

Grasshoppers, crickets (Orthoptera) and earwigs (Dermaptera) of Tovačov gravel pit (central Moravia, Czech Republic): New locality for several thermophilous species in anthropogenic secondary habitat

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Grasshoppers, crickets (Orthoptera) and earwigs (Dermaptera) of Tovačov gravel pit (central Moravia, Czech Republic): New locality for several thermophilous species in anthropogenic secondary habitat. – Acta Mus. Siles. Sci. Natur., 64: 199-205, 2015.

Abstract: Study of Orthoptera and earwigs was conducted in Tovačov gravel pit in 2014. We have recorded 18 species of Orthoptera and 3 species of earwigs. The most significant recorded species are Cepero's ground-hopper (*Tetrix ceperoi*), pygmy mole cricket (*Xya variegata*), Italian tree cricket (*Oecanthus pellucens*) and riparian earwig (*Labidura riparia*). Tovačov gravel pit poses the northernmost locality of *T. ceperoi* and *X. variegata* in the Czech Republic and the northernmost known locality in Moravia for *O. pellucens*. For the *L. riparia*, we present a founding from Tovačov together with another finding from Olomouc vicinity, which is currently the northernmost locality within Moravia. Our findings display recent spatial expansion of some thermophilous species. Moreover, we emphasize importance of (post)-industrial areas as secondary habitats for specialised endangered species.

Keywords: faunistics, *Tetrix ceperoi*, spatial expansion, secondary habitats/post-industrial habitats

Introduction

Tovačov gravel pit is situated in central Moravia between the towns Tovačov and Troubky in the river basin of the Morava River. Its area exceeds 500 ha and it lies from 191 to 210 m above sea level. This gravel pit is found in the lower part of the Hornomoravský úval basin. The geological base of this locality is formed by Neogen and Quaternary sediments covered by alluvial soils. This area is characterized by large wetland habitats including mainly artificial lakes created by gravel mining. The mining have begun there in the fifties of 20th century and since then, four lakes were made. Some smaller parts of the gravel pit were technically recultivated but the rest was left to natural succession. Majority of the most valuable invertebrate species can be found at smaller parts of alluvial biotopes without vegetation on which we focused primarily. Furthermore, one part of this gravel pit was declared as Site of Community Importance named “Morava – Chropýňský luh” (SCI CZ 0714085).



Fig 1: Map of the study area.

Material and methods

Our survey was conducted from April to September 2014 and it was aimed at exploring the local invertebrate fauna. Groups of Orthoptera and Dermaptera were collected using standard methods (mainly individual collecting, sweeping and beating). Additionally, several pitfall traps filled with salty solution and vinegar were placed in interesting biotopes. Species names are presented according Kočárek *et al.* (2013) for Orthoptera and Kočárek *et al.* (2005) for earwigs. All specimens lgt. and det. by F. Trnka, (unless otherwise stated).

Results

In total, 18 species of Orthoptera and 3 species of Dermaptera were recorded during the survey. Majority of them can be regarded as common and widespread species. Three species belonging to the Red List of Invertebrates of the Czech Republic (Holuša & Kočárek 2005, Kočárek & Holuša 2005) were found: vulnerable (VU) pygmy mole cricket (*Xya variegata*), near threatened (NT) Cepero's ground-hopper (*Tetrix ceperoi*) and endangered (EN) riparian earwig (*Labidura riparia*).

List of found species

ORTHOPTERA

Chorthippus biguttulus (Linnaeus, 1758) - 30.V.2014, 1 ex.; 24.VII.2014, 3 ex.; 31.VII.2014, 3 ex.
Chorthippus dorsatus (Zetterstedt, 1821) - 24.VII.2014, 5 ex. det. S. Rada
Chrysochraon dispar (Germar, 1834) - 24.VII.2014, 4 ex.
Oedipoda caerulea (Linnaeus, 1758) - 1. VII.2014, 1 ex.
Oecanthus pellucens (Scopoli, 1763) - 30. VIII.2014, 1 ex.
Gryllotalpa gryllotalpa (Linnaeus, 1758) 30.V.2014, 1 ex. O. Machač observ.
Myrmecophilus acervorum (Panzer, 1799) - 30.V.2014, 1 ex., under bark in the nest of ants *Lasius* sp.
Tetrix ceperoi (Bolivar, 1887) - (2M, 2F) - 30.V.2014, Tovačov, gravel pit Donbas, pitfall trap located in the gravel substrate near the water; GPS: 49°24'49.50"N, 17°18'42.06"E, all det. et coll. S. Rada, P. Kočárek revid.; (1M, 1F) 1.VII.2014, same locality and trap; (1M, 1F) 22.VIII.14, same locality and trap all det. et coll. S. Rada
Tetrix subulata (Linnaeus, 1758) - (1M, 1F) 30.V.2014, pitfall trap; (1F) 24.VII.2014, all det. et coll. S. Rada
Tetrix tenuicornis (Sahlberg, 1891) - 30.V.2014, 2 ex.; 1.VII.2014; 31.VII.2014, 2 ex. det. et coll. S. Rada
Tetrix undulata (Sowerby, 1806) - 30.V.2014, 4 ex.; 31.VII.2014, 3 ex.; 22.VIII.2014 all det. S. Rada
Conocephalus fuscus (Fabricius, 1793) - 24.IX.2014, 5 ex.
Leptophyes albivittata (Kollar, 1833) - 24.VII.2014, 1 ex.
Meconema thalassinum (DeGeer, 1773) - 24.VII.2014, 1 ex.
Metrioptera roeselii (Hagenbach, 1822) - 24.VII.2014, 3 ex.
Phaneroptera falcata (Poda, 1761) - 24.VII.2014, 2 ex.
Tettigonia viridissima Linnaeus, 1758 - 24.VII.2014, 1 ex.
Xya variegata Latreille, 1809 - 1.VII.2014, 25 ex., GPS: 49°24'49.452"N, 17°18'42.538"E, 4 ex S. Rada coll; 24.VII.2014, 20 ex., 1 ex. S. Rada coll., GPS: 49°24'26.088"N, 17°18'0.203"E

DERMAPTERA

Apterygida media (Hagenbach, 1822) - 24.VII.2014, 1 ex. det. et coll. S. Rada
Forficula auricularia Linnaeus, 1758 - 30.V.2014, 1 ex.
Labidura riparia (Pallas, 1773) - 30.V.2014, 1 ex., pitfall trap, S. Rada coll.; 31.VII.2014, 1 ex., pitfall trap, S. Rada coll.; 22.VIII.2014, 1 ex. at the bank under the piece of dead wood

Comments to notable species

Tetrix ceperoi

Areal of this species covers majority of Europe – from the Mediterranean to the coasts of Northern and Baltic sea (Kočárek *et al.* 2013). However, it is very scarce and rare species in Central Europe (Gröning *et al.* 2007, Kočárek *et al.* 2013). It occupies moist patches with bare sandy substrate and warm microclimate (Gröning *et al.* 2007). In Bohemia, it was found once

near Třeboň (Mařan 1960), but the occurrence of the species was not confirmed later. It is known from several localities in southern Moravia (Holuša & Holuša 2003, Holuša *et al.* 2013, P. Marhoul unpubl.). Here, we present new locality of *T. ceperoi*, which is rather distant from other localities and at the same time, it is the northernmost locality of the species in the Czech Republic.

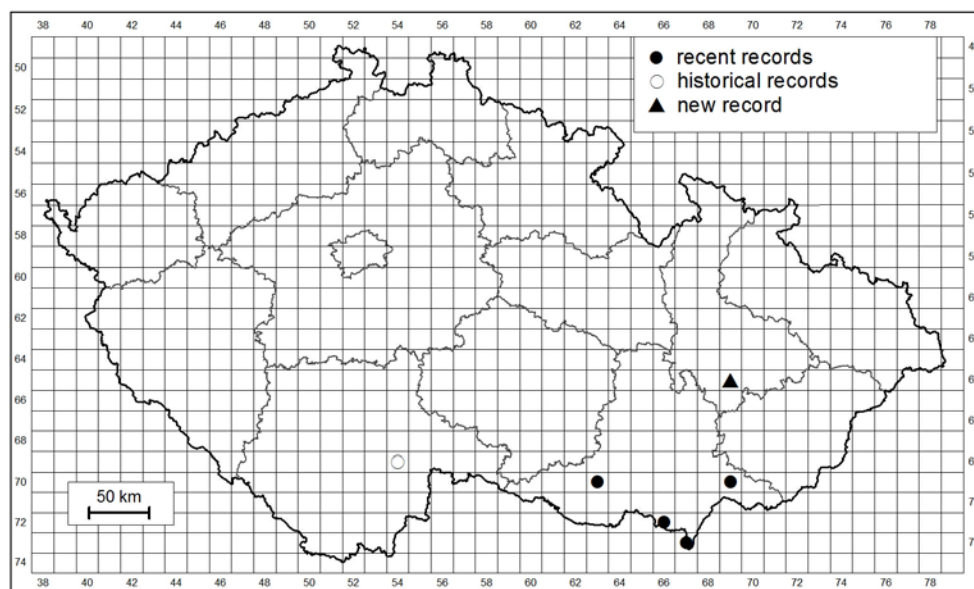


Fig 2: Distribution map of *Tetrix ceperoi* in the Czech Republic (published records and our new record)



Fig 3: *Tetrix ceperoi* (Bolivar, 1887)

Xya variegata

Specialised species, which occurs in riverine floodplains (primary habitat) or in secondary habitats, such as flooded sand pits. It lives on bare, fine sediment with sufficient moisture (Münsch *et al.* 2013). This pontomediterranean species reaches in Moravia northern edge of its distribution (Holuša & Vlk 2003). In the Czech Republic, it is found almost exclusively on secondary anthropogenic habitats, with the only exception of occurrence on sand gravel banks of Dyje river in Křídlovky (Holuša 2014). Until recently, the species was known only from southern Moravia (Holuša & Vlk 2003). We confirmed lately reported (Holuša 2014) occurrence of the species in Tovačov. The population is numerous and seems to thrive here. The species is recently expanding within Moravia, which is apparent not only from the finding of a locality in central Moravia (Tovačov), but also from gain of many new localities in southern Moravia within last 10–15 years (Holuša & Vlk 2003, Holuša 2014, R. Vlk pers. comm.).



Fig 4: *Xya variegata* Latreille, 1809

Oecanthus pellucens

This palearctic species (occurring in southern, western and central parts of Europe) lives on shrubs, trees or high herbs and prefers thermophilic localities (Holuša *et al.* 2012, Kočárek *et al.* 2013). In the Czech Republic, it is common in warm lowlands of southern Moravia and central and north-western Bohemia (Holuša *et al.* 2012, Kočárek *et al.* 2013). During last years, there is evident spatial expansion of the species in both Moravia and Bohemia (Holuša *et al.* 2012, P. Marhoul pers. comm.). In 2010, one male was observed by sand-pit near Ondratice, between Vyškov and Prostějov (M. Kinel unpublished). Our record in Tovačov poses northernmost observation of *O. pellucens* in Moravia and confirms ongoing spreading of the species.



Fig 5: *Oecanthus pellucens* (Scopoli, 1763)



Fig 6: *Labidura riparia* (Pallas, 1773)

Labidura riparia

Earwig species considered as endangered in the Czech Republic (Kočárek & Holuša 2005). It prefers warm localities with sandy soils, which can be found in natural habitats such as riverbanks, or in anthropogenic localities in sand and gravel pits (Holuša & Farkač 2010). In the CR, it was known only from central Bohemia and southern Moravia (Holuša & Vlk 2003, Holuša & Farkač 2010). Our discovery of the species in the Tovačov gravel-pit represents first published record from central Moravia. Another locality of *L. riparia* in central Moravia was found by J. Kašák near Olomouc on a sparsely vegetated fly-ash deposit (Olomouc-Nemilany, 49.5513292°N, 17.2690672°E; 1.5.2013, 1 ex. lgt.; 26.5.2013 8 ex. observ., 2 ex. lgt; all lgt., det. et coll. J. Kašák). Both localities in central Moravia were discovered recently, which suggest spreading of the species to the north.

Discussion

Total of 18 Orthoptera species and 3 Dermaptera species were recorded. Our survey of the locality was not systematic, therefore it is possible that presented orthopteran community is not complete. On the other hand, we have recorded several rare or new species for region of central Moravia. Also, some relatively widespread, but not often found species has been recorded, such as *Gryllotalpa gryllotalpa*, *Myrmecophilus acervorum* and *Meconema thalassinum*.

Occurrence of termophilous *T. ceperoi*, *X. variegata*, *O. pellucens* and *L. riparia*, which were until recently known only from southern areas within Moravia, makes another evidence of spreading species northwards. This process, connected with global warming, has been observed for many organisms all over the world (e.g. Parmesan & Yohe 2003, Root *et al.* 2003, Hickling *et al.* 2006). In the case of the Czech Orthoptera, there have been also a lot of observations of spatial expansion, both published (Holuša *et al.* 2007a, Holuša *et al.* 2007b, Kočárek *et al.* 2008, Holuša 2014) and unpublished.

The three most notable found species (*T. ceperoi*, *X. variegata*, *L. riparia*) are rare habitat specialist bounded to wet sandy river banks with minimal vegetation cover (Gröning *et al.* 2007, Holuša & Farkač 2010, Kočárek *et al.* 2013, Münsch *et al.* 2013). Postindustrial habitats such as sand and gravel pits are known as secondary biotopes, where initial stages of natural succession are used by these species (Kočárek 2011). Sites created during mining (which produces bare gravel or sandy lake banks) are therefore valuable from the nature protection point of view. They offer suitable habitat not only for threatened Orthoptera and Dermaptera species, but also for many other organisms – often rare or endangered. Management of such places should be focused on blocking of natural succession, especially at the sites with bare surface. Technical recultivations are highly undesirable – at least parts of mining areas should be leaved in their initial stage (see Tropek & Řehounek 2011).

Acknowledgements: We are very grateful to Petr Kočárek for the revision of *T. ceperoi* determination and to Jaroslav Holuša, Pavel Marhoul, Robert Vlk and Martin Kincl for consultations and sharing of data and literature. We are especially obliged to Josef Kašák for his data on *Labidura riparia* finding, included in this publication. We also thank to Ondřej Machač for his help during fieldwork.

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