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Updated checklist of pseudoscorpions (Arachnida: Pseudoscorpiones) of Central Europe

Обновленный список ложноскорпионов (Arachnida: Pseudoscorpiones) Центральной Европы

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КЛЮЧЕВЫЕ СЛОВА: классификация, разнообразие, эндемичные виды, список видов, синонимизация, таксономия, типовые виды.

ABSTRACT: The classification and estimated diversity of the order Pseudoscorpiones of Central Europe are updated. An annotated checklist is adjusted according to the latest taxonomic changes and species synonymisation. The present list provides the pseudoscorpion diversity from eight countries of Central Europe with the following species numbers: Austria (70), Switzerland (64), Czech Republic (38), Germany (50), Hungary (53), Poland (38), Slovenia (33) and Slovakia (57). In total, 125 species belonging to 30 genera and 10 families are documented for Central Europe. Austria and Switzerland represent the countries with the highest species and genera numbers, caused mainly by the occurrence of pseudoscorpions endemic to the Alpine province. The species *Neobisium deschmanni* (G. Joseph, 1882) is removed from the list of Austrian fauna and is added into the fauna of Slovenia based on correction of the type locality. The state of species diversity for each country of Central Europe is discussed.

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РЕЗЮМЕ: Дана обновленная классификация и оценка разнообразия ложноскорпионов Центральной Европы. Аннотированный список выверен в соответствии с последними таксономическими изменениями и видовой синонимией. В настоящей работе описано разнообразие ложноскорпионов восьми стран Центральной Европы со следующим количеством видов: Австрия (70), Швейцария (64), Чехия (38), Германия (50), Венгрия (53), Польша (38), Словения (33) и Словакия (57). Всего в регионе отмечено 125 видов из 30 родов и 10 семейств. В Австрии и Швейцарии представлено наиболее количество видов и родов ложноскорпионов, вследствие наличия там альпийских эндемиков. После уточнения локализации типового местонахождения *Neobisium deschmanni* (G. Joseph, 1882) исключен из списка фауны Австрии и включен в список Словении. Обсуждается видовое разнообразие ложноскорпионов каждой страны Центральной Европы.

Introduction

The catalogue of pseudoscorpions of the World (taxa numbers were calculated to the end of 2012) includes 3533 species belonging to 454 genera and 26 families [Harvey, 2013a, b]. Europe, with more than 760 described species, represents a continent with the greatest pseudoscorpion diversity [Harvey, 2007]. Due to more favourable climatic conditions combined with historical factors, of which the most important is the lack of glaciation during the Pleistocene, the highest pseudoscorpion diversity in Europe occurs mainly in Mediterranean countries [Harvey, 2007]. In addition, the numerous karst systems that exist in the Mediterranean region, are represented by specific troglomorphic species [Harvey, 2007].

The first version of the pseudoscorpion checklist of Central Europe was elaborated by Blick in the year 2000 (for all checklist versions see Blick [2004]). This checklist comprised, according to valid species at that time, 80 species of 26 genera and 10 families. It included data from three countries, namely Austria, Germany, and Switzerland. Two years later, Blick updated the version and added two more countries, Belgium and the Netherlands [Blick, 2004]. Summarising all data, 89 species of 27 genera and 10 families were recorded [Blick, 2004]. The last version comprised 94 species of 27 genera and 10 families from eight countries — Austria, Belgium, the Czech Republic, Denmark, Germany, the Netherlands, Poland and Switzerland [Blick, 2004].

Regarding Central Europe, pseudoscorpion research has intensified considerably since 2004 and has led to the discovery of the first species recorded in the countries, such as in Austria [Mahnert, 2011b], Switzerland [Gardini, 2009a; Mahnert, 2011a], the Czech Republic [Christophoryová *et al*., 2011d], Germany [Muster *et al*., 2008], Hungary [Kárpáthegyi, 2007a, b; Novák, 2012, 2013, 2015, 2017, 2018; Novák, Kutasi, 2014; Novák, Harvey, 2015], Slovenia [Gardini, 2013, 2014] and Slovakia [Christophoryová *et al*., 2011a, b, c, d, 2012a; Krajčovičová, Christophoryová, 2017; Krajčovičová *et al*., 2017; Červená *et al*., 2018]. Three species were even discovered as new to science, namely *Neobisium tothi* Novák, 2017 discovered in Hungary by Novák [2017], *Chthonius delmastroi* Gardini, 2009 and *Pseudoblothrus infernus* Mahnert, 2011 described in Switzerland [Gardini, 2009a; Mahnert, 2011a].

Since the last version of Central European checklist [Blick, 2004], important taxonomic changes of many taxa have been elaborated. Not only were species widely distributed in Central Europe, such as *Ephippiochthonius tetrachelatus* (Preyssler, 1790) and *Pselaphochernes scorpioides* (Hermann, 1804), redescribed [Gardini, 2009b; Nassirkhani, 2018], but also species types with more limited distribution such as *Diplotemnus balcanicus* (Redikorzev, 1928) [Novák, Harvey, 2015], *Geogarypus minor* (L. Koch, 1873) [Gardini *et al*., 2017], *Allochernes solarii* (Simon, 1898) [Červená *et al*., 2018] and *Neobisium slovacum* Gulička, 1977 [Červená *et al*., 2019].

Extensive taxonomic revision of the genus *Ephippiochthonius* Beier, 1930 was elaborated by Gardini [2013] based on specimens from Italy, Corsica and the Swiss Canton of Ticino. The species were arranged in two species groups: *tetrachelatus* and *fuscimanus* groups, and the species *Ephippiochthonius poeninus* (Mahnert, 1979) was transferred into the genus *Globochthonius* Beier, 1931 [Gardini, 2013]. One of the most impressive works containing important taxonomic revisions of the *Ephippiochthonius* complex was made by Zaragoza [2017]. The revision was based on species from the Iberian Peninsula, the Balearic Islands and Macaronesia, and some previously insufficiently studied characteristics were shown to be taxonomically useful [Zaragoza, 2017]. Zaragoza [2017] raised three taxa, previously treated as subgenera of *Chthonius*, to generic rank — *Ephippiochthonius*, *Globochthonius* and *Hesperochthonius* Muchmore, 1968. Two new genera were described: *Cantabrochthonius* Zaragoza, 2017 and *Occidenchthonius* Zaragoza, 2017, 35 new species were described, and 45 new combinations of species were proposed [Zaragoza, 2017].

Except for the revisions, taxonomic changes were also realised due to species synonymisation. Many species distributed in Central Europe were synonymised, e.g., *Chthonius baccettii* Callaini, 1980 [Gardini, 2004]; *Ephippiochthonius elbanus* (Beier, 1963) [Gardini, 2013]; *C. diophthalmus* Daday, 1888, *C. ellingseni* Beier, 1939, *C. ksenemani* Hadži, 1939 [Gardini, 2014]; *Cheiridium tetrophthalmum* Daday, 1889 [Harvey, 2011]; *Diplotemnus insolitus* Chamberlin, 1933 [Novák, Harvey, 2015] and *Neobisium biharicum* Beier, 1939 [Novák, Hörweg, 2017].

All of the above-mentioned facts lead to the necessity for updating the pseudoscorpion diversity in all Central European countries, including Slovakia, Slovenia, and Hungary, that had not been included in the previous checklist version [Blick, 2004].

Methods

The present checklist of Pseudoscorpiones of Central Europe is compiled from Blick [2004] and the catalogue of Pseudoscorpions of the World [Harvey, 2013b] and the following papers for individual countries:

Austria (AT): Mahnert [2004, 2011b];

Switzerland (CH): Gardini [2009a], Mahnert [2011a];

Czech Republic (CZ): Christophoryová *et al*. [2012b];

Germany (DE): Kreissl [1969], Muster *et al*. [2008], Muster, Blick [2016];

Hungary (HU): Kárpáthegyi [2007a, b], Novák [2012, 2013, 2015, 2017, 2018], Novák, Kutasi [2014], Novák, Harvey [2015];

Poland (PL): Rafalski [1967], Jędryczkowski [1985, 2014];

Slovenia (SI): Joseph [1882], Gardini [2013, 2014];

Slovakia (SK): Christophoryová *et al*. [2011b, c, 2012a, b], Krajčovičová, Christophoryová [2017], Krajčovičová *et al*. [2017], Červená *et al*. [2018], Hernández-Corral *et al*. [2018].

The pseudoscorpion list is adjusted according to the latest important taxonomic changes [Gardini, 2013; Zaragoza, 2017] and species synonymisation [Gardini, 2004, 2013, 2014; Harvey, 2011; Novák, Harvey, 2015; Novák, Hörweg, 2017; Harvey *et al*., 2018]. Nomenclature for all taxa follows Gardini [2013], Harvey [2013b] and Zaragoza [2017]. The year of description of three species — *Chthonius heterodactylus* Tömösváry, 1883; *Geogarypus hungaricus* (Tömösváry, 1883) and *Lamprochernes chyzeri* (Tömösváry, 1883) has been changed according to Judson [2018]. The order of families follows Harvey [1991], and genera and species are listed alphabetically under each family. Sub-species have not been considered.

The synonymised species are listed below with references and abbreviations for individual countries (since the last checklist version of Central Europe in Blick [2004]):

AT: *Chthonius ellingseni* was synonymised with *C. raridentatus* Hadži, 1930 [Gardini, 2014].

CH: *Chthonius baccettii* was synonymised with *C. carinthiacus* Beier, 1951 [Gardini, 2004]. *Ephippiochthonius elbanus* was synonymised with *E. nanus* (Beier, 1953) [Gardini, 2013].

DE: *Chthonius diophthalmus* was synonymised with *C. heterodactylus* [Gardini, 2014].

HU: *Cheiridium tetrophthalmum* Daday, 1889 was removed from the synonymy of *Geogarypus minor* and treated as a synonym of *Larca lata* [Harvey, 2011]. *Chthonius diophthalmus* was synonymised with *C. heterodactylus* [Gardini, 2014]. *Neobisium biharicum* was synonymised with *N. polonicum* Rafalski, 1936 [Novák, Hörweg, 2017]. *Geogarypus hungaricus* (Tömösváry, 1883) was synonymised with *Larca lata* [Harvey *et al*., 2018].

SI: *Chthonius ellingseni* and *C. brandmayri* Callaini, 1986 were synonymised with *C. raridentatus* [Gardini, 2014].

SK: *Chthonius diophthalmus* and *C. ksenemani* were synonymised with *C. heterodactylus* [Gardini, 2014]. *Diplotemnus insolitus* was synonymised with *D. balcanicus* [Novák, Harvey, 2015].

Results and Discussion

The present checklist provides the pseudoscorpion diversity from eight countries of Central Europe — Austria, Switzerland, the Czech Republic, Germany, Hungary, Poland, Slovenia and Slovakia (Table 1). A total of 125 species belonging to 30 genera and 10 families are documented in Central Europe (Tables 1, 2). Family Neobisiidae comprises the highest species number followed by the family Chthoniidae (Table 2). Austria and Switzerland represent the countries with the highest species diversity; by contrast the fauna of Slovenia, Poland, and the Czech Republic contain the lowest numbers of species (Table 2).

The diversity of pseudoscorpions in Central Europe includes species that are widespread throughout Europe, or have distributions restricted to certain territories. For example, some of the species are bounded mainly by Carpathian provinces (e.g. *Chthonius hungaricus*, *Mundochthonius carpaticus*, *Neobisium carpaticum*, *N. polonicum*, *Roncus transsilvanicus*) or Alpine provinces (e.g. *Chthonius submontanus*, *Globo-*

Table 1. Pseudoscorpion species list of Central European countries.
Таблица 1. Видовой список ложноскорпионов стран Центральной Европы.

Taxa	Countries							
	AT	**CH**	**CZ**	**DE**	**HU**	**PL**	**SI**	**SK**
Chthoniidae Daday, 1888								
Chthonius alpicola Beier, 1951	+*			+				
Chthonius carinthiacus Beier, 1951	+*	+	+		+		+	+
Chthonius cavernarum Ellingsen, 1909							+	
Chthonius comottii Inzaghi, 1987		+						
Chthonius delmastroi Gardini, 2009		+						
Chthonius heterodactylus Tömösváry, 1883			+	+	+	+		+*
Chthonius hungaricus Mahnert, 1980					+*			+
Chthonius ischnocheles (Hermann, 1804)	+	+	+	+	+	+		+
Chthonius jugorum Beier, 1952	+							
Chthonius lanzai Caporiacco, 1947		+						
Chthonius orthodactylus (Leach, 1817)	+	+	+	+	+		+	+
Chthonius pusillus Beier, 1947	+*				+		+	
Chthonius pygmaeus Beier, 1934	+				+		+	+*
Chthonius raridentatus Hadži, 1930	+						+*	
Chthonius ressli Beier, 1956	+*	+	+		+			+
Chthonius rhodochelatus Hadži, 1933		+					+	
Chthonius submontanus Beier, 1963	+*	+		+				
Chthonius subterraneus Beier, 1931					+			+
Chthonius tenuis L. Koch, 1873	+	+	+	+		+		+
Ephippiochthonius boldorii (Beier, 1934)	+	+		+			+	+
Ephippiochthonius fuscimanus (Simon, 1900)	+*		+	+	+	+		+
Ephippiochthonius kewi (Gabbutt, 1966)				+				
Ephippiochthonius microtuberculatus (Hadži, 1937)	+							
Ephippiochthonius nanus (Beier, 1953)		+						
Ephippiochthonius nidicola (Mahnert, 1979)		+*		+				
Ephippiochthonius parmensis (Beier, 1963)	+	+		+			+	
Ephippiochthonius tetrachelatus (Preyssler, 1790)	+	+	+*	+*	+	+	+	+
Ephippiochthonius tuberculatus (Hadži, 1937)				+	+			+
Globochthonius globifer (Simon, 1879)		+						
Globochthonius poeninus (Mahnert, 1979)		+*		+				
Globochthonius spelaeophilus (Hadži, 1930)							+*	
Mundochthonius alpinus Beier, 1947	+*							
Mundochthonius carpaticus Rafalski, 1948			+		+	+*		+
Mundochthonius styriacus Beier, 1971	+*	+	+	+				
Geogarypidae Chamberlin, 1930								
Geogarypus minor (L. Koch, 1873)	+							

Table 1 (continued).
Таблица 1 (продолжение).

Taxa	Countries							
	AT	**CH**	**CZ**	**DE**	**HU**	**PL**	**SI**	**SK**
Neobisiidae Chamberlin, 1930								
Microbisium brevifemoratum (Ellingsen, 1903)	+	+	+	+		+		
Microbisium suecicum Lohmander, 1945	+	+	+	+	+	+		+
Neobisium (*Blothrus*) *aueri* Beier, 1962	+*							
Neobisium (*B*.) *deschmanni* (G. Joseph, 1882)							+*	
Neobisium (*B*.) *pusillum* Beier, 1939							+*	
Neobisium (*B*.) *reimoseri* (Beier, 1929)							+*	
Neobisium (*B*.) *slovacum* Gulička, 1977					+			+*
Neobisium (*B*.) *spelaeum* (Schiödte, 1847)							+*	
Neobisium (*B*.) *stygium* Beier, 1931							+	
Neobisium (*Neobisium*) *aelleni* Vachon, 1976		+*						
Neobisium (*N*.) *beieri* Verner, 1958								+*
Neobisium (*N*.) *brevidigitatum* (Beier, 1928)					+	+		+
Neobisium (*N*.) *caporiaccoi* Heurtault-Rossi, 1966	+							
Neobisium (*N*.) *carcinoides* (Hermann, 1804)	+	+	+	+*	+	+	+	+
Neobisium (*N*.) *carinthiacum* Beier, 1939	+*							
Neobisium (*N*.) *carpaticum* Beier, 1935						+		+
Neobisium (*N*.) *crassifemoratum* (Beier, 1928)			+	+	+	+		+
Neobisium (*N*.) *doderoi* (Simon, 1896)	+	+					+	
Neobisium (*N*.) *dolicodactylum* (Canestrini, 1874)	+*							
Neobisium (*N*.) *dolomiticum* Beier, 1952	+	+		+				
Neobisium (*N*.) *erythrodactylum* (L. Koch, 1873)	+		+	+	+	+*	+	+
Neobisium (*N*.) *fuscimanum* (C.L. Koch, 1843)	+		+	+*	+	+	+	+
Neobisium (*N*.) *galeatum* Beier, 1953	+							
Neobisium (*N*.) *gineti* Vachon, 1966		+						
Neobisium (*N*.) *helveticum* Heurtault, 1971		+*						
Neobisium (*N*.) *hermanni* Beier, 1938	+*			+				
Neobisium (*N*.) *inaequale* Chamberlin, 1930					+*			+
Neobisium (*N*.) *jugorum* (L. Koch, 1873)	+*	+*					+	+
Neobisium (*N*.) *macrodactylum* (Daday, 1888)					+		+	+
Neobisium (*N*.) *minimum* (Beier, 1928)	+	+			+		+*	
Neobisium (*N*.) *noricum* Beier, 1939	+*				+			
Neobisium (*N*.) *polonicum* Rafalski, 1936					+	+		+
Neobisium (*N*.) *schenkeli* (Strand, 1932)		+*						
Neobisium (*N*.) *simile* (L. Koch, 1873)	+	+		+	+		+	+
Neobisium (*N*.) *simoni* (L. Koch, 1873)	+	+		+	+	+		
Neobisium (*N*.) *strausaki* Vachon, 1976		+*						
Neobisium (*N*.) *sylvaticum* (C.L. Koch, 1835)	+	+	+	+*	+*	+	+	+
Neobisium (*N*.) *tothi* Novák, 2017					+*			
Neobisium (*N*.) *validum* (L. Koch, 1873)					+			
Roncus alpinus L. Koch, 1873	+	+					+	
Roncus carinthiacus Beier, 1934	+*							
Roncus italicus (Simon, 1896)							+	
Roncus jagababa Ćurčić, 1988							+*	
Roncus julianus Caporiacco, 1949	+							
Roncus lubricus L. Koch, 1873	+	+	+	+	+*		+	+
Roncus stussineri (Simon, 1881)							+*	
Roncus tenuis Hadži, 1933	+							
Roncus transsilvanicus Beier, 1928						+		+
Syarinidae Chamberlin, 1930								
Pseudoblothrus infernus Mahnert, 2011		+*						
Pseudoblothrus strinatii Vachon, 1954		+*						
Pseudoblothrus thiebaudi Vachon, 1969		+*						
Syarinus strandi (Ellingsen, 1901)	+		+	+				

Table 1 (continued).
Таблица 1 (продолжение).

Taxa	Countries							
	AT	CH	CZ	DE	HU	PL	SI	SK
Larcidae Harvey, 1992								
Larca lata (Hansen, 1884)	+		+	+	+*	+		+
Cheiridiidae Hansen, 1894								
Apocheiridium ferum (Simon, 1879)	+	+	+	+		+		
Cheiridium museorum (Leach, 1817)	+	+	+	+	+	+		+
Atemnidae Kishida, 1929								
Atemnus politus (Simon, 1878)	+	+			+			+
Diplotemnus balcanicus (Redikorzev, 1928)					+			+
Cheliferidae Risso, 1827								
Beierochelifer peloponnesiacus (Beier, 1929)		+						+
Chelifer cancroides (Linnaeus, 1758)	+	+	+*	+*	+	+*		+
Dactylochelifer latreillii (Leach, 1817)	+	+	+	+*	+	+		+
Hysterochelifer meridianus (L. Koch, 1873)	+							
Hysterochelifer tuberculatus (Lucas, 1849)		+						
Mesochelifer ressli Mahnert, 1981	+*	+	+	+		+		+
Rhacochelifer euboicus Mahnert, 1977								+
Rhacochelifer peculiaris (L. Koch, 1873)	+	+			+*			+
Rhacochelifer quadrimaculatus (Tömösváry, 1882)								+*
Chernetidae Menge, 1855								
Allochernes peregrinus Lohmander, 1939	+	+	+	+	+	+		+
Allochernes powelli (Kew, 1916)	+	+		+	+			+
Allochernes solarii (Simon, 1898)								+
Allochernes wideri (C.L. Koch, 1843)	+	+	+	+*	+	+		+
Anthrenochernes stellae Lohmander, 1939			+	+		+		
Chernes beieri Harvey, 1991						+*		
Chernes cavicola G. Joseph, 1882							+*	
Chernes cimicoides (Fabricius, 1793)	+	+	+	+*	+	+	+	+
Chernes hahnii (C.L. Koch, 1839)	+	+	+	+*	+	+		+
Chernes montigenus (Simon, 1879)	+	+*			+			
Chernes nigrimanus Ellingsen, 1897	+	+	+	+		+		
Chernes similis (Beier, 1932)	+		+		+	+		+
Chernes vicinus (Beier, 1932)	+*	+	+	+				+
Dendrochernes cyrneus (L. Koch, 1873)	+	+	+	+	+*	+		+
Dinocheirus panzeri (C. L. Koch, 1837)	+	+	+	+*	+	+	+	+
Lamprochernes chyzeri (Tömösváry, 1883)	+	+	+	+	+*	+		+*
Lamprochernes nodosus (Schrank, 1803)	+	+	+*	+*	+*	+		+
Lasiochernes pilosus (Ellingsen, 1910)	+	+		+				+
Pselaphochernes anachoreta (Simon, 1878)		+						
Pselaphochernes dubius (O.Pickard-Cambridge, 1892)				+		+		
Pselaphochernes lacertosus (L. Koch, 1873)					+			
Pselaphochernes scorpioides (Hermann, 1804)	+	+	+	+	+*	+		+
Withiidae Chamberlin, 1931								
Withius hispanus (L. Koch, 1873)	+	+			+			+
Withius piger (Simon, 1878)	+	+		+	+			

Abbreviations: AT — Austria, CH — Switzerland, CZ — the Czech Republic, DE — Germany, HU — Hungary, PL — Poland, SI — Slovenia, SK — Slovakia, * — type localities.

chthonius poeninus, *Neobisium dolomiticum*). Some species restricted only to certain territories, may be considered as endemic. For example, *Neobisium slovacum* is endemic to the Slovak-Aggtelek Karst; *Mundochthonius alpinus*, *Neobisium aueri*, *N. carinthiacum*, *N. hermanni*, and *Roncus carinthiacus* are endemic to the Austrian Alps; *Neobisium aelleni*, *N. helveticum*, *N. strausaki* and *Pseudoblothrus infernus* are endemic species in caves in Switzerland. Type localities for individual species are star-marked in Table 1.

Table 2. Number of species/genera in each pseudoscorpion family in countries of Central Europe.
Таблица 2. Число видов/родов в каждом семействе ложноскорпионов в странах Центральной Европы.

Families	Countries								
	AT	CH	CZ	DE	HU	PL	SI	SK	Σ
Chthoniidae	18/3	18/4	10/3	15/4	13/3	6/3	11/3	14/3	34/4
Geogarypidae	1/1	0/0	0/0	0/0	0/0	0/0	0/0	0/0	1/1
Neobisiidae	24/3	17/3	8/3	12/3	18/3	12/3	19/2	17/3	48/3
Syarinidae	1/1	3/1	1/1	1/1	0/0	0/0	0/0	0/0	4/2
Larcidae	1/1	0/0	1/1	1/1	1/1	1/1	0/0	1/1	1/1
Cheiridiidae	2/2	2/2	2/2	2/2	1/1	2/2	0/0	1/1	2/2
Atemnidae	1/1	1/1	0/0	0/0	2/2	0/0	0/0	2/2	2/2
Cheliferidae	5/5	6/6	3/3	3/3	3/3	3/3	0/0	7/5	9/6
Chernetidae	15/7	15/7	13/7	15/8	13/6	14/7	3/2	14/7	22/8
Withiidae	2/1	2/1	0/0	1/1	2/1	0/0	0/0	1/1	2/1
Species/genera total	70/25	64/25	38/20	50/23	53/20	38/19	33/7	57/23	125/30

Abbreviations: AT — Austria, CH — Switzerland, CZ — the Czech Republic, DE — Germany, HU — Hungary, PL — Poland, SI — Slovenia, SK — Slovakia, Σ — number of species/genera for all considered countries.

Pseudoscorpion diversity in the countries of Central Europe

Austria (AT)

Mahnert [2004, 2011b] published checklists of Austrian pseudoscorpions containing 70 species of 25 genera and 10 families. Since then, only *Neobisium deschmanni* has been added into the Austrian fauna in the pseudoscorpion catalogue [Harvey, 2013b]. Harvey [2013b] mentioned the locality of Grotte von Luëg (Tirol, Austria) as the type locality for this species. In the original description, Joseph [1882] stated "in der grossen Grotte von Luëg in Unter-Krain" and Krain was mentioned as a locality of this species and also in other papers [Beier, 1932; Roewer, 1937; Wolf, 1938; Harvey, 1991]. Krain means Carniola, a historical region that comprised parts of present-day Slovenia. According to Schmidl [1854] Luëg or Lueg should be Predjama, a locality situated in Slovenia. Therefore, the species is here removed from the list of Austrian fauna and added to the fauna of Slovenia.

Austria, with 70 species of 25 genera and 10 families, represents the country with the highest species and genera numbers in Central Europe (Tables 1, 2), also caused by the occurrence of pseudoscorpions endemic to the Alpine province. Mahnert [2009] documented seven endemic and two subendemic species for the Alpine province. Type localities of 17 species are situated in Austria (Table 1).

Switzerland (CH)

In the checklist of Central Europe, Blick [2004] mentioned 62 species of 25 genera and eight families for Switzerland. Blick [2004] included the species *Ephippiochthonius beieri* (Lazzeroni, 1966) in the checklist, despite the fact that Lazzeroni later synonymised it with *Ephippiochthonius tetrachelatus* [Lazzeroni, 1969]. After the checklist by Blick [2004], three species were recorded in Switzerland for the first time, two of them new to science — *Chthonius rhodochelatus* [Gardini, 2009a], *C. delmastroi* [Gardini, 2009a] and *Pseudoblothrus infernus* [Mahnert, 2011a].

Summarising all data, the present checklist of Swiss pseudoscorpions includes 64 species of 25 genera and eight families; type localities of 11 species are situated in Switzerland (Tables 1, 2). Switzerland is the country with the second-highest pseudoscorpion diversity in Central Europe (Table 2). From the protection point of view, some troglobitic species may be considered as endemic to Switzerland (e.g. *Neobisium aelleni*, *Neobisium helveticum*, *Neobisium strausaki*, *Pseudoblothrus infernus*).

The catalogue of Pseudoscorpions of the World [Harvey, 2013b] includes only 43 species of 21 genera and eight families.

Czech Republic (CZ)

The last pseudoscorpion checklist of the Czech Republic was published by Christophoryová *et al*. [2012b] and includes 38 species of 20 genera and seven families.

The species number has not changed after the checklist by Christophoryová *et al*. [2012b] (Tables 1, 2). Type localities of three species are situated in the country (Table 1). From the protection point of view, the most important species is the rare *Anthrenochernes stellae* (Table 1). This species is red-listed not only in the Czech Republic but also in other countries of its occurrence [Fjellberg, Lissner, 2016; Šťáhlavský, 2017].

Ephippiochthonius kewi and *Chthonius heterodactylus* were excluded from the fauna by Christophoryová *et al*. [2012b], but these species are still included in the catalogue of Pseudoscorpions of the World [Harvey, 2013b] for the Czech Republic.

Germany (DE)

In the checklist of Central Europe, Blick [2004] presented 48 species from 22 genera and eight families for Germany. After the checklist [Blick, 2004], the latest recorded species, as well as genus, for Germany was *Globochthonius poeninus* [Muster *et al*., 2008].

The last updated pseudoscorpion list for Germany includes 49 species of 23 genera and eight families [Muster, Blick, 2016]. Several differences between the species lists [Blick, 2004; Muster, Blick, 2016] are commented on here. *Neobisium hermanni* was reported from Germany as far as back in 1969 [Kreissl, 1969] but was not included in the list for Germany since the last list [Muster, Blick, 2016]. The presence of *Ephippiochthonius kewi* in Germany is doubtful. The species was recorded firstly in Germany by Drogla [1992] on the basis of several specimens among the many specimens of *E. tetrachelatus* from one study area. They differ from *E. tetrachelatus* by the presence of additional short lateral microsetae on the posterior carapace margin; other morphological and morphometric characters overlap. The close relationship of these two species was considered also in other papers (e.g. Drogla, 2004; Drogla, Lippold, 2004). Later, van den Tooren [2011] revised the differential characters between these species from the Netherlands and found out that they could only be separated by using the setae number on the posterior genital operculum in both females and males. The status of the species remains doubtful, since Muster & Blick [2016] did not revise the German material (T. Blick, pers. comm.). The species *Chernes beieri* and *Ephippiochthonius parmensis* were excluded from the list [Muster, Blick, 2016]. The species *C. beieri* was originally described as *Chernes pallidus* Beier, 1936 from the locality of Kauffung, Schlesien in Poland [Beier, 1936]. Harvey [1991] stated that the locality is situated near Kassel in Germany, but at present Kauffung (meaning Wojcieszów) lies in Poland. *Ephippiochthonius parmensis* was found in the city park and it was assumed to have been introduced in the root balls of *Rhododendron* sp. [Drogla, 1990]. The species has not been observed over several years and there is no other evidence that the species can be regarded as established in Germany (T. Blick, pers. comm.). It is here included in the pseudoscorpion fauna of Germany in the same way as other introduced species in other countries.

The present checklist includes 50 species from 23 genera and eight families; type localities of 11 species are situated in Germany (Tables 1, 2). From the faunistic and geographic points of view, three species are interesting. The records of the rare species *Ephippiochthonius nidicola* and *G. poeninus* in Germany represent the first records outside of the Swiss Alps. Initially, they were regarded as Swiss-endemic [Muster, 2004; Muster *et al*., 2008]. Another rare species, *Anthrenochernes stellae*, is considered to be endangered in Germany and is protected by the European Habitat Directive [Ssymank, Muster, 2010; Muster, Blick, 2016].

The catalogue of Pseudoscorpions of the World [Harvey, 2013b] still contains the excluded species *C. beieri* [Muster, Blick, 2016], and does not include *N. hermanni* [Kreissl, 1969].

Hungary (HU)

Kárpáthegyi [2007a, b] listed in the checklists of Hungarian pseudoscorpions 40 species of 18 genera and eight families. After the checklists [Kárpáthegyi, 2007a, b], four synonymisation were made [Harvey, 2011; Gardini, 2014; Novák, Hörweg, 2017; Harvey *et al*., 2018] and 13 new species records for Hungarian fauna were discovered, one of them was new to science — *Chthonius carinthiacus*, *Mundochthonius carpaticus* and *Chernes similis* [Novák, 2012]; *Neobisium polonicum* [Novák, 2013]; *C. ressli* [Novák, Kutasi, 2014]; *N. brevidigitatum* and *Withius hispanus* [Novák, 2015]; *Diplotemnus balcanicus* [Novák, Harvey, 2015]; *N. noricum* and *N. tothi* [Novák, 2017]; *C. pusillus*, *Ephippiochthonius fuscimanus* and *N.* cf. *minimum* [Novák, 2018]. Beier [1963] reported occurrence of the species *Neobisium crassifemoratum* from Eastern Hungary without concrete locality data. Kárpáthegyi [2007a, b] overlooked this occurrence, and Novák [2012] later added the species into the Hungarian fauna with its first faunistic data.

Only two questionable records of *Neobisium simoni* are known from Hungary [Tömösváry, 1883; Daday, 1918]. Tömösváry [1883] listed *N. simoni* without detailed locality data. Daday [1918] mentioned the locality "Hunyad", which was a county of the Kingdom of Hungary, today in Romanian Transylvania. In addition, the specimens of *N. simoni* have not been found in the Hungarian Natural History Museum (J. Novák, pers. comm.). The occurrence of the species is therefore doubtful and needs to be confirmed.

Summarising all data, 53 species of 20 genera and eight families are documented for Hungary (Tables 1, 2). Type localities of 11 species are situated in Hungary (Table 1). From the faunistic and geographic points of view, two species are interesting: troglobiont *N. slovacum* is endemic to the Slovak-Aggtelek Karst found in Meteor cave [Ducháč, Mlejnek, 2000] and *Chthonius hungaricus* is restricted to inner Western Carpathians and Transylvania [Gardini, 2014].

In the catalogue of Pseudoscorpions of the World [Harvey, 2013b], 46 species of 19 genera and nine families are included. It still includes species that were excluded from Hungarian fauna by Novák [2012] and Harvey *et al*. [2018], i.e. *Geogarypus hungaricus*, *Microbisium manicatum* (L. Koch, 1873), *Neobisium seminudum* (Daday et Tömösváry, 1880), *N. minutum*

(Tömösváry, 1883), *Roncus euchirus* (Simon, 1879) and *Rhacochelifer quadrimaculatus*. In contrast, 13 species are not included (*Chthonius carinthiacus*, *C. pusillus*, *C. ressli*, *Ephippiochthonius fuscimanus*, *Mundochthonius carpaticus*, *Neobisium brevidigitatum*, *N. minimum*, *N. noricum*, *N. polonicum*, *N. tothi*, *Diplotemnus balcanicus*, *Chernes similis* and *Withius hispanus*).

Poland (PL)

The first comprehensive pseudoscorpion catalogue of Poland was published by Rafalski [1967] and includes 39 species from 18 genera and six families. The occurrence of three species was questioned by Rafalski [1967], and they were not listed later in the catalogue of Jędryczkowski [2014]. These questionable species are discussed here. Beier [1936] described *Neobisium vulpinum* Beier, 1936 from Krkonoše, western Sudetenland (a mountain range at present within parts of the Czech Republic and Poland). Beier [1963] later synonymised this species with *Neobisium minutum* (Tömösváry, 1882) and stated that the locality details of the species were erroneous. The next questionable species was *Neobisium jugorum* with distribution in the Tatry Mts. [Rafalski, 1967]. According to Verner [1960], the species was found on Ždiarska Vidla hill situated in the Belianske Tatry Mts. in Slovakia. In the case of the third species, *Neobisium simile*, Rafalski [1967] stated that it was probably a misidentification of *Neobisium muscorum germanicum* Beier, 1931 (actually a synonym of *Neobisium carcinoides*). Only *Mesochelifer ressli* was added to the Poland fauna [Jędryczkowski, 1985].

All above-mentioned changes were summarised in the updated pseudoscorpion list of Poland [Jędryczkowski, 2014]. The present checklist for Poland contains 38 species of 19 genera and six families (Tables 1, 2). Type localities of four species are situated in Poland (Table 1). Two species, *Mundochthonius carpaticus* and *Neobisium polonicum*, belong to Carpathian elements.

In the catalogue of Pseudoscorpions of the World [Harvey, 2013b] the species *N. minutum* and *N. simile* are still listed in Polish fauna, and two species, *Ephippiochthonius fuscimanus* and *Pselaphochernes dubius*, are not included.

Slovenia (SI)

The pseudoscorpion diversity of Slovenia was summarised in the catalogue of Pseudoscorpions of the World [Harvey, 2013b] and included 31 species from seven genera and three families. Including later synonyms of *Chthonius raridentatus* [Gardini, 2014], 29 species are valid. Recently, three new species were recorded for Slovenian fauna: *Ephippiochthonius boldorii*, *E. parmensis* [Gardini, 2013] and *Chthonius pusillus* [Gardini, 2014]. Moreover, based on the correction of type locality stated by Joseph [1882], the species *Neobisium deschmanni* has been added into the Slovenian fauna (see Austria).

Summarising all data, pseudoscorpion diversity of Slovenia consists of 33 species belonging to seven genera and three families (Tables 1, 2). Type localities of 10 species are situated in Slovenia (Table 1). Two rare species occurring in Slovenia, *Roncus jagababa* and *Chernes cavicola*, may be considered as endemic. Within the countries of Central Europe, Slovenia has the lowest species diversity.

Slovakia (SK)

The latest published checklist of Slovakian pseudoscorpions contained 51 species of 21 genera and seven families [Christophoryová *et al*., 2012b]. Two synonymisation were made after that [Gardini, 2014; Novák, Harvey, 2015] and seven species were quoted as new records for Slovakian fauna: *Chthonius carinthiacus* and *Ephippiochthonius tuberculatus* [Christophoryová *et al*., 2011c], *Allochernes powelli* [Christophoryová *et al*., 2011b], *Withius hispanus* [Christophoryová *et al*., 2012a], *Beierochelifer peloponnesiacus* [Krajčovičová, Christophoryová, 2017], *Rhacochelifer euboicus* (misidentified by Krajčovičová *et al*. [2017] with *R. disjunctus* (L. Koch, 1873) and later corrected by Hernández-Corral *et al*. [2018]), and *Allochernes solarii* [Červená *et al*., 2018]. The status of several species: *Chthonius subterraneus*, *Neobisium macrodactylum*, *N. simile*, *Roncus transsilvanicus*, *Rhacochelifer peculiaris* and *R. quadrimaculatus*, remains questionable [Christophoryová *et al*., 2012b], mainly because of no extant specimens available.

Summarising all data, pseudoscorpions in Slovakia are represented by 57 species of 23 genera and eight families (Tables 1, 2); type localities of six species are situated in Slovakia (Table 1). Two rare species occur in Slovakia: the endemic *Neobisium beieri* is known only from the Veľká Fatra Mts. and the troglobiont *Neobisium slovacum* is endemic to the Slovak-Aggtelek Karts, which simultaneously represents the northernmost occurrence of the subgenus *Blothrus* Schiödte, 1847 in Europe [Červená *et al*., 2019]. The following species are considered as the Carpathian elements: *Chthonius hungaricus*, *Mundochthonius carpaticus*, *Neobisium carpaticum*, *N. polonicum*, and *Roncus transsilvanicus*. Three species may be introduced: *Diplotemnus balcanicus*, *Beierochelifer peloponnesiacus* and *Rhacochelifer euboicus*.

The catalogue of Pseudoscorpions of the World [Harvey, 2013b] still contains species that were either synonymised (*Chthonius ksenemani*, *Diplotemnus insolitus*) or excluded from the pseudoscorpion fauna of Slovakia (*Roncus alpinus*, *Pselaphochernes dubius*) [Christophoryová *et al*., 2012b; Gardini, 2014]. On the other hand, four species — *Beierochelifer pelopponesiacus*, *Rhacochelifer euboicus*, *Allochernes solarii*, *Withius hispanus* — are not included.

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