

# DIPLOPODS FROM SĂLAJ COUNTY, ROMANIA (MYRIAPODA, DIPLOPODA)

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**ABSTRACT:** Here we present data of 16 diplopod taxa from Sălaj county, Romania. The species list can not be regarded as complete since a systematic diplopod-summary of whole Romania is still lacking, but anyway it represents almost 10% of the presently known diplopod fauna of the country. The most widespread species were *Polydesmus complanatus* (Linnaeus, 1761) and *Megaphyllum unilineatum* (C. L. Koch, 1838). All the identified species and subspecies are already known from Romania.

**Keywords:** Myriapoda, diplopods, Romania, Sălaj county, faunistical data

## INTRODUCTION:

Until now, the diplopod fauna of the Sălaj region was completely unknown. Although there are several sporadic faunistical and taxonomical data on the Romanian species (e.g. Ceuca, 1960, 1964, 1989, 1996, Tabacaru, 1958, 1976), a comprehensive book about the diplopod fauna of the country is still not available. Due to the joint research of the Vasile Goldiș Western University of Arad and the Hungarian Natural History Museum (HNHM) conducted between 2004 and 2007, we possess data about the millipedes of Maramureș, as Korsós and Lazányi (2008) published 21 species from 71 sampling sites. Between 2014 and 2015, extensive sampling of the invertebrate fauna has been carried out in the scarcely known Sălaj region. The aim of present study was to create a list of diplopod species, based on the samples collected from various localities of Sălaj county by taxonomists of the HNHM, and to collect data on the species' distribution. Here we present the enumeration of the species in systematic order, with localities and remarks on their identity or recent geographical situation.

## MATERIALS AND METHODS:

Material was collected between 2014 and 2015 by hand collecting, sifting and using pitfall traps and a leaf hoover by zoologists of the HNHM. Specimens were preserved in 70% ethanol, and are deposited in the Myriapoda Collection of the HNHM. A complete list of collecting localities and collectors can be found in Gubányi (2015). For identification of the species we used a Leica M125 stereomicroscope and the relevant publications (eg. Blower 1985, Schubart 1934, Korsós 2008). Habitus photos were made using a Nikon Coolpix E995 camera attached to a Leica MZ75 stereomicroscope.

## RESULTS:

GLOMERIDA  
 Glomeridae

### *Glomeris hexasticha* Brandt, 1833 (Figure 1)

*Glomeris hexasticha* Brandt, 1833  
*Glomeris hexasticha*: Jermy 1942: 21–24, Loksa 1968a: 266–272.

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Localities: 186: Munții Meseșului (Meszes-hegység), Poic, spruce plantation, 12.05.2015, N46.971° E22.946°; hand collecting, 3 ♀; Huta (Csákyújfalu), beech forest, pitfall traps 1-5, 04-08.06.2014, N46.593°, E22.554°, 1 ♀.

**Remarks:** *G. hexasticha* is a morphologically highly variable species. A very common woodland species which is sometimes found in open habitats up to about 2400 m. Essentially a forest species, living in litter and under debris or in the soil. One of the most abundant species of the European Diplopoda (Enghoff, 2013). According to Ceuca (1989) it is known from several localities in Romania.

POLYZONIIDA  
 Polyzoniidae

### *Polyzonium germanicum* Brandt, 1837 (Figure 1)

*Polyzonium germanicum* Brandt, 1837  
*Polyzonium germanicum*: Loksa 1968a: 266.

Localities: 113: Munții Meseșului (Meszes-hegység), Pria (Perje), SW slope of Vf. Măgura Priei (Perjei csúcs), 360m asl, beech forest with stream, 01.10.2014, N47.004° E22.8966°; hand collecting, 1 ♂.

**Remarks:** Among the European *Polyzonium* species *P. germanicum* is the most widespread, however it possesses rather patchy distribution, which may be related to its particular habitat requirements (Kime & Enghoff 2011). David (1989, 1990) stated that the species in the western zone appears to prefer living in acidic litter and humus of open woodlands. The eastern population is found in humid and open forest too (Golovatch and Kondeva, 1992). Although a second species of the genus also present in Romania, *P. transilvanicum* Verhoeff, 1989, despite its name is an Eastern Carpathian species. Our male belonged to the more widespread *P. germanicum*. The third European species of the genus is *P. eburneum* Verhoeff, 1907, known from Poland, Slovakia, Switzerland and Italy.

CHORDEUMATIDA  
 Mastigophorophyllidae

### *Mastigona* sp. (Figure 1)

Localities: 114: Munții Meseșului (Meszes-hegység), Huta (Csákyújfalu), 602 m asl, birch forest

with *Calluna vulgaris*, 01.10.2014, N46.99456° E22.92488°; leaf Hoover, 1 ♀.

**Remarks:** So far, two species are known from Romania: *Mastigona bosniensis* (Verhoeff 1897) and *Mastigona transsylvanica* (Verhoeff 1897). As the single collected specimen was a female, its proper identification was not possible.

JULIDA  
Blaniulidae

***Archiboreoiulus pallidus* (Brade-Birks, 1920)**, (Figure 1)

*Proteroiulus pallidus*, Brade-Birks, 1920  
*Archiboreoiulus pallidus*: Blower 1985: 118–119.

Localities: 123: Munții Plopiș (Réz-hegység), Tusa (Tuszatelke), Ponor, 830 m asl, pasture and fern (*Pteridium aqueinum*), 02.10.2014, N47.01195° E22.7421°; hand collecting, 1 ♀ det. Z. Korsós

**Remarks:** In Europe the species has been found on calcareous soils in synanthropic sites, in caves, at times in forests (Kime, 1999, 2004). Ceuca (1992) mentioned the species in the list of Balkan millipedes. *A. pallidus* is introduced in the Nearctic region (Vagalinski and Stoev, 2007). The species is similar in size and appearance to *Blaniulus guttulatus* (Fabricius, 1798). Our single female specimen was collected 830 m above sea level in Ponor. It was identified by the colour of the ozadenes and the length and number of metazonite setae on rings VI to IX.

Julidae

***Leptoiulus proximus* (Nemec, 1896)**

*Julus (Leptoiulus) proximus* Nemec, 1896  
*Julus (Leptoiulus) ciliatus buekkensis*: Verhoeff 1899: 201.  
*Leptoiulus trilobatus buekkensis*: Verhoeff 1908: 441.  
*Leptoiulus proximus*: Attems 1927: 137, Loksa 1979: 88, 91.

Localities: Mlaștină de la Iaz (Krasznajáz), swamp, 19.05.2014, N46.638°, E22.3940°, 1 ♂; 110: Munții Meseșului (Meszes-hegység), E of Meseșenii de Sus (Románkecel), 317 m asl, beech forest, 01.10.2014, N47.1059° E22.98988°, hand collecting, 1 ♂.

**Remarks:** A widespread forest-dwelling species, known from Central, Northern and Eastern Europe. Its easternmost distribution is in Russia East (Enghoff, 2013).

***Leptoiulus trilobatus* (Verhoeff, 1894)**

*Julus trilobatus* Verhoeff, 1894  
*Julus (Leptoiulus) ciliatus* Verhoeff 1897b: 115–116.  
*Leptoiulus trilobatus*: Verhoeff 1908: 440, Korsós 1994: 40.

Localities: Huta (Csákyújfalu), beech forest, pitfall traps 1-15, 23.04-22.05.2014, N46.593°, E22.554°, 1 ♂, 1 ♀; 105: Munții Plopiș (Réz-hegység), Iaz (Krasznajáz), valley of the Iaz Stream, 380 m asl, beech forest with stream, 30.09.2014, N47.08698°

E22.6511°; hand collecting, 3 ♂, 1 ♀; Huta (Csákyújfalu), beech forest, pitfall traps 6-10, 23.04-22.05.2014, N46.593°, E22.554°, 1 ♂.

**Remarks:** A widespread forest-dwelling species, occurring in and outside the Carpathian Mts. too. Korsós and Lazányi (2008) mentioned the species from the Gutâi Mts., Rodna Mts. and Maramureș Mts.  
***Leptoiulus cibdellus* (Chamberlin, 1921)**

*Julus minutus* Porat, 1889: 130–132.  
*Julus (Leptoiulus) minutus*: Verhoeff 1898: 136.  
*Leptoiulus minutus*: Verhoeff 1908: 436.  
*Julus cibdellus* Chamberlin, 1921: 83.

*Leptoiulus cibdellus*: Enghoff 1974: 31, Korsós 1994: 40.

Localities: Vârșoț (Varsolc), water reservoir, Salicetum, pitfall traps 1-10, 22.05-04.06.2014, N47.1042°, E23.057°, 1 ♂.

**Remarks:** It can be characterized by the same distribution as *L. proximus* (Nemec, 1896), however *L. cibdellus* is absent from Russia (Enghoff, 2013). Our finding in a water reservoir corresponds to the results of previous works which stated that the species occurs mostly in wet woodlands and has the ability to survive submersion during flood (Jędrzykowski 1992, Sallai, 1993, Enghoff, 2013, Bogyó *et al.*, 2012).

***Cylindroiulus luridus* (C.L. Koch, 1847)**

*Julus luridus* C. L. Koch, 1847  
*Julus luridus*: Jurinich 1904: 3, 37, Strasser 1966: 352.  
*Cylindroiulus luridus*: Verhoeff 1904, Schubart 1934: 213–214

Localities: 110: Munții Meseșului (Meszes-hegység), E of Meseșenii de Sus (Románkecel), 317 m asl, beech forest, 01.10.2014, N47.1059° E22.98988°; hand collecting, 1 ♂.

**Remarks:** Widespread forest-dwelling species, mostly occurs in beech (*Fagus sylvatica*) forests (Vagalinski and Stoev, 2007).

***Megaphyllum unilineatum* (C.L. Koch, 1838)** (Figure 1)

*Julus unilineatus* C. L. Koch, 1838  
*Brachyiulus (Chromatoiulus) unilineatus*: Verhoeff 1897b: 114–115.  
*Brachyiulus unilineatus*: Szabó 1931: 15, 18, 22–24, 26–28, 30.  
*Chromatoiulus unilineatus*: Attems 1927: 220.  
*Chromatoiulus unilineatus*: Loksa 1953: 179; 1983: 68.  
*Megaphyllum unilineatum*: Hoffman 1980: 104, 113, Loksa 1988: 162–164, 170.

Localities: Munții Plopiș (Réz-hegység), Tusa (Tuszatelke), Barcău (Berettyó) springs, 13.05.2015, N47.02° E22.749°, hand collecting, 2 ♂, 3 ♀; 123: Munții Plopiș (Réz-hegység), Tusa (Tuszatelke), Ponor, 830 m asl, pasture and fern (*Pteridium aqueinum*), 02.10.2014, N47.01195° E22.7421°; hand collecting, 1 ♂, 1 ♀, 5 juv.; Tusa (Tuszatelke), table

above Berettyó spring, sward, 654 m asl., 24.04.2014, N47.111°, E22.451°, hand collecting, 1 ♂; Aghireş (Egrespatak), dry sward, pitfall traps 1-10, 25.04-22.05.2014, N47. 925°, E22.593°, 1 ♀; Aghireş (Egrespatak), dry sward, pitfall traps 1-10, 22.05-04.06.2014, N47. 925°, E22.593°, 1 ♀; Aghireş (Egrespatak), dry sward, pitfall traps 1-10, 04.06-13.08.2014, N47. 925°, E22.593°, 2 ♀.

**Remarks:** In Europe it is a generally widespread, xerothermic open land species (e. g. Tuf and Tufová, 2008, Voigtländer, 2011, Bogyó *et al.*, 2012). The species was relatively abundant in our collected material.

***Megaphyllum transsylvanicum* (Verhoeff, 1897)**  
(Figure 1)

*Brachyiulus transsylvanicus* Verhoeff, 1897  
*Chromatoiulus transsylvanicus*: Strasser 1969: 158.  
*Megaphyllum transsylvanicum*: Hoffman 1980

Localities: 117: Depresiunea Almaş-Agrij (Almás-Egregy-medence), between Băbiu (Bábony) and Almaşu (Váralmás), shore of Băbiu Stream, 01.10.2014, N46.95291° E23.09595°, hand collecting, 1 ♂, 2 ♀, 1 juv.

**Remarks:** This species has a wide distribution range: it can be found in the Balkan Peninsula and in Eastern Europe, from Greece to Ukraine; from sea level up to 1700 m a.s.l. in diverse habitats as pastures, forests and even in caves (Lazányi and Vagalinski, 2013). Among the samples from Sălaj county it was found only in a single locality 337 m above sea level in a stream shore on decaying wood.

***Megaphyllum projectum projectum* Verhoeff, 1894** (Figure 1)

*Megaphyllum projectum* Verhoeff, 1894  
*Brachyiulus projectus*: Verhoeff 1897b: 111–112.  
*Chromatoiulus projectus*: Schubart 1934: 278–280, Loksa 1979: 88.  
*Brachyiulus projectus dioritanus* Verhoeff 1907: 303, 305, Figs 5–8.  
*Chromatoiulus projectus dioritanus*: Loksa 1968a: 268.  
*Megaphyllum projectum dioritanum*: Loksa 1988: 164, 1991: 131–132.  
*Megaphyllum projectum*: Hoffman 1980: 104.  
*Megaphyllum projectum projectum*: Lazányi & Korsós 2011: 45–49, 51–53.

Localities: 98: Dealurile Sălajului (Szilágymenti-dombság), Aluniş (Szamoszézplak), 22.05-04.06.2014, N47.371° E23.267°, oak forest, pitfall trap, 2 ♂, 3 ♀; 98: Dealurile Sălajului (Szilágymenti-dombság), Aluniş (Szamoszézplak), 13.08-03.10.2014, N47.371° E23.267°, oak forest, pitfall trap, 2 ♂; 98: Dealurile Sălajului (Szilágymenti-dombság), Aluniş (Szamoszézplak), 22.05-04.06.2014, N47.371° E23.267°, oak forest, pitfall trap, 1 ♂, 2 ♀.

**Remarks:** *M. projectum projectum* is widespread in Central and Eastern Europe (Korsós, 1994, Enghoff, 2013). In the Eastern European Plain the species is closely associated to the oak woodlands (Wytwer *et al.*, 2009), but seems to be more eurytopic in Western Europe (Voigtländer, 2011). Lazányi and Korsós

(2011) published detailed diagnosis and illustrations of the male's gonopods of the subspecies.

***Unciger transsylvanicus* Verhoeff, 1899**

*Unciger foetidus transsylvanicus*, Verhoeff 1899  
*Oncoiulus transsylvanicus*: Verhoeff 1928: 37. Schubart 1934: 36, 46. Verhoeff 1937: 114. Jawlowski 1938: 171. Strasser 1966: 360. Strasser 1969: 163.  
*Unciger transsylvanicus*: Korsós 1998: 84.

Localities: Munţii Meseşului (Meszes-hegység), E of Meseşeni de Sus (Románkecel), 317 m asl, beech forest, 01.10.2014, N47.1059° E22.98988°; hand collecting, 1 ♂; 98: Dealurile Sălajului (Szilágymenti-dombság), Aluniş (Szamoszézplak), oak forest, 22.05-04.06.2014, N47.371° E23.267°, pitfall trap, 1 ♀.

**Remarks:** Central to Eastern European species that inhabits deciduous forests and meadows situated 800-1400 m above sea level (Vagalinski and Stoev, 2007).

**POLYDESMIDA**  
**Paradoxosomatidae**

***Strongylosoma stigmatosum* (Eichwald, 1830)**  
(Figure 1)

*Julus stigmatosus* Eichwald, 1830  
*Strongylosoma pallipes* (Olivier, 1792): Latzel 1884: 168–170, Loksa 1953: 179.  
*Strongylosoma stigmatosum*: Jeekel 1967: 166, Szlávecz & Loksa 1991: 804.

Localities: 99: Munţii Meseşului (Meszes-hegység), Treznea (Ördökgút), main valley of the Treznea Stream, 377 m asl, beech forest and pasture, 29.09.2014, N47.11005° E23.06443°, hand collecting, 1 ♀; 105: Munţii Plopiş (Réz-hegység), Iaz (Krasznajáz), valley of the Iaz Stream, 380 m asl, beech forest with stream, 30.09.2014, N47.08698° E22.6511°; hand collecting, 1 ♂, 2 ♀.

**Remarks:** *S. stigmatosum* is widespread in hilly and montane forests in Central and East Europe (e.g. Korsós 1994, Kime and Enghoff, 2011, Lazányi and Korsós, 2009, Bogyó *et al.*, 2012). Korsós and Lazányi (2008) mentioned the species from two Romanian localities from the Maramureş Mts. and the Munţii Pietrii. Our samples were found between 370 and 380 m above sea level.

***Brachydesmus* sp.**

Localities: 125: Tusa (Tuszatelke), Ponor, Izvoarele Barcauleu, 752 m asl, edge of beech forest and pasture with spring and stream, 02.10.2014, N47.0121°, E22.4432°, hand collecting, 1 juv; 115: Huta (Csákyújfalu), beech forest, 19.09-01.10.2014, N46.59382°, E22.55438°, pitfall traps 1-5, 1 juv.

**Remarks:** Five species of this large genus are known from Romania, namely *B. dadayi* Verhoeff 1895, *B. jeanelli* Ceuca 1958, *B. jubatus* Attems 1907, *B. polydesmoides* Verhoeff 1895 and *B. troglobius* Daday 1889. Our samples consisted only juvenile specimens. All species of the genus have nineteen body rings in both sexes, are generally smaller than

*Polydesmus* species and occur particularly in the Ponto-Mediterranean zone. Vast majority are Balkan endemics, many of them are obligate cavernicolous (e.g. Kime and Enghoff, 2011, Angyal and Korsós, 2013).

***Polydesmus schaessburgensis* Verhoeff, 1898** (Figure 1)

*Polydesmus schässburgensis* Verhoeff, 1898  
*Polydesmus schaessburgensis*: Sallai 1993: 86.

Localities: 80: Muntii Meseşului, Poic, alder groove, 12.05.2015, N46.980°, E22.925°, hand collecting, 3 ♂; Mlaştină de la Iaz (Krasznajáz), oak forest, 04.06-13.08.2014, N47.6387°N, E22.3435°, 1 ♂.

**Remarks:** So far, the species has data only from Hungary, Moldova, Romania, Ukraina and the former Yugoslavia. It binds to deciduous forests, usually can be found in clearings and small woods, woodland margins (Kime and Enghoff 2011).

***Polydesmus complanatus* (Linnaeus, 1761)**

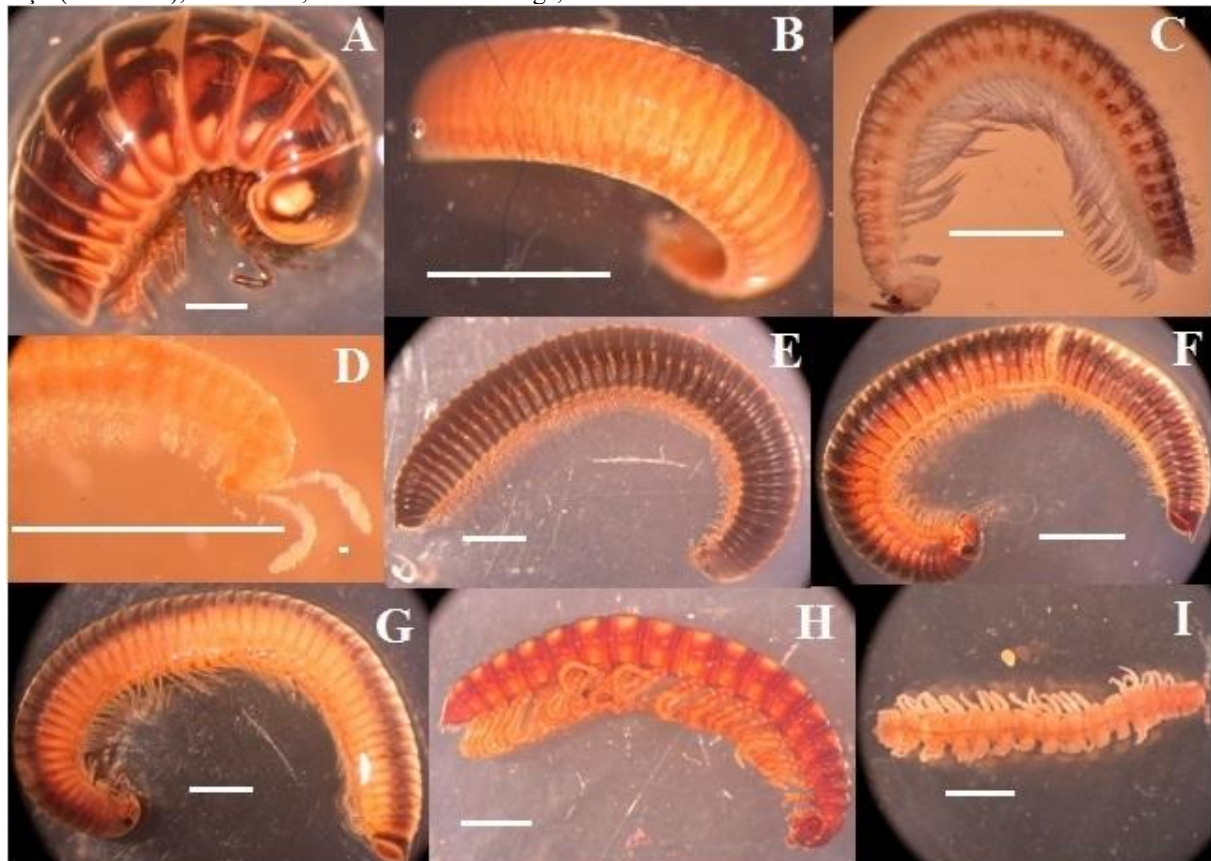
*Julus complanatus* Linnaeus, 1761  
*Polydesmus illyricus* Verhoeff 1893: 273–275.  
*Polydesmus complanatus*: Porat 1870: 820, Lohmander 1925:

16–17, Szabó 1931: 15, 17–18, 21–22, 25–29, Loksa 1954: 217–218.

Localities: 117: Depresiunea Almaş-Agrij (Almás-Egregy-medence), between Băbiu (Bábony) and Almaşu (Váralmás), 337 m asl, stream bank with logs,

01.10.2014, N46.95291° E23.09595°, hand collecting, 1 ♂; Mlaştină de la Iaz (Krasznajáz), swamp, 19.05.2014, N46.638°, E22.3940°, 1 ♂; 99: Munţii Meseşului (Meszes-hegység), Treznea (Ördögkút), main valley of the Treznea Stream, 377 asl, beech forest and pasture, 29.09.2014, N47.11005° E23.06443°, hand collecting, 1 ♂; 176: Tihău (Tihó), Valea Almaş, streamside, 11.05.2015, N47.232°, E23.316°, 1 ♂, 2 ♀; 180: Munţii Meseşului (Meszes-hegység), Poic, alder groove, 12.05.2015, N46.98° E22.925°; hand collecting, 1 ♂; Munţii Meseşului (Meszes-hegység), Poic, hornbeam-oak forest, 12.05.2015, N46.992° E22.917°; hand collecting, 1 ♂; Munţii Plopiş (Réz-hegység), Iaz (Krasznajáz), Mlaştina de la Iaz, pasture, 13.05.2015, N47.11° E22.659°; sifting and hand collecting, 1 ♂; Munţii Meseşului (Meszes-hegység), Poic, beech forest, 12.05.2015, N46.994° E22.93°; hand collecting, 1 ♂.

**Remarks:** Common and widespread millipede species in Romania (Korsós and Lazányi, 2008) and in most parts of Europe. It occurs in broad-leaved forests, bushy areas, hedges and swampy woodland of many types. The eurytopic species is often found near habitation too. It can be collected by checking of leaf litter or other decaying vegetation under woods or stones (Kime and Enghoff, 2011). Among our samples it was the most widespread and most abundant species.



**Fig. 1.** Habitus photos of some of the collected diplopod species. A: *Glomeris hexasticha* Brandt, 1833, B: *Polyzonium germanicum* Brandt, 1837, C: *Mastigona* sp., D: *Archiboreiulus pallidus* (Brade-Birks, 1920), E: *Megaphyllum unilineatum* (C.L. Koch, 1838), F: *Megaphyllum transsylvanicum* (Verhoeff, 1897), G: *Megaphyllum projectum projectum* Verhoeff, 1894, H: *Strongylosoma stigmatosum* (Eichwald, 1830), *Polydesmus schaessburgensis* Verhoeff, 1898, Scale bar: 2 mm.

## DISCUSSION:

Altogether, we identified 16 diplopod taxa from various localities in Sălaj county, visited by our colleagues between 2014 and 2015 (Table 1). It represents almost 10% of the presently known millipede fauna of Romania. In case of our *Mastigona* sp. and *Brachydesmus* sp. specimens, identification until species rank was not possible in the lack of males. The list reflects that the collected methods were restricted only to the usual terrestrial entomological activity, like hand collecting, sifting and using pitfall traps. Species that live under bark, in cavities or deep in the soil were not sampled.

Among the collected diplopods, *P. complanatus* and *M. unilineatum* were by far the most frequently Romania.

found species. All species of the found millipede fauna is generally widespread in Europe. Though, most of them are deciduous forest dwellers living in litter or under debris, we had some remarkable records too, like the finding of *A. pallidus* in a pasture in Ponor (Tusa), as the species can be more frequently found in underground habitats, such as caves.

Although the results published here cannot be considered as a total faunal list, we believe that all contributions to the better knowledge on understanding the distribution of the scarcely known millipedes of Romania are beneficial.

**Table 1.**  
List of diplopod species found in Sălaj county

| Species   | Distribution  |
|---|---|
| <i>Glomeris hexasticha</i> Brandt, 1833               | Central and SE Europe)  |
| <i>Polyzonium germanicum</i> Brandt, 1837             | Central, SE, E and N Europe                                       |
| <i>Mastigona</i> sp.                                  | Central and E Europe  |
| <i>Archiboreiulus pallidus</i> (Brade-Birks, 1920)    | Central, NW, N, SE Europe, Central and NW Russia, Nearctic region |
| <i>Leptoiulus proximus</i> (Nemec, 1896)              | Central, N and E Europe, Russia                                   |
| <i>Leptoiulus trilobatus</i> (Verhoeff, 1894)         | Central and SE Europe, Ukraina                                    |
| <i>Leptoiulus cibdellus</i> (Chamberlin, 1921)        | Central, N and E Europe   |
| <i>Cylindroiulus luridus</i> (C.L. Koch, 1847)        | Central and E Europe, Balkans                                     |
| <i>Megaphyllum unilineatum</i> (C.L. Koch, 1838)      | Central and SE Europe, Balkans                                    |
| <i>Megaphyllum transsylvanicum</i> (Verhoeff, 1897)   | E Europe, Balkans, Hungary  |
| <i>Megaphyllum projectum projectum</i> Verhoeff, 1894 | Central and E Europe  |
| <i>Unciger transsilvanicus</i> Verhoeff, 1899         | Central and E Europe, S Russia                                    |
| <i>Strongylosoma stigmatosum</i> (Eichwald, 1830)     | Central and E Europe, Balkans                                     |
| <i>Brachydesmus</i> sp.                               | Ponto-Mediterranean zone, Balkans                                 |
| <i>Polydesmus schaessburgensis</i> Verhoeff, 1898     | Central, SE and E Europe  |
| <i>Polydesmus complanatus</i> (Linnaeus, 1761)        | Central, S, N, and E Europe, Russia, Nearctic region, Near East   |

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