Chorthippus mollis* (mostly late in the season), *Chorthippus parallelus*, *Chrysochraon dispar* (early in the season) and *Euchorthippus declivus*. On the contrary, only one specimen of *Chorthippus dorsatus* (30. 9. 2011) was found. The occurrence of *Oedipoda caerulescens* was apparently connected



Figure 2. Hádecká planinka National Nature Reserve (photograph by Z. Košťálová, August 2011).



Figure 4. Kavky National Monument (photograph by Z. Košťálová, August 2011).



Figure 3. Velká Klajdovka National Monument (photograph by Z. Košťálová, August 2011).



Figure 5. Městský lom quarry (photograph by Z. Košťálová, August 2011).

Table 1. Occurrence of Orthopteran species at investigated localities of the Hády Hill (2011–2012) compared to data of CHLÁDEK (1977) from 1969–1976.

– not found, + 1–3 specimens found, ++ 4–9 specimens found, +++ more than 10 specimens found

	HP	VK	KY	LM	CHLÁDEK (1977)
Tettigoniidae					
<i>Barbitistes constrictus</i> Brunner von Wattenwyl, 1878	+	–	–	–	+
<i>Isophya kraussii</i> Brunner von Wattenwyl, 1878	+	–	–	–	+
<i>Leptophyes albobittata</i> (Kollar, 1833)	+	++	++	–	++
<i>Meconema thalassinum</i> (De Geer, 1773)	–	+	–	–	++
<i>Metrioptera bicolor</i> (Philippi, 1830)	+++	+++	++	–	++
<i>Phaneroptera falcata</i> (Poda, 1761)	+	+	++	–	+
<i>Phaneroptera nana</i> Fieber, 1853	–	–	+	–	–
<i>Pholidoptera griseoptera</i> (De Geer, 1773)	++	++	+	–	+++
<i>Platycleis albopunctata grisea</i> (Fabricius, 1781)	+	++	+++	+	++
<i>Tettigonia viridissima</i> (Linnaeus, 1758)	+	+	–	–	++
Gryllidae					
<i>Gryllus campestris</i> Linnaeus, 1758	–	+	+	–	++
<i>Modicogryllus frontalis</i> (Fieber, 1844)	–	–	–	–	+
<i>Myrmecophilus acervorum</i> (Panzer, 1799)	–	–	–	–	+
<i>Nemobius sylvestris</i> (Bosc, 1792)	+	+	+	–	+++
<i>Oecanthus pellucens</i> (Scopoli, 1763)	–	++	+++	–	+
Tetrigidae					
<i>Tetrix bipunctata</i> (Linnaeus, 1758)	–	–	–	–	+
<i>Tetrix tenuicornis</i> Sahlberg, 1893	+	+	++	++	++
Acrididae					
<i>Calliptamus italicus</i> (Linnaeus, 1758)	+	++	++	+++	+
<i>Chorthippus apricarius</i> (Linnaeus, 1758)	+	+	–	–	++
<i>Chorthippus biguttulus</i> (Linnaeus, 1758)	++	+++	+++	+++	++
<i>Chorthippus brunneus</i> (Thunberg, 1815)	+	+	++	+++	+++
<i>Chorthippus dorsatus</i> (Zetterstedt, 1821)	+	–	–	–	+
<i>Chorthippus mollis</i> (Charpentier, 1825)	+++	+++	+++	–	+++
<i>Chorthippus parallelus</i> (Zetterstedt, 1821)	++	+++	++	–	+
<i>Chrysochraon dispar</i> (Germar, 1834)	++	++	++	–	–
<i>Euchorthippus declivus</i> (Brisout de Barneville, 1849)	+++	++	+	–	–
<i>Euthystira brachyptera</i> (Ocskay, 1826)	+++	+++	++	–	++
<i>Gomphocerippus rufus</i> (Linnaeus, 1758)	+	–	–	–	+
<i>Myrmeleotettix maculatus</i> (Thunberg, 1815)	–	–	–	–	+
<i>Oedipoda caerulescens</i> (Linnaeus, 1758)	++	++	++	+	+++
<i>Omocestus haemorrhoidalis</i> (Charpentier, 1825)	+	–	–	–	+++
<i>Sphingonotus caeruleus</i> (Linnaeus, 1767)	+	+	+	+++	–
<i>Stenobothrus lineatus</i> (Panzer, 1796)	+++	+++	++	–	+++
<i>Stenobothrus nigromaculatus</i> (Herrich-Schäffer, 1840)	–	–	–	–	+

with the edge of the quarry. *Gomphocerippus rufus*, *Omocestus haemorrhoidalis*, *Barbitistes constrictus* and *Isophya kraussii* were collected exclusively at this locality.

Velká Klajdovka and Kavky National Monuments (VK and KY)

These two localities share, despite their different geological bedrock, similar microclimatic conditions and remarkable similarities in their Orthopteran fauna. We recorded almost the same species, especially grasshoppers, at both localities. The bush-cricket *Platycleis albopunctata grisea* and *Leptophyes albobittata* were much more abundant there than at the previous locality (HP). As at HP, *Metrioptera bicolor* was the commonest bush-cricket there. Two tree-dwelling bush-cricket species, *Meconema thalassinum* at VK and *Phaneroptera nana* at KY, were found only there.

Městský lom quarry (ML)

The Orthopteran fauna of this locality differed substantially from those of the previous three localities. Sparse vegetation and rocky ground apparently resulted in the least diverse of Orthopteran community there. However, some species had the highest recorded abundance in the Hády Hill area at this locality, e.g. *Sphingonotus caeruleus* and *Calliptamus italicus*, both characteristic of barren habitats.

DISCUSSION

When comparing our results with those of Chládek from the 1970s, we confirmed the presence 25 Orthopteran species of the 30 listed by CHLÁDEK (1977). Four species, *Phaneroptera nana*, *Euchorthippus declivus*, *Chrysochraon dispar* and *Sphingonotus caeruleus* are here recorded as new for the area.

Phaneroptera nana was originally a circummediterranean species distributed in Europe, Africa and Asia Minor (KOČÁREK et al. 2005). In the Czech Republic, it was found for the first time in southern Moravia at the beginning of the 1990s (VLK 2002). At the present time, it is known from many southern Moravian localities, reaching Brno and its surroundings in the north (KOČÁREK et al. 2008). However, at present, it also inhabits many localities in Prague (Marhoul, pers. comm.). Another two species, *Euchorthippus declivus* and *Chrysochraon dispar*, not mentioned by CHLÁDEK (1977), were common in all collecting sites on the Hády Hill except ML. *Euchorthippus declivus* is an abundant species, distributed in neighboring western Slovakia and northern Austria continually up to 48° 50'N (ZUNA-KRATKY et al. 2009, KRIŠTÍN & KAŇUCH 2013). It seems to be an expanding species (HOLUŠA et al. 2007) which apparently reaches the northernmost limit of its distribution at the Hády Hill, though anthropogenic introduction cannot be excluded

(Chládek, pers. comm.). *Sphingonotus caeruleus* was already mentioned from the Hády area by HOLUŠA (2003), but only from the lower parts (Růženin lom quarry). KOČÁREK (2012) reports, that *Sphingonotus caeruleus* and *Oedipoda caeruleus* are the most characteristic species of open barren ground in post-industrial areas. Both are thermophilous, strong-flying species. During the 2011 season, we observed considerably lower abundance of *Oedipoda caeruleus* in the Hády Hill area compared to data given by CHLÁDEK (1977).

We did not confirm the occurrence of following species: the true crickets *Modicogryllus frontalis* and *Myrmecophilus acervorum*, the groundhopper *Tetrix bipunctata* and the grasshoppers *Stenobothrus nigromaculatus* and *Myrmeleotettix maculatus*. These species were reported as rare by CHLÁDEK (1977) and, perhaps, they may have recently become locally extinct in the Hády area. *Stenobothrus rubicundulus* was found in the Hády hill area one hundred years ago (CZIŽEK 1917) and it is currently considered as regionally extinct throughout the whole of the Czech Republic (HOLUŠA 2012, HOLUŠA et al. 2013). The clearly higher species diversity of the Orthopteran fauna of all three nature protected areas investigated compared with the secondary habitat of the Městský lom quarry undoubtedly reflects the importance of nature protection in the Hády Hill area. Continuation of the protection and careful management of the protected areas is essential for the preservation of valuable habitats. This is especially obvious when taking in account the exploitation (large limestone quarry) of the southern slopes of Hády Hill in the past which destroyed a substantial part of these important natural biocenoses, the subjects of natural studies for many decades.

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