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Distribution of a rare saproxylic beetle *Cucujus haematodes* (Coleoptera: Cucujidae) in the Czech Republic with notes to the occurrence in central Europe

Rozšíření vzácného saporoxylického brouka *Cucujus haematodes* (Coleoptera: Cucujidae) v České republice s poznámkami k výskytu ve střední Evropě

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Coleoptera, Cucujidae, *Cucujus haematodes*, distribution, relictual occurrence, Bohemia, Moravia, Silesia, Poland, central Europe

Abstract. The saproxylic beetle *Cucujus haematodes* Erichson, 1845 lives under the bark of withered and dead trees, and is included on the red lists of endangered species in many European countries. Our results, based on literature, lead us to the preliminary conclusion that in the Czech Republic, this species could be considered as a relict of continuous forests. Populations of this species have steeply declined with loss of primary habitats. We present recent and historical distributional data for this species from the Czech Republic and adjacent countries. To our knowledge, the only recent Czech records of *C. haematodes* are from Mionší (Czech Silesia). However, the species occurred historically in southern Bohemia (four records, one confirmed from Kamýk u Protivína), northern Moravia (Kotouč u Štramberka) and Czech Silesia (Karlova Studánka and Praděd). We also discuss localities on the Polish side of the national border, and the occurrence and red-list status of the species in the central Europe. Thus, we analyse its presence, distribution and risk of extinction in the Czech Republic and central Europe.

INTRODUCTION

The genus *Cucujus* Fabricius, 1775 is represented by eleven species worldwide, two of which (*Cucujus cinnaberinus* (Scopoli, 1763) and *C. haematodes*) occur in Europe. The genus is distributed throughout the northern hemisphere (Horák & Chobot 2009, Lee & Pütz 2008).

Erichson (1845) described *C. haematodes* based on a specimen from K. W. Letzner. He found adult and larva in the historical Silesia, living under the bark of silver fir (*Abies alba*) in May. The larva of this species was described by Palm (1941). The larvae of all subspecies were described and compared by Mamaev et al. (1977).

Cucujus haematodes has the widest distribution of any *Cucujus* species. The subspecies *C. h. haematodes* is distributed from central-eastern Europe to the Far East and China. *Cucujus*

h. opacus Lewis, 1888 is distributed in Japan and Taiwan, *C. h. caucasicus* Motschulsky, 1845 in Armenia, Georgia and Russia. The presence of *C. haematodes* is regarded as a relict of primeval forest ecosystems (Horion 1960, Burakowski et al. 1986, Franc 2001, Gutowski et al. 2006). *Cucujus haematodes* is generally considered one of the rarest native European beetles. Ślipiński (1982) described this species as widely distributed in the Palaearctic, but observed that it was rare.

Roubal (1936) indicates that *C. haematodes* is distributed in Europe in undisturbed upland forests and in these regions, the species lives under the bark of dead Norway spruce (*Picea abies*), silver fir (*Abies alba*) and European beech (*Fagus sylvatica*). Ratti (1999) mentioned that *C. haematodes* was present in Italian mountain forests, and that conifers (*Pinus* spp., *Abies* spp.) were the host trees. Palm (1941) found adults and larvae under the bark of silver fir in Italy during the summer. He also observed one flying imago of this species. Burakowski et al. (1986) indicated that this species has a development period of more than two years, and that it lives under the bark of Norway spruces or silver firs. These tree species are probably the most suitable for development in European part of the beetle's distributional area. However, Mamaev et al. (1977) stated that it also develops under the bark of deciduous trees – particularly poplars and aspen (*Populus* spp.), goat willows (*Salix caprea*) and oaks (*Quercus* spp.). Burakowski et al. (1986) stated that adults overwinter under bark and that larvae are predators of other subcortical beetles. However, Mamaev et al. (1977) stated that this species is a scavenger. Zebe (1852) made an interesting observation, recording a mass occurrence in Poland of 78 copulating individuals (on 21.v.1851), and many larvae, pupae and immature beetles (on 17.vii.1851). To our knowledge, this kind of gregarious behaviour has never been recorded again in *C. haematodes*. Zebe (1852) also observed that this species has short pupation time of approximately two weeks.

The main object of this contribution is to present distribution data from surveillance for *C. haematodes* in the Czech Republic. This paper is a summary of the current situation and aims to bring attention to the plight of rare insects, which are frequently ignored by mainstream conservation.

MATERIAL AND METHODS

In order to examine the historical distribution of *C. haematodes*, we analysed recent and historical literature, as well as the collections of the National Museum in Prague (NMPC), the Moravian Museum in Brno (MMBC), the Museum of eastern Bohemia in Hradec Králové (KMVC), all in Czech Republic. We combined this dataset with field results. Sources for red-list categories were Horion (1960), Holecová & Franc (2001), IUCN (2001), Pawłowski et al. (2002), Jelínek (2005), Wegrzynowicz (2007) and Horák & Chobot (2009).

Distributional method. We compared the current and historical distributions of this species and constructed a distribution map for the Czech Republic (after Novák 1989).

RESULTS

Check-list of the records. We summarize here all the records of *C. haematodes* from the Czech Republic and adjoining regions (Figure 1) in following order: country, region, locality, GPS (Global Positioning System) (grid cell), altitude, date, ex., host tree, collector, collection. In parentheses are names of localities, which were mentioned by authors or labelled by collectors (if different). GPS and altitude is only approximate in the case of historical records.

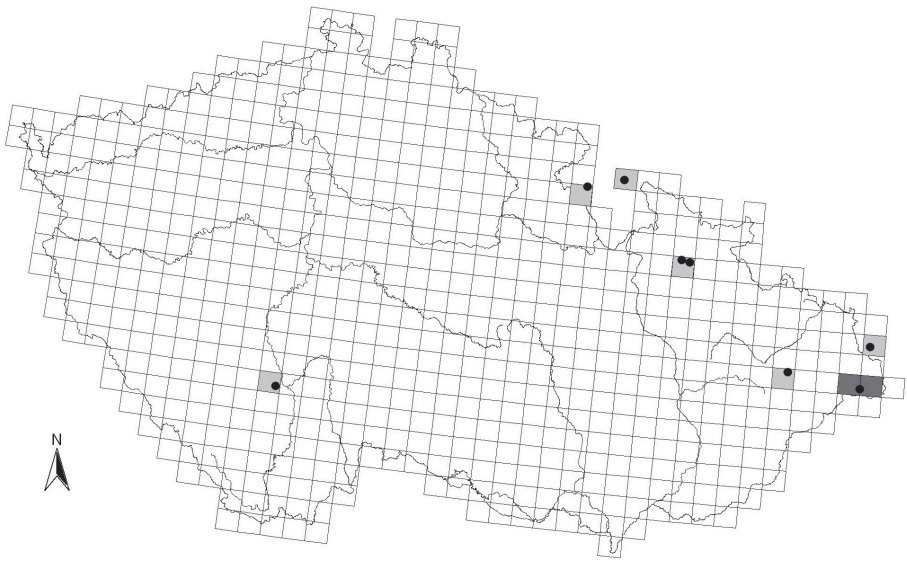


Fig. 1. Distribution of *Cucujus haematodes* Erichson in the Czech Republic and in adjoining areas of Poland. Recent records (post-2000) are represented by dark grey; records from before 1950 by light grey; black circles represent detail of locality; black lines represent national borders and major rivers. The northernmost and easternmost records on the map are located in modern Poland.
Obr. 1. Rozšíření *Cucujus haematodes* Erichson v České republice a poblíž její hranice. Současný nález (po roce 2000) je tmavošedě; nálezy historické jsou světlešedě; černá kolečka jsou přesnější umístění nálezů; černé linie představují hranice České republiky a hlavní řeky. Nejsevernější a nejvýchodnější nálezy jsou z území současného Polska.

(1) Czech Republic, Bohemia (without more precise locality), 1 imago, L. Heyrovský leg. (NMPC);

(2) Czech Republic, Bohemia (without more precise locality), 1 imago (NMPC);

(3) Czech Republic, Bohemia (without more precise locality), 1 imago, K. W. Erichson leg. (NMPC);

(4) Czech Republic, Bohemia ("Böhmen", without more precise locality) (Reitter 1911);

(5) Czech Republic, Moravskoslezský kraj, Karlova Studánka ("Karlsbrunn"), 50°04'19"N, 17°18'14"E (5969), 900 m a. s. l., *Picea abies*, K. Letzner observ. (Letzner 1871);

(6) Czech Republic, Jihočeský kraj, Všeteč – Velký a Malý Kamýk ("Kamýk u Protivína"), 49°13'55"N, 14°17'55"E (6751), 620 m a. s. l., 1902, 1 imago (NMPC, ex coll. B. Kouřil);

(7) Czech Republic, Moravskoslezský kraj, Praděd ("Altvater"), 50°05'07"N, 17°14'59"E (5969), 1200 m a. s. l., 1 imago, K. Letzner leg. (MMBC);

(8) Czech Republic, Moravskoslezský kraj, Štramberk – Kotouč ("Kotouč-Štramberk, Moravia"), 49°35'02"N, 18°06'45"E (6474), 500 m a. s. l., vi. 1921, 1 imago (KMVC);

(9) Czech Republic, Beskydy, Karpaty, *Abies alba*, *Picea abies*, A. Fleischer observ. (Fleischer 1923-1930);

(10) Czech Republic, Moravskoslezský kraj, Horní Lomná – Mionší, 49°31'57"N, 18°39'11"E (6477), 890 m a. s. l., viii.2005, 1 dead imago, dead fir snag (*Abies alba*), A. Sedláček leg., det. et coll.;

(11) Czech Republic, Moravskoslezský kraj, Horní Lomná – Mionší, 49°31'57"N, 18°39'11"E (6477), 890 m a. s. l., 9.ix.2005, several larvae, dead fir snag (*Abies alba*), J. Mertlik leg., det. et 1 larva coll.;

(12) Poland, Województwo dolnośląskie, Duszniki-Zdrój ("Heuscheuer"), 50°24'15"N, 16°23'24"E, 550 m a. s. l., 25.v.1851, 78 imagines, conifer, G. Zebe observ. (Zebe 1852);

(13) Poland, Województwo dolnośląskie, Duszniki-Zdrój ("Heuscheuer"), 50°24'15"N, 16°23'24"E, 550 m a. s. l., 17.vii.1851, larvae, pupae and adults, spruce (*Picea abies*) log, G. Zebe observ. (Zebe 1852);

(14) Poland, Województwo dolnośląskie, Ustroń, 50°46'03"N, 16°17'42"E, 450 m a. s. l., *Picea abies*, J. Roger observ. (Roger 1856);

(15) Poland, Województwo dolnośląskie, Szczelieniec ("Reinerz"), 50°23'36"N, 16°23'29"E, 650 m a. s. l., *Picea abies*, G. Zebe observ. (Zebe 1852).

Explanation of data:

Historical distribution (before 2000)**.** Erichson (1845) described this species from Silesia, which could refer to recent Polish or Czech Silesia. Fleischer (1927-1930) described occurrences in the Beskids Mountains, the Carpathian Mountains and repeats Reitter's (1911) observation regarding the presence of this species in Bohemia, although neither record is accompanied by precise locality data.

Horion (1960) indicates that Patkiewitz collected one specimen from Bollechow in the Moravian Beskids Mountains, but this may lead to misinterpretation. Today, Bollechow (Bolekhov) is in the eastern Carpathian Mountains in western Ukraine. The author also listed localities in Schlesien (historical Silesia), localities in Deutschland (Germany), namely Glatz (Kłodzko), which is today in south-western Poland and Karlsbrunn (Karlova Studánka), which is today in the Jeseníky Mountains in Czech Silesia. [Notes to Horion's record from Karlsbrunn: Roger (1856) mentioned Altvatergebirge (Praděd in Jeseníky Mountains) as the first, but Letzner (1871) gave the precise localization in Karlsbrunn, which was repeated by Horion (1960)]. In the Checklist of Czechoslovak insects, Jelínek (1993) listed, apart from Slovakia, only Moravia, which is consistent with the records of Horion (1960), but not with those of Reitter (1911).

As the historical distribution of the species was never studied systematically in literature, the published records are incomplete. For final distribution analysis, it was necessary to extract data from museum collections. These collections included records from the probable (cf. Horák & Chobot 2009) historical westernmost edge of the distribution area, e.g. Kamýk u Protivína (nr. Všeteč) in southern Bohemia (Czech Republic), based on a specimen in NMPC.

We also found one specimen in KMVC which had been neglected so far due to its locality – Kotouč hill near Štramberk (B. Mocek, M. Mikát, pers. comm.). The Kotouč hill locality is more likely known as a hot spot of xerothermophilic invertebrates. As the locality is relatively close to the Beskids Mountains, we think that this specimen was probably brought to this locality with fuel wood from its original locality in the Beskids Mts.

We found that localities in Silesia near the Czech border in Poland are particularly important, including Kłodzko [Glatz in Horion (1960)]. In this region, the species was reported by Zebe (1852) from Heuscheuer (Duszniki-Zdrój), Reinerz (Szczeliniec in Gory Stolowe). Roger (1856) reported also occurrence in the Polish Beskids Mountains near Ustroń.

Recent distribution. Mionší (nr. Horní Lomná) – this locality is one of the last remnants of former traditional forest management systems in the Beskids Mountains near the Slovakian border and is the largest complex of a mixed fir and beech forest in the Czech Republic (Weissmannová et al. 2004).

We have not confirmed the occurrence of this species at any of its historical localities until now.

Table 1. Occurrence of Cucujus haematodes Erichson in central Europe. R – recent, H – historical, DD – data deficient, CR – critically endangered, VU – vulnerable; red-list categories are after IUCN (2001).
Tabulka 1. Výskyt Cucujus haematodes Erichson ve střední Evropě. R – současný, H – historický, DD – nedostatek dat pro vyhodnocení, CR – kriticky ohrožený, VU – zranitelný; kategorie červeného seznamu jsou dle IUCN (2001).

country / stát	occurrence / výskyt	red-list category / kategorie v červeném seznamu
Czech Republic / ČR	R	CR
Germany / Německo	H	DD
Switzerland / Švýcarsko	–	
Austria / Rakousko	–	
Hungary / Maďarsko	–	
Slovakia / Slovensko	R	VU
Poland / Polsko	R	CR

In regard to its distribution in central Europe, the species is not known from Switzerland, Austria and Hungary. There are only doubtful records from Germany (H. Bussler, pers. comm., see also Horion (1960)). The only recent records are from Czech Republic, Poland and Slovakia (Table 1).

CONCLUSIONS

The recent occurrence of *C. haematodes* on the western edge of its distribution area was confirmed in Mionší. To our knowledge, this is the first confirmed occurrence of the species for this locality. We also present the first comprehensive published evidence of a historical occurrence of this species with the recent borders of the Czech Republic. We predict that in the Czech Republic *C. haematodes* is truly at the recent western edge of its distributional area. Today, little undisturbed forest habitats remain in the Czech Republic, and dead wood suitable for *C. haematodes* development is almost nonexistent.

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SOUHRN

Saproxylický brouk *Cucujus haematodes* Erichson, 1845 žije pod borkou odumírajících a mrtvých dřevin a je zmiňován v červených seznamech mnoha evropských zemí. Podle naší analýzy publikovaných zdrojů lze tento druh označit v České republice jako relikt kontinuálních lesních ekosystémů. Populace druhu totiž postupně vymírají na západním (Evropském) okraji areálu souběžně se ztrátou takových primárních stanovišť. V našem příspěvku uvádíme historické a současné údaje o rozšíření studovaného druhu v ČR a částečně (tabulka 1) analyzujeme ohrožení jeho výskytu ve střední Evropě. Podle všeho se v České republice *C. haematodes* dnes vyskytuje již jen v Mionší (české Slezsko). Dříve se však druh vyskytoval i v Čechách (čtyři blíže nelokalizované exempláře, pouze jedna konkrétní lokalita v Kamýku u Protivína) a v českém Slezsku ještě v Karlově Studánce, na Pradědu. Také existuje poměrně překvapivý nález z Kotouče u Štramberka. Jedná se o první známý údaj z území Moravy. Zde se však vzhledem k historii lokality jedná s největší pravděpodobností o zavlečení s palivovým dřívím z Beskyd. V našem příspěvku uvádíme také lokality poblíž státních hranic v současném Polsku (obr. 1).