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Catalogue of the pseudoscorpions (Pseudoscorpiones) in František Miller's collection (Department of Zoology, National Museum, Prague)

František Šťáhlavský & Petr Dolejš

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Abstract. The present catalogue lists data for a total of 176 specimens belonging to 18 species in the pseudoscorpion collection of the Czech arachnologist František Miller (1902–1983), housed in the National Museum in Prague. The material was collected during 1940–1976 in the modern-day Czech Republic and Slovakia. For these two countries, especially noteworthy items are species such as *Mesochelifer ressli*, *Rhacochelifer euboicus*, *Neobisium brevidigitatum* and *Neobisium* cf. *jugorum*.

Keywords: Arachnological collection, Bohemia, faunistics, historical records, Moravia, Slovakia

Zusammenfassung. Katalog der Pseudoskorpione (Pseudoscorpiones) in František Millers Sammlung (Abteilung für Zoologie, Nationalmuseum Prag). Im vorliegenden Katalog werden Daten von 176 Exemplaren aus 18 Arten aus der Pseudoskorpion-Sammlung des tschechischen Arachnologen František Miller (1902–1983) aus dem Nationalmuseum in Prag aufgelistet. Das Material wurde im Zeitraum 1940–1976 in den heutigen Ländern Tschechische Republik und Slowakei gesammelt. Für diese beiden Länder sind die Nachweise folgender Arten besonders bemerkenswert: *Mesochelifer ressli*, *Rhacochelifer euboicus*, *Neobisium brevidigitatum* und *Neobisium* cf. *jugorum*.

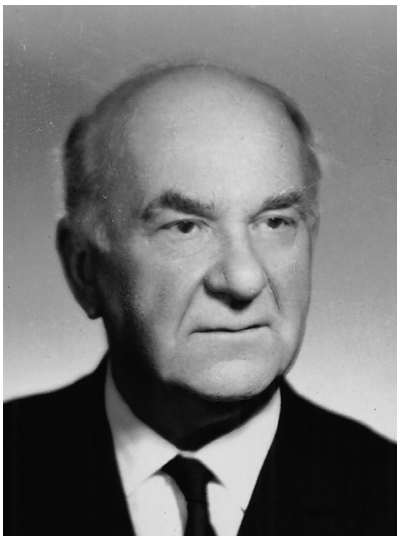


Fig. 1: Prof. RNDr. František Miller, DrSc. (1902–1983) (personal archive of Jan Buchar)

Professor RNDr. František Miller, DrSc. (Fig. 1) was born in Kročehlavy near Kladno on 27 January 1902. After graduating at the Faculty of Science of the Charles University in Prague, he started to teach at secondary schools in the Slovak towns of Štubnianske (today Turčianske) Teplice (1929) and Žilina (1939), and in the Czech town of Jindřichův Hradec (1939). He became director of the secondary school in the small Czech town of Soběslav during the Second World War. In 1947, he obtained his habilitation at the University of Agriculture in Brno and worked there until his death on 14 January 1983 (Buchar 1997).

During his fruitful life (65 published papers), Miller primarily studied spiders of the family Linyphiidae (Buchar 1997). As formalin pitfall traps and sieving belong to the most important collecting methods in arachnology, Miller's material also contains other soil or epigean invertebrates, including pseudoscorpions. The majority of the material was collected in the surroundings of Miller's places of work. His large private collection was purchased by the National Museum in Prague, Czech Republic, from Miller's widow, Jarmila Millerová, in 1983 and deposited in the Department of Zoology of this Museum under accession numbers 100/83 and 103/83 (e.g., Kůrka 1994, Dolejš & Kůrka 2013, Kocourek & Dolejš 2016, Dolejš & Tuf in press). Beside spiders, the collection also contained unsorted material of other invertebrates obtained together with spiders: harvestmen, pseudoscorpions, mites, centipedes, millipedes, isopods, etc. In this paper, we present a review of the pseudoscorpions (Pseudoscorpiones) found in the Miller's collection. It contains 176 specimens, representing 18 species in five families. The collection contains historical records of particular value for faunistic purposes (Krajčovičová et al. 2017).

The pseudoscorpion collection of the National Museum contains specimens preserved in ethanol, as well as some dry specimens. Most of the spirit material was collected by the former curator, Dr. Antonín Kůrka, from the Czech Republic and during inventory research in the newly established Brdy Protected Landscape Area (Just et al. 2018). Further recent material was collected during expeditions of the Department of Entomology to the Dominican Republic, New Zealand, Puerto Rico and South Africa. The historical material (dry specimens and a few spirit specimens) comes from various destinations: besides the former Czechoslovakia (including the southwestern part of modern Ukraine), these include the Balkan Peninsula, Brazil, Italy and Mexico. Miller's collection is thus an important part of the pseudoscorpion collection of the National Museum.

Material and methods

All pseudoscorpion specimens are maintained in 80% ethanol. Almost all of them (with the exceptions of *Rhacochelifer euboicus*) were sexed and identified by the first author, using Christophoryová at al. (2011). Families are sorted systematically; genera and species are sorted alphabetically according to nomenclature used in Harvey (2013).

The data are arranged as follows: locality – (number of mapping grid square) – date of collection – number and sex of specimens – (inventory number).

The present administrative divisions of Europe are used. Within the Czech Republic, the historical regions of Bohe-

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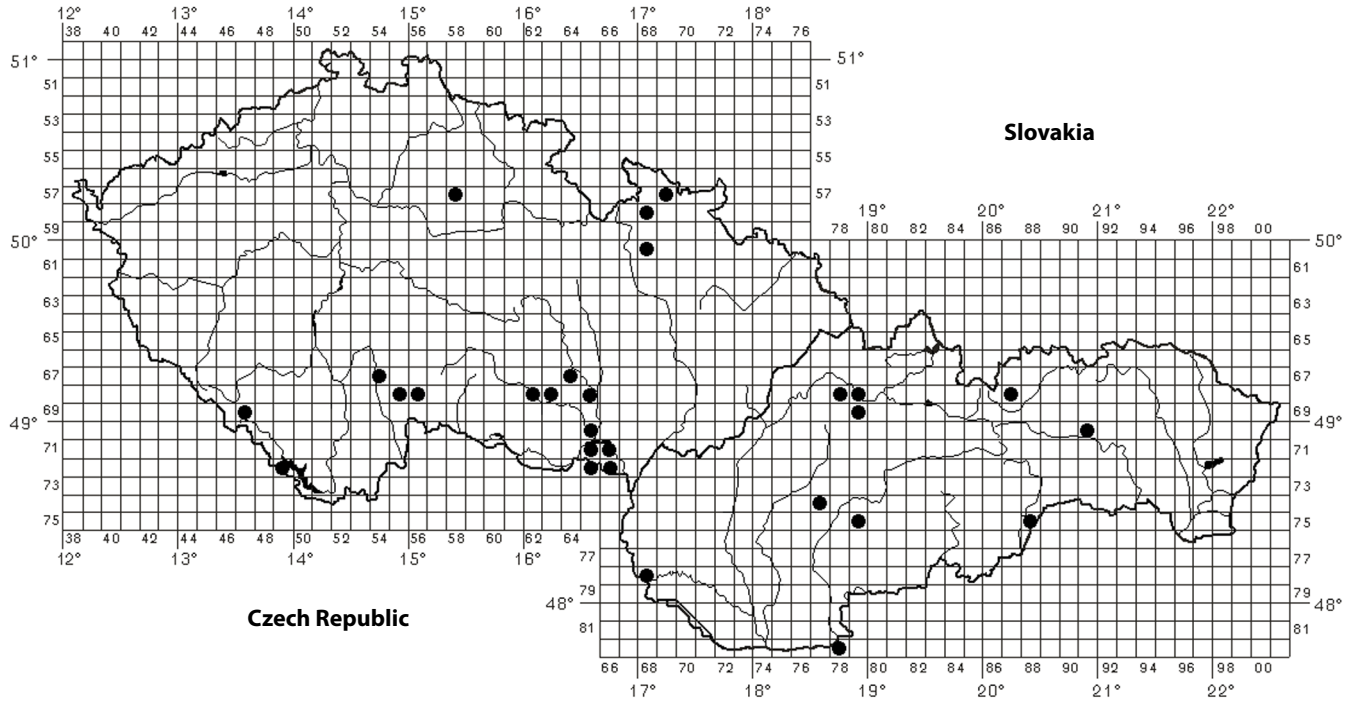


Fig. 2: Map of localities where Miller collected pseudoscorpions

mia and Moravia are recognized following Kment (2009). The geographic position of localities (Fig. 2) is given by grid squares after Buchar (1982) and, in the case of Czech settlements, after Pruner & Míka (1996).

Images of selected specimens were made using an Olympus SZX12 stereomicroscope equipped with an Olympus E-510 or DP70 camera, and processed using the QuickPHOTO MICRO 2.3 (Promicra) software including the module Deep Focus 3.2.

Abbreviations:

D = deutonymph, P = protonymph, T = tritonymph.

Systematic list

Chthoniidae Daday, 1889

***Chthonius heterodactylus* Tömösváry, 1883**

No collecting data: 1 ♀ (P6d-342/2006).

***Ephippiochthonius tetrachelatus* (Preyssler, 1790)** (Fig. 3)

SLOVAKIA: Štúrovo (8278), 10. Jun. 1956, 1 ♀ (P6A 6816).

Neobisiidae Chamberlin, 1930

***Neobisium brevidigitatum* (Beier, 1928)** (Fig. 4)

SLOVAKIA: Vysoké Tatry Mts., Aug., 2 ♂♂, 1 ♀ (P6A 6817).

***Neobisium carcinoides* (Hermann, 1804)**

CZECH REPUBLIC: **Bohemia**: Kvilda, at base of *Betula* sp. (6947), 6. Oct. 1960, 3 ♂♂, 2 ♀♀ (P6A 6818); **Moravia**: Pálava (7165–7266), 10. May 1956, 1 ♂ (P6A 6819); Pavlov (7165–7166), Aug. 1948, 1 ♂ (P6A 6820); Rejvíz (5769), 1 ♂, 1 ♀, 4 TT (P6A 6846); Skřítek Peatbog (6068), 2 ♀♀ (P6A 6847).

SLOVAKIA: Bratislava (7868), 1 ♀, 1 T (P6A 6821); Vysoké Tatry Mts., Aug., 14 ♂♂ (P6A 6822).

No collecting data: 1 ♂, 5 ♀♀ (P6d-342/2006).



Fig. 3: *Ephippiochthonius tetrachelatus*, female (P6A 6816)



Fig. 4: *Neobisium brevidigitatum*, female (P6A 6817)

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***Neobisium carpaticum* Beier, 1935**
SLOVAKIA: Malá Fatra Mts. (7868), Aug. 1948, 2 ♂♂, 2 ♀♀ (P6A 6823).

***Neobisium crassifemoratum* (Beier, 1928)**
No collecting data: 1 ♂, 2 ♀♀ (P6d-342/2006).

***Neobisium erythrodactylum* (L. Koch, 1873)**
CZECH REPUBLIC: **Moravia**: Jeseník (5769), Jun., 1 ♂, 1 ♀ (P6A 6824); Jinošovice Rock, in grass at forest margin (6862), 13. Sep. 1940, 2 ♂♂, 1 ♀, 1 D (P6A 6825); Pálava (7165–7266), 5. May 1956, 1 ♀ (P6A 6826), 10. May 1956, 1 ♀ (P6A 6827); Rejvíz (5769), 11 ♂♂, 8 ♀♀, 3 TT (P6A 6848).
SLOVAKIA: Banská Štiavnica, on *Abies* sp. (7579), Jun. 1956, 1 ♀ (P6A 6828); Beluj (7679), 25. Mar. 1955, 1 T, leg. Patočka (P6A 6829); Turie (6878), Aug., 1 ♀ (P6A 6830).

***Neobisium fuscimanum* (C. L. Koch, 1843)**
CZECH REPUBLIC: **Bohemia**: Pernek (7249), 30. Jul. 1956, 1 ♂, 2 ♀♀ (P6A 6831); **Moravia**: Pavlov (7165–7166), Aug. 1948, 1 ♀ (P6A 6832); Skřítek (6068), 1 ♂ (P6A 6849).
No collecting data: 1 ♀ (P6d-342/2006).

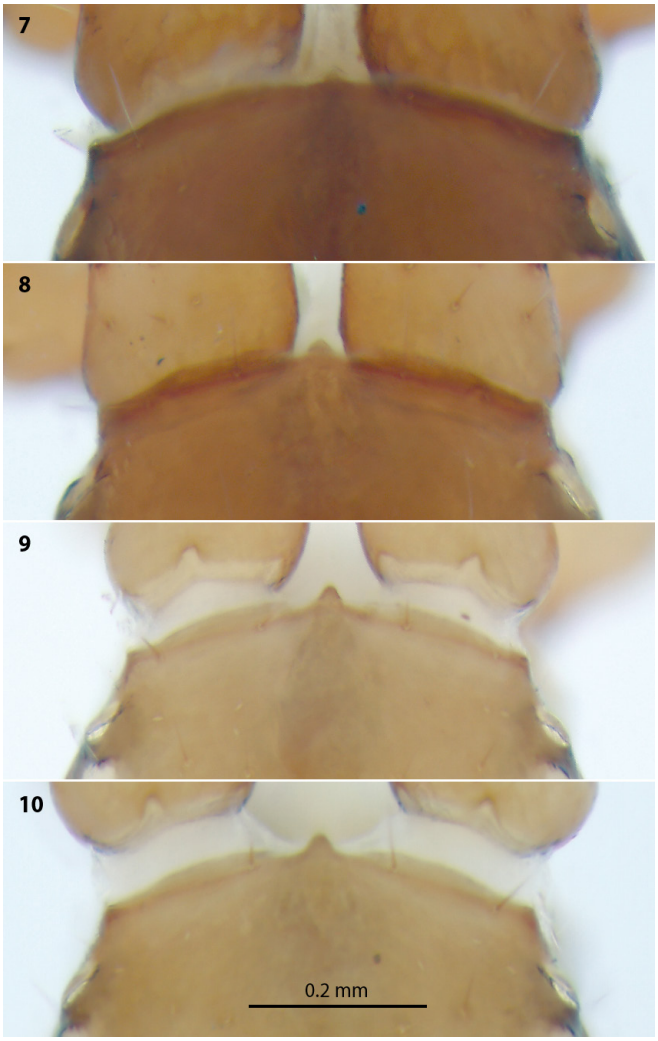
***Neobisium* cf. *jugorum* (L. Koch, 1873)** (Figs 5-10)
SLOVAKIA: Modré pleso Lake, 2200 m a.s.l. (6887), 12. Apr. 1948, 3 ♂♂, 1 ♀ (P6A 6833); unknown, 4 ♀♀ (P6d-342/2006).



Fig. 5: *Neobisium* cf. *jugorum*, female (P6A 6833)



Fig. 6: *Neobisium* cf. *jugorum*, male (P6A 6833)



Figs 7-10: Epistomes of *Neobisium* cf. *jugorum* (P6A 6833), female (**7**) and males (**8-10**)

***Neobisium sylvaticum* (C. L. Koch, 1835)**
CZECH REPUBLIC: **Bohemia**: Blata, 3. Apr. 1948, 1 ♀ (P6A 6834); Jindřichův Hradec (6855–6856), 1 ♀ (P6A 6835); Říčky (6764), Oct., 1 ♂ (P6A 6836); **Moravia**: Bobrava Valley (6865), 30. Sep., 1 ♂ (P6A 6837); Jeseníky Mts., Jul. 1956, 1 ♂, 1 ♀ (P6A 6838); Pouzdřany (7065), 15. Oct. 1966, 13 ♀♀ (P6A 6839); Skřítek Peatbog (6068), 1 T (P6A 6840); **Unknown**: Račice, Nov., 6 ♂♂, 2 ♀♀ (P6A 6841).
SLOVAKIA: Vrútky (6879), IX, 1 ♀ (P6A 6842).
No collecting data: 5 ♂♂, 6 ♀♀, 3 TT (P6d-342/2006).

Cheliferidae Risso, 1827
***Chelifer cancroides* (Linnaeus, 1758)**
CZECH REPUBLIC: **Moravia**: Brno, in house, 19. Dec. 1964, 1 ♀ (P6A 6843); Mohelno (6863), Jun. 1940, 1 ♀ (P6A 6803); Šerák Mt. (5868), 5. Aug. 1946, 1 ♀ (P6A 6804).
Unknown: locality H-138/65, 1 T (P6A 6805).
No collecting data: 3 ♂♂, 2 ♀♀ (P6d-342/2006).

***Dactylochelifer latreillii* (Leach, 1817)**
CZECH REPUBLIC: **Moravia**: Lednice (7266), 10. Jul. 1958, 1 ♀ (P6A 6806).
SLOVAKIA: Bratislava, nest of *Turdus merula* (7868), 11. May 1961, 1 ♂, 1 D (P6A 6807), 1 ♀ (P6A 6808); Domica (7588), 10. May, 1 ♂ (P6A 6809).

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Unknown: locality H-173/65, 2 ♂♂ (P6A 6810).
No collecting data: 1 ♀ (P6d-342/2006).

***Mesochelifer ressli* Mahnert, 1981** (Fig. 11)
CZECH REPUBLIC: **Moravia**: Mohelno (6863), 10. Jul. 1958, 1 ♀ (P6A 6844).

***Rhacochelifer euboicus* Mahnert, 1977** (det. K. Krajčovičová)
SLOVAKIA: Kľak, on *Abies* sp. (7477), May 1957, 3 ♀♀ (P6A 6386), in forest, 25. Mar. 1958, 12 ♂♂, 8 ♀♀, 1 P, 3 TT (P6A 6387); Richnava, on *Abies* sp. (7091), 30. Jul. 1959, 5 ♂♂, 2 ♀♀ (P6A 6388); Banská Štiavnica (7579), 13. May , 2 ♂♂, 1 ♀ (P6A 6389). These records were previously published by Krajčovičová et al. (2017).

Chernetidae Menge, 1855
***Chernes hahnii* (C. L. Koch, 1839)**
CZECH REPUBLIC: **Moravia**: Bílovice, on *Platanus* sp., 20. May , 4 ♂♂, 1 ♀ (P6A 6812); Bobrava Valley (6865), 4. May , 1 ♂ (P6A 6845); Lednice (7266), 1. Jun., 3 ♂♂, 1 ♀, 1 T (P6A 6813).

***Chernes similis* (Beier, 1932)** (Fig. 12)
SLOVAKIA: Domica (7588), 10. May, 1 ♂ (P6A 6811).

***Lamprochernes nodosus* (Schrank, 1803)**
CZECH REPUBLIC: **Bohemia**: Nový Bydžov, in a flat (5758), 4. Oct. 1976, 1 ♀ (P6A 6814); Soběslav (6754), Apr. 1946, 3 ♀♀ (P6A 6815).

Atemnidae Kishida, 1929
***Atemnus politus* (E. Simon, 1878)** (Fig. 13)
SLOVAKIA: Štúrovo (8278), 10. Jun. 1956, 1 ♀ (P6A 6802).



Fig. 11: *Mesochelifer ressli*, female (P6A 6844)



Fig. 12: *Chernes similis*, male (P6A 6811)



Fig. 13: *Atemnus politus*, female (P6A 6802)

Discussion

The material of pseudoscorpions from the collection of Prof. Miller forms a significant part of this order housed in the National Museum in Prague. Given that the main collecting methods used were formalin pitfall traps and sieving, it is not surprising that half of Miller's samples contain representatives of the family Neobisiidae, which are closely associated with the soil. This material includes the species *Neobisium carcinoides*, which is one of the most widespread European species (Harvey 2013) and one of the most abundant pseudoscorpions inhabiting leaf litter in Central Europe (e.g. Christophoryová et al. 2007, Šťáhlavský & Chytil 2013, Muster & Blick 2015). Among the other neobisiid species in Miller's collection are *Neobisium erythrodactylum*, *Neobisium fuscimanum* and *Neobisium sylvaticum*, from several localities. These species have been mentioned in many faunistic papers on the Czech Republic and Slovakia (see Christophoryová et al. 2012) and they seem to be typical for the leaf litter in Central Europe. The most interesting material of the genus *Neobisium* in the collection is that of the species *N. brevidigitatum* and *N.* cf. *jugorum*. *Neobisium brevidigitatum* was described from Romania (Beier 1928) and later recorded from Georgia, Poland and Slovakia (see Harvey 2013). Although detailed collecting information is lacking for the material from the High Tatra Mountains, it confirms the presence of this species in the Western Carpathians, which was previously mentioned only from Great Fatra (Krumpál 1980) and, with doubt, from the Pienin Mountains (Rafalski 1967). The specimens of *N.* cf. *jugorum* from Modré pleso Lake in the High Tatra Mountains provide an additional record of this species from the Carpathians that was already recorded by Verner (1960) from these mountains. However, Miller's specimens from one locality show variability in the shape and size of the epistome from none in the female to sharp pronounced in some males (see Figs 7-10). All other characteristics correspond to the

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features typical to *N. jugorum* (e.g. Beier 1963). The fauna of the family Neobisiidae is still not well known from the Carpathian region and preliminary cytogenetic results indicate existence of additional taxa in this region (e.g. Šťáhlavský et al. 2012). The pronounced difference in the epistomes between males and females is not mentioned in this species and we cannot exclude the possibility that Miller's material represents in fact a new species with distinct sexual dimorphism.

Miller collected several pseudoscorpion species a long time before the final published records for the Czech or Slovak Republics. For example, his collection of *Atemnus politus* (Atemnidae) in 1956, close to Štúrovo, predates that of the female collected in 1974 in the same area that served to establish the presence of this species in Slovakia (Krumpálová & Krumpál 1993). Miller's specimens of *Rhacochelifer euboicus* (Cheliferidae) were also the first to be collected in Slovakia and his abundant material enabled the description of the variability of morphological characteristics (Krajčovičová et al. 2017) from populations situated at the northern limit of its distribution (Hernández-Corral et al. 2018). Among the rare species (in the Czech Republic and Slovakia) in the Miller's collection belongs also *Mesochelifer ressli*, a species usually found under the bark of the trees (e.g. Šťáhlavský & Chytil 2013).

It is evident that Miller's collection includes valuable material and provides important historical records for pseudoscorpions in the Czech Republic and Slovakia.

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