

## Checklist of the millipedes (Myriapoda: Diplopoda) of the Republic of North Macedonia

### КОНТРОЛЬНЫЙ СПИСОК ДИПЛОПОД (Myriapoda: Diplopoda) РЕСПУБЛИКИ СЕВЕРНАЯ МАКЕДОНИЯ

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КЛЮЧЕВЫЕ СЛОВА: Diplopoda, разнообразие, фауна, Северная Македония, Балканский полуостров.

**ABSTRACT.** The millipede fauna of the Republic of North Macedonia presently includes 67 species from 33 genera, 15 families and seven orders. As many as 12 and 19 species, or ca. 18% and 28% of all records, are endemic to North Macedonia and the Balkan Peninsula, respectively. The most speciose families are Julidae, with 29 species, or 43%, followed by Polydesmidae with 16 species, or 24%. *Hirudisoma hirsutum* (Verhoeff, 1901) and *Brachydesmus cristofer* Strasser, 1966 are new to the millipede fauna of North Macedonia. The distribution pattern and maps are given for each species.

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**РЕЗЮМЕ.** Диплоподы фауны Республики Северная Македония ныне включают 67 видов из 33 родов, 15 семейств и семи отрядов. Из них 12 и 19 видов, или примерно 18% и 28% всех находок, — эндемики соответственно Северной Македонии и Балканского полуострова. Самые богатые видами семейства — Julidae с 29 видами, или 43% фауны, и Polydesmidae с 16 видами, или 24%. Виды *Hirudisoma hirsutum* (Verhoeff, 1901) и *Brachydesmus cristofer* Strasser, 1966 — новые для фауны Македонии. Для каждого вида представлены тип ареала и карта с распространением.

### Introduction

The Republic of North Macedonia occupies the central part of the Balkan Peninsula. It has varied relief structure and age, geology and soil types, a situation resulting from its complex geotectonic evolution, which shaped the republic's present-day rich biodiversity. The mountains of the older Rhodopian tectonic mass (Mts Belasica and Osogovo) and those of the younger Dinaric tectonic mass (Šar Planina Mountains and Mts Bistra, Korab and Pelister) include localities with a large number of reported species. The shores of the large tectonic lakes Ohrid and Prespa and of the smaller Lake Dojran are also the sites of numerous millipede records. Different influences, such as the presence of various water bodies, the existence of high mountains and human impacts, modify the mostly continental and Mediterranean climate. Vegetation is represented by forest, grass, semi-steppe and marsh communities, together with ones of certain other types as well. This diversity of natural conditions contributes to the profound species richness of the republic's flora and fauna [Makarov *et al.*, 2004].

Diplopoda are ancient terrestrial arthropods with more than 12,000 described species, while their diversity is estimated to range between ca. 25,000 to 80,000 species [Hopkin, Read, 1992; Golovatch, Kime, 2009; Sierwald, Bond, 2007]. One of the globe's most important centres of millipede diversity is the Balkan Peninsula, which is inhabited by almost 1,000 species, including many endemic taxa. The first comprehensive review of the millipede fauna of present-day North Macedonia was published by Strasser [1971a, b], pre-

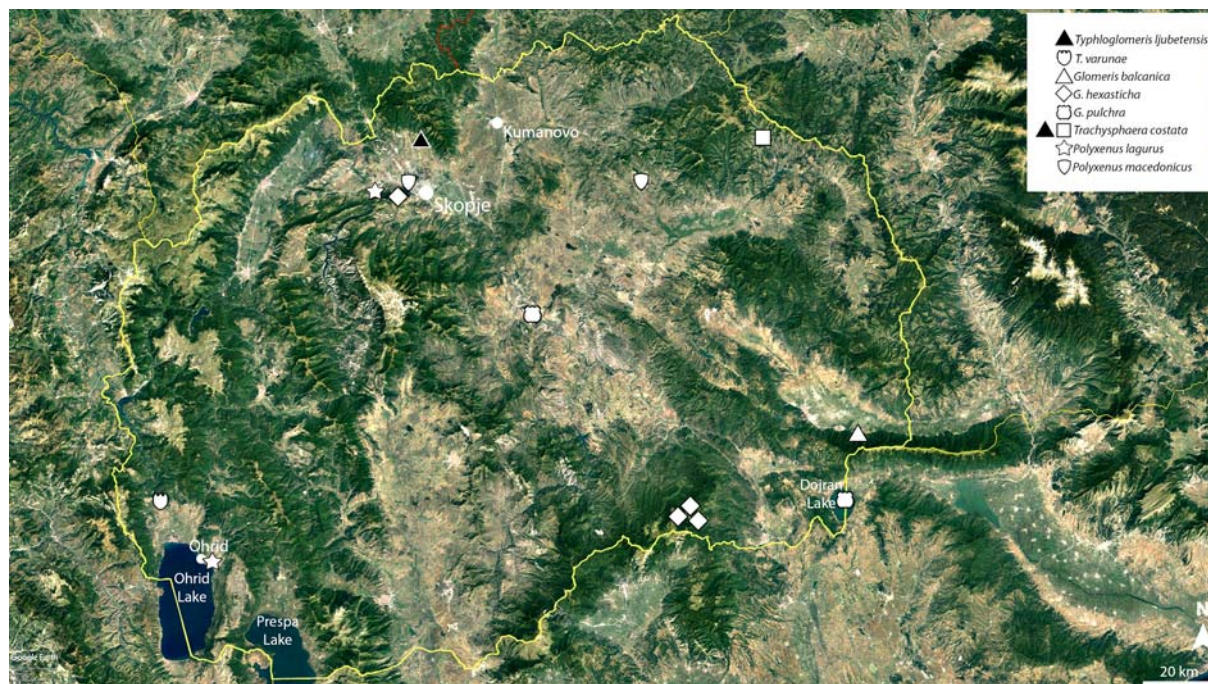


Fig. 1. Distribution of representatives of the orders Glomerida and Polyxenida in North Macedonia.

Рис. 1. Распространение представителей отрядов Glomerida и Polyxenida в Северной Македонии.

ceded by the studies by Attems [1929, 1959], and it listed already 43 species or subspecies. Research efforts carried out in the late 1980's and early 1990's supplemented these records with a number of new taxa, thereby resulting in 59 species or subspecies, as reported by Mršić [1993a]. In the late 1990's and early 2000's, Čurčić *et al.* [1999a, b, 2002a, b] and Makarov *et al.* [2001, 2003] added several new species to the diplopod fauna of North Macedonia. Makarov *et al.* [2004] recognized 61 species, 12 of which were endemic to the country. Finally, Petkovski [2009] published his National Catalogue containing 62 millipede species. Kime & Enghoff [2011, 2017], in their pan-European atlases, listed most of the millipede species described, accepted or recorded to date from North Macedonia, except for those in the order Chordeumatida. In their comprehensive work, Vagalinski & Lazányi [2018] revised the tribe Brachyiulini, including North Macedonian species.

The objective of the present study is to critically list all members of the North Macedonian diplopod fauna based on published records and new material collected between the 1990's and late 2010's. The synonymy lists are largely after Kime & Enghoff [2011, 2017], Spelda [2013], and Vagalinski & Lazányi [2018].

## Material and methods

The specimens collected were examined using a Nikon SMZ 745T stereo microscope and are presently deposited at the Institute of Zoology, Faculty of Biology, University of Belgrade, Serbia. All taxonomically

important structures were dissected, mounted in glycerine as temporary microscope preparations, and observed with a Carl Zeiss Axioscope 40 microscope. The distribution maps were created using Google Earth Pro (version 7.3.0.3832) and Adobe Photoshop CS6.

## List of species

### Order POLYXENIDA

#### Family POLYXENIDAE

#### 1. *Polyxenus lagurus* (Linnaeus, 1758)

*Scolopendra lagurus* Linnaeus, 1758

*Polyxenus germanicus* Verhoeff, 1941

Distribution in the Republic of North Macedonia: Ohrid [Makarov *et al.*, 2004]; river Treska, Skopje [Attems, 1929]; without precise locality [Strasser 1971a, b; Mršić, 1993a; Mauriès *et al.*, 1997] (Fig. 1).

World distribution: Albania, Austria, Azores Islands, Balearic Islands, Belarus, Belgium, Bulgaria, Channel Islands, Corsica, Croatia, Cyclades Islands, Czech Republic, Germany, Danish mainland, Estonia, European Turkey (without islands in the Sea of Marmara), French mainland, Great Britain, Hungary, Ireland, Italian mainland, Latvia, Lithuania, Luxembourg, Republic of North Macedonia, Moldova, Northern Ireland, Norwegian mainland and inshore islands, Poland, Portuguese mainland, Romania, Russia (Central European Russia, North European Russia, Northwest Russia), Sicily and neighbouring Italian islands, Spanish mainland, Serbia, Slovenia, Slovakia, Sweden, Switzerland, the Netherlands, Ukraine, and Northern USA [Kime, Enghoff, 2011].

## 2. *Polyxenus macedonicus* Verhoeff, 1952

Distribution in the Republic of North Macedonia: Skopje [Verhoeff, 1952; Strasser, 1971a]; village of Strmoš, Probištip [Mršić, 1993a]; without precise locality [Mauriès *et al.*, 1997; Ćurčić *et al.*, 2002a; Makarov *et al.*, 2004] (Fig. 1).

World distribution: Corsica, French mainland, Republic of North Macedonia, Malta [Kime, Enghoff, 2011].

Order GLOMERIDA

Family GLOMERIDELLIDAE

## 3. *Typhloglomeris ljubetensis* (Attems, 1929)\*\*

*Albanoglomeris ljubetensis* Attems, 1929

*Albanoglomeris ljubotensis* Mršić, 1985

Distribution in the Republic of North Macedonia: Ljuboten, Šar Planina Mts [Attems, 1929; Strasser, 1971a; Mršić, 1993a; Makarov *et al.*, 2003, 2004]; without precise locality [Strasser, 1971b; Mauriès *et al.*, 1997; Ćurčić *et al.*, 1999a, 2000] (Fig. 1).

World distribution: Republic of North Macedonia, Serbia [Kime, Enghoff, 2011].

Balkan endemic.

## 4. *Typhloglomeris varunae* Makarov, Lučić, Tomić et Karaman, 2003\*\*

MATERIAL. 1 ♂, 1 ♀, and 3 juvenile topotypes: Mlečnik Cave, village of Tašmarunište, Struga, 21.IV.2006, leg. I. Karaman.

Distribution in the Republic of North Macedonia: Mlečnik Cave, village of Tašmarunište, Struga [Makarov *et al.*, 2003, 2004; present study] (Fig. 1).

North Macedonian endemic.

Family GLOMERIDAE

## 5. *Glomeris balcanica* Verhoeff, 1906\*\*

*Glomeris bureschi* Verhoeff, 1926

*Glomeris latemarginata* Attems, 1927

*Glomeris hahni* Lang, 1935

*Glomeris kaloferensis* Verhoeff, 1937

*Glomeris olympiaca* Verhoeff, 1937

*Glomeris rhodopina* Verhoeff, 1937

*Glomeris sakarensis* Verhoeff, 1937

MATERIAL. 1 ♀, near the village of Popadija, Mt Belasica, 767 m a.s.l., *Quercus-Fraxinus* forest, 24.IV.2010; 1 ♀, same locality, 1200 m a.s.l., *Calamintha-Fagus* community, 24.IV.2010; 8 ♂♂, 8 ♀♀, same locality, 847 m a.s.l., *Quercus-Fraxinus* forest, 28.V.2010; 13 ♂♂, 4 ♀♀, same locality, 1100 m a.s.l., *Festuca-Fagus* community, 28.V.2010; 11 ♂♂, 1 ♀, same locality, 1200 m a.s.l., *Calamintha-Fagus* community, 28.V.2010; 4 ♂♂, 1 ♀, same locality, 847 m a.s.l., *Quercus-Fraxinus* forest, 3.VII.2010; 1 ♂, same locality, 1038 m a.s.l., *Quercus-Fraxinus* forest, 3.VII.2010; 3 ♀♀, same locality, 1100 m a.s.l., *Festuca-Fagus* community, 3.VII.2010; 1 ♂, same locality, 1200 m a.s.l., *Calamintha-Fagus* community, 3.VII.2010; 1 ♂, between Pod and Suva Eešma, Mt Belasica, 587 m a.s.l., *Quercus-Carpinus* forest, 28.V.2010; 6 ♂♂, 1 ♀, 1 juv., near Groba, Mt Belasica, 1300 m a.s.l., *Calamintha-Fagus* community, 28.V.2010; 1 ♂, 1 ♀, same locality, 1300 m a.s.l., *Calamintha-Fagus* community, 3.VII.2010; 1 ♀, same locality, 1300 m a.s.l., *Calamintha-Fagus* community, 4.IX.2010; 1 ♂, 1 ♀, near Pisana Skala slopes, Mt Belasica, 1385 m a.s.l., *Calamintha-Fagus* community, 28.V.2010; 3 ♂♂, 4 ♀♀, same locality, 1442 m a.s.l., cleared area, 28.V.2010; 2 ♂♂, 1 ♀,

same locality, 1385 m a.s.l., *Calamintha-Fagus* community, 3.VII.2010; 1 ♂, 5 ♀♀, same locality, 1442 m a.s.l., cleared area, 3.VII.2010; 1 juv., same locality, 1385 m a.s.l., *Calamintha-Fagus* community, 4.IX.2010; 1 ♀, same locality, 1442 m a.s.l., cleared area, 4.IX.2010, all leg. A.C. Gjorgjievska.

Distribution in the Republic of North Macedonia: Mt Belasica (present study); village of Kosturino [Mršić, 1993a; Makarov *et al.*, 2004]; without precise locality [Mauriès *et al.*, 1997] (Fig. 1).

World distribution: Bulgaria, European Turkey (without islands in the Sea of Marmara), Greek mainland, and the Republic of North Macedonia [Kime, Enghoff, 2011].

Balkan endemic.

## 6. *Glomeris hexasticha* Brandt, 1833

*Glomeris mniszechii* Nowicki, 1870

*Glomeris ambigua* Haase, 1886

*Glomeris ruscorum* Verhoeff, 1929

*Glomeris chiemensis* Verhoeff, 1941

MATERIAL. 1 ♀, Mt Kožuf, 550 m a.s.l., *Quercus-fraxinus* forest, 15.VI.2010; 1 ♀, Mt Kožuf, Gorska Buka, 1505 m a.s.l., *Calamintha-Fagus* community, 14.VI.2016; 1 ♀, Mt Kožuf, ecotope between spruce forests, 1673 m a.s.l., 19.VII.2016, all leg. D. Matevski; 1 ♀, Mt Vodno, Skopje, 770 m a.s.l., Mediterranean pine forest, 15.VI.2015, leg. R. Blaževska.

Distribution in the Republic of North Macedonia: Belčište-Blato [Mršić, 1993a]; village of Dubrovica [Mršić, 1993]; Mt Konečka [Mršić, 1993]; Mt Kožuf (present study); Matka [Mršić, 1993a; Ćurčić *et al.*, 1999a]; Mt Osogovo [Mršić, 1993a]; Popova Šapka, Šar Planina Mts [Mršić, 1993a]; village of Rašče, near Skopje [Ćurčić *et al.*, 1999a; Makarov *et al.*, 2004]; Lake Tikveš [Mršić, 1993a]; village of Treska, Skopje [Attems, 1929; Mršić, 1993a]; Mt Vodno near Skopje [Mršić, 1993a; present study]; without precise locality [Strasser, 1971a, b; Mauriès *et al.*, 1997] (Fig. 1).

World distribution: Albania, Asiatic Turkey, Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, European Turkey (without islands in the Sea of Marmara), Germany, Hungary, Italian mainland, Republic of North Macedonia, Moldova, Montenegro, Poland, Romania, Russia (Central European), Serbia, Slovenia, Slovakia, Switzerland, and Ukraine [Kime, Enghoff, 2011].

## 7. *Glomeris pulchra* C. L. Koch, 1847

*Glomeris buccariensis* Verhoeff, 1924

*Glomeris quarnerona* Attems, 1927

*Glomeris kratohvili* Lang, 1939

Distribution in the Republic of North Macedonia: Mt Babuna [Mršić, 1993a]; Lake Dojran [Mršić, 1993a; Makarov *et al.*, 2004] (Fig. 1).

World distribution: Albania, Bosnia and Herzegovina, Croatia, Italian mainland, Republic of North Macedonia, and Montenegro [Kime, Enghoff, 2011].

## 8. *Trachysphaera costata* (Waga, 1857)

*Gervaisia costata* Waga, 1857

*Trachysphaera hyrtlii* Wankel, 1861

*Gervaisia rotundata* Lignau, 1911

*Trachysphaera asiaeminoris* (Verhoeff, 1940)

*Gervaisia pigmentifera* Verhoeff, 1941

*Gervaisia similicostata* Radu, Ceuca, 1951

Distribution in the Republic of North Macedonia: Ljuboten, Šar Planina Mts [Attems, 1929]; Rudnik, Strumica [Mršić, 1993a]; Sasa [Mršić, 1993a]; without precise

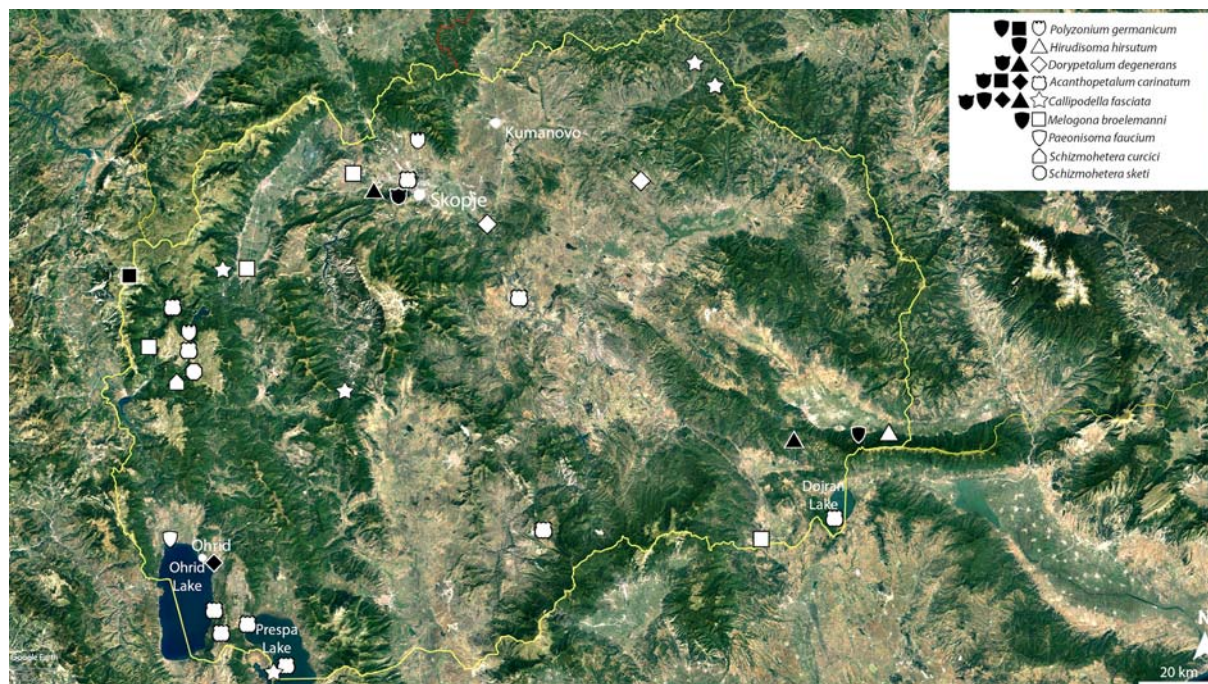


Fig. 2. Distribution of representatives of the orders Polyzoniida, Callipodida and Chordeumatida in North Macedonia.

Рис. 2. Распространение представителей отрядов Polyzoniida, Callipodida и Chordeumatida в Северной Македонии.

locality [Strasser, 1971a, b; Mauriès *et al.*, 1997; Makarov *et al.*, 2004] (Fig. 1).

World distribution: Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Germany, Greek mainland with Evia Island, Hungary, Republic of North Macedonia, Montenegro, Poland, Romania, Serbia, Slovenia, Slovakia, Ukraine, and possibly Albania [Kime, Enghoff, 2011].

#### Order POLYZONIIDA

##### Family POLYZONIIDAE

#### 9. *Polyzonium germanicum* Brandt, 1837

*Platyulius audouinianus* Gervais, 1836

*Polyzonium bosniense* Verhoeff, 1898

*Polyzonium albanicum* Verhoeff, 1932

*Polyzonium atlanticum* Brolemann, 1935

*Polyzonium controversarium* Verhoeff, 1937

MATERIAL. 1 ♂, Mavrovo, 14.VI.1996, leg. E. Stojkoska; 1 ♂, near the village of Popadija, Mt Belasica, 1038 m a.s.l., *Festuca-Fagus* community, 28.V.2010; 2 ♂♂, same locality, 1100 m a.s.l., *Festuca-Fagus* community, 28.V.2010, all leg. A.C. Gjorgjievska.

Distribution in the Republic of North Macedonia: Mt Belasica (present study); Korab [Verhoeff, 1932]; Ljuboten, Šar Planina Mts [Attems, 1929; Verhoeff, 1932]; Mavrovo (present study); without precise locality [Strasser, 1971a, b; Mršić, 1993a; Mauriès *et al.*, 1997; Makarov *et al.*, 2004] (Fig. 2).

World distribution: Albania, Austria, Bosnia and Herzegovina, Belarus, Bulgaria, Croatia, Czech Republic, Danish mainland, Estonia, Finland, French mainland, Germany, Great Britain, Hungary, Italian mainland, Lithuania, Latvia, Republic of North Macedonia, Moldova, Montenegro, Poland, Romania, Russia (Kaliningrad Region, Central European Russia, East Central Russia, North European Russia, North-

west Russia), Serbia, Slovakia, Slovenia, Sweden, and Ukraine [Kime, Enghoff, 2011].

#### Family HIRUDISOMATIDAE

#### 10. *Hirudisoma hirsutum* (Verhoeff, 1901)\*

*Heterozonium hirsutum* Verhoeff, 1901

MATERIAL. 3 ♂♂, 6 ♀♀, near the village of Popadija, Mt Belasica, 847 m a.s.l., *Quercus-Fraxinus* forest, 28.V.2010; 1 ♀, same locality, 847 m a.s.l., *Quercus-Fraxinus* forest, 3.VII.2010, all leg. A.C. Gjorgjievska; 2 ♀♀, village of Smolare, Strumica, chestnut forest, 25.X.2010, leg. M. Komnenov.

Distribution in the Republic of North Macedonia: Mt Belasica (present study); Strumica (present study) (Fig. 2).

Note: This is the first record of this species in the Republic of North Macedonia, but also the first record of the genus and family for the country.

World distribution: Asiatic Turkey, Bulgaria, European Turkey (without islands in the Sea of Marmara), Republic of North Macedonia, and Greek mainland [Kime, Enghoff, 2011; present study].

#### Order CALLIPODIDA

##### Family DORYPETALIDAE

#### 11. *Dorypetalum degenerans* (Latzel, 1884)

*Lysiopetalum degenerans* Latzel, 1884

Distribution in the Republic of North Macedonia: Kaplan, near Skopje [Attems, 1929]; Katlanovo [Mršić, 1993a]; Kosturino [Mršić, 1993a]; Strmoš, Probištip [Mršić, 1993a]; Treska [Attems, 1929]; Mt Vodno, Skopje [Mršić, 1993]; without precise locality [Strasser, 1971a; Mauriès *et al.*, 1997; Makarov *et al.*, 2004] (Fig. 2).

World distribution: Bosnia and Herzegovina, Hungary, Republic of North Macedonia, Romania, and Serbia [Kime, Enghoff, 2011].

#### Family SCHIZOPETALLIDAE

##### 12. *Acanthopetalum carinatum* (Brandt, 1840)

*Lysiopetalum carinatum* Brandt, 1840  
*Lysiopetalum comma* Verhoeff, 1900  
*Lysiopetalum thessalorum* Verhoeff, 1901  
*Lysiopetalum macedonicum* Verhoeff, 1923  
*Lysiopetalum albanicum* Verhoeff, 1932  
*Lysiopetalum janinense* Verhoeff, 1932  
*Lysiopetalum lychnitis* Verhoeff, 1932

Distribution in the Republic of North Macedonia: Bigor drop, Vitolište [Mršić, 1993a]; Carevec, Mt Bistra, [Mršić, 1993a]; Dojran [Mršić, 1993a]; Mt Galičica [Mršić, 1993a]; Jama Leskovec Cave, Prespa [Mršić, 1993a]; Kaldrma, Stari Dojran [Čurčić *et al.*, 1999a]; Maharovac Cave, near Veles [Mršić, 1993a]; Mt Korab [Verhoeff, 1932; Strasser, 1971a]; Ohrid [Attems, 1929; Verhoeff, 1932; Strasser, 1971a]; Oteševo, near Prespa [Mršić, 1993a]; Peštani, near Ohrid [Mršić, 1993a]; Skopje [Attems, 1929]; Veles [Strasser, 1971a]; Topolka, Veles [Verhoeff, 1923]; Trnica, Mt Bistra [Čurčić *et al.*, 1999a; Makarov *et al.*, 2004]; Veles [Attems, 1929]; Mt Vodno [Verhoeff, 1923]; without precise locality [Attems, 1959; Mauriès *et al.*, 1997; Čurčić *et al.*, 2002a, b; Makarov *et al.*, 2004] (Fig. 2).

World distribution: Albania, Bosnia and Herzegovina, Croatia, Greek mainland, Republic of North Macedonia, and Montenegro [Kime, Enghoff, 2011].

##### 13. *Callipodella fasciata* (Latzel, 1883)\*\*

*Lysiopetalum fasciatum* Latzel, 1883  
*Callipodella trifasciatum* (Daday, 1889)

MATERIAL. 1 ♂, Đuralo Cave, Makedonski Brod, 18.III.2000, leg. E. Stojkoska; 1 ♀, Ohrid, Stari Grad, 22.VII.2009, leg. D. Stojanovića; 1 ♀, near the Kolešino Waterfall, Mt Belasica, 415 m a.s.l., *Quercus-Carpinus* forest, 24.IV.2010; 1 ♀, below the vantage point near the Kolešino Waterfall, Mt Belasica, 327 m a.s.l., *Quercus-Carpinus* forest, 28.V.2010; 2 ♀♀, between the localities of Pod and Suva Češma, Mt Belasica, 587 m a.s.l., *Quercus-Carpinus* forest, 28.V.2010; 1 ♂, near the village of Popadija, Mt Belasica, 767 m a.s.l., *Quercus-Fraxinus* forest, 28.V.2010; 1 ♀, same locality, 1038 m a.s.l., *Quercus-Fraxinus* forest, 3.VII.2010; 2 ♂♂, same locality, 1100 m a.s.l., *Festuca-Fagus* community, 3.VII.2010; 1 ♀, near the Pisana Skala slopes, Mt Belasica, 1385 m a.s.l., *Calamintha-Fagus* community, 3.VII.2010; 1 ♂, near Groba, Mt Belasica, 1300 m a.s.l., *Calamintha-Fagus* community, 4.X.2010; all leg. A.C. Gjorgjievska; 1 ♂, 4 ♀♀, Vodno, Skopje, 770 m a.s.l., 15.VI.2015; 1 ♀, same locality, 770 m a.s.l., 7.VII.2015, all leg. R. Blaževska; 1 ♀, village of Dolno Jelovce, Šar Planina Mts, Cornish oak forest, 6.IX.2017; 1 ♀, village of Dolno Jelovce, Šar Planina Mts, oak forest, 6.IX.2017, all leg. A.C. Gjorgjievska, S. Hristovski.

Distribution in the Republic of North Macedonia: Mt Belasica (present study); Dubrovica [Mršić, 1993a]; Golem grad, Lake Prespa [Verhoeff, 1932]; Kosturino [Mršić, 1993a]; Krklja, near Kriva Palanka [Mršić, 1993a]; Makedonski Brod (present study); Ohrid (present study); Šar Planina Mts (present study); Treska, near Skopje [Attems, 1929]; Mt Vodno, Skopje [Mršić, 1993a, present study]; without precise locality [Attems, 1959; Strasser, 1971a; Mauriès *et al.*, 1997; Makarov *et al.*, 2004] (Fig. 2).

World distribution: Albania, Bosnia and Herzegovina, Bulgaria, Greek mainland, Republic of North Macedonia, Montenegro, Romania, and Serbia [Kime, Enghoff, 2011].

Balkan endemic.

#### Order CHORDEUMATIDA Family CHORDEUMATIDAE

##### 14. *Melogona broelemanni* (Verhoeff, 1897)

*Microchordeuma broelemanni* Verhoeff, 1897  
*Microchordeuma illyricum* Verhoeff, 1932  
*Microchordeuma gebhardti* Loksa, 1962

MATERIAL. 1 ♀, Gostivar, date and leg.: no data; 1 ♂, 1 ♀ same locality, date and leg.: no data; 1 ♂, 1 ♀, village of Rašče, near Skopje, 1.V.1996; 1 ♂, Monastery of St. Jovan Bigorski, Mt Bistra, 13.IV.2006; 1 ♂, Smrdliva Voda, Mt Kožuf, 700 m a.s.l., 25.IV.2010, all leg. I. Karaman; 1 ♂, near the Kolešino Waterfall, Mt Belasica, 415 m a.s.l., *Quercus-Carpinus* forest, 24.IV.2010; 1 ♂, 2 ♀♀, near the village of Popadija, Mt Belasica, 1100 m a.s.l., *Festuca-Fagus* community, 28.V.2010; 1 ♂, same locality, 1200 m a.s.l., 28.V.2010; 5 ♂♂, 1 ♀, near the Pisana Skala slopes, Mt Belasica, 1385 m a.s.l., 28.V.2010, all leg. A.C. Gjorgjievska.

Distribution in the Republic of North Macedonia: Mt Belasica (present study); Mt Bistra (present study); Mt Kožuf (present study); Ljuboten, Šar Planina Mts [Attems, 1929]; Nerezi, near Skopje [Attems, 1929]; Gostivar (present study); Rašče, near Skopje (present study); village of Sasa [Mršić, 1993a]; without precise locality [Strasser, 1971a; Mauriès *et al.*, 1997; Makarov *et al.*, 2004] (Fig. 2).

World distribution: Albania, Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Greek mainland, Hungary, Republic of North Macedonia, Montenegro, Romania, Serbia, and Slovenia [Kime, Enghoff, 2013].

#### Family NEOATRACTOSOMATIDAE

##### 15. *Paeonisoma faucium* Verhoeff, 1932\*\*

Distribution in the Republic of North Macedonia: Kaka-lo, Mt Jablanica [Verhoeff, 1932; Strasser, 1971a; Mršić, 1993a]; without precise locality [Mauriès *et al.*, 1997; Čurčić *et al.*, 2002a; Makarov *et al.*, 2004] (Fig. 2).

Note: So far, one adult female and juveniles are the only known specimens of this species. According to Mauriès [2003] it is possible that *Paeonisoma* and *Schizmohetera* are related or that *Paeonisoma* is a synonym of *Schizmohetera*, since *Paeonisoma faucium* specimens were found relatively near the type locality of *Schizmohetera sketi* and the vulvae of these two species are similar. Until males are found, precise answers cannot be given.

Mauriès *et al.* [1997] included this species in the checklist of millipedes of Albania and adjacent lands, based on findings by Ceuca [1992] and their own findings, but they did not provide with any information about the record of *P. faucium* in Albania.

North Macedonian endemic.

##### 16. *Schizmohetera curcici* Makarov, 2001\*\*

Distribution in the Republic of North Macedonia: Kalina Dupka Cave, village of Lazaropole, Mt Bistra [Makarov, 2001; Makarov *et al.*, 2004] (Fig. 2).

North Macedonian endemic.

##### 17. *Schizmohetera sketi* Mršić, 1987\*\*

Distribution in Republic of North Macedonia: Alilica Cave, Mt Bistra [Mršić, 1987, 1993a]; without precise locality [Čurčić *et al.*, 2002a, b; Makarov *et al.*, 2004] (Fig. 2).

North Macedonian endemic.

Order JULIDA

Family BLANIULIDAE

### 18. *Nopoiulus kochii* (Gervais, 1847)

*Iulus kochii* Gervais, 1847

*Nopoiulus pulchellus* auct., not C.L. Koch (1838)

*Nopoiulus minutus* auct., not Brandt (1841)

*Blaniulus venustus* Meinert, 1868

*Nemasoma minutum* Bollman, 1888

*Blaniulus armatus* Nemeč, 1895

*Gomphiocephalus gracilis* (Verhoeff, 1943)

*Nopoiulus breuili* Brolemann, 1921

*Nopoiulus subtilis* Brolemann, 1923

*Blaniulus atticus* Verhoeff, 1925

Distribution in the Republic of North Macedonia: Without precise locality [Mršić, 1993a; Mauriès *et al.*, 1997; Makarov *et al.*, 2004].

World distribution: Cosmopolitan [Kime, Enghoff, 2017].

Family JULIDAE

### 19. *Acanthoiulus fuscipes* (C. L. Koch, 1847)

*Iulus fuscipes* C.L. Koch, 1847

*Iulus idriensis* C.L. Koch, 1847

*Iulus dalmaticus* C.L. Koch, 1847

*Iulus leuconotus* Latzel, 1884

*Iulus subcrassus* Latzel, 1884

*Pachyiulus bosniensis* Verhoeff, 1895

*Pachyiulus krohnii* Verhoeff, 1898

*Pachyiulus antivagus* Verhoeff, 1899

*Pachyiulus plasensis* Verhoeff, 1910

*Pachyiulus simplex* Verhoeff, 1910

*Pachyiulus fuscipes* auct.

Distribution in the Republic of North Macedonia: Beli near Kočani [Mršić, 1993a]; Mt Bistra [Mršić, 1993a]; Istibanja [Mršić, 1993a]; Katlanovo [Mršić, 1993a]; Kosturino [Mršić, 1993a]; Ljuboten, Šar Planina Mts [Attems, 1929]; Matka, Dogadžica [Mršić, 1993a]; Babunište, Struško [Mršić, 1993a]; village of Sasa [Mršić, 1993a]; Staro Nagoričane [Mršić, 1993a]; Stobi [Mršić, 1993a]; Struško [Mršić, 1993a]; river Treska, near Skopje [Attems, 1929]; Mt Vodno, Skopje [Mršić, 1993a]; without precise locality [Strasser, 1971a; Makarov *et al.*, 2004] (Fig. 3).

World distribution: Albania, Bosnia and Herzegovina, Croatia, Greece (Peloponnese); Italian mainland, Republic of North Macedonia, Montenegro, Serbia, and Slovenia [Kime, Enghoff, 2017].

### 20. *Brachyiulus lusitanus* Verhoeff, 1898

*Brachyiulus corcyraeus* Verhoeff, 1900

*Microbrachyiulus calcivagus* Verhoeff, 1910

Distribution in the Republic of North Macedonia: Without precise locality [Strasser, 1971a; Mršić, 1993a; Mauriès *et al.*, 1997; Makarov *et al.*, 2004].

World distribution: Austria, Azores Islands, Balearic Islands, Bulgaria, Canary Islands, Corsica, Croatia, Czech Republic, Germany, Great Britain, Greek mainland including Ionian Islands, Italian mainland, Republic of North Macedonia, Madeira Islands, Monaco, Portuguese mainland, Sardinia, Spanish mainland, and Switzerland, as well as Algeria, Egypt, Iran, Australia, North America, and possibly Hungary [Kime, Enghoff, 2017].

### 21. *Brachyiulus bagnalli* (Brolemann, 1924)

*Microbrachyiulus bagnalli* Brolemann, 1924

*Brachyiulus latzeli* Attems, 1949

Distribution in the Republic of North Macedonia: Skopje [Mršić, 1993a] (Fig. 3).

World distribution: Austria, Bulgaria, Czech Republic, Hungary, Republic of North Macedonia, Poland, Romania, Serbia, Slovakia, and Slovenia [Kime, Enghoff, 2017].

### 22. *Chromatoiulus hamuligerus* (Verhoeff, 1932)\*\*

*Pachybrachyiulus hamuligerus* Verhoeff, 1932

*Leptomastigoiulus hamuligerus* Mršić, 1993

Distribution in the Republic of North Macedonia: Mt Bistra, Mavrovo [Mršić, 1993a]; Jablanica, Mt Kakalo [Verhoeff, 1932]; Mt Korab [Verhoeff, 1932; Strasser, 1971a]; without precise locality [Mauriès *et al.*, 1997; Ćurčić *et al.*, 2002a; Makarov *et al.*, 2004] (Fig. 3).

North Macedonian endemic.

### 23. *Chromatoiulus podabrus* (Latzel, 1884)

*Iulus podabrus* Latzel, 1884

*Iulus bosniensis* Latzel, 1888

*Brachyiulus krohnii* Verhoeff, 1898

*Pachybrachyiulus podabrus* auct.

MATERIAL. 1 ♂, Jelak, Šar Planina Mts, date and leg.: no data; 1 ♂, 1 ♀, village of Raduša, Mt Žeden, 15.IV.1994, leg.: no data; 1 ♀, St. Ilija Monastery, Skopska Crna Gora, 13.X.2000, legs. S. Stanković, E. Stojkoska.

Distribution in the Republic of North Macedonia: Ljuboten, Šar Planina Mts [Attems, 1929; present study]; Skopska Crna Gora (present study); Treska [Attems, 1929]; Mt Žeden (present study); without precise locality [Strasser, 1971a; Mršić, 1993a; Mauriès *et al.*, 1997; Makarov *et al.*, 2004] (Fig. 3).

World distribution: Albania, Bosnia and Herzegovina, Croatia, Republic of North Macedonia, Greek mainland including Ionian Islands, Italian mainland, Montenegro, and Serbia [Kime, Enghoff, 2017].

### 24. *Cylindroiulus arborum* Verhoeff, 1928

*Allajulus arborum* (Verhoeff, 1928)

Distribution in the Republic of North Macedonia: Stenje, Lake Prespa [Mršić, 1993a; Makarov *et al.*, 2004] (Fig. 3A).

World distribution: Austria, Belgium, Bulgaria, Czech Republic, Germany, Greek mainland, Hungary, Lithuania, Republic of North Macedonia, Poland, Romania, Slovakia, and Ukraine, with a record from the Northern Caucasus region, Russia [Kime, Enghoff, 2017].

### 25. *Cylindroiulus boleti* (C.L. Koch, 1847)

*Iulus boleti* C.L. Koch, 1847

*Diploiulus boleti* auct.

MATERIAL. 1 ♂, 2 ♀♀, village of Smojmirovo, Berovo, 924–932 m a.s.l., ecotope between pine forest and open area dominated by *Juniperus communis* and *Pinus silvestris*, IV.2014, leg. D. Matovski.

Distribution in the Republic of North Macedonia: Berovo (present study), Crn Kamen, Mt Korab [Verhoeff, 1932]; Dragomance, near Kumanovo [Mršić, 1993a]; Katlanovo [Mršić, 1993a]; Ljuboten, Šar Planina Mts [Attems, 1929];

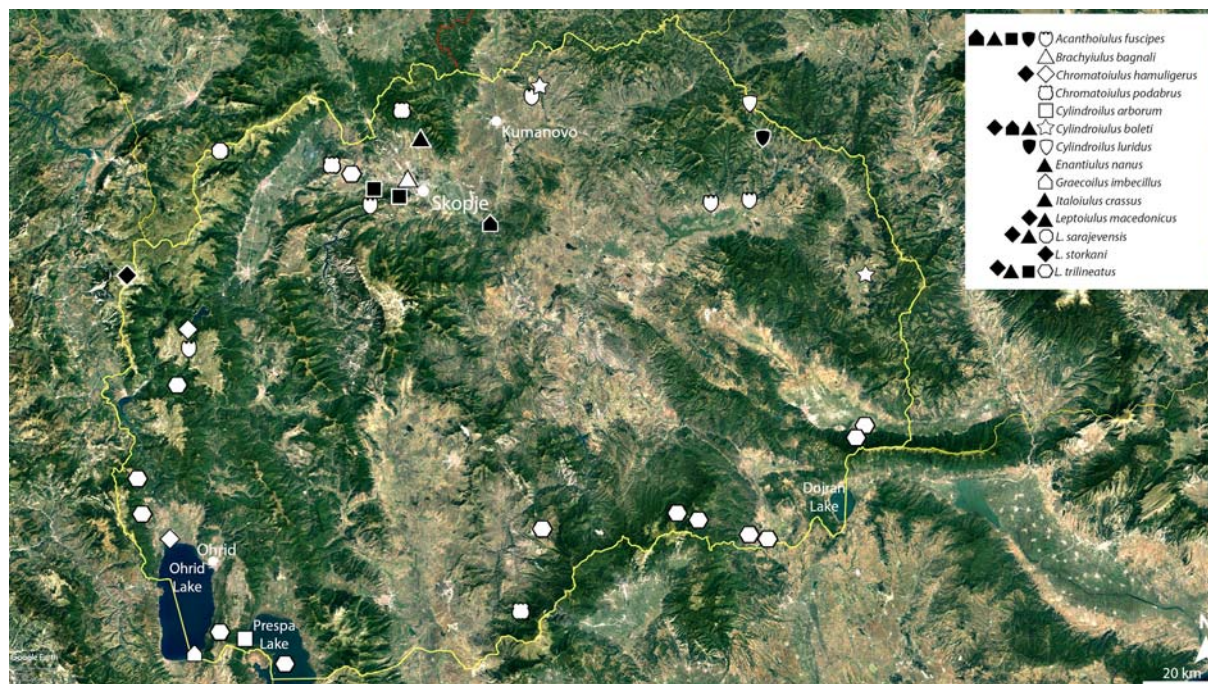


Fig. 3. Distribution of representatives of the order Julida (family Julidae) in North Macedonia.

Рис. 3. Распространение представителей отряда Julida (семейство Julidae) в Северной Македонии.

without precise locality [Strasser, 1971a; Mauriès *et al.*, 1997; Makarov *et al.*, 2004] (Fig. 3).

World distribution: Albania, Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Italian mainland, Republic of North Macedonia, Moldova, Montenegro, Romania, Serbia, Slovakia, Slovenia, and Ukraine [Kime, Enghoff, 2017].

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

*Julus luridus* C.L. Koch, 1847

MATERIAL. 2 ♂♂, Gumnove Livade, Mt Osogovo, 31.V. 2000, leg. E. Stojkoska.

Distribution in the Republic of North Macedonia: Mt Osogovo (present study); village of Sasa [Mršić, 1993a] (Fig. 3).

World distribution: Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Italian mainland, Republic of North Macedonia, Romania, Serbia, Slovakia, and Slovenia [Kime, Enghoff, 2017].

## 27. *Enantiulus nanus* (Latzel, 1884)

*Allajulus albicornis* C.L. Koch, 1847

*Iulus nanus* Latzel, 1884

*Leptophyllum nanum* auct.

Distribution in the Republic of North Macedonia: Ljuboten, Šar Planina Mts [Attems, 1929; Makarov *et al.*, 2004] (Fig. 3).

World distribution: Albania, Bosnia and Herzegovina, Belgium, Bulgaria, Croatia, Czech Republic, Danish mainland, French mainland, Germany, Hungary, Italian mainland, Lithuania, Luxembourg, Republic of North Macedonia, Montenegro, the Netherlands, Poland, Romania, Serbia, Slovakia, Slovenia, Sweden, Switzerland, and Ukraine [Kime, Enghoff, 2017].

## 28. *Graecoiulus imbecillus* (Attems, 1935)\*\*

*Chromatoiulus imbecillus* Attems, 1935

*Megaphyllum imbecillum* Mauriès *et al.*, 1997

Distribution in the Republic of North Macedonia: St. Naum Monastery, Lake Ohrid [Lazányi *et al.*, 2012] (Fig. 3).

World distribution: Albania, Greece, Republic of North Macedonia [Lazányi *et al.*, 2012; Vagalinski, Lazányi, 2018]. Balkan endemic.

## 29. *Italoius crassus* (Attems, 1929)\*\*

*Chromatoiulus crassus* Attems, 1929

*Megaphyllum crassum* Mršić, 1993

Distribution in the Republic of North Macedonia: Ljuboten, Šar Planina Mts [Attems, 1929; Strasser, 1971a]; without precise locality [Mršić, 1993a; Mauriès *et al.*, 1997; Čurčić *et al.*, 2002a; Makarov *et al.*, 2004] (Fig. 3).

World distribution: Republic of North Macedonia, Serbia [Lazányi *et al.*, 2012; Vagalinski, Lazányi, 2018]. Balkan endemic.

## 30. *Leptoiulus macedonicus* (Attems, 1927)\*\*

*Microiulus macedonicus* Attems, 1927

*Xestoiulus macedonicus* auct.

Distribution in the Republic of North Macedonia: Duboka Rečka, Mt Korab [Verhoeff, 1932]; Mt Korab [Attems, 1927; Strasser, 1976]; Ljuboten, Šar Planina Mts [Attems, 1927, 1929; Verhoeff, 1932; Strasser, 1971a, 1976; Mršić, 1988a]; without precise locality [Mršić, 1993a; Mauriès *et al.*, 1997; Čurčić *et al.*, 2002a; Makarov *et al.*, 2004] (Fig. 3).

World distribution: Albania, Greek mainland, Republic of North Macedonia, and Serbia [Kime, Enghoff, 2017]. Balkan endemic.

**31. *Leptoiulus sarajevensis* Verhoeff, 1898\*\****Julus sarajevensis* Verhoeff, 1898*Macedoiulus storkani* Verhoeff, 1932

MATERIAL. 1 ♂, 1 ♀, Lake Brezno, Šar Planina Mts, 6.IX.2017, leg. A.C. Gjorgjievska, S. Hristovski.

Distribution in the Republic of North Macedonia: Lake Brezno, Šar Planina Mts (present study), Čošelija, Mt Korab [Verhoeff, 1932]; Ljuboten, Šar Planina Mts [Attems, 1929]; without precise locality [Strasser, 1971a; Mršić, 1988a, 1993a; Mauriès *et al.*, 1997; Makarov *et al.*, 2004] (Fig. 3).

World distribution: Bosnia and Herzegovina, Bulgaria, Croatia, Republic of North Macedonia, Montenegro, and Serbia [Kime, Enghoff, 2017].

Balkan endemic.

**32. *Leptoiulus storkani* Verhoeff, 1932\*\****Microiulus storkani* auct.*Xestoiulus storkani* auct.*Leptoiulus jaroslavi* Mauriès *et al.*, 1997Distribution in the Republic of North Macedonia: Čošelija, Mt Korab [Verhoeff, 1932]; Duboka Rečka, Mt Korab [Verhoeff, 1932; Strasser, 1971a]; Mt Korab [Strasser, 1976]; without precise locality [Strasser, 1976; Mršić, 1993a; Mauriès *et al.*, 1997; Ćurčić *et al.*, 2002a; Makarov *et al.*, 2004] (Fig. 3).Note: Kime & Enghoff [2017] question the presence of this species in Albania, Croatia, and Greece. Mauriès *et al.* [1997] remark that Strasser [1976] included *L. storkani* in the millipede fauna of Albania, without providing information about the records.

World distribution: Republic of North Macedonia and possibly Albania, Croatia, and Greece [Kime, Enghoff, 2017].

Balkan endemic.

**33. *Leptoiulus trilineatus* (C.L. Koch, 1847)***Julus trilineatus* C.L. Koch, 1847*Julus silvivagus* Verhoeff, 1898*Julus plasensis* Verhoeff, 1908*Leptoiulus luganensis* Verhoeff, 1913*Leptoiulus bureschi* Verhoeff, 1928MATERIAL. 1 ♂, Gostivar, date and leg.: no data; 1 ♀, 2 ♂♂, village of Rašče, near Skopje, 1.V.1996, leg. I. Karaman; 1 ♂, near the village of Popadija, Mt Belasica, 1200 m a.s.l., *Calamintha-Fagus* community 24.IV.2010; 1 ♂, same locality, 1100 m a.s.l., *Festuca-Fagus* community, 28.V.2010; 3 ♂♂, same locality, 1200 m a.s.l., 28.V.2010; 1 ♂, below the vantage point near the Kolešino Waterfall, Mt Belasica, 327 m a.s.l., *Quercus-Carpinus* forest, 28.V.2010, all leg. A.C. Gjorgjievska; 1 ♂, Mt Vodno, Skopje, 770 m a.s.l., Mediterranean pine forest, 15.VI.2010, leg. R. Blaževska; 1 ♂, Gorska Buka, Mt Kožuf, 1505 m a.s.l., *Calamintha-Fagus* community, 14.VI.2016; 1 ♂, Mt Kožuf, 679 m a.s.l., *Festuca-Fagus* community, 14.VI.2016; 1 ♂, Mt Kožuf, 87 m a.s.l., *Quercus-Carpinus* forest, 16.VI.2016, all leg. D. Matevski; 1 ♂, St. Spas, Mt Jablanica, 1267 m a.s.l., chestnut forest, 15.IX.2017; 1 ♂, Vevčanski Izvori, Mt Jablanica, 1300 m a.s.l., 15.X.2017, all leg. A. Taseska.Distribution in the Republic of North Macedonia: Mt Belasica (present study); Bigor drop, Vitolište [Mršić, 1993a]; Gabrovo reservoir, Gevgelija [Mršić, 1993a]; Mt Galiëica [Mršić, 1993a]; Mt Jablanica [Verhoeff, 1932; present study]; Mt Korab [Verhoeff, 1932]; Mt Kožuf (present study); Lazaropole, Mt Bistra [Ćurčić *et al.*, 1999a]; Ljuboten, Šar Planina Mts [Verhoeff, 1932]; Lake Prespa [Verhoeff, 1932]; Stenje, Lake Prespa [Mršić, 1993a]; Treska, near Skopje [Attems, 1929; Mršić, 1993a]; Mt Vodno, Skopje (presentstudy); without precise locality [Makarov *et al.*, 2004] (Fig. 3).

World distribution: Albania, Austria, Bosnia and Herzegovina, Bulgaria, Croatia, European Turkey (without islands in the Sea of Marmara), Greek mainland including Ionian Islands, Italian mainland, Montenegro, Romania, Serbia, Slovenia, and possibly Switzerland [Kime, Enghoff, 2017].

**34. *Megaphyllum austriacum* (Latzel, 1884)***Iulus austriacus* Latzel, 1884*Brachyiulus austriacus* auct.*Chromatoiulus austriacus* auct.*Brachyiulus dahli* Verhoeff, 1901*Chromatoiulus dahli* auct.Distribution in the Republic of North Macedonia: along the Treska River, Skopje [Ćurčić *et al.*, 1999a; Makarov *et al.*, 2004] (Fig. 4).

World distribution: Bosnia and Herzegovina, Croatia, Italian mainland, Republic of North Macedonia, Montenegro, Serbia, and Slovenia [Kime, Enghoff, 2017].

**35. *Megaphyllum bosniense* (Verhoeff, 1897)***Brachyiulus bosniensis* Verhoeff, 1897*Chromatoiulus bosniensis* auct.*Chromatoiulus cotinophilus* Loksa, 1962MATERIAL. 1 ♀, Gostivar, date and leg.: no data; 1 ♂, Kratovo, 3.VIII.2009; 3 ♂♂, near Groba, Mt Belasica, 1300 m a.s.l., *Calamintha-Fagus* community, 24.IV.2010; 1 ♂, same locality, 1300 m a.s.l., *Calamintha-Fagus* community, 4.IX.2010; 1 ♂, near the village of Popadija, Mt Belasica, 1100 m a.s.l., *Festuca-Fagus* community, 28.V.2010; 2 ♂♂, 2 ♀♀, same locality, 1200 m a.s.l., *Calamintha-Fagus* community, 28.V.2010; 3 ♂♂, near the Pisana Skala slopes, Mt Belasica, 1385 m a.s.l., *Calamintha-Fagus* community, 28.V.2010; 2 ♂♂, 5 ♀♀, same locality, 1442 m a.s.l., cleared area, 28.V.2010; 1 ♂, same locality, 1385 m a.s.l., *Calamintha-Fagus* community, 3.VII.2010, all leg. A.C. Gjorgjievska; 1 ♀, Mt Kožuf, 679 m a.s.l., *Festuca-Fagus* community, 16.VI.2016; 1 ♂, Mt Kožuf, 896 m a.s.l., *Festuca-Fagus* community, 19.VII.2016, all leg. D. Matevski.Distribution in the Republic of North Macedonia: Mt Belasica (present study); Bregalnica River [Mršić, 1993a]; Carevec, Mt Bistra [Mršić, 1993a]; Ceripašina peak, Šar Planina Mts [Mršić, 1993a]; Dragomance, near Kumanovo [Mršić, 1993a]; Mt Galiëica [Mršić, 1993a]; Mt Jablanica [Verhoeff, 1932]; Katlanovo [Mršić, 1993a]; Mt Korab [Verhoeff, 1932]; Mt Kožuf (present study); valley of the Bregalnica River [Mršić, 1993a]; Kriva Reka, Kriva Palanka [Mršić, 1993a]; Ljuboten, Šar Planina Mts [Attems, 1929]; Nerezi, near Skopje [Attems, 1929]; near Lake Prespa [Verhoeff, 1932]; village of Sasa [Mršić, 1993a]; Skopje [Attems, 1929]; Treska, near Skopje [Attems, 1929]; without precise locality [Strasser, 1971a; Mauriès *et al.*, 1997; Makarov *et al.*, 2004] (Fig. 4).

World distribution: Albania, Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Greek mainland, Hungary, Italian mainland, Republic of North Macedonia, Montenegro, Romania, Serbia, and Slovenia [Kime, Enghoff, 2017].

**36. *Megaphyllum dentatum* (Verhoeff, 1898)\*\****Brachyiulus dentatus* Verhoeff, 1898*Chromatoiulus dentatus* auct.

Distribution in the Republic of North Macedonia: Ceripašina peak, Šar Planina Mts [Strasser, 1971a]; Mt Jablani-



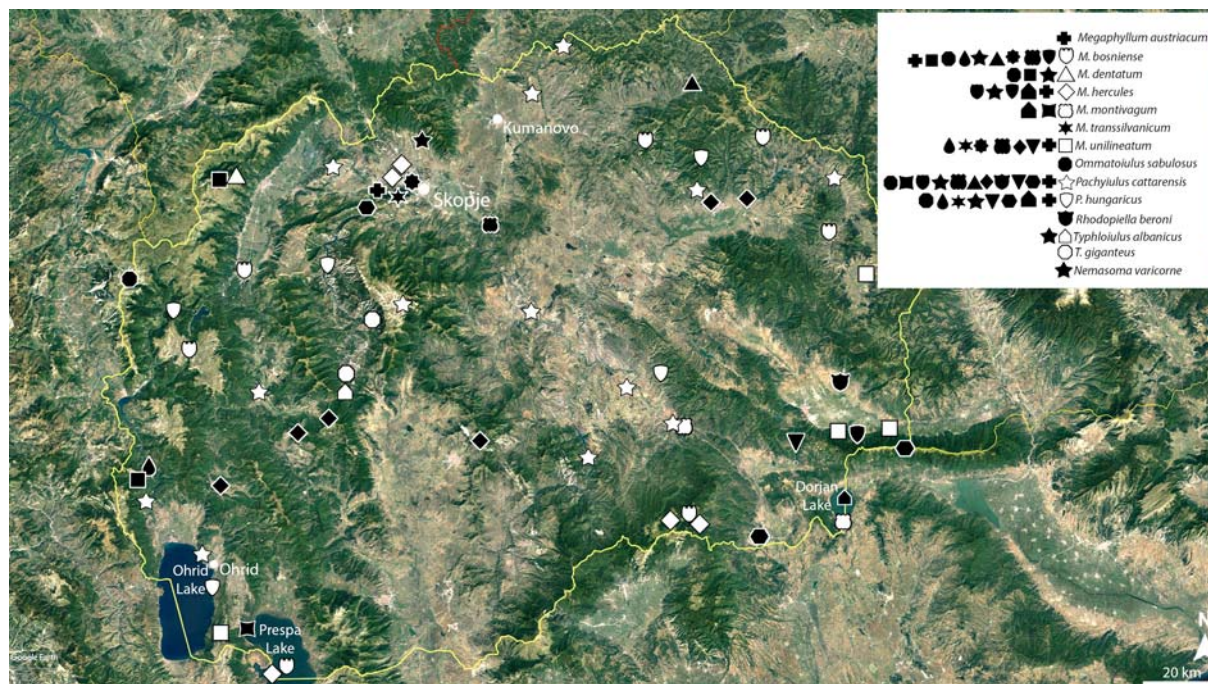


Fig. 4. Distribution of representatives of the order Julida (families Julidae and Nemasomatidae) in North Macedonia.

Рис. 4. Распространение представителей отряда Julida (семейства Julidae и Nemasomatidae) в Северной Македонии.

ca [Verhoeff, 1932]; Mt Korab [Verhoeff, 1932]; Ljuboten, Šar Planina Mts [Attems, 1929; Verhoeff, 1932; Makarov *et al.*, 2004]; Popova Šapka, Šar Planina Mts [Mršić, 1993a] (Fig. 4).

World distribution: Albania, Bosnia and Herzegovina, Bulgaria, Republic of North Macedonia, Montenegro, and Serbia [Kime, Enghoff, 2017].

Balkan endemic.

### 37. *Megaphyllum hercules* (Verhoeff, 1900)

*Brachyiulus hercules* Verhoeff, 1900

*Brachyiulus tauricus* Attems, 1907

*Chromatoiulus hercules* auct.

MATERIAL. 1 ♀, village of Kolešino, Mt Belasica, 20.X.2000, legs. E. Stojkoska, S. Stankovič; 1 ♂, Mt Kožuf, 550 m a.s.l., 15.VI.2010, leg.: no data; 2 ♀♀, near the Pisana Skala slopes, Mt Belasica, 1442 m a.s.l., cleared area, 3.VII.2010, leg. A.C. Gjorgjievska; 1 ♀, municipality of Sonje, Skopje, 478 m a.s.l., thermo-Mediterranean shrubby formation, 10.VI.2015; 1 ♀, 1 juv., same locality, 478 m a.s.l., thermo-Mediterranean shrubby formation, 5.VII.2015; 1 ♀, village of Vizbegovo, Skopje, 146 m a.s.l., Mediterranean xerothermal grassy vegetation, 10.VI.2015, all leg. R. Blaževska; 1 ♀, Mt Kožuf, 1672 m a.s.l., *Fagus-Pinus* forest, 15.VI.2016, leg. D. Matevski.

Distribution in the Republic of North Macedonia: Golem Grad near Prespa [Verhoeff, 1932]; Karadojranski Potok, Lake Dojran [Čurčić *et al.*, 1999a]; Ljuboten, Šar Planina Mts [Verhoeff, 1932]; Treska [Attems, 1929]; Mt Vodno, Skopje [Verhoeff, 1932]; without precise locality [Strasser, 1971a; Mršić, 1993a; Mauriès *et al.*, 1997; Makarov *et al.*, 2004] (Fig. 4).

World distribution: Albania, Bulgaria, Greek mainland including Ionian Islands, Republic of North Macedonia, and Ukraine [Kime, Enghoff, 2017].

### 38. *Megaphyllum montivagum* (Verhoeff, 1901)\*\*

*Brachyiulus montivagus* Verhoeff, 1901

*Brachyiulus latesquamosus* Attems, 1903

*Chromatoiulus montivagus* auct.

*Chromatoiulus latesquamosus* auct.

*Chromatoiulus macedonicus* Strasser, 1976

*Megaphyllum latesquamosus* auct.

*Megaphyllum macedonicum* auct.

MATERIAL. 5 ♂♂, 9 ♀♀, Dojran, Mrdaja, date and leg.: no data; 4 ♂♂, Lake Dojran, 10.XI.1999, leg. E. Stojkoska, S. Stankovič.

Distribution in the Republic of North Macedonia: Demir Kapija, Vardar River [Lazányi *et al.*, 2012]; Lake Dojran (present study); Lake Prespa and lakeshore south of Oteševo [Lazányi *et al.*, 2012] (Fig. 4).

World distribution: Greece, Republic of North Macedonia, and Serbia [Kime, Enghoff, 2017].

Balkan endemic.

### 39. *Megaphyllum transsylvanicum* (Verhoeff, 1897)

*Brachyiulus transsylvanicus* Verhoeff, 1897

*Brachyiulus croaticus* Verhoeff, 1929

*Chromatoiulus transdanubicus* Loksa, 1962

*Chromatoiulus transsylvanicus* auct.

Distribution in the Republic of North Macedonia: Mt Vodno, near Skopje [Mršić, 1993a; Makarov *et al.*, 2004] (Fig. 4).

World distribution: Bosnia and Herzegovina, Bulgaria, Croatia, European Turkey (without islands in the Sea of Marmara), Greek mainland, Republic of North Macedonia, Moldova, Romania, Russia (South European), Serbia, and Ukraine [Kime, Enghoff, 2017].

#### 40. *Megaphyllum unilineatum* (C.L. Koch, 1838)

*Julus unilineatus* C.L. Koch, 1838  
*Julus gilvolineatus* L. Koch, 1881  
*Julus balearicus* L. Koch, 1881  
*Julus frivaldszkyi* Daday, 1889  
*Brachyiulus balticus* Verhoeff, 1907  
*Brachyiulus degenerans* Verhoeff, 1937  
*Brachyiulus genuinus* Verhoeff, 1907  
*Chromatoiulus unilineatus* auct.

MATERIAL. 2 ♂♂, village of Smojmirovo, Berovo, Meadow, 923–932 m a.s.l., open area (grassland) dominated by *Achillea millefolium*, *Ononis spinosa*, *Galium verum*, and *Hypericum purpureum*, VII.2014, leg. D. Matevski.

Distribution in the Republic of North Macedonia: Bansko [Mršić, 1993a]; Belgište-Blato [Mršić, 1993a]; Belčišta (Ohrid) [Mršić, 1993a]; Beli, near Kočani [Mršić, 1993a]; Berovo (present study); Mt Galičica, near Česma [Mršić, 1993a]; Istibanja [Mršić, 1993a]; Katlanovo [Mršić, 1993a]; Kosturino [Mršić, 1993a]; Nerezi, near Skopje [Attems, 1929]; Oreovec [Mršić, 1993a]; Ramnište, Cer [Mršić, 1993a]; Skopje [Mršić, 1993a]; Smolari, Mt Belasica [Mršić, 1993a]; Treska, near Skopje [Attems, 1929]; Mt Vodno [Mršić, 1993a] (Fig. 4).

World distribution: Albania, Austria, Balearic Islands, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Germany, Greek mainland, Hungary, Italian mainland, Republic of North Macedonia, Montenegro, Poland, Romania, Serbia, Slovakia, and Slovenia [Kime, Enghoff, 2017].

#### 41. *Ommatoiulus sabulosus* (Linnaeus, 1758)

*Julus sabulosus* Linnaeus, 1758  
*Julus aimatopodus* Risso, 1826  
*Julus bilineatus* C.L. Koch, 1838  
*Julus rubripes* C.L. Koch, 1847  
*Archiulus sabulosus* auct.  
*Palaioiulus sabulosus* auct.  
*Schizophyllum sabulosus* auct.  
*Archiulus irregularis* Attems, 1927  
*Ommatoiulus irregularis* auct.

Distribution in the Republic of North Macedonia: Crn Kamen, Mt Korab [Verhoeff, 1932]; without precise locality [Strasser, 1971a; Mršić, 1993a; Makarov *et al.*, 2004] (Fig. 4).

World distribution: Albania, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Belarus, Channel Islands, Croatia, Czech Republic, Danish mainland, Finland, French mainland, Germany, Great Britain, Northern Ireland, Hungary, Ireland, Italian mainland, Lithuania, Luxembourg, Latvia, Republic of North Macedonia, Monaco, Norwegian mainland and inshore islands, Poland, Romania, Russia (Kalinin-grad Region, as well as Central European, East Central, and North European Russia), Serbia, Slovakia, Slovenia, Spanish mainland, Sweden, Switzerland, the Netherlands, and Ukraine [Kime, Enghoff, 2017].

#### 42. *Pachyiulus cattarensis* (Latzel, 1884)

*Iulus cattarensis* Latzel, 1884  
*Pachyiulus longelobatus* Attems, 1906  
*Pachyiulus venetus* Verhoeff, 1926  
*Pachyiulus flavipes catterensis* auct.

Distribution in the Republic of North Macedonia: Babuna [Mršić, 1993a]; Belčišta (Ohrid) [Mršić, 1993a]; Belasica [Mršić, 1993a]; Belgište-Blato [Mršić, 1993a]; Beli, Kočani [Mršić, 1993a]; Crn Kamen, Mt Korab [Verhoeff,

1932]; Demir Kapija [Mršić, 1993a]; Gabrovo accumulation, Gevgelija [Mršić, 1993a]; Golem Grad, Lake Prespa [Verhoeff, 1932]; near Hamzali, Mt Ogražden [Mršić, 1993a]; Istibanja [Mršić, 1993a]; Jakupica [Mršić, 1993a]; Katlanovo [Mršić, 1993a]; Kičevsko [Mršić, 1993a]; Kosturino [Mršić, 1993a]; Kozjak, Majdan [Mršić, 1993a]; Kriva Palanka [Mršić, 1993a]; Matka [Mršić, 1993a]; Nivičani near Kočani [Mršić, 1993a]; Ohrid [Verhoeff, 1932]; Oskomci, Kičevo [Mršić, 1993a]; Oreovec (Makedonski Brod) [Mršić, 1993a]; Oteševo [Mršić, 1993a]; Babunište, Struško [Mršić, 1993a]; Radoviš–Negotino, Mt Konečka [Mršić, 1993a]; Raduša, Mt Žeden [Čurčić *et al.*, 1999a]; Ramnište, Cer–Makedonski Brod [Mršić, 1993a]; Staro Nagoričane [Mršić, 1993a]; Lake Tikveš [Mršić, 1993a]; Treska, Skopje [Attems, 1929]; Mt Vodno, Skopje [Mršić, 1993a]; without precise locality [Strasser, 1971a; Mauriès *et al.*, 1997; Makarov *et al.*, 2004]; Zvegor, Delčevo [Mršić, 1993a] (Fig. 4).

World distribution: Albania, Asiatic Turkey, Bosnia and Herzegovina, Bulgaria, Croatia, European Turkey (without islands in the Sea of Marmara), Greek mainland including Ionian Islands, Italian mainland, Republic of North Macedonia, Montenegro, and Serbia [Kime, Enghoff, 2017].

#### 43. *Pachyiulus hungaricus* (Karsch, 1881)

*Julus hungaricus* Karsch, 1881  
*Pachyiulus gracilis* Verhoeff, 1928

MATERIAL. 1 ♀, St. Nikola Monastery, Matka, 30.V.2000, leg. E. Stojkoska; 1 ♂, Kočansko, Ponikva, 18.VII.2001, leg. E. Stojkoska, S. Stanković.

Distribution in the Republic of North Macedonia: Mt Belasica [Mršić, 1993a]; Crn Kamen, Mt Korab [Verhoeff, 1932]; Karadojranski Potok, Lake Dojran [Čurčić *et al.*, 1999a]; Kočansko, Ponikva (present study); Konjsko, Lake Ohrid [Verhoeff, 1932]; Kosturino [Mršić, 1993a]; Kozjak, Treska [Čurčić *et al.*, 1999a]; Mt Konečka [Mršić, 1993a]; Mt Kožuf [Mršić, 1993a]; Ljuboten, Šar Planina Mts [Attems, 1929]; Matka [Mršić, 1993a; present study]; Nerezi, near Skopje [Attems, 1929]; Treska, Skopje [Attems, 1929]; Trnica, Mt Korab [Verhoeff, 1932]; Mt Vodno, Skopje [Mršić, 1993a]; without precise locality [Strasser, 1971a; Mauriès *et al.*, 1997; Makarov *et al.*, 2004] (Fig. 4).

World distribution: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greek mainland, Republic of North Macedonia, Montenegro, Romania, and Serbia [Kime, Enghoff, 2017].

#### 44. *Rhodopiella beroni* (Strasser, 1966)\*\*

*Apfelbeckiella beroni* Strasser, 1966  
*Mesoiulus bulgaricus* Gulička, 1967  
*Apfelbeckiella saetigera* Strasser, 1973

Distribution in the Republic of North Macedonia: Hamzali, Mt Ogražden [Mršić, 1993a] (Fig. 4).

World distribution: Bulgaria, Greek mainland, and Republic of North Macedonia [Kime, Enghoff, 2017].  
 Balkan endemic.

#### 45. *Typhloiulus albanicus* Attems, 1929\*\*

Distribution in the Republic of North Macedonia: Ljuboten, Šar Planina Mts [Attems, 1929]; Ovčarska Cave, Makedonski Brod [Čurčić *et al.*, 2002b; Makarov *et al.*, 2004]; Skopje, Matka, Propast Srt (pot hole) [Vagalinski *et al.*, 2015]; without precise locality [Strasser, 1962; Mršić, 1993; Mauriès *et al.*, 1997; Čurčić *et al.*, 2002a] (Fig. 4).

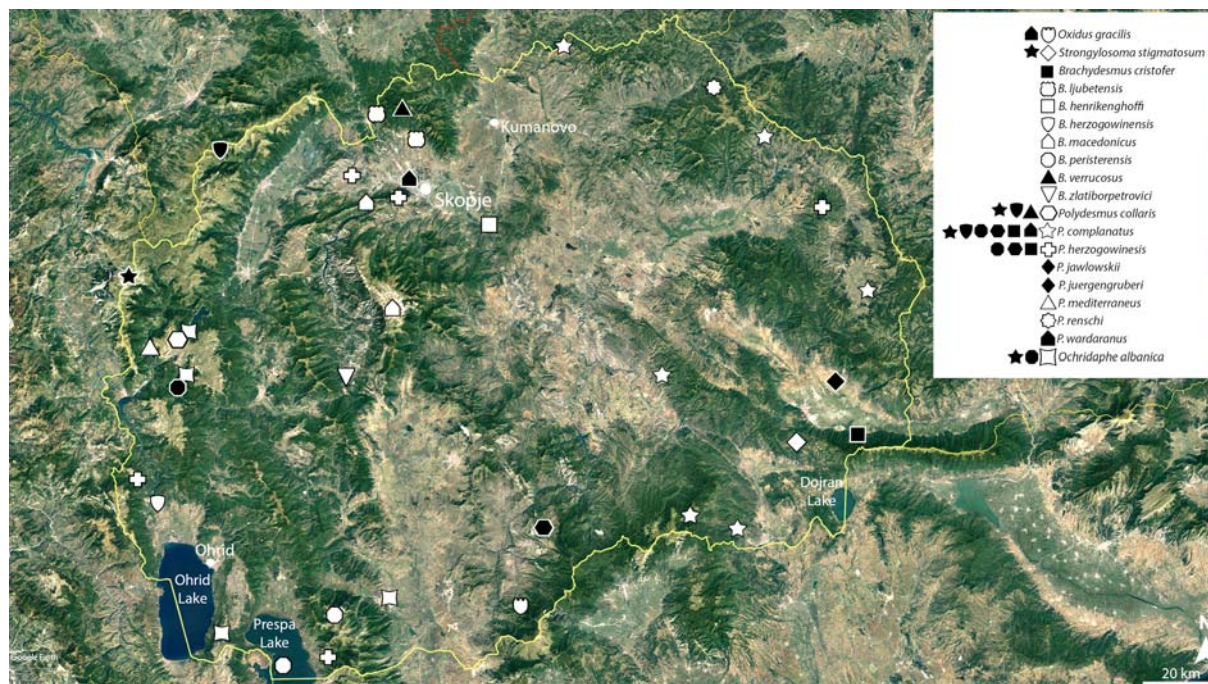


Fig. 5. Distribution of representatives of the order Polydesmida in North Macedonia.

Рис. 5. Распространение представителей отряда Polydesmida в Северной Македонии.

World distribution: Croatia, Republic of North Macedonia, and Serbia [Kime, Enghoff, 2017; Antić *et al.*, 2018]. Balkan endemic.

**46. *Typhloiulus giganteus* Ćurčić et Makarov, 2002\*\***

MATERIAL. 1 ♀, Devina Cave, village of Deviè, Makedonski Brod, 10.III.2003, leg. E. Bušarova.

Distribution in the Republic of North Macedonia: Devina Cave, village of Deviè, Makedonski Brod (present study); Momiček Cave, village of Belica, Makedonski Brod, Mt Dautica [Ćurčić *et al.*, 2002b; Makarov *et al.*, 2004] (Fig. 4).

North Macedonian endemic.

**47. *Unciger foetidus* (C.L. Koch, 1838)**

*Julus foetidus* C.L. Koch, 1838

*Oncoiulus foetidus* auct.

Distribution in the Republic of North Macedonia: Without precise locality [Mršić, 1993a; Makarov *et al.*, 2004].

World distribution: Austria, Bosnia and Herzegovina, Croatia, Czech Republic, Danish mainland, Estonia, Finland, Germany, Great Britain, Hungary, Italian mainland, Lithuania, Latvia, Republic of North Macedonia, Norwegian mainland and inshore islands, Poland, Romania, Russia (Kaliningrad Region), Serbia, Slovakia, Slovenia, Sweden, Switzerland, the Netherlands, and Ukraine [Kime, Enghoff, 2017].

Family NEMASOMATIDAE

**48. *Nemasoma varicorne* C.L. Koch, 1847**

*Isobates semisulcatus* Menge, 1851

*Isobates varicornis* (C.L. Koch, 1847)

Distribution in the Republic of North Macedonia: Ljuboten, Šar Planina Mts [Attems, 1929]; without precise locality [Strasser, 1971a; Mršić, 1993a; Mauriès *et al.*, 1997] (Fig. 4).

World distribution: Austria, Bosnia and Herzegovina, Belgium, Bulgaria, Belarus, Croatia, Czech Republic, Danish mainland, Finland, French mainland, Germany, Great Britain, Hungary, Ireland, Italian mainland, Lithuania, Luxembourg, Latvia, Northern Ireland, Norwegian mainland and inshore islands, Republic of North Macedonia, Poland, Romania, Russia (Kaliningrad Region, Central European Russia), Serbia, Sicily and neighbouring Italian islands, Slovakia, Slovenia, Sweden, Switzerland, the Netherlands, and Ukraine [Kime, Enghoff, 2011].

Order POLYDESMIDA

Family PARADOXOSOMATIDAE

**49. *Oxidus gracilis* (C.L. Koch, 1847)**

*Fontaria gracilis* C.L. Koch, 1847

*Paradesmus dasys* Bollman, 1887

*Kepolydesmus sontus* Chamberlin, 1910

Distribution in the Republic of North Macedonia: Jelak, Šar Planina Mts [Ćurčić *et al.*, 1999a]; Skopje [Mršić, 1993a; Makarov *et al.*, 2004] (Fig. 5).

World distribution: Cosmopolitan, introduced worldwide [Kime, Enghoff, 2011].

**50. *Strongylosoma stigmatosum* (Eichwald, 1830)**

*Iulus stigmatosus* Eichwald, 1830

*Strongylosoma pallipes* Brandt, 1833

*Tropisoma corrugatum* C.L. Koch, 1847

*Tropisoma ferrugineum* C.L. Koch, 1847

*Strongylosoma vej dovskyi* Němec, 1895

*Strongylosoma balcanicum* Schubart, 1934

Distribution in the Republic of North Macedonia: Crn Kamen, Mt Korab [Verhoeff, 1932]; Kosturino [Mršić, 1993a]; without precise locality [Attems, 1959; Strasser, 1971a; Mauriès *et al.*, 1997; Makarov *et al.*, 2004] (Fig. 5).

World distribution: Albania, Austria, Bosnia and Herzegovina, Bulgaria, Belarus, Croatia, Czech Republic, Germany, Hungary, Italian mainland, Lithuania, Latvia, Republic of North Macedonia, Moldova, Montenegro, Poland, Romania, Russia (Kaliningrad Region, Central European Russia, East Central Russia, Northwest Russia), Serbia, Slovakia, Slovenia, and Ukraine [Kime, Enghoff, 2011].

#### Family POLYDESMIDAE

##### 51. *Brachydesmus cristofer* Strasser, 1966\*

MATERIAL. 1 ♂, near the village of Popadija, Mt Belasica, 1038 m a.s.l., *Quercus-Fraxinus* forest, 28.V.2010, leg. A.C. Gjorgjievska.

Distribution in the Republic of North Macedonia: near the village of Popadija, Mt Belasica (present study) (Fig. 5).

Note: A species new to the Republic of North Macedonia.

World distribution: Bulgaria, Republic of North Macedonia [Kime, Enghoff, 2011; present study].

Balkan endemic.

##### 52. *Brachydesmus ljubetensis* Attems, 1912\*\*

*Brachydesmus ljubetensis* Mršić, 1985

Distribution in the Republic of North Macedonia: in front of Blatce Cave [Mršić, 1993a]; Ljuboten, Šar Planina Mts [Attems, 1912, 1929; Strasser, 1971a; Makarov *et al.*, 2004]; without precise locality [Mauriès *et al.*, 1997; Čurčić *et al.*, 2002a; Makarov *et al.*, 2004] (Fig. 5).

World distribution: Republic of North Macedonia, Serbia [Kime, Enghoff, 2011].

Balkan endemic.

##### 53. *Brachydesmus henrikenghoffi* Mršić, 1993\*\*

Distribution in the Republic of North Macedonia: Katlanovo [Mršić, 1993b]; village of Sasa [Mršić, 1993a, b]; without precise locality [Čurčić *et al.*, 2002a; Makarov *et al.*, 2004] (Fig. 5).

North Macedonian endemic.

##### 54. *Brachydesmus herzogowinensis* Verhoeff, 1897\*\*

*Brachydesmus armatus* Strasser, 1933

*Brachydesmus parvus* Strasser, 1940

*Brachydesmus septentrionalis* Strasser, 1940

*Brachydesmus confinis* Strasser, 1969

*Brachydesmus trifidus* Strasser, 1973

*Brachydesmus reflexus* Strasser, 1975

*Brachydesmus serbicus* Mršić, 1988

MATERIAL. 1 ♂, 4 ♀♀, Mlečnik Cave, Tašmarunište, Struga, 21.IV.2006, leg. I. Karaman.

Distribution in the Republic of North Macedonia: Mlečnik Cave, village of Tašmarunište, Struga (present study); village of Sasa [Mršić, 1993a]; without precise locality [Mauriès *et al.*, 1997; Makarov *et al.*, 2004] (Fig. 5).

World distribution: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Republic of North Macedonia, Montenegro, Serbia, and Slovenia [Kime, Enghoff, 2011].

Balkan endemic.

##### 55. *Brachydesmus macedonicus* Mršić, 1988\*\*

MATERIAL. 1 ♂, Ubava Cave, Matka, date and leg.: no data.

Distribution in the Republic of North Macedonia: Solunska Glava [Mršić, 1988b, 1993a]; Ubava Cave, Matka (present study); without precise locality [Čurčić *et al.*, 2002a; Makarov *et al.*, 2004] (Fig. 5).

North Macedonian endemic.

##### 56. *Brachydesmus peristerensis* Verhoeff, 1932\*\*

Distribution in the Republic of North Macedonia: Mt Pelister [Strasser, 1971a]; Lake Prespa [Mršić, 1993a]; Virovi, Mt Pelister [Verhoeff, 1932; Attems, 1940; Mršić, 1993a]; without precise locality [Mauriès *et al.*, 1997; Čurčić *et al.*, 2002a; Makarov *et al.*, 2004] (Fig. 5).

World distribution: Bulgaria, Republic of North Macedonia [Kime, Enghoff, 2011].

Balkan endemic.

##### 57. *Brachydesmus verrucosus* Makarov et Antić, 2013\*\*

Distribution in the Republic of North Macedonia: Skopska Crna Gora, near St. Ilija Monastery, 600 m [Antić *et al.*, 2013] (Fig. 5).

North Macedonian endemic.

##### 58. *Brachydesmus zlatiborpetrovici* Čurčić et Makarov, 2002\*\*

Distribution in the Republic of North Macedonia: Devina Cave, village of Devič, Makedonski Brod [Čurčić *et al.*, 2002a; Makarov *et al.*, 2004] (Fig. 5).

North Macedonian endemic.

##### 59. *Polydesmus collaris* C.L. Koch, 1847

*Polydesmus rannensis* Attems, 1895

*Polydesmus tussilaginis* Verhoeff, 1929

*Polydesmus anienanus* Verhoeff, 1932

*Polydesmus salamandrinus* Verhoeff, 1932

MATERIAL. 1 ♂, St. Ilija Monastery, Skopska Crna Gora, 600 m a.s.l., 14.IV.2006, leg. I. Karaman.

Distribution in the Republic of North Macedonia: Carevec, Mt Bistra [Mršić, 1988b, 1993a]; Crn Kamen, Mt Korab [Verhoeff, 1932; Attems, 1940]; Šar Planina Mts [Attems, 1940]; Skopska Crna Gora (present study) (Fig. 5).

World distribution: Albania, Austria, Bulgaria, Bosnia and Herzegovina, Croatia, Italian mainland, Hungary, Republic of North Macedonia, Montenegro, Romania, Serbia, and Slovenia [Bachvarova *et al.*, 2017; Kime, Enghoff, 2011].

##### 60. *Polydesmus complanatus* (Linnaeus, 1761)

*Julus complanatus* Linnaeus, 1761

*Polydesmus constrictus* Latzel, 1884

*Polydesmus illyricus* Verhoeff, 1893

*Polydesmus balticus* Verhoeff, 1907

*Polydesmus fluviatilis* Verhoeff, 1907

*Polydesmus brohmeri* Schubart, 1964

*Polydesmus calaber* Strasser, 1970

MATERIAL. 2 ♀♀, near the village of Popadija, Mt Belasica, 1038 m a.s.l., *Quercus-Fraxinus* forest, 28.V.2010; 1 ♂, same

locality, 1100 m a.s.l., *Festuca-Fagus* community 28.V.2010; 1 ♂, 1 ♀, same locality, 1200 m a.s.l., *Calamintha-Fagus* community, 28.V.2010; 1 ♂, 1 ♀, same locality, 847 m a.s.l., *Quercus-Fraxinus* forest, 3.VII.2010; 2 ♀♀, same locality, 1100 m a.s.l., *Festuca-Fagus* community, 3.VII.2010; 1 ♂, same locality, 1200 m a.s.l., *Calamintha-Fagus* community, 3.VII.2010; 4 ♂♂, same locality, 1038 m a.s.l., *Quercus-Fraxinus* forest, 4.X.2010; 3 ♂♂, same locality 1100 m a.s.l., *Festuca-Fagus* community, 4.X.2010; 4 ♂♂, 1 juv., same locality, 1200 m a.s.l., *Calamintha-Fagus* community, 4.X.2010; 1 ♂, 5 ♀♀, near the Pisana Skala slopes, Mt Belasica, 1442 m a.s.l., cleared area, 28.V.2010; 1 ♂, 1 ♀, and 1 juv., same locality, 1385 m a.s.l., *Calamintha-Fagus* community, 3.VII.2010, all leg. A.C. Gjorgjievska; 1 ♀, Mt Kožuf, 896 m a.s.l., *Festuca-Fagus* community, 19.VII.2016; 1 ♂, Mt Kožuf, 181 m a.s.l., riparian habitat, *Juglans-Platanus* forest, 21.VII.2016, all leg. D. Matevski; 2 ♂♂, Lake Brezno, Šar Planina Mts, 6.IX.2017, leg. A.C. Gjorgjievska, S. Hristovski.

Distribution in the Republic of North Macedonia: Mt Belasica (present study); Bigor drop, Vitolište [Mršić, 1993a]; Lake Brezno, Šar Planina Mts (present study); Crn Kamen, Mt Korab [Verhoeff, 1932]; Mt Konečka [Mršić, 1993a]; Mt Kozjak, Vitolište [Mršić, 1993a]; Mt Kožuf (present study); Lazaropole [Mršić, 1993a]; Rateva Reka ravine [Mršić, 1993a]; village of Sasa [Mršić, 1993a]; Skopje [Mršić, 1993a]; without precise locality [Strasser, 1971a; Mauriès *et al.*, 1997; Makarov *et al.*, 2004] (Fig. 5).

World distribution: Albania, Asiatic Turkey, Austria, Bosnia and Herzegovina, Bulgaria, Belarus, Croatia, Czech Republic, Danish mainland, Estonia, European Turkey (without islands in the Sea of Marmara), Finland, Germany, Greek mainland, Hungary, Italian mainland, Lithuania, Latvia, Republic of North Macedonia, Moldova, Montenegro, Norwegian mainland and inshore islands, Poland, Romania, Russia (Kaliningrad Region, as well as Central European, East Central, North European, and Northwest Russia), Serbia, Slovakia, Slovenia, Sweden, Switzerland, Ukraine, and introduced into the Nearctic [Kime, Enghoff, 2011].

#### 61. *Polydesmus herzogowinensis* Verhoeff, 1897

*Polydesmus insulanus* Attems, 1898

*Polydesmus elchowensis* Verhoeff, 1928

*Polydesmus gladius* Schubart, 1934

*Polydesmus herzegowinensis* auct.

MATERIAL. 1 ♂, Mt Golak, 1.VI.2000, leg. E. Stojkoska; 1 ♂, 1 ♀, between the localities of Pod and Suva Češma, Mt Belasica, 587 m a.s.l., *Quercus-Carpinus* forest, 28.V.2010; 2 ♂♂, 1 ♀, near the village of Popadija, Mt Belasica, 847 m a.s.l., *Quercus-Fraxinus* forest, 28.V.2010; 9 ♂♂, 1 ♀, same locality, 1038 m a.s.l., *Quercus-Fraxinus* forest, 28.V.2010; 3 ♂♂, 1 ♀, same locality, 1100 m a.s.l., *Festuca-Fagus* community, 28.V.2010; 6 ♂♂, same locality, 1300 m a.s.l., *Calamintha-Fagus* community, 28.V.2010; 1 ♂, same locality, 767 m a.s.l., *Quercus-Fraxinus* forest, 3.VII.2010; 1 ♂, same locality, 847 m a.s.l., *Quercus-Fraxinus* forest, 3.VII.2010; 2 ♂♂, same locality, 1100 m a.s.l., *Festuca-Fagus* community, 3.VII.2010; 1 ♂, same locality, 1200 m a.s.l., *Calamintha-Fagus* community, 3.VII.2010; 1 ♂, same locality, 1100 m a.s.l., *Festuca-Fagus* community, 4.X.2010; 8 ♂♂, near the Pisana Skala slopes, Mt Belasica, 1385 m a.s.l., *Calamintha-Fagus* community, 28.V.2010; 8 ♂♂, 2 ♀♀, same locality, 1442 m a.s.l., cleared area, 28.V.2010; 2 ♂♂, 1 ♀, same locality, 1442 m a.s.l., cleared area, 3.VII.2010; 1 ♂, near Groba, Mt Belasica, 1300 m a.s.l., *Calamintha-Fagus* community, 3.VII.2010, all leg. A.C. Gjorgjievska; 1 ♂, village of Brajčino, Mt Pelister, *Fagus-Abies* plantation, 1.VII.2016, leg. E. Džima.

Distribution in the Republic of North Macedonia: Mt Belasica (present study); village of Brajčino, Mt Pelister (present study); Mt Golak (present study); Jablanica [Verhoeff, 1932]; Kula, Kopanje [Ćurčić *et al.*, 1999a; Makarov *et al.*, 2004]; village of Lazaropole [Mršić, 1988b, 1993a];

village of Rašee, near Skopje [Ćurčić *et al.*, 1999a; Makarov *et al.*, 2004]; village of Vitolište, Mt Kozjak [Mršić, 1988b, 1993a; Makarov *et al.*, 2004]; Mt Vodno, Skopje [Attems, 1940] (Fig. 5).

World distribution: Albania, Asiatic Turkey, Bosnia and Herzegovina, Bulgaria, Croatia, Greek mainland, Republic of North Macedonia and Montenegro [Kime, Enghoff, 2011].

#### 62. *Polydesmus jawlowskii* Strasser, 1966\*\*

Distribution in the Republic of North Macedonia: Hamzali, Mt Ogražden [Mršić, 1993a] (Fig. 5).

World distribution: Bulgaria, Republic of North Macedonia [Kime, Enghoff, 2011].

Balkan endemic.

#### 63. *Polydesmus juergengruberi* Mršić, 1993\*\*

Distribution in the Republic of North Macedonia: Hamzali, Mt Ogražden [Mršić, 1993b]; without precise locality [Ćurčić *et al.*, 2002a; Makarov *et al.*, 2004] (Fig. 5).

North Macedonian endemic.

#### 64. *Polydesmus mediterraneus* Daday, 1889

*Polydesmus oertzeni* Verhoeff, 1901

*Polydesmus montenegrinus* Attems, 1903

*Polydesmus klisurenensis* Verhoeff, 1903

*Polydesmus valachicus* Tabacaru et Negrea, 1961

*Polydesmus martensi* Strasser, 1967

MATERIAL. 1 ♂, Monastery of St. Jovan Bigorski, Mt Bistra, 13.IV.2006, leg. I. Karaman.

Distribution in the Republic of North Macedonia: Mt Bistra (present study); Skopje [Mršić, 1988b, 1993a] (Fig. 5).

World distribution: Albania, Asiatic Turkey, Bulgaria, Croatia, European Turkey (without islands in the Sea of Marmara), Greek mainland, Republic of North Macedonia, Malta, Montenegro, Romania, Serbia, and Ukraine [Kime, Enghoff, 2011].

#### 65. *Polydesmus renschi* Schubart, 1934\*\*

*Polydesmus tridens* Attems, 1951

*Polydesmus dobrogicus* Ceuca, 1958

*Polydesmus dobrogensis* Tabacaru et Negrea, 1961

Distribution in the Republic of North Macedonia: village of Krklja [Mršić, 1993a] (Fig. 5).

World distribution: Bulgaria, Republic of North Macedonia, Romania, and Serbia [Antić *et al.*, 2013a; Kime, Enghoff, 2011].

Balkan endemic.

#### 66. *Polydesmus wardaranus* Verhoeff, 1937\*\*

Distribution in the Republic of North Macedonia: Skopje [Verhoeff, 1937; Attems, 1940; Strasser, 1971a; Mršić, 1993a]; without precise locality [Mauriès *et al.*, 1997; Ćurčić *et al.*, 2002a; Makarov *et al.*, 2004] (Fig. 5).

North Macedonian endemic.

### Family XYSTODESMIDAE

#### 67. *Ochridaphe albanica* (Verhoeff, 1932)\*\*

*Melaphe albanica* Verhoeff, 1932



Fig. 6. Distribution of representatives of the class Diplopoda in North Macedonia.

Рис. 6. Распространение представителей класса Diplopoda в Северной Македонии.

Distribution in the Republic of North Macedonia: Begova Česma, Mt Pelister [Čurčić *et al.*, 1999a]; Mt Bistra, Mavrovo [Mršić, 1988b, 1993a]; Mt Galičica [Mršić, 1993a]; Mt Jablanica [Verhoeff, 1932; Strasser, 1971a]; Mt Korab [Verhoeff, 1932; Strasser, 1971a]; Lazaropole, Mt Bistra [Čurčić *et al.*, 1999]; Mala Reka, Mt Tresonče [Čurčić *et al.*, 1999a]; Mavrovo [Čurčić *et al.*, 1999a]; without precise locality [Mauriès *et al.*, 1997; Čurčić *et al.*, 2002a; Makarov *et al.*, 2004] (Fig. 5).

World distribution: Albania, Republic of North Macedonia, and Greek mainland [Kime, Enghoff, 2011].

Balkan endemic.

## Discussion

The millipede fauna of North Macedonia consists of 67 species, 33 genera, 15 families, and seven orders (Fig. 6). The best represented are the species-rich families Julidae, with 29 species, and Polydesmidae, with 16 species. The genera *Megaphyllum* Verhoeff, 1894, *Polydesmus* Latreille, 1802, and *Brachydesmus* Heller, 1858 contribute eight species each. Taxa new for the diplopod fauna of North Macedonia are *Hirudisoma hirsutum* (Verhoeff, 1901) and *Brachydesmus cristofler* Strasser, 1966. *Hirudisoma hirsutum*, as a representative of a genus and family (Hirudisomatidae) new to North Macedonia, is found in the neighbouring countries of Bulgaria and Greece, as well as in Turkey. *Brachydesmus cristofler* has so far been recorded only in Bulgaria. After the revision of Vagalinski & Lazányi [2018], two species, *Megaphyllum crassum* (Attems, 1929) and *M. imbecillum* (Attems, 1935), are presented as *combinatio nova*, *Italoiulus crassus* (Attems, 1929) and *Graecoiulus imbecillus* (Attems, 1935), re-

spectively. Thirty one endemics comprise ca. 46% of the North Macedonian millipede fauna, with 12 species being endemic to North Macedonia and 19 considered as Balkan endemics.

With its complex geological history, variety of natural conditions, various biogeographical influences, and vast number of endemic and relict species, the Balkan Peninsula is a heterogeneous and diverse region. During the last Ice Age, the Balkan Peninsula represented one of the three main refugia of Europe, the other two being the Iberian and Italian Peninsulas, where a great number of relict and endemo-relict species and communities were preserved in various epigeal and subterranean habitats [Savić, 2008]. In some neighbouring countries, the reported number of species is well over 100 (nearly 200 in Croatia), although this is not the case in Albania and Montenegro, where it is in the range of currently known diversity of the North Macedonian fauna [Antić *et al.*, 2013a]. It can therefore be presumed that the millipede fauna of North Macedonia is probably more abundant than has been shown thus far.

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