

GROUND BEETLES (CARABIDAE) FROM SLOPES OF MACOŠSKÁ STRÁŇ AND VILÉMOVICKÁ STRÁŇ (PROTECTED LANDSCAPE AREA OF MORAVSKÝ KRAS, CZECH REPUBLIC)

J. Niedobová, V. Hula, P. Šťastná

Received: January 4, 2011

Abstract

NIEDOBOVÁ, J., HULA, V., ŠŤASTNÁ, P.: Ground beetles (*Carabidae*) from slopes of Macošská stráň and Vilémovická stráň (Protected landscape area of Moravský kras, Czech Republic). Acta univ. agric. et silvic. Mendel. Brun., 2011, LIX, No. 3, pp. 143–150

Collecting of Carabidae was conducted using pitfall traps at four sites. The first two sites (T1 + T2) were at the slope of Macošská stráň and the other two sites (T3 + T4) at the slope of Vilémovická stráň. The study was done in 2008 and 2009. At Macošská stráň in 2008, 21 species of Carabidae with the total number of 228 individuals were found and in 2009, 18 species of the total number of 116 specimens were collected. At Vilémovická stráň in 2008, 22 species of Carabidae with the total number of 1977 specimens were found and in 2009, 21 species of the total number of 623 specimens were caught. In terms of classification of relictiness, Macošská stráň in 2008 was dominated by species of adaptable group A (60%), species of eurytop group (E) were represented by 35% and of relic group (R) by 5%. In 2009, the same representation of species of groups A and E (47%) were found and the species of group R were represented by 6%. Vilémovická stráň in 2008 was dominated by species of group A (52%), species of group E were represented by 43% and of group R by 5%. In 2009 also dominated species of group A (54%), species of group E were represented by 41% and of group R by 5%. In the studied area we reported four endangered species of Carabidae protected by Law (No. 395/1992 Coll.) as amended, these were *Calosoma auropunctatum* (critically endangered), *Brachinus crepitans*, *Carabus ullrichii* and *Cicindela campestris* (endangered) and two species listed under the Red List of Threatened Species of the Czech Republic (Veselý *et al.*, 2005). One of the species is listed as vulnerable (*Calosoma auropunctatum*) and one as near endangered (*Carabus cancellatus*). Another significant species found on the monitored sites was *Aptinus bombardae*.

Carabidae, PLA Moravský kras, Macošská stráň, Vilémovická stráň, faunistics, ecology, relic species

Carabidae are considered one of the most important bioindicator groups of organisms and are often used to assess the natural and altered habitats (Holland, 2002). The main reason for use of ground beetles as bioindicator is easy monitoring and the popularity of the insects connected with availability of checklist and determination literature. The first review of ground beetles of the Czech Republic was published in Kult (1947) and this was followed by species lists by Pulpán & Reška (1971), Pulpán & Hůrka (1993) and Hůrka (1996). Very important are the works dealing with bioindications of individual

species (Hůrka *et al.*, 1996), where this methodology is focused more on agricultural habitats. This trend of monitoring of agricultural habitats can be seen in foreign works, of which probably the most important is the summarizing work by Holland (2002). As regards the recognition of protected areas and their fauna of Carabidae beetles, the situation is considerably worse. Complex works on ground beetles from any small areas have practically not existed until recently. A positive exception in this respect is Protected landscape area (PLA) Moravský kras, where a very complex work was compiled

by Hamet *et al.* (2009), who made an inventory of various families of beetles. Among other authors dealing with the beetle fauna of PLA Moravský kras it is necessary to highlight Šťastná & Bezděk (2001), Horáková (2005), Horáková *et al.* (2005) or Klačková (2005). Our work builds on these studies by expanding our knowledge of Carabidae of the region. We focused on Macošská stráň and Vilémovická stráň, an area within the first zone of PLA Moravský kras, which also has never been intensively studied, although it is an interesting xerothermic habitat, and virtually the only extensive xerothermic lawns of Moravský kras (except from Hády and Šošůvka surrounding). Small fragments can be found on different cliff edges (eg. in the vicinity of Býčí skála or rocks of Rudické propadání), but clearly the largest treeless complex are the slopes of Macošská stráň and Vilémovická stráň on the west end of Suchý žleb.

MATERIAL AND METHODS

As the main collecting method selected were pitfall traps and monitoring was conducted in 2008 and 2009. In each of the four localities a line of five pitfall traps were placed. The collections were conducted at 4 locations on the slopes of Macošská stráň (T1 + T2) and Vilémovická stráň (T3 + T4) in PLA Moravský kras. Macošská and Vilémovická stráň slopes are locations with sloping terrain, which originated in the limestone bedrock. A well developed limestone pavements with habitats of secondary dry grasslands are characteristic for them. The whole area was previously used as communal grazing. In 2006 the grazing was restored.

Individual transects are given with GPS coordinates, the grid square numbers are according to Pruner & Mika (1996), exposure of the slope and type of management.

- Macošská stráň T1 (PLA Moravský kras), GPS 49°22'14.329"N, 16°44'13.089"E; Grid square 6666 – south exposed slope on limestone, in 2008 unmanaged, in 2009 extensive pastured in the end of summer (21. 8.–16. 9.).
- Macošská stráň T2 (PLA Moravský kras), GPS 49°22'13.81"N, 16°44'21.749"E; Grid square 6666 – south exposed slope on limestone, in 2008 pastured (27. 8.–19. 9.), in 2009 pastured in the end of summer (21. 8.–16. 9.).
- Vilémovická stráň T3 (PLA Moravský kras), GPS 49°22'7.176"N, 16°44'32.176"E; Grid square 6666 – north–west exposed slope on limestone, in 2008 pastured (25. 4.–15. 5. and 25. 9.–11. 10.), in 2009 pastured (16. 6.–11. 7.).
- Vilémovická stráň T4 (PLA Moravský kras), GPS 49°22'9.479"N, 16°44'38.407"E; Grid square 6666 – west exposed slope on limestone, in 2008 pastured (4. 6.–2. 9.), in 2009 pastured (6. 6.–16. 6. and 11. 7.–11. 9.).

Traps were buried in lines always in the direction into the slope with about five-meter-long distances between them. As a fixation we used

4% formaldehyde solution. Dates, locations and selection of traps in 2008 were as follows: traps were installed in April (22. 4.) and collected at monthly intervals (on the 22. 5., 18. 6., 22. 7., 18. 8., 21. 9., 21. 10. and 28. 11.). In 2009, traps were placed on 8th April and collections took place on the 8. 5., 18. 6., 19. 7., 18. 8., 20. 9., 20. 10. and 20. 11. Biological material obtained from pitfall traps was preserved in 70% alcohol. Determination of species of Carabidae was performed using a monograph by Hůrka (1996). The nomenclature was according to Audisio & Taglianti (2004).

Individual species were classified according Hůrka *et al.* (1996) into three relictiness groups (R, A and E) according to the extension of ecological valence of taxons and their relation to habitat. Species of group E are eurytopic species without special demands on the habitat type and quality. Species from varying of habitats, species inhabiting strongly anthropogenically influenced landscape and expansive species belong here. Species of group A are more adaptable species, found in more or less natural habitats. This group consists mainly of species typical for forests, meadows, pastures and coastal species of standing and flowing water. Species of groups R are species with narrow ecological amplitude, currently have the character of the relicts. These are rare and endangered species and natural not too damaged ecosystems.

RESULTS AND DISCUSSION

In total, in 2008 at Macošská stráň 21 species of Carabidae with the total number of 228 specimens were found and in 2009 18 species of the total number of 116 specimens were caught. At in 2008 Vilémovická stráň 22 species of Carabidae with the total number of 1977 specimens were found and in 2009 21 species of the total number of 623 specimens were caught (Tab. I). In terms of relictiness, in 2008 Macošská stráň was dominated by species of group A (60%), species of group E were represented by 35% and of group R by 5%. In 2009, the same representation of species of groups A and E (47%) were found and the species of group R were represented by 6%. Vilémovická stráň in 2008 was dominated by species of group A (52%), species of group E were represented by 43% and of group R by 5%. In 2009 also dominated species of group A (54%), species of group E were represented by 41% and of group R by 5% (Fig. 1–4).

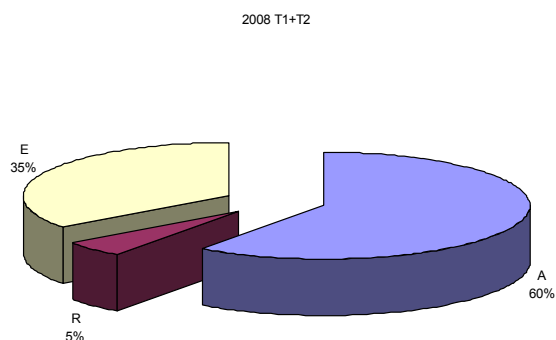
We recorded in this study four endangered species of Carabidae in accordance with Decree No. 395/1992 Coll. as amended, these were *Calosoma auropunctatum* (critically endangered), *Brachinus crepitans*, *Carabus ullrichii* and *Cicindela campestris* (endangered). Furthermore, we found also two species of Carabidae included in the Red List of Threatened Species of the Czech Republic (Veselý *et al.*, 2005). One of the species found was listed as vulnerable (*Calosoma auropunctatum*) and one species as near endangered (*Carabus cancellatus*). Another

I: Species and abundances of carabid beetles, recorded in our study of Macošská (T1 and T2) and Vilémovická stráň (T3 and T4) in Moravský kras PLA

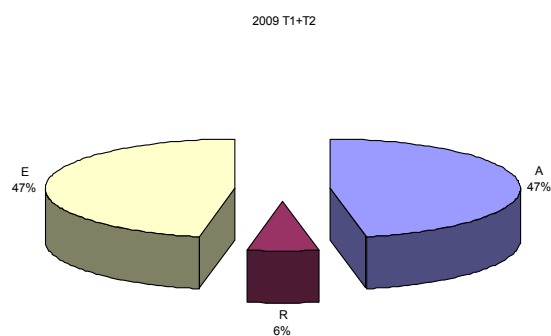
Species	2008		2009	
	T1 +T2	T3+T4	T1 +T2	T3+T4
<i>Abax ovalis</i> (Duftschmid, 1812)	12	37	5	4
<i>Abax parallelepipedus</i> (Piller & Mitterpacher, 1783)	11	20	3	5
<i>Abax parallelus</i> (Duftschmid, 1812)	5	4	3	8
<i>Amara aenea</i> (De Geer, 1774)		2		
<i>Amara aulica</i> (Panzer, 1797)		2		
<i>Amara convexior</i> Stephens, 1828	1	2		5
<i>Amara equestris</i> (Duftschmid, 1812)		3	1	
<i>Amara familiaris</i> (Duftschmid, 1812)				2
<i>Amara lunicollis</i> Schiödt, 1837				1
<i>Amara plebeja</i> (Gyllenhal, 1810)	1			
<i>Anchomenus dorsalis</i> (Pontoppidan, 1763)			1	
<i>Aptinus bombarda</i> (Illiger, 1800)	57	1 778	30	482
<i>Brachinus crepitans</i> (Linnaeus, 1758)				1
<i>Brachinus explodens</i> Duftschmid, 1812	1			
<i>Broscus cephalotes</i> (Linnaeus, 1758)			1	
<i>Calathus fuscipes</i> (Goeze, 1777)	1	35		8
<i>Calathus melanocephalus</i> (Linnaeus, 1758)				1
<i>Calosoma auropunctatum</i> (Herbst, 1784)	1			
<i>Carabus cancellatus</i> Illiger, 1798		2		1
<i>Carabus convexus</i> Fabricius, 1775		5		3
<i>Carabus hortensis</i> Linnaeus, 1758	1	1	1	5
<i>Carabus nemoralis</i> O. F. Müller, 1764		1		
<i>Carabus ullrichii</i> Germar, 1824	12	26	2	7
<i>Carabus violaceus</i> Linnaeus, 1758	1	1		2
<i>Cicindela campestris</i> Linnaeus, 1758	1		1	
<i>Cymindis angularis</i> Gyllenhal, 1810	2			
<i>Harpalus distinguendus</i> (Duftschmid, 1812)				1
<i>Harpalus rubripes</i> (Duftschmid, 1812)			29	20
<i>Harpalus rufipalpis</i> Sturm, 1818	3			
<i>Metallina lampros</i> (Herbst, 1784)		1		
<i>Microlestes maurus</i> (Sturm, 1827)			3	
<i>Microlestes minutulus</i> (Goeze, 1777)	9	2	3	
<i>Molops elatus</i> (Fabricius, 1801)	22	27	23	31
<i>Molops piceus</i> (Panzer, 1793)	2			
<i>Panagaeus cruxmajor</i> (Linnaeus, 1758)			1	
<i>Paradromius linearis</i> (Olivier, 1795)	1			
<i>Poecilus cupreus</i> (Linnaeus, 1758)	76	24	6	34
<i>Pseudoophonus calceatus</i> (Duftschmid, 1812)				1
<i>Pseudoophonus griseus</i> (Panzer, 1797)			2	1
<i>Pseudoophonus rufipes</i> (De Geer, 1774)	8	2		
<i>Pterostichus melanarius</i> (Illiger, 1798)		2	1	
Number of specimens	228	1 977	116	623
Number of species	21	22	18	21

significant species found on the monitored sites was *Aptinus bombarda*. It has been reported as prolific only from the area of Moravský kras (Uhlíková,

2009). Hamet *et al.* (2009) from vicinity of Ostrov u Macochy erroneously listed the species of *Carabus ullrichii* among endangered species under the Red



1: Distribution of representatives of Carabidae according to the relict status on the slope of Macošská stráň in 2008



3: Distribution of representatives of Carabidae according to the relict status on the slope of Macošská stráň in 2009



2: Distribution of representatives of Carabidae according to the relict status on the slope of Vilémovická stráň in 2008



4: Distribution of representatives of Carabidae according to the relict status on the slope of Vilémovická stráň in 2009

List of Threatened Species (Veselý *et al.*, 2005), however, the Red List includes the subspecies of *Carabus ullrichii fastuosus* only, whereas the only the nominate subspecies of *Carabus ullrichii ullrichii* occupies the area.

Annotated list of species found

Comments on individual species are taken from Hůrka (1996). Carabidae were assessed according to their status under the Red List of Threatened Species of the Czech Republic (Veselý *et al.*, 2005).

Abax ovalis (Duftschmid, 1812)

Common species of deciduous forests from lowlands to mountains. Data: 2ex: T3, 22. 4.–22. 5. 2008; 2ex: T4, 22. 4.–22. 5. 2008; 1ex: T1, 22. 5.–18. 6. 2008; 6ex: T2, 22. 5.–18. 6. 2008; 1ex: T3, 22. 5.–18. 6. 2008; 2ex: T4, 22. 5.–18. 6. 2008; 1ex: T1, 18. 6.–22. 7. 2008; 1ex: T2, 22. 7.–18. 8. 2008; 10ex: T3, 22. 7.–18. 8. 2008; 6ex: T4, 22. 7.–18. 8. 2008; 1ex: T2, 18. 8.–21. 9. 2008; 1ex: T3, 18. 8.–21. 9. 2008; 4ex: T4, 18. 8.–21. 9. 2008; 1ex: T2, 21. 9.–21. 10. 2008; 3ex: T3, 21. 9.–21. 10. 2008; 6ex: T4, 21. 9.–21. 10. 2008; 1ex: T2, 21. 10.–26. 11. 2008; 1ex: T2, 8. 5.–18. 6. 2009; 1ex: T3, 8. 5.–18. 6. 2009; 4ex: T2, 18. 6.–19. 7. 2009; 1ex: T4, 20. 9.–20. 10. 2009; 1ex: T3, 20. 10.–20. 11. 2009; 1ex: T4, 20. 10.–20. 11. 2009.

Abax parallelepipedus (Piller & Mitterpacher, 1783)

Very common species of all types of forests, known from lowlands to mountains. Data: 1ex: T2, 22. 4.–22. 5. 2008; 6ex: T3, 22. 4.–22. 5. 2008; 1ex: T4, 22. 4.–22. 5. 2008; 3ex: T2, 22. 5.–18. 6. 2008; 1ex: T4, 22. 5.–18. 6. 2008; 2ex: T1, 18. 6.–22. 7. 2008; 1ex: T2, 22. 7.–18. 8. 2008; 1ex: T3, 22. 7.–18. 8. 2008; 3ex: T2, 18. 8.–21. 9. 2008; 3ex: T4, 18. 8.–21. 9. 2008; 1ex: T2, 21. 9.–21. 10. 2008; 4ex: T3, 21. 9.–21. 10. 2008; 1ex: T3, 21. 10.–26. 11. 2008; 1ex: T2, 8. 5.–18. 6. 2009; 2ex: T2, 18. 6.–19. 7. 2009; 1ex: T3, 18. 6.–19. 7. 2009; 3ex: T3, 19. 7.–18. 8. 2009; 1ex: T4, 18. 8.–20. 9. 2009.

Abax parallelus (Duftschmid, 1812)

Common forest species known from lowlands to mountains. Data: 1ex: T1, 22. 4.–22. 5. 2008; 1ex: T4, 18. 6.–22. 7. 2008; 4ex: T2, 18. 8.–21. 9. 2008; 3ex: T3, 21. 9.–21. 10. 2008; 2ex: T2, 8. 5.–18. 6. 2009; 2ex: T3, 8. 5.–18. 6. 2009; 1ex: T2, 18. 6.–19. 7. 2009; 1ex: T4, 19. 7.–18. 8. 2009; 1ex: T3, 20. 9.–20. 10. 2009; 3ex: T4, 20. 9.–20. 10. 2009; 1ex: T4, 20. 10.–20. 11. 2009.

Amara aenea (De Geer, 1774)

Very common eurytopic species of open habitats (fields, steppes, ruderals), from lowlands to mountains. Data: 2ex: T3, 18. 8.–21. 9. 2008.

Amara aulica (Panzer, 1797)

Very common eurytopic species of different open habitats, known from lowlands to mountains. Data: 1ex: T3, 22. 7.–18. 8. 2008; 1ex: T3, 18. 8.–21. 9. 2008.

Amara convexior Stephens, 1828

Common to sporadic species known from lowlands to mountains, indifferent to shade (meadows, shrubby hill-sides, open forests). Data: 1ex: T2, 22. 4.–22. 5. 2008; 2ex: T4, 22. 4.–22. 5. 2008; 4ex: T3, 8. 4.–8. 5. 2009; 1ex: T3, 8. 5.–18. 6. 2009.

Amara equestris (Duftschmid, 1812)

Sporadic species on dry to very dry, unshaded habitats (steppe, pastures), from lowlands to mountains. Data: 3ex: T4, 18. 8.–21. 9. 2008; 1ex: T1, 19. 7.–18. 8. 2009.

Amara familiaris (Duftschmid, 1812)

Very common eurytopic species of open habitats known from lowlands to mountains. Data: 1ex: T3, 8. 4.–8. 5. 2009; 1ex: T3, 18. 6.–19. 7. 2009.

Amara lunicollis Schiödte, 1837

Common species of dry to moderately moist habitats, indifferent to shade (meadows, forest clearings, pastures) known from lowlands to mountains. Data: 1ex: T4, 8. 5.–18. 6. 2009.

Amara plebeja (Gyllenhal, 1810)

Very common species of moderately dry to moist habitats (meadows, margins of waters with vegetation, fields) known from lowlands to mountains. Data: 1ex: T1, 18. 6.–22. 7. 2008.

Anchomenus dorsalis (Pontoppidan, 1763)

Very common of unshaded, dry to moderately moist habitats known from lowlands to mountains, often gregarious. Data: 1ex: T1, 20. 9.–20. 10. 2009.

Aptinus bombarda (Illiger, 1800)

Species known from Moravia only and very local, but locally common. From the Czech Republic is known practically from Moravian Karst PLA only (see Uhlíková, 2009). Data: 21ex: T3, 22. 4.–22. 5. 2008; 2ex: T4, 22. 4.–22. 5. 2008; 709ex: T3, 22. 5.–18. 6. 2008; 406ex: T4, 22. 5.–18. 6. 2008; 254ex: T3, 18. 6.–22. 7. 2008; 125ex: T4, 18. 6.–22. 7. 2008; 1ex: T1, 22. 7.–18. 8. 2008; 54ex: T2, 22. 7.–18. 8. 2008; 96ex: T3, 22. 7.–18. 8. 2008; 107ex: T4, 22. 7.–18. 8. 2008; 2ex: T2, 18. 8.–21. 9. 2008; 25ex: T3, 18. 8.–21. 9. 2008; 5ex: T4, 18. 8.–21. 9. 2008; 13ex: T3, 21. 9.–21. 10. 2008; 15ex: T3, 21. 10.–26. 11. 2008; 1ex: T1, 8. 4.–8. 5. 2009; 4ex: T3, 8. 4.–8. 5. 2009; 1ex: T4, 8. 4.–8. 5. 2009; 2ex: T2, 8. 5.–18. 6. 2009; 163ex: T3, 8. 5.–18. 6. 2009; 57ex: T4, 8. 5.–18. 6. 2009; 6ex: T2, 18. 6.–19. 7. 2009; 86ex: T3, 18. 6.–19. 7. 2009; 79ex: T4, 18. 6.–19. 7. 2009; 5ex: T1, 19. 7.–18. 8. 2009; 15ex: T2, 19. 7.–18. 8. 2009; 56ex: T3, 19. 7.–18. 8. 2009; 19ex: T4, 19. 7.–18. 8. 2009; 4ex: T3, 18. 8.–20. 9. 2009; 12ex: T4, 18. 8.–20. 9. 2009; 1ex: T4, 20. 9.–20. 10. 2009; 1ex: T2, 20. 10.–20. 11. 2009.

Brachinus crepitans (Linnaeus, 1758)

Common species, but relatively local and recently declining. Known from unshaded, dry to semimoist habitats (steppe, fields), from lowlands to foothills. Data: 1ex: T3, 8. 4.–8. 5. 2009.

Brachinus explodens Duftschmid, 1812

Common species of sunny, dry to semimoist habitats (steppe, fields) known from lowlands to mountains. Data: 1ex: T1, 22. 5.–18. 6. 2008.

Broscus cephalotes (Linnaeus, 1758)

Common species of open, moderately dry to moist habitats (sand-pits, sandy fields, sandy water edges) known from lowlands to foothills. Data: 1ex: T2, 20. 9.–20. 10. 2009.

Calathus fuscipes (Goeze, 1777)

Very common species of unshaded, rather dry habitat (meadows, fields, barks, steppe) known from lowlands to mountains. Data: 1ex: T3, 22. 5.–18. 6. 2008; 6ex: T4, 22. 7.–18. 8. 2008; 1ex: T2, 18. 8.–21. 9. 2008; 1ex: T3, 18. 8.–21. 9. 2008; 26ex: T4, 18. 8.–21. 9. 2008; 1ex: T3, 21. 9.–21. 10. 2008; 2ex: T4, 19. 7.–18. 8. 2009; 3ex: T3, 18. 8.–20. 9. 2009; 3ex: T4, 18. 8.–20. 9. 2009.

Calathus melanocephalus (Linnaeus, 1758)

Very common species of mainly unshaded or moderately shaded habitats (fields, steppe), known from lowlands to mountains. Data: 1ex: T3, 8. 4.–8. 5. 2009.

Calosoma auropunctatum (Herbst, 1784) **VU**

Very rare species across the territory of Czech Republic characteristic for fields and steppe in lowlands. Data: 1ex: T1, 22. 7.–18. 8. 2008.

Carabus cancellatus Illiger, 1798 **NT**

Common species of all types types on natural habitats occurring from lowlands to middle mountain elevations. Data: 1ex: T4, 22. 5.–18. 6. 2008; 1ex: T4, 18. 8.–21. 9. 2008; 1ex: T4, 18. 6.–19. 7. 2009.

Carabus convexus Fabricius, 1775

Common species across whole territory of the Czech Republic known from slightly shaded habitats. Data: 1ex: T3, 22. 5.–18. 6. 2008; 1ex: T4, 18. 6.–22. 7. 2008; 1ex: T3, 22. 7.–18. 8. 2008; 2ex: T3, 21. 9.–21. 10. 2008; 1ex: T3, 8. 4.–8. 5. 2009; 1ex: T4, 8. 4.–8. 5. 2009; 1ex: T3, 8. 5.–18. 6. 2009.

Carabus hortensis Linnaeus, 1758

Very common species of coiferous and deciduous forests known from lowlands to mountains. Data: 1ex: T2, 22. 7.–18. 8. 2008; 1ex: T4, 21. 9.–21. 10. 2008; 1ex: T4, 8. 5.–18. 6. 2009; 1ex: T2, 18. 6.–19. 7. 2009; 3ex: T4, 18. 8.–20. 9. 2009; 1ex: T4, 20. 9.–20. 10. 2009.

Carabus nemoralis O. F. Müller, 1764

Very common species of shaded habitats occurring from lowlands to mountains. Data: 1ex: T3, 21. 9.–21. 10. 2008.

Carabus ullrichi Germar, 1824

Common but declining species of open habitats known from lowlands to foothills. Data: 1ex: T3, 22. 4.–22. 5. 2008; 1ex: T4, 22. 4.–22. 5. 2008; 10ex: T1, 22. 5.–18. 6. 2008; 2ex: T3, 18. 6.–22. 7. 2008; 1ex: T2, 22. 7.–18. 8. 2008; 1ex: T3, 22. 7.–18. 8. 2008; 2ex: T4, 22. 7.–18. 8. 2008; 1ex: T2, 18. 8.–21. 9. 2008; 1ex: T3, 18. 8.–21. 9. 2008; 8ex: T4, 18. 8.–21. 9. 2008; 9ex: T3, 21. 9.–21. 10. 2008; 1ex: T3, 21. 10.–26. 11. 2008; 1ex: T4, 8. 4.–8. 5. 2009; 1ex: T2, 8. 5.–18. 6. 2009; 2ex: T4, 8. 5.–18. 6. 2009; 1ex: T2, 18. 6.–19. 7. 2009; 1ex: T3, 19. 7.–18. 8. 2009; 1ex: T4, 18. 8.–20. 9. 2009; 2ex: T4, 20. 9.–20. 10. 2009.

Carabus violaceus Linnaeus, 1758

Common forest species known from lowlands to high mountain elevations. Data: 1ex: T2, 18. 8.–21. 9. 2008; 1ex: T4, 18. 8.–21. 9. 2008; 2ex: T3, 19. 7.–18. 8. 2009.

Cicindela campestris Linnaeus, 1758

Common species of open habitats known from lowlands to mountains. Data: 1ex: T2, 22. 5.–18. 6. 2008; 1ex: T2, 8. 5.–18. 6. 2009.

Cymindis angularis Gyllenhal, 1810

Relatively rare species of open and dry habitats. It is sporadic species in Bohemia and sporadic to rare in Moravia known from lowland to hills. Data: 1ex: T1, 21. 9.–21. 10. 2008; 1ex: T1, 21. 10.–26. 11. 2008.

Harpalus distinguendus (Duftschmid, 1812)

Very common species of dry to moderately moist unshaded habitats (fields, steppe, ruderals) known from lowlands to hills. Data: 1ex: T3, 8. 5.–18. 6. 2009.

Harpalus rubripes (Duftschmid, 1812)

Very common species of dry to indifferent unshaded habitats (fields, quarries, brick-yards, ruderals) known from lowlands to mountains, mainly in hills. Data: 2ex: T1, 8. 4.–8. 5. 2009; 10ex: T3, 8. 4.–8. 5. 2009; 1ex: T2, 8. 5.–18. 6. 2009; 9ex: T1, 18. 6.–19. 7. 2009; 1ex: T2, 18. 6.–19. 7. 2009; 1ex: T3, 18. 6.–19. 7. 2009; 3ex: T4, 18. 6.–19. 7. 2009; 4ex: T1, 19. 7.–18. 8. 2009; 2ex: T3, 19. 7.–18. 8. 2009; 4ex: T3, 18. 8.–20. 9. 2009; 9ex: T1, 20. 9.–20. 10. 2009; 2ex: T2, 20. 9.–20. 10. 2009; 1ex: T2, 20. 10.–20. 11. 2009.

Harpalus rufipalpis Sturm, 1818

Common species of very dry to moderately dry unshaded habitats known from lowlands to mountains. Data: 1ex: T1, 22. 5.–18. 6. 2008; 2ex: T1, 22. 7.–18. 8. 2008.

Metallina lampros (Herbst, 1784)

Very common species of dry to moderately moist unshaded habitats known from lowlands to mountains. Data: 1ex: T3, 22. 5.–18. 6. 2008.

Microlestes maurus (Sturm, 1827)

Common species of rather dry habitats indifferent to shade known from lowlands to mountains, often in hills. Data: 2ex: T1, 8. 4.–8. 5. 2009; 1ex: T1, 20. 9.–20. 10. 2009.

Microlestes minutulus (Goeze, 1777)

Common eurytopic species of unshaded habitats (steppe, forests) known from lowlands to mountains, often in hills. Data: 2ex: T1, 22. 4.–22. 5. 2008; 2ex: T2, 22. 4.–22. 5. 2008; 2ex: T1, 22. 5.–18. 6. 2008; 1ex: T2, 22. 5.–18. 6. 2008; 1ex: T3, 22. 5.–18. 6. 2008; 2ex: T1, 18. 6.–22. 7. 2008; 1ex: T3, 18. 6.–22. 7. 2008; 2ex: T2, 8. 5.–18. 6. 2009; 1ex: T2, 18. 6.–19. 7. 2009.

Molops elatus (Fabricius, 1801)

In Bohemia sporadic and local, only very locally common, in Moravia sporadic and local, prefers drier habitats, indifferent to shade, known from lowlands to mountains. Data: 8ex: T1, 22. 4.–22. 5. 2008; 11ex: T2, 22. 4.–22. 5. 2008; 1ex: T3, 22. 4.–22. 5. 2008; 8ex: T4, 22. 4.–22. 5. 2008; 1ex: T1, 22. 5.–18. 6. 2008; 2ex: T2, 22. 5.–18. 6. 2008; 7ex: T3, 22. 5.–18. 6. 2008; 8ex: T4, 22. 5.–18. 6. 2008; 1ex: T3, 18. 6.–22. 7. 2008; 1ex: T3, 22. 7.–18. 8. 2008; 1ex: T4, 18. 8.–21. 9. 2008; 16ex: T1, 8. 4.–8. 5. 2009; 1ex: T4, 8. 4.–8. 5. 2009; 4ex: T2, 8. 5.–18. 6. 2009; 16ex: T3, 8. 5.–18. 6. 2009; 9ex: T4, 8. 5.–18. 6. 2009; 1ex: T1, 18. 6.–19. 7. 2009; 2ex: T2, 18. 6.–19. 7. 2009; 4ex: T4, 18. 6.–19. 7. 2009; 1ex: T4, 20. 10.–20. 11. 2009.

Molops piceus (Panzer, 1793)

Very common species in forests known from mountains to lowlands. Data: 1ex: T1, 22. 4.–22. 5. 2008; 1ex: T1, 22. 5.–18. 6. 2008.

Panagaeus cruxmajor (Linnaeus, 1758)

Sporadic species, rather in moist, unshaded or partly shaded habitats (meadows near waters, grassy water edges) known from lowlands to hills. Data: 1ex: T1, 18. 6.–19. 7. 2009.

Paradromius linearis (Olivier, 1795)

Sporadic to common species in dry unshaded habitats known from lowlands to mountains. Data: 1ex: T2, 22. 4.–22. 5. 2008.

Poecilus cupreus (Linnaeus, 1758)

Very common species in unshaded habitats (fields, steppe, water edges) known from lowlands to mountains. Data: 32ex: T1, 22. 4.–22. 5. 2008; 36ex: T2, 22. 4.–22. 5. 2008; 1ex: T3, 22. 4.–22. 5. 2008; 18ex: T4, 22. 4.–22. 5. 2008; 1ex: T2, 22. 5.–18. 6. 2008; 1ex: T3, 22. 5.–18. 6. 2008; 1ex: T3, 18. 6.–22. 7. 2008; 1ex: T1, 22. 7.–18. 8. 2008; 1ex: T3, 22. 7.–18. 8. 2008; 5ex: T1, 18. 8.–21. 9. 2008; 1ex: T3, 18. 8.–21. 9. 2008; 1ex: T1, 21. 9.–21. 10. 2008; 1ex: T3, 21. 10.–26. 11. 2008; 3ex: T1, 8. 4.–8. 5. 2009; 16ex: T3, 8. 4.–8. 5. 2009.

5. 2009; 9ex: T4, 8. 4.–8. 5. 2009; 1ex: T2, 8. 5.–18. 6. 2009; 1ex: T3, 8. 5.–18. 6. 2009; 2ex: T3, 18. 8.–20. 9. 2009; 3ex: T4, 18. 8.–20. 9. 2009; 1ex: T1, 20. 9.–20. 10. 2009; 1ex: T2, 20. 9.–20. 10. 2009; 2ex: T3, 20. 9.–20. 10. 2009; 1ex: T4, 20. 9.–20. 10. 2009.

Pseudoophonus calceatus (Duftschmid, 1812)

In Bohemia sporadic species, in Moravia common species of dry to very dry, unshaded habitats known from lowlands to foothills. Data: 1ex: T3, 18. 8.–20. 9. 2009.

Pseudoophonus griseus (Panzer, 1797)

Very common species, in dry to indifferent, unshaded habitats known from lowlands to mountains. Data: 1ex: T1, 18. 6.–19. 7. 2009; 1ex: T2, 18. 6.–19. 7. 2009; 1ex: T4, 19. 7.–18. 8. 2009.

Pseudoophonus rufipes (De Geer, 1774)

Very common species in dry to moderately moist, preferably unshaded habitats known from lowlands to mountains. Data: 3ex: T1, 22. 4.–22. 5. 2008; 1ex: T2, 22. 4.–22. 5. 2008; 1ex: T1, 22. 5.–18. 6. 2008; 1ex: T2, 22. 5.–18. 6. 2008; 1ex: T4, 22. 5.–18. 6. 2008; 2ex: T1, 22. 7.–18. 8. 2008; 1ex: T4, 22. 7.–18. 8. 2008.

Pterostichus melanarius (Illiger, 1798)

Very common eurytopic species of fields, meadows, gardens, as well as forests known from lowlands to mountains. Data: 1ex: T4, 22. 4.–22. 5. 2008; 1ex: T4, 18. 6.–22. 7. 2008; 1ex: T1, 8. 4.–8. 5. 2009.

Acknowledgment

This study was supported by project IGA MENDELU Brno TP5/2011. The authors thank to Zdeněk Laštůvka for his notes to the manuscript.

REFERENCES

- AUDISIO, P., TAGLIANTI, A. V. (eds.), 2004: Fauna Europaea – Carabidae. Available online at <http://www.fauna-eur.org/> (cited: 22. 10. 2010).
- HAMET, A., VANCL, Z., BOUKAL, M., TRÁVNÍČEK, D., VAŠÍČKOVÁ K., 2009: Brouci CHKO Moravský kras. Acta musealia, 9(1–2): 11–46.
- HOLLAND, J. M., 2002: The agroecology of carabid beetles. Intercept, Andover, 356 pp.
- HORÁKOVÁ J. 2005: Vybrané skupiny epigeické fauny závrťů CHKO Moravský kras a jejich antropogenní ovlivnění [Selected groups of epigeal invertebrate fauna of sink hole in Moravský kras PLA and their anthropogenetic involvement]. Ph.D. Thesis, AF MZLU Brno, 248 pp.
- HORÁKOVÁ, J., HULA, V., PIKULA, J., 2005: Contribution to fauna of invertebrates of sink holes within the agricultural landscape of the Moravian Karst Protected Area. Part one: Carabidae (Coleoptera). Acta univ. agric. et silvic. Mendel. Brun., 52(5): 53–62.
- HŮRKA, K., 1996: Carabidae of the Czech and Slovak Republics. Kabourek, Zlín, 565 pp.
- HŮRKA, K., VESELÝ, P., FARKAČ, J., 1996: Využití střevlíkovitých (Coleoptera: Carabidae) k indikaci kvality prostředí. Klapalekiana, 32: 15–26.
- KLAŠKOVÁ, J., 2005: Diverzita a bioindikační využití střevlíkovitých a drabčíkovitých (Coleoptera: Carabidae, Staphylinidae) na antropogenně různě ovlivněných travnatých biotopech Moravského krasu. Ph.D. Thesis, AF MZLU Brno, 140 pp.
- KULT, K., 1947: Klíč k určování brouků čeledi Carabidae Československé republiky: Čs. spol. entomol., Praha. Entomol. příručky, 20: 1–199.
- PRUNER, L., MÍKA, P., 1996: Seznam obcí a jejich částí v České republice s čísly mapových polí pro síťové mapování fauny. Klapalekiana, 32: 1–175.
- PULPÁN, J., HŮRKA, K., 1993: Carabidae, p. 12–22. In: JELÍNEK, J. (ed.), Check-list of Czechoslovak Insects IV (Coleoptera). Seznam československých brouků. Folia Heyrovskyana, Suppl. 1: 1–172.
- PULPÁN, J., REŠKA, M., 1971: Vertikální a územní rozšíření brouků čeledi Carabidae, Coleoptera v Československu. Acta Mus. Reginaehradec., 12: 85–140.
- ŠTASTNÁ, P., BEZDĚK, J., 2001: Investigation results of Carabidae (Coleoptera) in selected habitats of Moravian Karst Protected Area during 1999 and 2000. Acta univ. agric. et silvic. Mendel. Brun. (Brno) 49(5): 101–107.
- VESELÝ, P., MORAVEC, P., STANOVSKÝ, J., 2005: Carabidae (střevlíkovití), p. 406–411. In: FARKAČ, J., KRÁL, D., ŠKORPÍK, M. (eds), Červený seznam ohrožených druhů České republiky. (Red list of Threatened Species in the Czech Republic). AOPK ČR, Praha, 760 pp.
- UHLÍKOVÁ, H., 2009: An interesting record of *Aptinus bombardus* (Coleoptera: Carabidae) from southwestern Moravia. Klapalekiana, 45: 77–79.

Address

Ing. Jana Niedobová, Ing. Vladimír Hula, Ph.D., Dr. Ing. Pavla Štastná, Ústav zoologie, rybářství, hydrobiologie a včelařství, Mendelova univerzita v Brně, Zemědělská 1, 613 00 Brno, Česká republika, e-mail: hula@mendelu.cz

