

Flight activity of beetles (Coleoptera) in Vysoké Tatry Mts (Malaise fauna)

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Abstract

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In 2006 we studied flight activity of beetles at 4 sites in Vysoké Tatry Mts using a method of Malaise traps. The research was focused to find differences in diversity and equitability of beetle coenoses in 2 biotope types. The assemblages appear balanced in undamaged forest habitats. At deforested sites we recorded decline in equitability.

Key words

beetle assemblages, ecology, diversity

Introduction

2 years after the wind disaster (November 19, 2004) in Vysoké Tatry Mts we analysed flight activity of beetles in 2 types of habitats. The new situation has formed “a nature laboratory“ including its new ecological conditions. A cold air mass, a bora, with a speed of 170 km per hour had disaster effects on forest complexes, which have suddenly changed into open habitats. Consequentially this has been followed by increased radiation and new proportion in atmospheric gas concentration (oxygen and carbon dioxide). The assimilation potential of forests has declined what has been temporarily accompanied by an increase of decomposition components. The destroyed forest has followed significant natural succession of vegetation. However the development of coenoses, particularly entomocoenoses are less visible and requires more complex methods to be studied. According to our experiences Malaise traps are one of them.

Study area

4 research sites were established on southern slopes of Vysoké Tatry Mts from Tatranská Lomnica to Vyšné Hágy. 2 traps were installed, one of them in Tatranská Lomnica (Štart) in a forest site (Fig 1) and the second

one in the National Nature Reserve Studené doliny – Jamy (deforested site). The traps were exposed since May 4, 2006 (exposition period of 148 days).

The second couple of traps were installed at the site of Nová Polianka – Danielov dom (deforested site, Fig 2) and Vyšné Hágy – Smrekovec (a forest site). These traps were exposed since May 15, 2006 (exposition period of 137 days).



Fig 1. The Malaise trap in Larici-Piceetum at the site of Tatranská Lomnica – Štart (photo by O. Majzlan, May 16, 2006)



Fig 2. The Malaise trap at the deforested site in Nová Polianka – Danielov dom (photo by O. Majzlan, May 16, 2006)

In terms of phytosociology the vegetation at all the sites can be classified as Larici-Piceetum.

Material and methods

A Malaise trap is the sampling equipment, which analyses flight activity of arthropods, especially insects. It works permanently and without attractants. The material was collected in regular weekly intervals. The traps were installed from May 19 to September 30, 2006 (total exposition period of 134 days).

Diversity and equitability were evaluated using the Simpson's indices.

The material was analysed by various experts and compared with relevant research in Slovakia (MAJZLAN, 2002).

Results

Research on flight activity of insects, especially beetles (Coleoptera) enhances to evaluate character of biotopes after the wind disaster. From 4 Malaise traps 222 beetle species were obtained (Table 1). Based on the quality and quantity, as well as on the chosen ecological variables, the sites may be ordered:

Species richness: Štart (111) – Jamy (110) – Danielov dom (86) – Smrekovec (74)

Quantity: Danielov dom (517) – Štart (495) – Jamy (422) – Smrekovec (319)

Diversity: Štart (63) – Jamy (50) – Smrekovec – (52) Danielov dom (23)

Equitability: Smrekovec (0.69) – Štart (0.57) – Jamy (0.45) – Danielov dom (0.27).

The site Smrekovec shows stable and balanced values of equitability in beetle communities suggesting a climax stage of the locality (original forest phytocoenoses Abieti-Piceetum). The community includes only 2 dominant species: *Polydrusus impar* (15.6%) and *Athous subfuscus* (7.8%).

The higher quantity (517 ex) refers to the site of Danielov dom (Daniel's house); however the equitability reaches its minimum (0.27). The community contains 6 dominant species: *Athous subfuscus* (15.8%), *Polydrusus impar* (9.8%), *Podabrus alpinus* (7.4%), *Rhagonycha translucida* (6.8%), *Coccinella septempunctata* (6.0%), *Rhagonycha atra* (5.2%) which decrease qualitative – quantitative balance in the community as they form 51% of all the specimens.

Deforested sites are characterised by lower values of equitability reflecting the disturbed function of the forest. The other sites are in various stage of succession. Beetle communities seem to be more diverse (higher diversity) and balanced (equitability) in climax stages.

Table 1. A survey of the beetle species recorded from the Malaise trap at 4 sites in 2006 (including a month of collection and their abundance)

Family	Štart	Jamy	Danielov dom	Smrekovec
<i>Species</i>				
Carabidae				
<i>Bradycellus csikii</i> Laczó, 1812	5/1			
<i>Calathus micropterus</i> (Duftschmid, 1812)				8/1
<i>Dromius agilis</i> (Fabricius, 1787)		6/1, 7/1	7/1, 8/1	
<i>Dromius fenestratus</i> (Fabricius, 1794)	5/1, 6/1, 7/1, 8/2		8/4, 9/3, 10/1	
<i>Notiophilus biguttatus</i> (Fabricius, 1779)		6/1	8/1, 9/1	7/1
<i>Trechus quadristriatus</i> (Schrank, 1781)	5/1			
Dytiscidae				
<i>Agabus guttatus</i> (Paykull, 1798)	9/1			

Table 1. Continued

Family	Štart	Jamy	Danielov dom	Smrekovec
<i>Species</i>				
Silphidae				
<i>Necrophorus vespilloides</i> Herbst, 1784	7/1			7/1
<i>Necrophorus sepultor</i> Charpentier, 1825	7/1			
Leiodidae				
<i>Anisotoma castanea</i> (Herbst, 1792)	7/1			
<i>Anisotoma humeralis</i> (Fabricius, 1792)				6/1, 8/1
<i>Catops coracinus</i> Kellner, 1846		7/1		
<i>Catops nigriclavus</i> Gerhardt, 1900	9/1		9/1	
<i>Catops nigrita</i> Erichson, 1837	9/1		7/1	5/1, 7/1
<i>Catops subfuscus</i> Kellner, 1846	8/1			
<i>Catops tristis</i> (Panzer, 1794)	10/2			7/1, 8/15, 9/6, 10/2
<i>Choleva cisteloides</i> (Frölich, 1799)	10/2	6/1		8/1
<i>Choleva nivalis</i> (Kraatz, 1856)	9/1			
<i>Choleva sturmi</i> Brisout, 1863	10/1			
<i>Leiodes ferruginea</i> (Fabricius, 1787)				8/2
<i>Leiodes oblonga</i> (Erichson, 1845)			8/1	
<i>Sciodrepoides watsoni</i> (Spence, 1815)	7/1, 8/1			5/1, 7/2
Staphylinidae				
<i>Aleochara sparsa</i> Heer, 1839				10/2
<i>Aleochara stichai</i> Likovský, 1965	8/2			8/2
<i>Amphichroum canaliculatum</i> (Erichson, 1840)		6/1		
<i>Atheta laticollis</i> (Kirby, 1832)			10/1	
<i>Atheta picipes</i> (Thomson, 1856)	8/1			
<i>Atheta trinotata</i> (Kraatz, 1856)	8/1			
<i>Broyphacis rufus</i> (Erichson, 1792)				9/1
<i>Drusilla canaliculata</i> (Fabricius, 1787)			10/1	
<i>Leptusa pulchella</i> (Mannerheim, 1830)	8/1			8/1
<i>Lordithon lunulatus</i> (Linnaeus, 1860)	8/3			8/2
<i>Ontholestes tessellatus</i> (Fourcroy, 1758)		5/1		
<i>Philonthus addendus</i> Sharp, 1867		9/1		
<i>Philonthus cognatus</i> Stephens, 1832		9/5	10/1	
<i>Philonthus marginatus</i> (Stroem, 1768)				10/1
<i>Philonthus succicola</i> Thomson, 1855				9/2
<i>Phloeostiba plana</i> (Paykull, 1792)				8/2
<i>Phyllodrepa floralis</i> (Paykull, 1789)		9/1		
<i>Quedius mesomelinus</i> (Marshall, 1802)	8/1	9/3	10/6	8/3, 9/3, 10/14
<i>Quedius nitipennis</i> (Stephens, 1833)	9/2		10/10	10/1
<i>Quedius paradisiannus</i> (Heer, 1839)		9/2		8/3
<i>Tachinus pallipes</i> (Gravenhorst, 1806)				10/1
<i>Tachinus proximus</i> Kraatz, 1855	8/2			8/8, 9/2
Clambidae				
<i>Calyptomeres alpestris</i> Redtenbacher, 1849				8/1

Table 1. Continued

Family	Štart	Jamy	Danielov dom	Smrekovec
<i>Species</i>				
Helodidae				
<i>Cyphon rufipes</i> Tournier, 1868		6/16, 9/7		
<i>Cyphon variabilis</i> (Thunberg, 1787)		5/2, 6/1, 9/5	7/1	
<i>Elodes pseudominuta</i> Klausnitzer, 1971		6/1		
Scarabaeidae				
<i>Aphodius fimetarius</i> (Linnaeus, 1758)				8/1
<i>Phyllopertha horticola</i> (Linnaeus, 1758)	6/1	7/4	6/1	
Buprestidae				
<i>Anthaxia quadripunctata</i> (Linnaeus, 1758)		6/1		
Elateridae				
<i>Ampedus aethiops</i> (Lacordaire, 1835)	6/1			
<i>Ampedus auripes</i> (Reitter, 1895)			5/1	7/1
<i>Ampedus nigrinus</i> (Herbst, 1784)		6/1		6/2
<i>Athous subfuscus</i> (Müller, 1767)	6/9, 7/32	6/39, 7/28	6/15, 7/82	6/25, 7/4
<i>Ctenicera cuprea</i> (Fabricius, 1781)	6/25, 7/1	6/2		
<i>Dalopius marginatus</i> (Linnaeus, 1758)	6/3, 7/2	6/9	5/6, 6/3	6/1
<i>Denticollis interpositus</i> Roubal, 1841			7/1	
<i>Denticollis rubens</i> (Pill. et. Mitt., 1783)		6/1		7/1
<i>Kibunea minuta</i> (Linnaeus, 1758)	6/1, 7/1			
<i>Melanotus castanipes</i> (Paykull, 1800)		6/1	7/1	
<i>Prosternon tessellatum</i> (Linnaeus, 1758)			7/1	
<i>Selatosomus aeneus</i> (Linnaeus, 1758)	6/2	5/1, 6/1	5/4, 6/2	
Homalidae				
<i>Omalisus fontisbellaquei</i> (Geoffroy, 1762)			7/4	
Lycidae				
<i>Dictyoptera aurora</i> (Herbst, 1784)		7/1	7/1	7/3
<i>Platycis minutus</i> (Fabricius, 1787)			8/3	7/2, 8/1, 9/1, 10/1
Lampyridae				
<i>Lampyris noctiluca</i> (Linnaeus, 1767)				7/2
<i>Phosphaenus hemipterus</i> (Geoffroy, 1762)	6/1			
Drilidae				
<i>Drilus concolor</i> Ahrens, 1812	5/1	5/2		6/1
Cantharidae				
<i>Cantharis fulvicollis</i> Fabricius, 1792		5/1	7/1	7/1
<i>Cantharis obscura</i> Linnaeus, 1758			7/2	
<i>Cantharis pagana</i> Rosenhauer, 1846		6/5	6/5	
<i>Cantharis pellucida</i> Fabricius, 1792	6/1		7/1	
<i>Cratosilis denticollis</i> (Schummel, 1844)	7/4, 8/1	7/2	7/12	7/6
<i>Malthinus biguttatus</i> (Paykull, 1800)	7/1	6/4	8/1	5/1, 6/1
<i>Malthinus flaveolus</i> (Herbst, 1786)	7/1	8/2	8/2	7/1, 8/5
<i>Malthinus seriepunctatus</i> Kiesenwetter, 1851	6/4, 7/10		5/1	6/2
<i>Malthodes brevicollis</i> (Paykull, 1798)	5/5		6/2	
<i>Malthodes hexacanthus</i> Kiesenwetter, 1852	6/1, 7/2		6/1	7/4, 8/5
<i>Podabrus alpinus</i> (Paykull, 1798)	7/1, 8/6	6/4, 7/4	7/38	6/1, 7/1

Table 1. Continued

Family	Štart	Jamy	Danielov dom	Smrekovec
<i>Species</i>				
<i>Rhagonycha atra</i> (Linnaeus, 1767)	7/4, 8/1	7/1	7/27	7/4, 8/1
<i>Rhagonycha elongata</i> (Fallén, 1807)	7/11	8/1	7/4	7/1
<i>Rhagonycha testacea</i> (Linnaeus, 1758)	7/3, 8/5	7/1	7/1	
<i>Rhagonycha translucida</i> (Krynicky, 1832)	7/15, 8/2	7/6	7/35	7/13
Anobiidae				
<i>Caenocara bovistae</i> (Hoffmann, 1803)			8/1	
<i>Ernobius abietis</i> (Fabricius, 1792)	6/1	5/1, 7/1	10/2	
<i>Ernobius nigrinus</i> (Sturm, 1837)		6/3		
Trogositidae				
<i>Nemozoma elongatum</i> (Linnaeus, 1761)		6/1		
Cleridae				
<i>Thanasimus formicarius</i> (Linnaeus, 1758)		6/5, 7/3	6/1, 10/1	
<i>Thanasimus pectoralis</i> (Zetterstedt, 1828)	6/1			
Dasytidae				
<i>Aplocnemus tarsalis</i> (Sahlberg, 1822)			5/5, 7/2	
Malachiidae				
<i>Charopus graminicola</i> (Dejean, 1833)	6/1	7/1		
Lymexylonidae				
<i>Hylecoetus dermestoides</i> (Linnaeus, 1761)	7/1			
Nitidulidae				
<i>Carpophilus mutilatus</i> Erichson, 1843		7/1		
<i>Cychramus variegatus</i> (Herbst, 1792)	8/1, 9/1			10/2, 9/5
<i>Epuraea angustula</i> Sturm, 1844		7/1		
<i>Epuraea marseuli</i> Reitter, 1872	6/1			6/1, 7/1
<i>Epuraea neglecta</i> (Heer, 1841)	8/1			
<i>Epuraea unicolor</i> (Olivier, 1790)				7/1
<i>Meligethes aeneus</i> (Fabricius, 1775)	7/1, 9/1	6/1		
<i>Meligethes viridescens</i> (Fabricius, 1787)	7/2, 8/5, 9/1	6/1	7/1	8/5, 9/1
<i>Thalycra fervida</i> (Olivier, 1790)			6/1	
Rhizophagidae				
<i>Rhizophagus depressus</i> (Fabricius, 1792)			10/1	
Sphindidae				
<i>Aspidiophorus orbicularis</i> (Gyllenhal, 1808)	8/1			
Cucujidae				
<i>Placonotus testaceus</i> (Fabricius, 1787)		7/1		
Cryptophagidae				
<i>Henoticus serratus</i> (Gyllenhal, 1808)		9/1		
Byturidae				
<i>Byturus tomentosus</i> (De Geer, 1774)		6/3		
Erotylidae				
<i>Triplax lepida</i> Faldermann, 1835	6/1			
Endomychidae				
<i>Mycetina cruciata</i> (Schaller, 1783)			5/1	

Table 1. Continued

Family	Štart	Jamy	Danielov dom	Smrekovec
<i>Species</i>				
Coccinellidae				
<i>Anatis ocellata</i> (Linnaeus, 1758)	8/12, 9/1			
<i>Aphidecta oblitterata</i> (Linnaeus, 1758)	9/2	6/2		5/1
<i>Ceratomegilla alpina redt.</i> (Capra, 1928)			7/1	
<i>Coccinella septempunctata</i> Linnaeus, 1758	6/1, 7/21, 8/15, 9/3	5/2, 7/11, 8/1	5/2, 7/31, 8/12, 9 3, 10/2	
<i>Halyzia sedecimguttata</i> (Linnaeus, 1758)	7/1	6/1, 7/3		
<i>Hippodamia tredecimpunctata</i> (L., 1758)			7/1, 10/1	
<i>Myzia oblongopunctata</i> (Linnaeus, 1758)	8/1			
<i>Propylea quatuordecimpunctata</i> (L., 1758)	8/2, 9/1	6/1, 7/1	5/1, 7/5, 8/2	
<i>Scymnus abietis</i> Paykull, 1798				7/1
Lathridiidae				
<i>Aridius nodifer</i> (Westwood, 1839)	8/1, 9/1		9/1	
<i>Cartodere constricta</i> (Gyllenhal, 1827)				
<i>Corticaria ferruginea</i> Marsham, 1802			7/1	
<i>Corticaria rubripes</i> Mannerheim, 1844	8/1, 9/3			
<i>Corticarina fuscata</i> (Gyllenhal, 1827)		7/4		
<i>Corticaria gibbosa</i> (Herbst, 1793)		9/1		
<i>Enicmus fungicola</i> Thomson, 1868				
<i>Enicmus histrio</i> Joy et Tomlin, 1910				7/1
<i>Latridius minutus</i> (Linnaeus, 1767)		9/1		
<i>Stephostethus rugicollis</i> (Olivier, 1790)	6/1			
Ciidae				
<i>Cis punctulatus</i> Gyllenhal, 1827			7/1	
Melandryidae				
<i>Xylita livida</i> (Sahlberg, 1834)		6/1		
<i>Xylita laevigata</i> (Hellenius, 1786)		5/1		
Mordellidae				
<i>Mordella aculeata</i> (Linnaeus, 1758)		5/1	6/1	
<i>Mordella brachyura</i> Mulsant, 1856				
<i>Mordellistena brevicauda</i> (Boheman, 1849)	5/1, 7/4			
<i>Mordellistena dieckmanni</i> Ermisch, 1963	6/1			
<i>Mordellistena kraatzi</i> Emery, 1876		8/4		7/1
<i>Mordellistena micantoides</i> Ermisch, 1954	6/3, 7/5			
<i>Mordellistena neuwaldeggiana</i> (Panzer, 1796)				6/2
<i>Mordellistena pumila</i> (Gyllenhal, 1810)				5/1
<i>Mordellistenula perrisi</i> (Mulsant, 1856)			6/1, 7/2	8/4
<i>Mordellochroa abdominalis</i> (Fabricius, 1775)	5/1, 7/1		6/1	
<i>Tomoxia bucephala</i> Costa, 1854	6/1			
<i>Variimorda basalis</i> (Costa, 1854)	5/1	6/1		6/4
Scraptidae				
<i>Anaspis arctica</i> Zetterstedt, 1828	5/1, 8/8			6/5
<i>Anaspis frontalis</i> (Linnaeus, 1758)	6/1		5/2	7/2
<i>Anaspis ruficollis</i> (Fabricius, 1792)			5/5	
<i>Anaspis rufilabris</i> (Gyllenhal, 1827)		6/2		6/10, 7/5

Table 1. Continued

Family	Štart	Jamy	Danielov dom	Smrekovec
<i>Species</i>				
Salpingidae				
<i>Rabocerus gabrieli</i> (Gerhardt, 1901)		6/1		
<i>Salpingus ruficollis</i> (Linnaeus, 1761)	8/1			
Lagriidae				
<i>Lagria hirta</i> (Linnaeus, 1758)		7/1, 8/1	7/2	
Cerambycidae				
<i>Acanthoderes clavipes</i> (Schrank, 1781)		7/1		
<i>Acmaeops septentrionis</i> (Thomson, 1866)	6/2, 7/2	7/1		
<i>Allosterna tabacicolor</i> (De Geer, 1775)	8/1			
<i>Anastrangalia dubia</i> (Scopoli, 1763)		7/3	6/1	7/1
<i>Carilia virginea</i> (Linnaeus, 1758)		6/1, 7/4	7/2	
<i>Cortodera femorata</i> (Fabricius, 1787)			5/1, 6/2	
<i>Evodinus clathratus</i> (Fabricius, 1792)	5/6, 6/15	5/5, 6/1		
<i>Grammoptera ruficornis</i> (Fabricius, 1781)			7/1	
<i>Isarthron castaneum</i> (Linnaeus, 1758)	6/3, 7/2	6/3	6/6	
<i>Isarthron fuscum</i> (Fabricius, 1787)	6/1		5/1	
<i>Molorchus minor</i> (Linnaeus, 1758)		7/1		
<i>Monochamus sutor</i> (Linnaeus, 1758)		8/1		
<i>Obrium brunneum</i> (Fabricius, 1792)	8/2		6/1	
<i>Oxymirus cursor</i> (Linnaeus, 1758)		5/1, 6/2	5/12, 6/3	
<i>Pachyta lamed</i> (Linnaeus 1758),		7/2	6/1	
<i>Pachyta quadrimaculata</i> (Linnaeus, 1758)		6/1, 7/4		
<i>Pachytodes cerambyciformis</i> (Sch., 1781)		7/1	7/1	
<i>Pidonia lurida</i> (Fabricius, 1792)	7/1	5/12, 6/1, 7/3	6/3, 7/1	7/1
<i>Pogonocherus fasciculatus</i> (De Geer, 1775)	6/1	5/1, 6/1, 9/3		
<i>Pseudovadonia livida</i> (Fabricius, 1776)	7/1			
<i>Rhagium inquisitor</i> (Linnaeus, 1758)				
<i>Rhagium mordax</i> (De Geer, 1775)		7/1		
<i>Stenurella melanura</i> (Linnaeus, 1758)		7/1	7/1	7/1
Chrysomelidae				
<i>Altica quercetorum</i> Foudras, 1859		7/1		5/1
<i>Cryptocephalus labiatus</i> (Linnaeus, 1761)				8/1
<i>Cryptocephalus ocellatus</i> Drapiez, 1819	7/1		6/3	
<i>Gonioctena viminalis</i> (Linnaeus, 1758)	7/1			
<i>Chaetocnema concinna</i> (Marsham, 1802)		7/1		
<i>Chrysolina hyperici</i> (Forster, 1771)	9/1			
<i>Chrysolina varians</i> (Schaller, 1783)	7/1			
<i>Longitarsus lateripunctatus</i> Weise, 1893		7/1		
<i>Longitarsus melanocephalus</i> (De Geer, 1775)	8/2			
<i>Longitarsus scutellaris</i> (Rey, 1847)		9/1		
<i>Luperus viridipennis</i> (Germar, 1824)	7/14, 8/45, 9/3, 10/1	8/8		7/7
<i>Oulema gallaeciana</i> (Heyden, 1870)	5/1, 7/1	6/1, 9/1		
<i>Phyllotreta exclamationis</i> (Thunberg, 1784)	7/1			
<i>Phyllotreta nemorum</i> (Linnaeus, 1758)	8/1	5/1		

Table 1. Continued

Family	Štart	Jamy	Danielov dom	Smrekovec
<i>Species</i>				
Chrysomelidae				
<i>Phyllotreta nigripes</i> (Fabricius, 1775)	5/1			
Anthribidae				
<i>Brachytarsus nebulosus</i> (Forster, 1771)	6/3, 7/1	5/2, 6/13, 7/3	6/3, 7/3	6/1, 7/1
Attelabidae				
<i>Caenorhinus germanicus</i> (Herbst, 1797)	6/1			
<i>Cimberis attelaboides</i> (Fabricius, 1787)	8/2	5/2, 6/2	5/1	
Curculionidae				
<i>Anthonomus phyllocola</i> (Herbst, 1795)		5/1		
<i>Anthonomus pinivorax</i> Silfverberg, 1977	8/1			
<i>Brachonyx pineti</i> (Paykull, 1792)		5/1		
<i>Cionus scrophulariae</i> (Linnaeus, 1758)			7/1	
<i>Curculio glandium</i> Marsham, 1802		7/1		
<i>Ellescus bipunctatus</i> (Linnaeus, 1758)			5/1	
<i>Gymnetron tetrum</i> (Fabricius, 1801)		6/1		
<i>Hylobius abietis</i> (Linnaeus, 1758)		6/1	8/1	
<i>Magdalis linearis</i> (Gyllenhal, 1827)		6/1		
<i>Magdalis nitida</i> (Gyllenhal, 1827)		7/1		
<i>Magdalis phlegmatica</i> (Herbst, 1797)		6/1		
<i>Magdalis punctulata</i> (Mulsant et Rey, 1859)	9/1			
<i>Magdalis violacea</i> (Linnaeus, 1758)			7/1	
<i>Miarus graminis</i> (Gyllenhal, 1813)			7/1	
<i>Otiorhynchus lepidopterus</i> (Fabricius, 1794)		7/2	5/3	5/1
<i>Otiorhynchus niger</i> (Fabricius, 1775)		6/1, 7/1		
<i>Otiorhynchus scaber</i> (Linnaeus, 1758)	8/3, 9/1			
<i>Phyllobius alpinus</i> Stierlin, 1859				7/1
<i>Phyllobius arborator</i> (Herbst, 1797)				6/1, 7/1
<i>Phyllobius calcaratus</i> (Fabricius, 1792)				7/1
<i>Pissodes castaneus</i> (De Geer, 1775)		5/1, 9/1		
<i>Pissodes harcyniae</i> (Herbst, 1795)		7/2, 8/2, 9/7		
<i>Pissodes piceae</i> (Illiger, 1807)		5/1, 7/4	6/1, 7/1	
<i>Pissodes scabricollis</i> Miller, 1859		8/1, 9/1		
<i>Polydrusus cervinus</i> (Linnaeus, 1758)				7/1
<i>Polydrusus impar</i> Des Gozis, 1882	9/1	6/4, 7/3	6/22, 7/28	5/1, 7/50, 8/2
<i>Polydrusus pilosus</i> Gredler, 1866		5/1		6/2
<i>Sitona hispidulus</i> (Fabricius, 1776)	9/1			
<i>Sitona inops</i> Gyllenhal, 1832	9/2			
<i>Sitona lineatus</i> (Linnaeus, 1758)			9/2	
<i>Sitona macularis</i> (Marsham, 1902)	9/1			
<i>Sitona sulcifrons</i> (Thunberg, 1798)	8/1	6/2		
<i>Strophosoma melanogrammum</i> (Forster, 1771)	9/2			
Scolytidae				
<i>Dendroctonus micans</i> (Kugelann, 1794)	6/6, 7/3			
<i>Hylastes cunicularius</i> Erichson, 1836		6/1		

Table 1. Continued

Family	Štart	Jamy	Danielov dom	Smrekovec
<i>Species</i>				
<i>Ips typographus</i> (Linnaeus, 1758)	5/4, 6/14, 7/3, 9/2	5/8, 6/11, 7/9, 8/19	5/3, 6/3	8/10
<i>Pityophthorus exsculptus</i> (Ratzeburg, 1837)	7/1			
<i>Pityophthorus glabratus</i> Eichhoff, 1878		9/1		
<i>Polygraphus poligraphus</i> (Linnaeus, 1758)		7/1		
<i>Tomicus piniperda</i> (Linnaeus, 1758)	10/1			
<i>Xyloterus lineatus</i> (Olivier, 1795)		7/1		

In initial stages they contain more zoophagous species, oligo- and polyphagous phytophagous elements as well as numerous invasive, infiltrating and accidental species. Succession towards climax gradually eliminates several species from the community. Finally the coenosis reaches stability on the level of its eucenous species and finds balance amongst its phytophagous and zoophagous elements. Therefore we may evaluate the sites of Jamy, Danielov dom and Štart as changed and developing in their first initial stage.

The flight activity of beetles had the following daily means:

Štart 3.7 ex/day, Jamy 3.1 ex/day, Danielov dom 3.8 ex/day and Smrekovec 2.4 ex/day. These values are comparable with data from other localities in Slovakia (MAJZLAN, 2002).

The flight activity shows its maximum in June and July (Fig 3) including the absolute peak of 220 specimens at the site of Danielov dom in July (7.1 specimens per day in average). Such a value is typical for hills rather than for submontane and montane regions. Abundance of beetles studied during vegetation season culminates in July and August at all the sites (Table 2).

Amongst the recorded species we can determine several stenoeicous and faunistically important elements.

Choleva nivalis, *Choleva cisteloides* and *Choleva sturmi* (Leiodidae) live in burrows of micromammals, which were probably overpopulated at open sites after deforestation (site Jamy).

Calyptomerus alpestris inhabits old decaying spruces and common silver fir. Mountainous element,

which was even found in burrows of *Marmota marmota* (ROUBAL, 1930). In Slovakia very rare. Found at the site Smrekovec (August 14, 2006, 1 ex).

Denticollis interpositus, montane species, described from Slovakia, in the whole area rare and local.

Ampedus nigrinus and *Ampedus auripes*, montane species indicating natural habitats. Found particularly at the site Smrekovec.

Henoticus serratus, submontane and montane species, inhabiting naturally diverse environment. In Slovakia local and rare.

Enicmus fungicola, *Stephostethus rugicollis*, *Corticaria ferruginea* and *Corticaria rubripes*. These latridids indicate stable biotopes. In Slovakia rare.

Pachyta lamed, a montane species being classified as a pest of spruce wood (together with *Pachyta quadrimaculata*). It intensively attacks fresh wood in mountains. In Slovakia local and rare.

Cimebris attelaboides, the European species (the area extends to Asia Minor). It inhabits pines where it feeds on their buds. In Slovakia known from Moravian region to Tatry Mts.

Anthonomus phyllocola and *Anthonomus pinivorax*, weevils living on flowering spruces and pines. Exclusively montane species, locally occurring at higher altitudes in Slovakia.

Pissodes harcyniae and *Pissodes castaneus* as well as the other species of the genus *Pissodes* are considered as pests of coniferous species, especially of their young plants. These two species are however rare and local in Slovakia.

Table 2. Abundance of beetles in the Malaise trap (monthly at a site)

Site	May	June	July	August	September	October	Total
Štart	30	118	167	136	37	7	495
Jamy	53	161	126	40	42	–	422
Danielov dom	63	85	220	111	11	27	517
Smrekovec	8	60	128	78	21	24	319

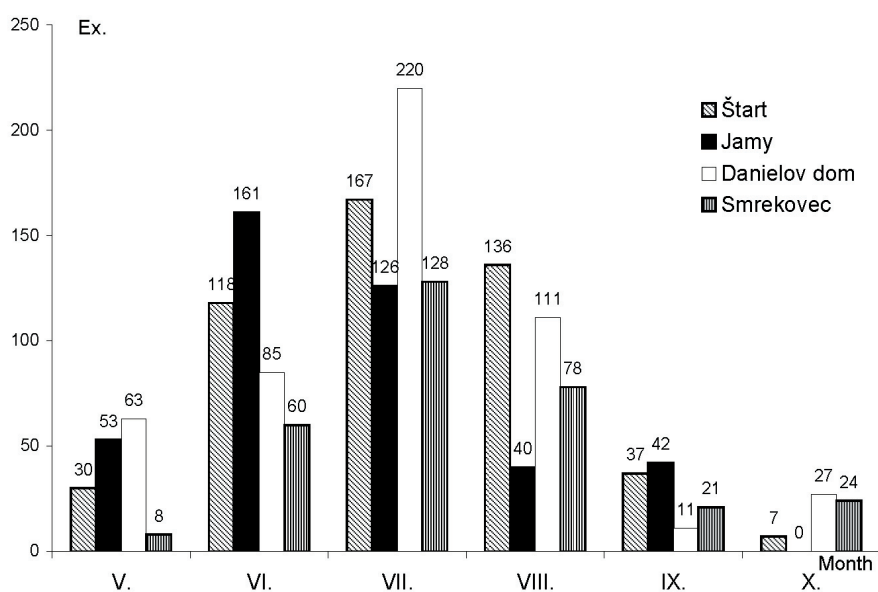


Fig 3. Dynamics of beetle quantity in the study period in 2006 at 4 sites in Vysoké Tatry Mts

References

- MAJZLAN, O. 2002. Aktivita chrobákov (Coleoptera) študovaná pomocou Malaiseho pascí na Slovensku [Activity of beetles (Coleoptera) studied by Malaise traps in Slovakia]. *Ochr. Prír.*, 21: 91–127.
- ROUBAL, J. 1930. *Katalog Coleopter Slovenska a Podkarpatska* [Catalogue des Coleopteres de la Slovaquie et de la Russie Subcarpathique]. Praha: Učená společnost Šafaříkova. 527 p.

Letová aktivita chrobákov (Coleoptera) vo Vysokých Tatrách (Malaise fauna)

Súhrn

V roku 2006 sme metódou Malaiseho pascí študovali letovú aktivitu chrobákov. Na 4 plochách vo Vysokých Tatrách sme na základe získaného študijného materiálu stanovili diverzitu a ekvitabilitu cenóz chrobákov. Porovnávali sme dva typy plôch. Lesné spoločenstvo jedľo-smrečín a dve plochy po kalamite. Vyrovnané cenózy boli v lesných typoch. Na kalamitných plochách dochádza k rýchlej sukcesii cenóz chrobákov. Ekvitabilita je posunutá v prospech viacerých dominantov.

Celkove sme zistili 222 druhov chrobákov. Priemerná letová aktivita bola 3,2 ex./deň.

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