

## Faunistical and biogeographical survey of the centipede fauna in the Aggtelek National Park, Northeast Hungary

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**Abstract.** Twenty-seven species of centipedes (Chilopoda) were recorded during a survey of the Aggtelek National Park in Northeast Hungary. Sixteen taxa are new to the area, one of which, *Lithobius cyrtopus* is reported second times from Hungary. On the basis of this species list and literature data from the Hungarian Lower Mountains' regions a cluster analysis was carried out to evaluate the biogeographical relations of the investigated area. As a result, the Carpathian influence in the Aggtelek Karst was demonstrated for the Chilopoda fauna as well.

### INTRODUCTION

Aggtelek National Park (NP), situated on the north-eastern part of Hungary, was established in 1985. Larger part of this unit belongs to the geographical region called Aggtelek Karst, the largest carstic area in the country, that composes the Gömör–Torna Karst region with the neighbouring Slovakian Karst. This is the southernmost part of the inner limestone zone of the Northern Carpathians, which displays both geographically and biogeographically transitional zone between the higher mountains of the Carpathians and the lowlands and hilly regions of the Carpathian Basin (Varga, 1999). Due to this transitional position, it is an overlapping area of several different biogeographical components showing Carpathian influences as well (Varga, 1964, 1999).

During the last decades intensive researches of the Hungarian Natural Parks were carried out in coordination by the Hungarian Natural History Museum (HNHM) (cf. Mahunka, 1999). These investigations covered also the Aggtelek NP. The main goals of these researches were establishing the species composition of the territory, to study the quantitative and cenological conditions of the fauna, to study the autoecology, ethology and phenology of the species found, and furthermore to explore the rare species and ecosystems need-

ing protection (Mahunka, 1999). By now, there are reliable informations available on most of the taxa, e.g. earthworms (Zicsi *et al.*, 1999), spring-tails (Traser, 1999), carabids (Szél, 1999) and millipedes (Lazányi & Korsós, 2009). Contrary to these results, the Chilopoda fauna of the Aggtelek Karst is insufficiently known comparing to the other parts of the Hungarian Lower Mountain Ranges (Dányi, 2006, 2008a).

The earliest publication on the centipedes in the region is from Daday (1889), but the two species reported by him have to be considered only cautiously, as Daday's identifications proved to be erroneous in numerous cases (Loksa, 1948; Dányi, 2008a, 2008b). Later Loksa (1955) and Matic and Ceuca (1969) published sporadic data of some (ten and eight, respectively) species, and finally Loksa (1966) investigated a Pannonian karst white oak low wood in the area, recording eight species.

Although no comprehensive work was published on Myriapoda in the framework of the study of ANP, a huge amount of myriapod material was collected during that project, waiting for identification in the HNHM till the latest time (Lazányi & Korsós, 2009). On the basis of this material and some more recently collected ones in the present paper we summarize the centipede fauna of ANP and furthermore evaluate its bio-

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geographical relations with other parts of the Hungarian Lower Mountains.

## MATERIAL AND METHODS

The specimens were collected by hand, using pitfall traps and by sifting. The material studied was collected mostly by the members of the Hungarian Natural History Museum during the eighties and nineties (1981–1992, 1996, 1999, 2000–2002). Further materials were collected by the authors, as well. Acronyms of the collectors are as the followings: AB – Attila Bankovits; AK – András Krolopp; AP – Attila Podlusány; BB – Béla Bakó; DK – Dávid Kupai; GH – Gábor Hegyessy; LD – László Dányi; GM – Gábor Meggyessy; GS – Győző Szél; HS – Hella Simkó; IF – Imre Fürjes; JN – János Novák; MH – Márta Hámori; OM – Ottó Merkl; RDK – Richard Desmond Kime; SR – Szilvia Róka; ZK – Zoltán Korsós.

The material was examined by using stereo microscope and biological microscope. Mounted specimens and body parts were cleared in a gelatin–lactic acid mixture, and fixed in Kaiser's glycerol–gelatin (Dányi, 2010). Drawings were made with a drawing tube. For Geophilomorpha, where it is of special importance, sex and the number of pairs of legs are given for each specimen.

The specimens identified are preserved in 70% ethanol, some of them prepared on slides and deposited in the Myriapoda Collection of the Hungarian National History Museum. Inventory numbers („chilo–Nr.” and „chilopr–Nr”) are given for each item (vials and slides respectively) of records in chapter Results.

Information on habitat types in which the materials were collected are given in cases when it is available. However, several items were not accompanied with any data on habitat of the collecting locality.

Collecting localities (Fig. 1) are listed according to the settlements in alphabetical order. A

short name (toponym) is given to each locality, which indicates the locality under the listed species.

In cases when specimens do not have sufficient data for the accurate location of their collecting places, we simply use the name of the settlements instead of the locality codes in records.

For comparison of the Chilopoda fauna of the Hungarian Lower Mountains we used hierarchical cluster-analysis with information theory method (minimum pooled entropy in new cluster) implemented in the SYNTAX 2000 software package (Podani, 2001).

## LOCALITIES

1. **Telekes 1** (48.434°N; 20.676°E): Alsótelekes, Telekes Valley, 220m above sea level (asl.), 26.04.1989, leg. IF.
2. **Luzsok** (48.532°N; 20.556°E): Aggtelek, Luzsok, 510m asl., 13.05.1987, leg. ZK, 14.05.1987, leg. ZK.
3. **Ménes 1** (48.534°N; 20.573°E): Aggtelek, Ménes Valley, 421m asl., 21.03.1981, leg. OM, 21.03.1988–09.05.1988, leg. OM, 02.05.1988–16.09.1988, leg. OM, 02.05.1988–26.11.1988, leg. OM, 26.09.1988–16.11.1988, leg. OM, 16.11.1988, leg. ZK&OM, 21.03.1989, leg. OM, 21.03.1989–09.05.1989, leg. OM, 04.09.1989, leg. OM.
4. **Patkós Hillside** (48.525°N; 20.605°E): Aggtelek, Patkós Hillside, 402m asl., 11.05.1987, leg. ZK, 13.05.1987, leg. ZK, 06.1987–05.1988, leg. OM&ZK, 02.05.1988, leg. ZK.
5. **Haragistya** (48.526°N; 20.515°E): Aggtelek, Haragistya, 494m asl., 18.06.1987, leg. OM, 13.05.1988, leg. BB, 19.07.1988, leg. ZK, 27.09.1988, leg. ZK.
6. **Lake Aggtelek** (48.469°N; 20.511°E): Aggtelek, Lake Aggtelek, 340m asl., 12.04.1990, leg. ZK&SR.
7. **Szár Hill** (48.467°N; 20.531°E): Aggtelek, Szár Hill, 352m asl., 18.11.1988, leg. OM, 12.04.1989, leg. OM, 12.05.1989, leg. OM, 13.08.1992, leg. OM.
8. **Vörös Lake** (48.473°N; 20.542°E): Aggtelek, Lake Vörös, 323m asl., 26.04.1989, leg. IF, 18.04.1990, leg. ZK, 02.05.1996, leg. ZK, 03.05.1996, leg. ZK.
9. **Mihály** (48.535°N; 20.563°E): Aggtelek, Mihály-láza, 483m asl., 13.05.1987, leg. ZK, 27.08.2007, leg. JN.
10. **Bagoly** (48.449°N; 20.494°E): Aggtelek, Bagoly-vágás, 350m asl., 11.07.2002, leg. LD.
11. **Sugó** (48.533°N; 20.583°E): Aggtelek, Sugó, 465m asl., 27.08.2007, leg. JN.
12. **Esztramos** (48.517°N; 20.752°E): Bódvarákó, Esztramos Hill, 302m asl., 14.05.1987, leg. ZK.
13. **Ostromosalja** (48.516°N; 20.740°E): Bódvarákó, Ostromosalja, 160m asl., 19.10.1990, leg. OM.
14. **Nagy-Bene** (48.548°N; 20.682°E): Bódvaszilás, Nagy-Bene Crag, 381m asl., 23.09.2007, leg. JN&HS.

15. **Nagy-Kopasz** (48.549°N; 20.693°E): Bódvaszilas, Nagy-Kopasz-galy, 413m asl., 23.09.2007, leg. JN&HS.
16. **Kerek** (48.545°N; 20.707°E): Bódvaszilas, Kerek Hill, 322m asl., 23.09.2007, leg. JN&HS.
17. **Bába** (48.546°N; 20.675°E): Bódvaszilas, Bába Valley, 358m asl., 23.09.2007, leg. JN&HS.
18. **Patkós Spring** (48.529°N; 20.616°E): Jósvafő, Patkós Spring, 318m asl., 30.05.1988, leg. BB.
19. **Tohonya Valley** (48.499°N; 20.529°E): Jósvafő, Tohonya Valley, 340m asl., 07.03.1989, leg. AB, 24.05.1999, leg. ZK, 29.05.1999, leg. RDK, 05.10.1999, leg. ZK, 06.10.1999, leg. ZK, 07.10.1999, leg. ZK, 08.10.1999, leg. ZK, 09.10.1999, leg. ZK, 10.10.1999, leg. ZK.
20. **Szelce** (48.512°N; 20.587°E): Jósvafő, Szelce Valley, 351m asl., 03.05.1988, leg. ZK, 21.03.1989, leg. OM.
21. **Hosszú** (48.506°N; 20.532°E): Jósvafő, Hosszú Valley, 415m asl., 18.06.1987, leg. OM, 31.03.1988, leg. BB, 27.09.1988, leg. ZK, 29.07.1989, leg. OM, 30.07.1989, leg. OM.
22. **Nagy-oldal** (48.507°N; 20.570°E): Jósvafő, Nagy-oldal, 565m asl., 03.05.1988, leg. ZK, 03.08.1988, leg. ZK, 03.08.1989, leg. ZK, 25.05.1990, leg. OM.
23. **Fertős** (48.509°N; 20.564°E): Jósvafő, Fertős Hilltop, 560m asl., 03.05.1988, leg. ZK.
24. **Lófej Valley** (48.509°N; 20.546°E): Jósvafő, Lófej Valley, 350m asl., 20.09.1988, leg. ZK, 24.05.1999, leg. RDK, 24.05.1999, leg. ZK, 25.05.1999, leg. ZK.
25. **Tohonya Crag** (48.500°N; 20.538°E): Jósvafő, Tohonya Crag, 315m asl., 06.09.1989, leg. OM.
26. **Tohonya Spring** (48.497°N; 20.537°E): Jósvafő, Tohonya Spring, 269m asl., 05.10.1999, leg. ZK.
27. **Hotel** (48.484°N; 20.540°E): Jósvafő, Hotel Tengersizem, 275m asl., 23.03.1989, leg. OM.
28. **Tengersizem** (48.483°N; 20.544°E): Jósvafő, Lake Tengersizem, 235m asl., 23.03.1989, leg. OM, 20.06.1990, leg. OM, 21.06.1990, leg. OM, 22.06.1990, leg. OM, 23.06.1990, leg. OM.
29. **Kecső** (48.489°N; 20.522°E): Jósvafő, valley of the Kecső Brook, 280m asl., 28.04.1989, leg. IF.
30. **Lófej Spring** (48.521°N; 20.545°E): Jósvafő, Lófej Spring, 443m asl., 20.04.1987, leg. AK.
31. **Kossuth** (48.487°N; 20.550°E): Jósvafő, mouth of Kossuth Cave, 05.10.1999, leg. ZK&GM, 06.10.1999, leg. ZK&GM.
32. **Mohos** (48.339°N; 20.430°E): Kelemér, Mohos Lakes, 310m asl., 29.04.1989, leg. IF.
33. **Mész** (48.473°N; 20.703°E): Perkupa, Mész Valley, 230m asl., 16.06.1987, leg. OM.
34. **Telekes 2** (48.439°N; 20.683°E): Perkupa, Telekes Valley, 214m asl., 22.03.1989, leg. OM, 05.09.1989, leg. OM, 18.04.1990, leg. OM, 26.04.1990, leg. ZK, 27.04.1990, leg. ZK, 28.04.1990, leg. ZK.
35. **Telekes Hillside** (48.491°N; 20.686°E): Perkupa, Telekes Hillside, 243m asl., 14.05.1987, leg. ZK.
36. **Railway station** (48.489°N; 20.692°E): Perkupa, Jósvafő-Aggtelek railway station, 152m asl., 13.04.1990, leg. ZK&RS.
37. **Abodi Brook** (48.377°N; 20.754°E): Szendrő, Abodi Brook, 185m asl., 25.07.2001, leg. GH.
38. **Garadnapuszta** (48.375°N; 20.730°E): Szendrő, Garadnapuszta, 170m asl., 25.07.2001, leg. GH.
39. **Hajnácsó** (48.368°N; 20.722°E): Szendrő, Hajnácsó, 215m asl., 06.06.2001, leg. GH, 25.07.2001, leg. GH.
40. **Határ** (48.445°N; 20.709°E): Szendrő, Határ Valley, 220m asl., 26.04.1990, leg. OM.
41. **Büdöskútpuszta** (48.372°N; 20.710°E): Szendrő, Büdöskútpuszta, 150m asl., 06.06.2000, leg. GH, 25.07.2001, leg. GH.
42. **Puska** (48.526°N; 20.605°E): Szin, Puska Pál Spring, 417m asl., 27.04.1987, leg. IF, 31.10.1989, leg. ZK.
43. **Szelcepuszta** (48.520°N; 20.605°E): Szin, Szelcepuszta, 380m asl., 11.05.1987, leg. ZK, 06.1987–05.1988, leg. ZK&OM, 06.1987–05.1988, leg. OM, 02.05.1988, leg. ZK, 31.05.1988, leg. BB, 04.08.1988, leg. ZK, 05.08.1988, leg. ZK, 28.09.1988, leg. OM, 15.11.1988, leg. ZK, 21.03.1989–11.04.1989, leg. OM, 21.03.1989–11.05.1989, leg. OM, 26.04.1989, leg. IF, 27.04.1989, leg. IF, 07.05.1989–19.07.1989, leg. OM, 23.06.1989–30.07.1989, leg. OM, 01.11.1989, leg. ZK, 25.04.1990, leg. OM, 25.05.1990, leg. OM, 29.07.2007, leg. JN&DK.
44. **Ózes** (48.522°N; 20.620°E): Szin, Ózes Crag, 435m asl., 31.05.1988, leg. BB, 30.07.1988, leg. ZK, 29.07.2007, leg. JN&DK, 27.08.2007, leg. JN.
45. **Háló** (48.518°N; 20.623°E): Szin, Háló Valley, 362m asl., 28.09.1988, leg. ZK&OM, 27.11.1988, leg. ZK&OM, 30.07.1989, leg. OM, 24.04.1990, leg. OM, 20.06.1999, leg. OM, 27.08.2007, leg. JN.
46. **Kuhogy** (48.497°N; 20.653°E): Szin, Kuhogy, 210m asl., 12.05.1987, leg. ZK.
47. **Szőlőhegy** (48.485°N; 20.582°E): Szin, Szőlőhegy, 325m asl., 24.05.1999, leg. RDK, 24.05.1999, leg. ZK, 25.05.1999, leg. ZK.
48. **Ménes 2** (48.529°N; 20.634°E): Szögliget, Ménes Valley, 245m asl., 09.05.1987, leg. AP, 11.05.1987, leg. ZK, 02.05.1988, leg. ZK, 26.09.1988, leg. ZK, 16.11.1988, leg. OM, 16.11.1988, leg. ZK, 21.03.1989, leg. OM, 27.04.1989, leg. IF, 19.10.1990, leg. OM, 20.10.1990, leg. OM, 21.10.1990, leg. OM, 22.10.1990, leg. OM, 23.10.1990, leg. OM.
49. **Medvekerthi** (48.533°N; 20.586°E): Szögliget, Medvekerthi Spring, 395m asl., 31.10.1989, leg. ZK.
50. **Derenk** (48.541°N; 20.639°E): Szögliget, Derenk, 344m asl., 04.05.1988, leg. ZK, 16.11.1988, leg. ZK, 19.04.1990, leg. ZK.
51. **Lake Ménes** (48.532°N; 20.646°E): Szögliget, Lake Ménes, 231m asl., 02.03.1988, leg. ZK, 15.07.2007, leg. JN&DK, 29.07.2007, leg. JN&DK, 27.08.2007, leg. JN.
52. **Óvár** (48.533°N; 20.664°E): Szögliget, Óvár Hilltop, 358m asl., 27.08.2007, leg. JN.
53. **Éles** (48.526°N; 20.645°E): Szögliget, Éles Hilltop, 395m asl., 27.08.2007, leg. JN.
54. **Szádvár** (48.544°N; 20.664°E): Szögliget, Szádvár, 439m asl., 19.10.1990, leg. OM.
55. **Patkós Valley** (48.525°N; 20.612°E): Szögliget, Patkós Valley, 350m asl., 11.05.1987, leg. ZK, 12.05.1987, leg. ZK, 13.05.1987, leg. ZK, 05.1987–08.1987, leg. GS-&LA.
56. **Szuha** (48.387°N; 20.480°E): Zádorfalva, Szuha Valley, 232m asl., 02.05.1988, leg. ZK.

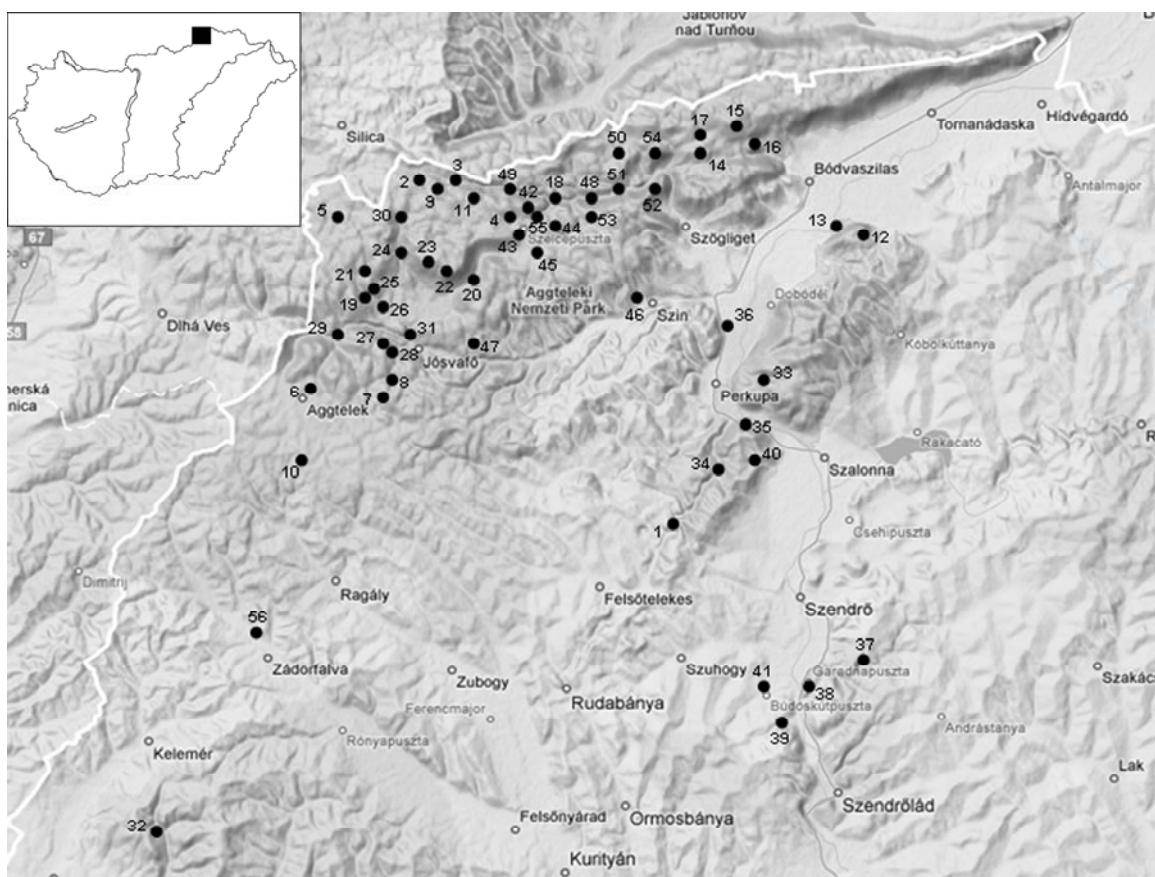


Figure 1. Collecting localities marked with numbers according to the toponymes' list given in the text

## RESULTS

### List of species

Twenty-seven taxa have been found in course of the investigation. Sixteen of them are new to the area. Two taxa reported from the region by Loksa (1966) haven't been recollected. The list of species and localities are as follows.

#### LITHOBIOMORPHA

##### Lithobiidae

###### *Lithobius aeruginosus* L. Koch, 1862

**Locality.** Haragistya: 29.07.1988, ZK (1♀: chilo-2466).

**Remarks.** Loksa (1966) and Matic and Ceuca

(1969) have already reported this species from the area.

###### *Lithobius austriacus* (Verhoeff, 1937)

**Localities.** Haragistya: 29.07.1988, ZK (1♂: chilo-2468); Szár Hill: 12.04.1989, OM (2♂♂: chilo-2529); Tengerszem: 20.06.1990, OM (2♂♂, 2♀♀: chilo-2513); Telekes 2: 05.09.1989, OM, oak forest (2♂♂, 3♀♀: chilo-2486); Szelcepuszta: 25.05.1990, OM (1♂: chilo-2506).

**Remarks.** New to the fauna of the Aggtelek NP.

###### *Lithobius crassipes* L. Koch, 1862

**Locality.** Szelcepuszta: 26.04.1989, IF (1♂: chilo-2526).

**Remarks.** New to the fauna of the Aggtelek NP.

###### *Lithobius curtipes* C. L. Koch, 1847

**Locality.** Telekes 2: 22.03.1989, OM, alder forest (2♂♂: chilo-2272).

**Remarks.** New to the fauna of the Aggtelek NP. Spelda (1999) found this species occurring characteristically in wet habitats, that is supported by our data (from an alder forest) as well.

*Lithobius burzenlandicus* Verhoeff, 1931

**Localities.** **Háló:** 17.11.1988, OM&ZK (1♀: chilo-2472); **Szólóhegy:** 24.05.1999, ZK, oak forest (3♂♂, 1♀: chilo-2499; 2♂♂, 2♀♀: chilo-2517); 24.05.1999, RDK (2♂♂, 2♀♀: chilo-2528).

**Remarks.** *L. burzenlandicus* has been reported from Hungary only from two area, the Aggtelek Karst (Matic & Ceuca, 1969) and near to the eastern border of the country (Dányi, 2008a). The presence of the species in the Aggtelek Karst indicates a Carpathian effect in the region.

*Lithobius agilis* C. L. Koch, 1847

**Localities.** **Ménes 1:** 21.03.1989–09.05.1989, OM, alder forest (1♀: chilo-2195); **Bagoly:** 11.07.2002, LD (1♀: 1 juv.); **Garadnapuszta:** 25.07.2001, GH (1♀); **Ménes 2:** 19.10.1990, OM (1♂: chilo-2484).

**Remarks.** New to the fauna of the Aggtelek NP. In Hungary *Lithobius agilis* is considered to be a wood-dweller species (Dányi 2008a), just like in South-Germany (Spelda, 1999).

*Lithobius cyrtopus* Latzel, 1880

**Localities.** **Puska:** 31.10.1989, ZK, beech forest (1♂, 1♀: chilo-2421); **Szelcepuszta:** 04.08.1988, ZK (1♀: chilo-2492); **Szólóhegy:** 24.05.1999, ZK, oak forest (1♀: chilo-2407); **Medvekereti:** 31.10.1989, ZK (1♀: chilo-2447); **Patkós Valley:** 05.1987–08.1987, LA&GS, beech forest (3♂♂, 4♀♀: chilo-2266).

**Remarks.** In Hungary, *L. cyrtopus* was known so far only from the Zemplén Mountains, thus the Aggtelek Karst is the second occurrence of this species in the country. It is a relatively rare Alpine–Carpathian species (Dányi & Korsós, 2002) occurring between 1000 and 2000 m a.s.l. in Rumania (Matic, 1966), while in Poland and Slovakia it is present also in lower areas (Kaczmarek, 1979; Országh & Országhová, 1995, respectively).

*Lithobius forficatus* (Linnaeus, 1758)

**Localities.** **Haragistya:** 18.06.1987, OM (1♀: chilo-2254); 29.07.1988, ZK (4♂♂, 1♀: chilo-2351; 2♀♀: chilo-

2464); 27.09.1988, ZK (2♂♂: chilo-2414); **Hosszú:** 18.06.1987, OM (4♂♂, 3♀♀: chilo-2275); **Luzsok:** 13.05.1987, ZK (1♂: chilo-2268; 1♀: chilo-2216); **Ménes 1:** 16.11.1988, ZK&OM (1♂, 1♀: chilo-2371); 21.03.1989, OM, alder forest (1♀: chilo-2432); 02.05.1988–09.26.1988, OM, alder forest (2♂♂: 7♀♀: chilo-2368); 26.09.1988–16.11.1986OM, alder forest (1♂, 3♀♀: chilo-2286); 21.03.1989–09.05.1989, OM (1♂, 2♀♀: chilo-2194); 02.05.1989–26.11.1989, OM, oak forest (1 juv, chilo-2293); **Mihály:** 13.05.1987, ZK (1♀: chilo-2251; 2 juv, chilo-2434); **Patkós Hillside:** 11.05.1987, ZK (1♂, 3♀♀: chilo-2248); 13.05.1987, ZK (2♀♀: chilo-2246); 02.05.1988, ZK (1♂: chilo-2242); 06.1987–05.1988, ZK&OM, oak forest (1♂: chilo-2376); **Puska:** 27.04.1987, IF (1♀: chilo-2262); **Szár Hill:** 13.08.1992OM, oak forest (1♀: chilo-2508); **Telekes Valley:** 26.04.1989, IF (1♂, 1♀: chilo-2233); **Esztramos:** 14.05.1987, ZK (6♂♂, 2♀♀: chilo-2298); **Bába:** 23.09.2007, SH&JN (2♂♂, 1♀: chilo-2207); **Kerek:** 23.09.2007, SH&JN (2♂♂, 1♀: chilo-2201; 4♂♂: chilo-2199); **Nagy-Kopasz:** 23.09.2007, SH&JN (1♂: chilo-2210); **Fertős:** 03.05.1988, ZK (1♂, 2♀♀: chilo-2363; 1♀: chilo-2520); **Hosszú:** 31.05.1988, BB (1♀: chilo-2358; 1♀: chilo-2474); 27.09.1988, ZK (3♂♂, 1♀: chilo-2416); **Valley of the Kecsó Brook:** 28.04.1989, IF (1♂, 2♀♀: chilo-2357); **Lófej Spring:** 20.04.1987, AK (1♂: chilo-2280); **Lófej Valley:** 20.09.1988, ZK (1♂, 2♀♀: chilo-2420); 24.05.1999, ZK, mixed forests of linden and ash (3♂♂, 2♀♀: chilo-2397); 24.05.1999, RDK (1♂: chilo-2395); **Nagy-oldal:** 03.05.1988, ZK (1♂: chilo-2243); 25.05.1990, OM (1♂: chilo-2388); **Szelce:** 03.05.1988, ZK (1♀: chilo-2362); **Tengerszem:** 20.06.1990, OM (1 juv, chilo-2512); **Hotel:** 23.03.1989, OM (1♂, 1♀: chilo-2198); **Tohonya Crag:** 06.09.1989, OM (1♀: chilo-2425); **Tohonya Valley:** 29.05.1999, RDK, mixed forests of linden and ash (1♀: chilo-2383); 05.10.1999, ZK, oak forest (1♂: chilo-2393); **Mohos:** 05.09.2002, oak–hornbeam forest (1♂: chilo-2442); 03.10.2002, (1♀: chilo-2443); **Railway station:** 13.04.1990, ZK&RS (3♂♂, 1♀: chilo-2296); **Mész:** 16.06.1987, OM (5♂♂, 1♀: chilo-2277); **Telekes side:** 14.05.1987, ZK (1♀: chilo-2253); 22.03.1989, OM, alder forest (1♀: chilo-2225; 4♂♂: chilo-2415); 05.09.1989, OM (1♂: chilo-2384); 18.04.1990, OM (1♀: chilo-2292); **Szendró, Abodi-patak:** 25.07.2001, GH (5♂♂, 1♀: 1 juv.); **Büdös-kúpuszta:** 06.06.2000GH (1♀); 25.07.2001, GH (1♂); **Garadnapuszta:** 25.07.2001, GH (2♀♀); **Hajnácsó:** 06.06.2001, GH (2♀♀); 25.07.2001, GH (1♂, 1♀); **Határ:** 26.04.1990, OM (1♂, 2♀♀: chilo-2391); **Háló:** 20.06.1999, OM (1♂: chilo-2496); 27.08.2007, JN, beech forest (1♂: chilo-2190); **Ózese:** 31.05.1988, BB (4♂♂, 4♀♀: chilo-2354; 1♂, 1♀: chilo-2377; 1 juv: chilo-2462); **Patkós Valley:** 11.05.1987, ZK (1♂, 1♀: chilo-2191); **Puska:** 31.10.1989, ZK, beech forest (1♀: chilo-2422); **Szelcepuszta:** 28.09.1988, OM (1 juv: chilo-2469); 15.11.1988, ZK (2♀♀: chilo-2365); 26.04.1989, IF (1♂: chilo-2364); 27.04.1989, IF (1♀: chilo-2359); 25.04.1990, OM (1♀: chilo-2400);

29.07.2007, JN&DK, beech forest (1♂, 1♀: chilo-1889); 06.1987–05.1988, ZK&OM, oak forest (1♂, 4♀♀: chilo-2227; 1♀: chilo-2348); 21.03.1989–11.05.1989, OM (1♂, 2♀♀: chilo-2284); 07.05.1989–19.07.1989, OM (2♂♂,

6♀♀: chilo-2213); **Szólóhegy**: 24.05.1999, ZK, oak forest (2♂♂: chilo-2403; 2♀♀: chilo-2500); 24.05.1999, RDK (2♂♂, 2♀♀: chilo-2405); **Derenk**: 04.05.1988, ZK (1♀: chilo-2255); 19.04.1990, ZK (1♂: chilo-2278); **Lake Ménes**: 15.07.2007, JN&DK, beech forest (1♂: chilo-1881); 29.07.2007, JN&DK, beech forest (1♂, 2♀♀: chilo-1894); 27.08.2007, JN (1♂: chilo-1899); 11.05.1987, ZK (2♂♂, 2♀♀: chilo-2235; 1 juv: chilo-2238); 02.03.1988, ZK (2♂♂: chilo-2410); **Óvár**: 27.08.2007, JN, beech forest (1♀: chilo-1901); **Patkós Valley**: 05.1987–08.1987, LA&GS, beech forest (1♀: chilo-2264); **Szádvár**: 19.10.1990, OM (3♀♀: chilo-2282); **Éles**: 27.08.2007, JN, beech forest (2♂♂, 1♀: chilo-2175); **Patkós Valley**: 02.05.1988, ZK (1♂: chilo-2258).

*Remarks.* One of the most common species in the area, it was found almost in every biotopes. Loksa (1966) and Matic and Ceuca (1969) have already reported this species from the region.

#### *Lithobius lapidicola* Meinert, 1872

*Localities.* **Haragistya**: 29.07.1988, ZK (1♂: chilo-2467); **Patkós Hillside**: 11.05.1987, ZK (1♀: chilo-2455); **Nagy-oldal**: 03.08.1989, ZK (1♂: chilo-2495); **Tohonya Crag**: 06.09.1989, OM (2♂♂, 1♀: chilo-2481); **Telekes Valley**: 22.03.1989, OM, alder forest (1♂: chilo-2270); oak forest, 05.09.1989, OM (1♂, 5♀♀: chilo-2488); **Háló**: 17.11.1988, OM&ZK (1♀: chilo-2471); 30.07.1989, OM (1♂: chilo-2509); **Lake Ménes**: 27.08.2007, JN, beech forest (1♀: chilo-1898); **Ménes 2**: 16.11.1988, OM, alder forest (1♂: chilo-2518); 19.10.1990, OM (1♂: chilo-2485); **Szuha**: 02.05.1988, ZK (1♂, 1♀: chilo-2254).

*Remarks.* New to the fauna of the Aggtelek NP. We found this species in beech, alder and oak forests.

#### *Lithobius lucifugus* L. Koch, 1862

*Locality.* **Szólóhegy**: 24.05.1999, ZK, oak forest (1♂: chilo-2498).

*Remarks:* New to the fauna of the Aggtelek NP. *L. lucifugus* is usually known from higher elevations (Koren, 1992; Matic, 1966; Spelda, 1999), but there are data also from lower regions (e.g. Stoev, 2002) similarly to our experiences. In Hungary the species was known so far only from the Zemplén and Visegrád Mountains (Dányi, 2008a).

#### *Lithobius luteus* Loksa, 1948

*Localities.* **Szelcepuszta**: 31.05.1988, BB (1♀: chilo-2525); **Derenk**: 16.11.1988, ZK (1♂: chilo-2521).

*Remarks.* New to the fauna of the Aggtelek NP. The only other occurrence in the eastern part of Hungary is the Bükk Mts (Dányi, 2006).

#### *Lithobius mutabilis* L. Koch, 1862

*Localities.* **Aggtelek**: 02.05.1996, ZK, oak forest (1♀: chilo-2399); **Haragistya**: 13.05.1988, BB (1♀: chilo-2346); 29.07.1988, ZK (3♂♂: chilo-2352; 1♂: chilo-2465); **Hosszú**: 18.06.1987, OM (1♀: chilo-2276); **Ménes 1**: 21.03.1981, OM, alder forest (1♀: chilo-2215); 02.05.1988–09.26.1988, OM (9♂♂: chilo-2369); 26.09.1988–16.11.1986 OM (1♀: chilo-2287; 1♂, 1♀: chilo-2473); 21.03.1989–09.05.1989, OM (1♀: chilo-2197); 19.06.1989–28.07.1989, OM (1♂: chilo-2490); **Mihály**: 13.05.1987, ZK (1♀: chilo-2251); 27.08.2007, JN, beech forest (1♂: chilo-2183); **Patkós Hillside**: 11.05.1987, ZK (1♀: chilo-2247); 13.05.1987, ZK (1♀: chilo-2247); **Puska**: 27.04.1987, IF (1♂, 3♀♀: chilo-2261); **Szár Hill**: 18.11.1988, OM, oak–hornbeam forest (1♀: chilo-2372; 1♂: chilo-2523); 12.04.1989, OM (1♂: chilo-2531); 12.05.1989, OM (2♀♀: chilo-2301); **Vörös lake**: 26.04.1989, IF (1♂, 3♀♀: chilo-2436); 18.04.1990, ZK (1♀: chilo-2294; 1♀: chilo-2295); 02.05.1996, ZK (1♀: chilo-2387); **Sugó**: 27.08.2007, JN, beech forest (4♂♂, 5♀♀: chilo-2179); **Bagoly**: 11.07.2002, LD (10♂♂, 9♀♀: 1 juv.); **Bába**: 23.09.2007, SH&JN (3♂♂, 4♀♀: chilo-2208); **Kerek**: 23.09.2007, SH&JN, beech forest (1♀: chilo-2304; 5♂♂, 1♀: chilo-2202; 1♀: chilo-2200); **Nagy-Bene**: 23.09.2007, SH&JN, beech forest (1♂, 3♀♀: chilo-2205); SH&JN (3♂♂, 3♀♀: chilo-2205); **Nagy-Kopasz**: 23.09.2007, SH & JN (3♂♂, 2♀♀: chilo-2211); **Fertős**: 03.05.1988, ZK (1♂: chilo-2476); **Valley of the Kecsó Brook**: 28.04.1989, IF (1♀: chilo-2527); **Lófej Valley**: 24.05.1999, ZK, mixed forests of linden and ash (2♂♂, 1♀: chilo-2504); 24.05.1999, RDK (1♂: chilo-2396); **Nagy-oldal**: 03.05.1988, ZK (1♂, 1♀: chilo-2244); 03.08.1988, ZK (4♂♂, 10♀♀: chilo-2412; 1♀: chilo-2430; 2♀♀: chilo-2453; 1♀: chilo-2494); 25.05.1990, OM (1♀: chilo-2389); **Patkós Spring**: 30.05.1988, BB (1♀: chilo-2260); **Szelce**: 21.03.1989, OM (1♀: chilo-2419); **Tengerszem**: 20.06.1990, OM (2♂♂: chilo-2510); **Tohonya Crag**: 06.09.1989, OM (1♂: chilo-2424); **Tohonya Spring**: 05.10.1999, ZK (1♂: chilo-2402; 1♀: chilo-2507); **Tohonya Valley**: 07.03.1989, AB (1♂: chilo-2290); 05.10.1999, ZK, oak forest (1♂: chilo-2394); **Mohos**: 29.04.1989, IF (1♂: chilo-2232); **Telekes Valley**: 22.03.1989, OM, alder forest (1♂, 3♀♀: chilo-2226; 1♀: chilo-2271); 05.09.1989, OM (1♂: chilo-2487); 28.04.1990, ZK (1♂: chilo-2220); **Abodi-patak**: 25.07.2001, GH (2♂♂, 1♀); **Büdöskútpuszta**: 06.06.2000, GH (2♂♂; 3♀♀); 25.07.2001, GH (1♂, 1♀); **Hajnásó**: 25.07.2001, GH (3♀♀); **Háló**: 17.11.1988, ZK&OM (1♂, 1♀: chilo-2373); 27.08.2007, JN, beech forest (3♂♂, 5♀♀: chilo-2189); **Ózes**: 31.05.1988, BB (1♀: chilo-2356; 1♂, 1♀: chilo-2378; 1♀: chilo-2461; 1♀: chilo-2524); 30.07.1988, ZK (1♂: chilo-2522); **Patkós Valley**: 12.05.1987, ZK (2♂♂, 2♀♀: chilo-2192); **Puska**: 31.10.1989, ZK, beech forest (1♀: chilo-2423); **Szelcepuszta**: 02.05.1988, ZK (1♀: chilo-2231); 05.08.1988, ZK (1♂: chilo-2477); 15.11.1988, ZK (1♀:

chilo-2366); 27.04.1989, IF (1♂: chilo-2361); 01.11.1989, ZK, oak-hornbeam forest (1♂: chilo-2427; 1♂, 1 juv.: chilo-2437); 06.1987-05.1988, ZK&OM, oak forest (2♂♂, 4♀♀: chilo-2228); 06.1987-05.1988, OM (2♀♀: chilo-2349); 21.03.1989-11.05.1989, OM (2♂♂, 3♀♀: chilo-2285); 07.05.1989-19.07.1989, OM, oak forest (1♂, 2♀♀: chilo-2214); 23.06.1989-30.07.1989, OM (1♀: chilo-2448); **Szólóhegy**: 24.05.1999, ZK, oak forest (5♂♂: chilo-2404; 1♀: chilo-2516); 24.05.1999, RDK (1♂: chilo-2406); **Derenk**: 04.05.1988, ZK (1♂: chilo-2257; 1♂: chilo-2302); 19.04.1990, ZK (2♀♀: chilo-2279); **Lake Ménes**: 15.07.2007, JN&DK, beech forest (4♂♂, 3♀♀: chilo-1882); 29.07.2007, JN&DK, beech forest (7♂♂, 7♀♀: chilo-1896); 27.08.2007, JN, beech forest (5♂♂, 10♀♀: chilo-1897); 02.03.1988, ZK (1♂: chilo-2411); **Ménes 2**: 11.05.1987, ZK (1♀: chilo-2239); 02.05.1988, ZK (1♀: chilo-2221); 16.11.1988, ZK (1♂, 1♀: chilo-2367); 16.11.1988, OM, alder forest (4♂♂, 3♀♀: chilo-2379; 2♂♂: chilo-2502); 21.03.1989, OM, alder forest (1♂: chilo-2224); 19.10.1990, OM (1♂, 4♀♀: chilo-2483); 09.05.1987, AP (1♂: chilo-2297); **Ózes**: 29.07.2007, JN&DK, beech forest (3♂♂, 3♀♀: chilo-1891); 27.08.2007, JN, beech forest (1♂, 6♀♀: chilo-2172); **Medvekerti**: 31.10.1989, ZK (1♀: chilo-2409); **Óvár**: 27.08.2007, JN, beech forest (7♂♂, 4♀♀: chilo-1900); **Patkós Valley**: 31.10.1989, ZK (1♂: chilo-2408); **Éles**: 27.08.2007, JN, beech forest (5♂♂, 5♀♀: chilo-2176); **Szuha**: 02.05.1988, ZK (1♂: chilo-2274).

*Remarks.* The most dominant species, found in all types of forests. Also Loksa (1955, 1966) and Matic and Ceuca (1969) have reported this species from the area.

#### *Lithobius muticus* C. L. Koch, 1847

*Localities.* **Lake Aggtelek**: 12.04.1990, SR&ZK (3♂♂, 1♀: chilo-2289); **Haragistya**: 13.05.1988, BB (1♀: chilo-2347); 27.09.1988, ZK (1♂: chilo-2451); **Luzsok**: 14.05.1987, ZK (1♀: chilo-2217); **Ménes 1**: 02.05.1988-09.26.1988, OM, alder forest (3♂♂, 1♀: chilo-2370); 26.09.1988-16.11.1986OM, alder forest (1♀: chilo-2288); 21.03.1989-09.05.1989, OM, alder forest (1♀: chilo-2196); 19.06.1989-28.07.1989, OM, alder forest (1♀: chilo-2491); **Mihály**: 27.08.2007, JN, beech forest (2♂♂: chilo-2182); **Patkós Hillside**: 11.05.1987, ZK (1♀: chilo-2250); 06.1987-05.1988, ZK&OM, oak forest (2♂♂: chilo-2375); **Szár Hill**: 12.04.1989, OM (2♂♂, 1♀: chilo-2530); 12.05.1989, OM (2♀♀: chilo-2300); **Vörös lake**: 26.04.1989, IF (1♀: chilo-2435); **Bagoly**: 11.07.2002, LD (6♂♂, 8♀♀: 1 juv.); **Sugó**: 27.08.2007, JN, beech forest (1♂: chilo-2178); **Telekes 1**, 26.04.1989, IF (1♂, 1♀: chilo-2234); **Bába**: 23.09.2007, SH&JN (3♂♂, 3♀♀: chilo-2209); **Kerek**: 09.2007, SH&JN, beech forest (3♂♂: chilo-2203); **Nagy-Bene**: 23.09.2007, SH&JN, beech forest (1♂: chilo-2428; 1♂: chilo-2433; 3♂♂: chilo-2206); **Nagy-Kopasz**: 23.09.2007, SH&JN, beech forest (2♂♂: chilo-2231; 1♀: chilo-2212); **Hosszú**: 27.09.1988, ZK (1♀: chilo-2417); **Lófej Valley**: 24.05.1999, ZK, mixed forests of linden and ash (1♂, 1♀: chilo-2398);

1♀: chilo-2505); **Nagy-oldal**: 03.08.1988, ZK (2♂♂: chilo-2413; 1♂: chilo-2452); 25.05.1990, OM (1♂: chilo-2390); **Tengerszem**: 20.06.1990, OM (1♀: chilo-2511; 1 juv., chilo-2514; 1♀: chilo-2515); **Tohonya Valley**: 07.03.1989, AB (1♂: chilo-2291); 24.05.1999, ZK, mixed forests of linden and ash (1♀: chilo-2386); 29.05.1999, RDK, mixed forests of linden and ash (1♂: chilo-2382); **Kelemér**: 05.09.2002, oak-hornbeam forest (1♂: chilo-2444); fenyves, 17.10.2002, (1♂, 1♀: chilo-2445); **Telekes Valley**: 27.04.1990, ZK (1♂: chilo-2219); **Büdöskútpuszta**: 25.07.2001, GH (1♀); **Hajnácsó**: 06.06.2001, GH (1♀); **Kuhogy**: 12.05.1987, ZK, rocky slopes (1♂: chilo-2259); **Ózes**: 31.05.1988, BB (1♂: chilo-2355; 2♀♀: chilo-2463); **Szelcepuszta**: 11.05.1987, ZK (1♂: chilo-2249); 15.11.1988, ZK (1♂: chilo-2478); 27.04.1989, IF (2♂♂, 1♀: chilo-2360); 01.11.1989, ZK, oak-hornbeam forest (1♂: chilo-2438); 25.04.1990, OM (1♂, 2♀♀: chilo-2401); 06.1987-05.1988, OM, oak forest (1♀: chilo-2350); 23.06.1989-30.07.1989, OM (1♀: chilo-2449); **Derenk**: 04.05.1988, ZK (1♂: chilo-2256); **Lake Ménes**: 15.07.2007, JN&DK, beech forest (1♂: chilo-1880); 29.07.2007, JN&DK, beech forest (2♀♀: chilo-1895); **Ménes 2**: 11.05.1987, ZK (1♂: chilo-2237); 26.09.1988, ZK (1♀: chilo-2418); 16.11.1988, OM, alder forest (1♂: chilo-2380); (2♂♂: chilo-2503); 21.03.1989, OM, alder forest (2♀♀: chilo-2223; 1♀: chilo-2458); 19.10.1990, OM (1♂: chilo-2482); 27.04.1989, IF I. (1♂: chilo-2480); **Ózes**: 29.07.2007, JN&DK, beech forest (1♀: chilo-1892); 27.08.2007, JN (2♂♂, 2♀♀: chilo-2171); **Patkós Valley**: 05.1987-08.1987, AL&GS, beech forest (1♂: chilo-2267); **Szuha**: 02.05.1988, ZK (1♂: chilo-2230).

*Remarks.* One of the most common species in the region. Loksa (1966) and Matic and Ceuca (1969) have already reported this species from ANP.

#### *Lithobius parietum* Verhoeff, 1899

*Localities.* **Esztramos**: 14.05.1987, ZK (1♀: chilo-2299); **Szuha**: 02.05.1988, ZK (1♀: chilo-2273).

*Remarks.* New to the fauna of the Aggtelek NP. Loksa (1955) considered *L. parietum* as a waterfront species, but its occurrence on the Esztramos Hill does not support this view.

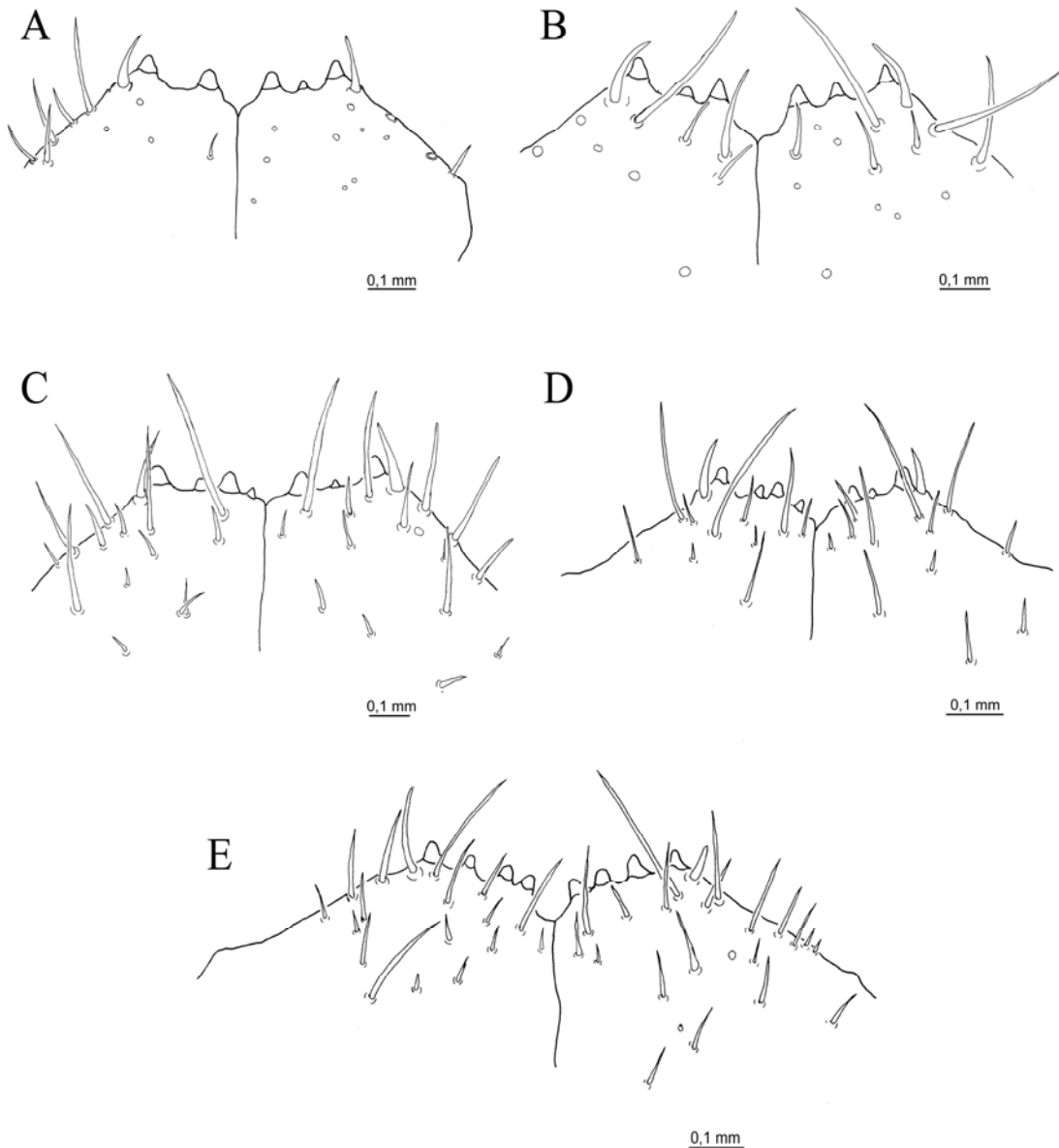
#### *Lithobius piceus* L. Koch, 1862

*Localities.* **Ménes 1**: 21.03.1989-09.05.1989, OM (1 juv.: chilo-2222); **Mihály**: 13.05.1987, ZK (1♂: chilo-2240); **Bába**: 23.09.2007, SH&JN (1 juv., chilo-2459); **Kerek**: 23.09.2007, SH&JN, beech forest (1♂: chilo-2303; 1♂, 1♀: chilo-2204); **Telekes Valley**: 26.04.1990, ZK (1♂: chilo-2218); **Ménes 2**: 16.11.1988, OM, alder forest (1 juv.: chilo-2501); 21.03.1989, OM, alder forest (1 juv., chilo-2460); **Ózes**: 29.07.2007, JN&DK, beech forest (2♂♂, 1♀, 1 juv.: chilo-1890); 27.08.2007, JN, beech forest (4♂♂: chilo-2174);

**Patkós Valley:** 05.1987–08.1987, LA&GS, beech forest (1♂: chilo–2265); **Sugó:** 27.08.2007, JN, beech forest (3♂♂: chilo–2181).

*Remarks.* Loksa (1955) and Matic and Ceuca (1969) have already reported this species from the region. We found it in beech, alder and oak forests as well, that supports the opinion of Iorio (2007) considering it as a woodland species.

Examining several specimens revealed that the postembrional development of the forcipular teeth of this species is quite unique in the genus *Lithobius*. The first larval stadia possess only 2+2 teeth, that raises to 4+4 during the subsequent moultings (Fig. 2). Also worth mentioning that in a male specimen (chilo–2303) the coxolateral spines are missing.



**Figure 2.** Development of forcipular teeth in *Lithobius piceus* during postlarval (A–D) and adult (E) stadia



*Lithobius schuleri* Verhoeff, 1925

**Localities.** **Haragistya:** 27.09.1988, ZK (1♂: chilo-2450); **Luzsok:** 13.05.1987, ZK (1♂: chilo-2269); **Mihály:** 27.08.2007, JN, beech forest (2♂♂: chilo-2184); 13.05.1987, ZK (2♀♀: chilo-2241); **Puska:** 27.04.1987, IF (1♀: chilo-2263); **Sugó:** 27.08.2007, JN, beech forest (2♀♀: chilo-2180); **Esztramos:** 14.05.1987, ZK (1 juv, chilo-3532); **Nagy-oldal:** 03.05.1988, ZK (3♀♀: chilo-2245); **Tohonya Valley:** 24.05.1999, ZK, mixed forest of linden and ash (1♂: chilo-2385); 05.10.1999, ZK, oak forest (1♀: chilo-2519); **Határ:** 26.04.1990, OM (1♂, 1♀: chilo-2392); **Háló:** 28.09.1988, ZK&OM, oak-hornbeam forest (1♂: chilo-2479); 17.11.1988, ZK&OM (1♀: chilo-2374); (1♂: chilo-2470); 27.08.2007, JN (1♂: chilo-2457); **Patkós Valley:** 13.05.1987, ZK (2♂♂, 4♀♀: chilo-2193); **Szelcepuszta:** 1988, .08.04, ZK (1♂: chilo-2497); **Ménes 2:** 11.05.1987, ZK (1♀: chilo-2236); 16.11.1988, OM, alder forest (1♀: chilo-2381); **Ózes:** 29.07.2007, JN&DK, beech forest (2♂♂, 4♀♀: chilo-1893); 27.08.2007, JN, beech forest (1♂, 1♀: 1 juv, chilo-2173); **Szuha:** 2003.05.20, GH (1♀).

**Remarks.** Loksa (1955) has already reported this montane species from the region.

*Lithobius tricuspis* Meinert, 1872

**Locality.** **Telekes Valley:** 22.03.1989, OM (1♂: chilo-2426).

**Remarks.** New to the fauna of the Aggtelek NP.

SCOLOPENDROMORPHA

Cryptopidae

*Cryptops anomalans* Newport, 1844

**Localities.** **Aggtelek,** 02.05.1996, ZK (1 juv, chilo-2493); **Szelcepuszta:** 06.1987–05.1988, ZK&OM (chilo-2975); 21.03.1989–11.04.1989, OM (1 juv: chilo-2475).

**Remarks.** New to the fauna of the Aggtelek NP. Its presence in the region is not surprising because it occurs also in the Bükk and Zemplén Mts (Dányi, 2006).

*Cryptops hortensis* (Donovan, 1810)

**Locality.** **Éles:** 27.08.2007, JN, beech forest (1 juv: chilo-2177).

**Remarks.** New to the fauna of the Aggtelek NP. The specimen found has been collected in a beech forest, that supports the results of Minelli

and Iovane (1987), who consider it mainly as a wood-dweller species.

*Cryptops parisi* Brölemann, 1920

**Localities.** **Bába:** 23.09.2007, SH&JN (2 juv: chilo-2456); **Háló:** 27.08.2007, JN, beech forest (1 juv: chilo-2185); **Óvár:** 27.08.2007, JN, beech forest (1 juv: chilo-1902).

**Remarks.** Matic and Ceuca (1969) have already reported this species from the region. Most of its data are from the western part of the country, the only nearby occurrence is from the Bükk Mts (Dányi, 2006). The specimens were collected from beech forests.

GEOPHILOMORPHA

Schendylidae

*Schendyla carniolensis* (Verhoeff, 1902)

**Locality.** **Ménes 1:** 04.09.1989, OM (1♂: 43 pairs of legs, chilo-2572, chilopr-231).

**Remarks.** New to the fauna of the Aggtelek NP. *S. carniolensis* has only a few data from the country (Dányi, 2006).

*Schendyla nemorensis* (C. L. Koch, 1837)

**Localities.** **Tengerszem:** 21.06.1990, OM (1♀: 39 pairs of legs, chilo-2997, chilopr-241); **Ménes 2:** 19.10.1990, OM (1♀: 41 pairs of legs, chilo-2978, chilopr-232; 1♀: 37 pairs of legs, chilo-2992, chilopr-245); 23.06.1990, OM (1♀: 39 pairs of legs, chilo-2999, chilopr-243); 20.10.1990, OM (1♀: 39 pairs of legs, chilo-2979, chilopr-233); 21.10.1990, OM (1♀: 39 pairs of legs, chilo-2981, chilopr-234; 1♀: 41 pairs of legs, chilo-2995, chilopr-240); 22.10.1990, OM (1 juv: 43 pairs of legs, chilo-3000, chilopr-244); 23.10.1990, OM (1 juv: 41 pairs of legs, chilo-3001, chilopr-246).

**Remarks.** A common species in the country with many occurrence data (Dányi, 2006). Loksa (1966) has already reported this species from ANP.

Geophilidae

*Clinopodes flavidus* C. L. Koch, 1847

**Localities.** **Ostromosalja:** 19.10.1990, OM (1♀: 69 pairs of legs, chilo-2538, chilopr-205); **Jósvafő:** 25.05.1990, OM (1♂: 69 pairs of legs, chilo-2560, chilopr-225); Jósvafő, hegyoldal, 26.05.1990, OM (1♂: 71 pairs of legs, chilo-2561, chilopr-226).

**Remarks.** Loksa (1966) has already reported this species from the region.

*Gepophilus alpinus* Meinert 1870

**Localities.** **Tengerszem:** 23.03.1989, OM (1♀: 51 pairs of legs, chilo–2550, chilopr–217); **Tohonya Valley:** 07.10.1999, ZK (1♀: 51 pairs of legs, chilo–2568, chilopr–228); 08.10.1999, ZK (1♀: 53 pairs of legs, chilo–2569, chilopr–229); 09.10.1999, ZK (1♂: 49 pairs of legs, chilo–2570, chilopr–230); 10.10.1999, ZK (1♀: 49 pairs of legs, chilo–2571).

**Remarks.** New to the fauna of the Aggtelek NP.

*Gepophilus flavus* (De Geer, 1778)

**Localities.** **Vörös lake:** 02.05.1996, ZK (1♀: 51 pairs of legs, chilo–2987, chilopr–237); 03.05.1996, ZK (1♂: 51 pairs of legs, chilo–2988, chilopr–238); **Esztramos:** 14.05.1987, ZK (1♀: 47 pairs of legs, chilo–2990, chilopr–239); **Kerek:** 23.09.2007, SH&JN, beech forest (1♀: 53 pairs of legs, chilo–2554, chilopr–221; 1♀: 53 pairs of legs, chilo–2555, chilopr–222); **Bába:** 24.09.2007, SH&JN, beech forest (1♀: 53 pairs of legs, chilo–2537, chilopr–204); **Nagy-Kopasz:** 23.09.2007, SH&JN, beech forest (1♀: 53 pairs of legs, chilo–2540, chilopr–207); **Hosszú:** 29.07.1989, OM (1♂: 49 pairs of legs, chilo–2557, chilopr–223); , 30.07.1989, OM (1♂: 53 pairs of legs, chilo–2558, chilopr–224); **Lófej Spring:** 20.04.1987, AK (2 juv.); **Lófej Valley:** 25.05.1999, ZK, mixed forest of linden and ash (1♀: 53 pairs of legs, chilo–2548, chilopr–215); **Tengerszem:** 22.06.1990, OM (1♀: 49 pairs of legs, chilo–2998, chilopr–242); **Mész:** 16.06.1987, OM (1♂: 49 pairs of legs, chilo–2985, chilopr–236); **Határ:** 26.04.1990, OM (1♀: 51 pairs of legs, chilo–2552, chilopr–219); 27.04.1990, OM (1♀: 51 pairs of legs, chilo–2553, chilopr–220); **Háló:** 29.07.2007, JN, beech forest (1♂: 49 pairs of legs, chilo–2541, chilopr–208); **Szólóhegy:** 25.05.1999, ZK, oak forest (1♀: 51 pairs of legs, chilo–2545, chilopr–212); **Ózes:** 29.07.2007, JN (1♀: 47 pairs of legs, chilo–2551, chilopr–218).

**Remarks.** These are the first reliable data of the species from ANP. The specimens reported under the name *Pachymerium tristanicum* Attems, 1928 from the region by Matic and Ceuca (1969: 107) should be referred to this species, too. According to Voigtländer (2005) *G. flavus* prefers dry habitats however, we found this species mainly in beech forests.

Linotaenidae

*Strigamia acuminata* (Leach, 1815)

**Localities.** **Bába:** 23.09.2007, SH&JN, beech forest (1♂: chilo–2536, chilopr–203); **Kossuth:** 06.10.1999, ZK&GM, oak–hornbeam forest (1♂: 39 pairs of legs, chilo–2543, chilopr–201); **Lófej Valley:** 24.05.1999, ZK, mixed forest of

linden and ash (1♂: 39 pairs of legs, chilo–2547, chilopr–214); 24.05.1999, RDK (1♂: 39 pairs of legs, chilo–2556); **Tengerszem:** 20.06.1990, OM (3♀♀: 41–41–37 pairs of legs, chilo–2996); **Tohonya Valley:** 05.10.1999, ZK (1 juv, 41 pairs of legs, chilo–2566); **Abodi-patak:** 25.07.2001, GH (1♀); **Hajnácsó:** 25.07.2001, GH (1♀: 1 juv.); **Háló:** 1989, .07.30, OM (1 juv, 41 pairs of legs, chilo–2565); **Lake Ménes:** 29.07.2007, JN, beech forest (1♂: 39 pairs of legs, chilo–2535, chilopr–202); **Ménes 2:** 20.10.1990, OM (1♀: 39 pairs of legs, chilo–2993); 22.10.1990, OM (1♀: 39 pairs of legs, chilo–2982).

**Remarks.** New to the fauna of the Aggtelek NP. We found this species mostly in forests which corroborates the previous observations (Koren, 1986; Spelda, 1999).

*Strigamia transsilvanica* (Verhoeff, 1928)

**Localities.** **Sugó:** 27.08.2007, JN (1♀: 51 pairs of legs, chilo–2546, chilopr–213); **Szár Hill:** 13.08.1992OM, beech forest (1♀: 51 pairs of legs, chilo–2534, cilopr–201); **Kossuth:** 05.10.1999, ZK&GM, oak–hornbeam forest (1♀: 53 pairs of legs, chilo–2542, chilopr–209); **Tohonya Valley:** 06.10.1999, ZK (1♀: 53 pairs of legs, chilo–2567, chilopr–227); **Háló:** 24.04.1990, OM (1♂: 51 pairs of legs, chilo–2549, chilopr–216); **Patkós Valley:** 11.05.1987, ZK (1♀: 51 pairs of legs, chilo–2983, chilopr–235); **Szólóhegy:** 24.05.1999, ZK, oak forest (1♀: 53 pairs of legs, chilo–2544, chilopr–211; 1♀: 53 pairs of legs, chilo–2539, chilopr–206).

**Remarks.** New to the fauna of the Aggtelek NP.

DISCUSSION

During our investigation we found 27 Chilopoda species in the territory of the Aggtelek NP. 16 of these are new to the region's fauna. Two taxa (*Dignathodon microcephalus* (Lucas, 1846), *Henia illyrica* (Meinert, 1870)) reported from the area by Loksa (1966) haven't been found by us, probable due to our less intensive sampling in some special habitats investigated by Loksa with high accuracy. Considering the fauna of the neighbouring areas, the existence of several other species are expected in the Aggtelek NP, such as *Lithobius erythrocephalus* C. L. Koch, 1847, *Lithobius tenebrosus* Meinert, 1872, *Schendyla tyrolensis* Meinert, 1870 and *Pachymerium ferrugineum* (C. L. Koch, 1835).

According to the zoogeographical division of Varga (1964) the Aggtelek Karst belongs to the

*Carpathicum* fauna region. This is supported by the occurrences of numerous Carpathian elements of different taxonomic groups, e.g. Gastropoda, Orthoptera, Trichoptera and Coleoptera: Carabidae (Varga, 1999). Also in soil-dweller groups, mountain species with Carpathian affinities are represented, for instance the earthworm species *Fitzingeria platyura montana* (Černosvitov, 1932) (Csuzdi & Zicsi, 2003), the oribatid mites *Conchogneta dalecarlica* (Forsslund, 1947) and *Carabodes subarcticus* Trägårdh, 1902 (Mahunka & Mahunka-Papp, 2004) and the springtail *Tetradontophora bielensis* (Waga, 1842) (Traser, 1999).

Regarding the Chilopoda fauna the influence of the Carpathians is also supported by the presence of some species of Alpián–Carpathian, or Carpathian distribution, such as *L. cyrtopus*, *L. burzenlandicus* and *L. luteus*. Most of the taxa however belong to chorological groups covering larger areas e.g. West Palearctic (*L. crassipes*) or European (*L. aeruginosus*, *L. forficatus*, *L. lapidicola*, *L. lucifugus*, *S. nemorensis*, *G. alpinus*, *Str. acuminata*). Beside these, some further, relatively widespread species with more special chorotypes occur also in the region, like *C. flavidus* (Turánic–European), *L. curtipes* and *G. flavus* (Siberic–European), or *C. hortensis* (Centralasiatic–European). Other, relatively well represented chorotypes are the Central European (*L. austriacus*, *L. agilis*, *L. mutabilis*, *L. muticus*, *L. tricuspis*) and South-European (*L. parietum*, *L. piceus*, *L. schulleri*, *C. anomalans*, *C. parisi*, *Str. transsilvanica*). The high number of these South European elements, and the presence of a mediterranean species (*S. carniolensis*) can be explained by the relatively low elevation of the region (300–500 m asl.) compared to the Carpathians and furthermore by the calcareous parent material which results in a warmer microclimate.

According to the result of the cluster analysis, the Chilopoda fauna of the Aggtelek NP shows highest similarity with the fauna of the neighbouring Zemplén Mts belonging also to the *Carpathicum*. As a sister group of this region the remaining parts of the northeastern chain grouped together presenting the region called *Matricum*. Inside this group the closeness of the Mátra and

Medves Mts fits well with their geographical position. The position of the Bükk Mts beside the Börzsöny Mts can be affected by the fact both of these regions being relatively less investigated.

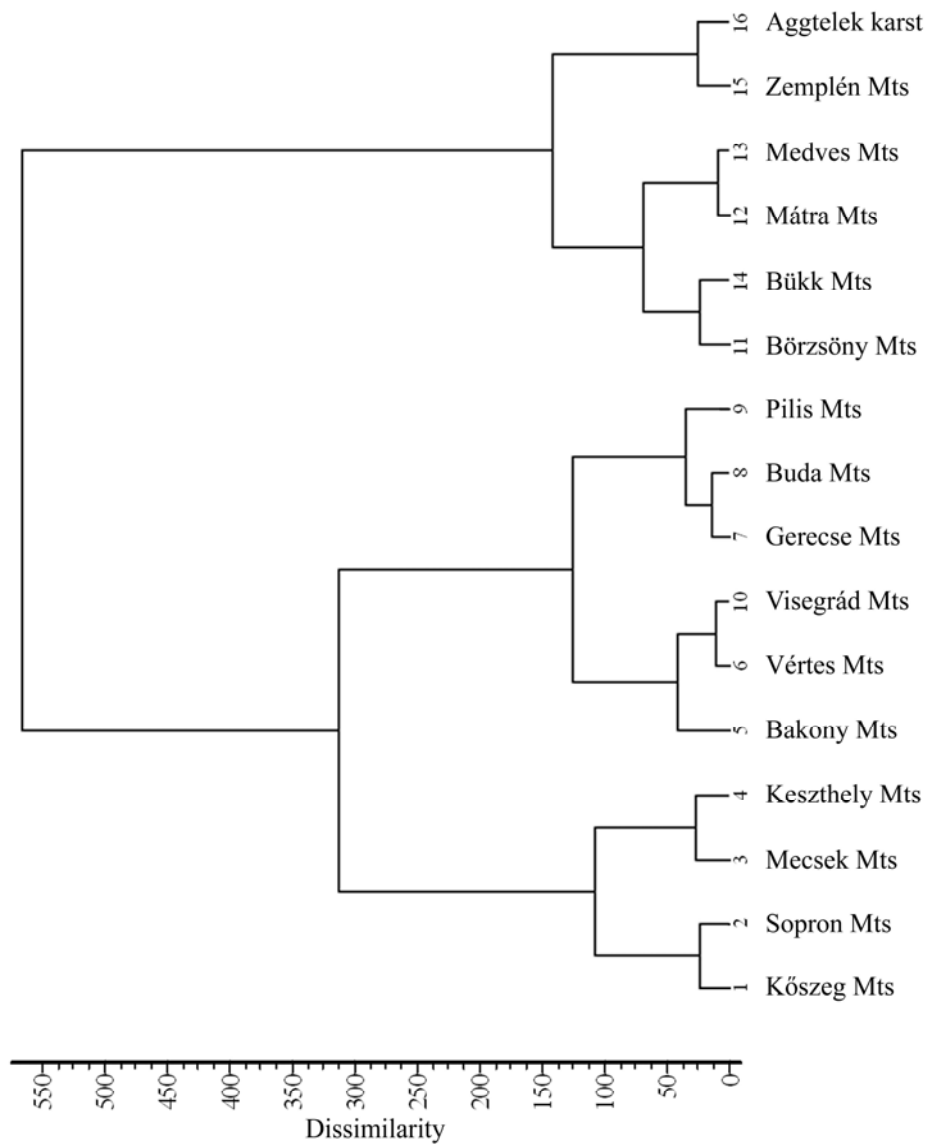
The cluster of the northeastern chain is well separated from all the other parts situated on the western side of the River Danube. In this other main branch, the region of *Noricum* composed by the Sopron and Kőszeg Mts is clearly represented. This region is affected by the closeness of the Alps. In our analysis, the Mecsek and Keszthely Mts grouped together as the *Noricum*'s sister group. The Mecsek Mts is considered by Varga (1964) as belonging to the region of *Praeillyricum* while the Keszthely Mts as being part of the *Bakonyicum*. However, our results show higher similarity in the centipede fauna of these two areas that suggests stronger Illyric effect in the Keszthely Mts. The remaining parts of the *Bakonyicum* formed another group well separated from the (*Noricum*+*Praeillyricum*) branch.

**Acknowledgements.** We would like to thank all the collectors of the examined material. Directorate of the Aggtelek National Park is thanked for supporting the Museum during the faunistic survey and for the permits issued to collect and preserve centipede samples. We are grateful to Dr. Jenő Kotschán for his advice and help with the cluster analysis. Special thank to Dr. Zoltán Korsós, curator of the Myriapoda Collection for allow us to access to the earlier materials housed in the HNHM.

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**Figure 3.** Cluster analysis for regions in the Hungarian Lower Mountains based on their Chilopoda fauna. (For location of the regions, see Dányi 2006a, Fig. 1)

**Table 1.** The species lists of the Aggtelek NP and the other regions of the Hungarian Lower Mountains (summarized after Dányi 2006a, 2008a), adding the chorotype of each species according to Koren (1986, 1992) and Zapparoli (2002, 2003): ACA= Alpine–Carpathian, CAR= Carpathian, CAE= Centralasiatic–European, CEU= Central European, EUR= European, MED= Mediterranean, SEE= Southeast-European, SEU= South-European, SIE= Sibiric–European, TUE= Turanic–European, WPA=W-Paleartic. 1. Kőszeg Mts; 2. Sopron Mts; 3. Mecsek Mts; 4. Keszthely Mts; 5. Bakony Mts; 6. Vértes Mts; 7. Gerecse Mts; 8. Buda Mts; 9. Pilis Mts; 10. Visegrád Mts; 11. Börzsöny Mts; 12. Mátra Mts; 13. Medves; 14. Bükk Mts; 15. Zemplén Mts; 16. Aggtelek Karst.

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	chorotype
<i>Scutigera coleoptrata</i> (Linnaeus, 1758)				+		+		+	+								MED
<i>Eupolybothrus transsylvanicus</i> (Latzel, 1882)			+														SEU
<i>Eupolybothrus tridentinus</i> (Fanzago, 1874)	+	+	+	+	+	+			+	+							SEE
<i>Lithobius aeruginosus</i> L. Koch, 1862	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	EUR
<i>Lithobius austriacus</i> (Verhoeff, 1937)	+	+	+		+	+	+	+	+	+	+	+	+			+	CEU
<i>Lithobius biunguiculatus</i> Loksa, 1947					+									+			CAR
<i>Lithobius crassipes</i> L. Koch, 1862	+	+	+	+	+	+	+	+		+	+			+		+	WPA
<i>Lithobius curtipes</i> C.L. Koch, 1847																+	SIE
<i>Lithobius burzenlandicus</i> Verhoeff, 1931																+	ACA
<i>Lithobius cf. microps</i> Meinert, 1868			+	+								+			+		EUR
<i>Lithobius agilis</i> C.L. Koch, 1847	+	+	+	+	+	+			+	+	+	+	+	+	+	+	CEU
<i>Lithobius borealis</i> Meinert, 1868	+	+															EUR
<i>Lithobius cyrtopus</i> Latzel, 1880															+	+	ACA
<i>Lithobius dentatus</i> C.L. Koch, 1844	+	+	+	+	+	+	+	+	+	+							CEU
<i>Lithobius erythrocephalus</i> C.L. Koch, 1847	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	EUR
<i>Lithobius forficatus</i> (Linnaeus, 1758)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	EUR
<i>Lithobius lapidicola</i> Meinert, 1872												+	+	+	+	+	EUR
<i>Lithobius lucifugus</i> L. Koch, 1862									+						+	+	EUR
<i>Lithobius luteus</i> Loksa, 1947	+	+	+	+			+							+		+	CAR
<i>Lithobius macilentus</i> L. Koch, 1862	+	+		+	+												CEU
<i>Lithobius melanops</i> Newport, 1845			+			+		+									EUR
<i>Lithobius mutabilis</i> L. Koch, 1862	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	CEU
<i>Lithobius muticus</i> C.L. Koch, 1847	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	CEU
<i>Lithobius nodulipes</i> Latzel, 1880	+	+	+		+												CEU
<i>Lithobius parietum</i> Verhoeff, 1899			+		+	+				+					+	+	SEU
<i>Lithobius pelidnus</i> (Haase, 1880)	+	+															EUR
<i>Lithobius piceus</i> L. Koch, 1862	+	+									+				+	+	SEU
<i>Lithobius schuleri</i> Verhoeff, 1925			+								+			+	+	+	SEU
<i>Lithobius cf. stygius</i> Latzel, 1880								+									SEE
<i>Lithobius tenebrosus</i> Meinert, 1872	+	+		+										+	+	+	CEU
<i>Lithobius tricuspis</i> Meinert, 1872	+	+		+	+												CEU
<i>Lithobius validus</i> (Meinert, 1872)	+	+	+		+												SEU
<i>Scolopendra cingulata</i> Latreille, 1829					+	+											MED

Table 1. continued

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	chorotype
<i>Cryptops anomalans</i> Newport, 1844	+		+	+	+	+	+	+	+	+				+	+	+	SEU
<i>Cryptops hortensis</i> (Donovan, 1810)				+	+	+			+	+	+			+	+	+	CAE
<i>Cryptops parisi</i> Brölemann, 1920	+	+	+	+	+	+	+	+	+	+				+		+	SEU
<i>Schendyla carniolensis</i> (Verhoeff, 1902)	+			+	+											+	MED
<i>Schendyla nemorensis</i> (C.L. Koch, 1836)			+	+	+	+	+	+	+	+	+	+	+	+	+	+	EUR
<i>Schendyla tyrolensis</i> Meinert, 1870	+		+	+	+	+				+				+			SEU
<i>Pachymerium ferrugineum</i> (C.L. Koch, 1835)	+		+	+		+									+		WPA
<i>Clinopodes flavidus</i> C.L. Koch, 1847	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	TUE
<i>Stenotaenia linearis</i> (C.L. Koch, 1835)		+	+	+	+		+										SEU
<i>Geophilus alpinus</i> Meinert, 1870	+	+	+	+	+	+	+	+	+	+				+	+	+	EUR
<i>Geophilus carpophagus</i> Leach, 1815					+												EUR
<i>Geophilus electricus</i> (Linneus, 1758)	+				+												WPA
<i>Geophilus flavus</i> (DeGeer, 1778)	+	+	+	+	+	+	+			+	+	+	+	+	+	+	SIE
<i>Geophilus proximus</i> C.L. Koch, 1847					+	+		+	+					+			TUE
<i>Dignathodon microcephalus</i> (Lucas, 1846)			+	+	+	+	+	+	+	+	+			+			MED
<i>Henia illyrica</i> (Meinert, 1870)	+		+	+	+	+	+	+	+	+	+		+	+	+	+	SEU
<i>Strigamia acuminata</i> (Leach, 1815)	+	+	+	+	+	+	+	+		+			+	+	+	+	EUR
<i>Strigamia crassipes</i> (C.L. Koch, 1835)			+	+					+								EUR
<i>Strigamia transsilvanica</i> (Verhoeff, 1928)	+		+		+	+				+	+	+		+	+	+	SEU

