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# *Apocheiridium ferum* (Simon, 1879) (Arachnida, Pseudoscorpiones, Cheiridiidae), a newly recorded genus and species of pseudoscorpion for Hungary

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## Abstract

The genus *Apocheiridium* Chamberlin, 1924 is reported from Hungary for the first time. Adults of *Apocheiridium ferum* (Simon, 1879) were collected under the bark of a *Platanus* Linné, 1753 tree in Pápa, Veszprém County. Simultaneously, the second known European cheiridiid species, *Cheiridium museorum* (Leach, 1817), was found under the same bark. The differences between these two species are discussed. With the new record of *A. ferum*, 54 species and 21 genera are now known for the Hungarian fauna of Pseudoscorpiones.

## Keywords

Central Europe, *Cheiridium museorum*, distribution, faunistics, first record.

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## Introduction

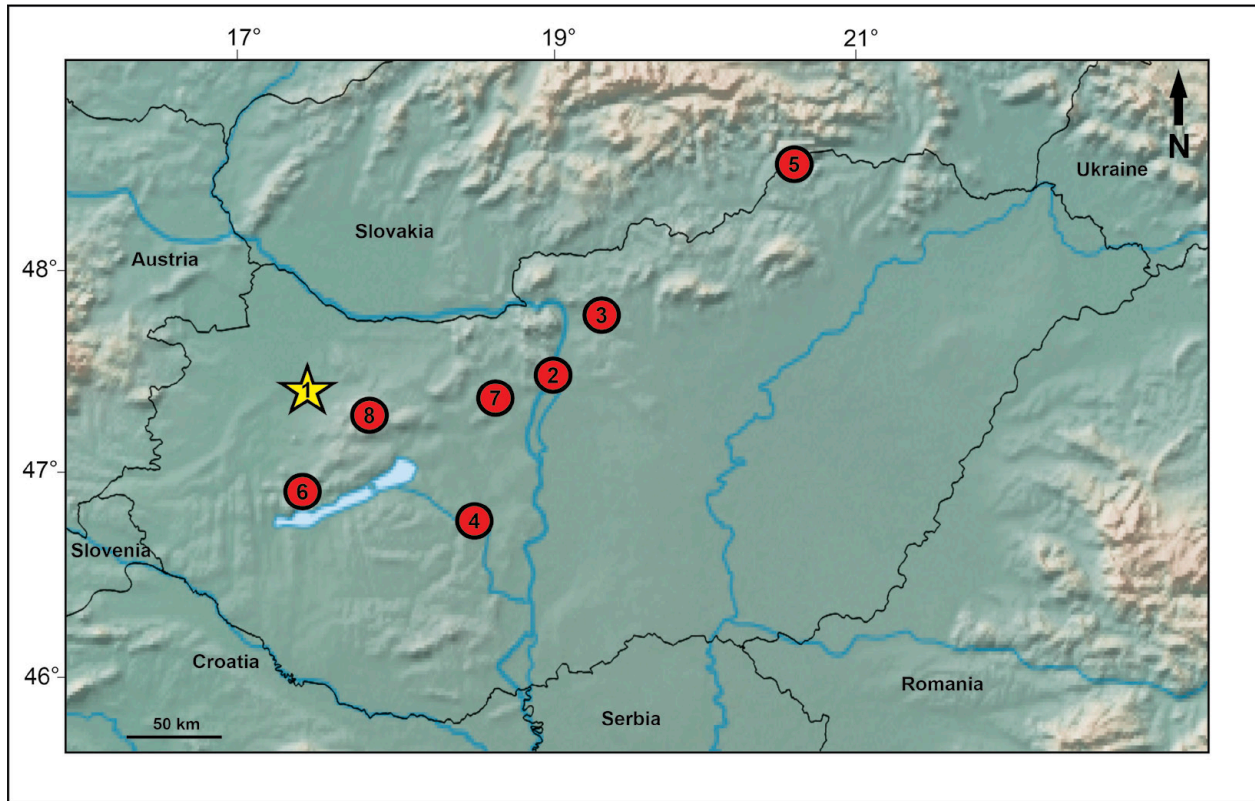
The family Cheiridiidae contains two subfamilies, Cheiridiinae with six genera (including one fossil genus) and Pycnocheiridiinae with two genera (Harvey 2013). Many genera of the subfamily Cheiridiinae are widely distributed, e.g. *Apocheiridium* Chamberlin, 1924, *Cheiridium* Menge, 1855, *Cryptocheiridium* Chamberlin, 1931, and *Neocheiridium* Beier, 1932 are known from multiple continents. The genus *Nesocheiridium* Beier, 1957 is restricted to the western Pacific region (Harvey 2013). In Central Europe, two species, *Apocheiridium ferum* (Simon, 1879) and *Cheiridium museorum* (Leach, 1817), have a wide geographical distribution. *Apocheiridium ferum* lives mainly under the bark of trees, while *C. museorum* is a synanthropic species and often found in

bird nests (e.g. Beier 1963). Regardless of the present record, the Hungarian pseudoscorpion fauna includes 53 species belonging to 20 genera and eight families (Harvey 2011, 2013; Novák 2012, 2013a, 2015, 2017, 2018; Novák and Kutasi 2014; Novák and Harvey 2015; Harvey et al. 2019). The current finding of *A. ferum* represents the first record of the genus and the species for the Hungarian fauna. *Cheiridium museorum* has previously been found in various synanthropic habitats distributed around different localities in Hungary (Tömösváry 1883; Pillich 1914; Szalay 1968; Kárpáthegeyi 2007; Novák 2013b, 2015, 2018). The aims of this work are to i) present the first known occurrence of *A. ferum* in Hungary, ii) compare the main morphological characteristics of both recorded cheiridiid species, and iii) show the distribution patterns of both species in Hungary.

## Methods

Adults of *Apocheiridium ferum* (15 females, 10 males) were collected individually, using tweezers, from be-

neath the bark of a *Platanus occidentalis* L. tree in Várkert-Castle Park, Pápa (Figs 1, 2). The specimens were preserved in 95% ethanol and identified using the Zeiss Stemi 2000 stereomicroscope and the identification key



**Figure 1.** Distribution of *Apocheiridium ferum* (yellow star = new locality) and *Cheiridium museorum* (yellow star = new locality, red circles = previous records) in Hungary. 1: Pápa, Várkert-Castle Park, 47.3332°S, 017.4659°W (new locality). 2: Budapest, 47.4719°S, 019.0503°W (Tömösváry 1883). 3: Püspökatvan, 47.7667°S, 019.3667°W (Novák 2013). 4: Simontornya, 46.7539°S, 018.5475°W (Pillich 1914). 5: Szin, Szelcepuszta, Aggtelek National Park, 48.5198°S, 20.6041°W (Novák 2018). 6: Tapolcza, 46.8825°S, 017.43667°W (Tömösváry 1883). 7: Vál, 47.3637°S, 018.6753°W (Kárpáthe gyi 2007). 8: Zirc, 47.2654°S, 017.8662°W (Novák 2015).



**Figure 2.** Habitat of *Apocheiridium ferum* and *Cheiridium museorum* in Hungary. **A.** *Platanus occidentalis* in Várkert-Castle Park. **B.** Silk chambers under the tree bark.

by Christophoryová et al. (2011b). Digital photographs were taken using a Canon EOS 5D Mark II camera attached to a Zeiss Axio Zoom V16 stereomicroscope. Image stacks were produced manually, combined using the Zerene Stacker software and subsequently edited in Adobe Photoshop CC. The material of *A. ferum* is deposited in the Naturhistorisches Museum Wien in Austria (NHMW 29198; curator: Christoph Hörweg). *Cheiridium museorum* (2 females) (Figs 1, 2) was found together with *A. ferum*. The specimens of *C. museorum* are deposited in the zoological collection at the Department of Zoology, Comenius University in Bratislava (PK 13/28; curator: Jana Christophoryová).

## Results

**New record.** Hungary: Veszprém County, Pápa, Várkert-Castle Park, 47.3332°S, 017.4659°W, 148 m a.s.l., (Fig. 1); Christophoryová Jana leg.; 27 October 2019; under bark of *Platanus occidentalis* (Fig. 2A); 15 females, 10 males (NHMW 29198).

**Identification.** Cheiridiid species have a small body size (length ca 1 mm), and their integument is strongly granulated (Fig. 3). Abdominal tergites are divided (Fig. 3A, B). Vestitural setae are short and denticulate. They have a triangular carapace, with cuculus and two small eyes distinctly removed from the anterior carapace margin (Fig. 3). Pedipalps are granulated (Fig. 3), and the number of trichobothria is reduced (Beier 1963; Christophoryová et al. 2011b). The two known genera from Central Europe are easily recognised and differ in four main characters. The first character is the number of trichobothria on the movable chelal finger (1 in *Apocheiridium ferum* and 2 in *Cheiridium museorum*). The second is the shape of the palpal segments, with the most marked one being the palpal femur (in *A. ferum*, the palpal femur is widened basally (Fig. 3C), whereas it is not widened in *C. museorum* (Fig. 3D)). The third is the number of visible tergites from above (11 in *A. ferum* (Fig. 3A) and 10 in *C. museorum* (Fig. 3B)). The last characteristic is visible on the carapace (*A. ferum* has a carapace without humeral angles (Fig. 3C), while *C. museorum* has humeral angles on the carapace (Fig. 3D) (Beier 1963; Christophoryová et al. 2011b). For more detailed characteristics see Nassirkhani (2015).

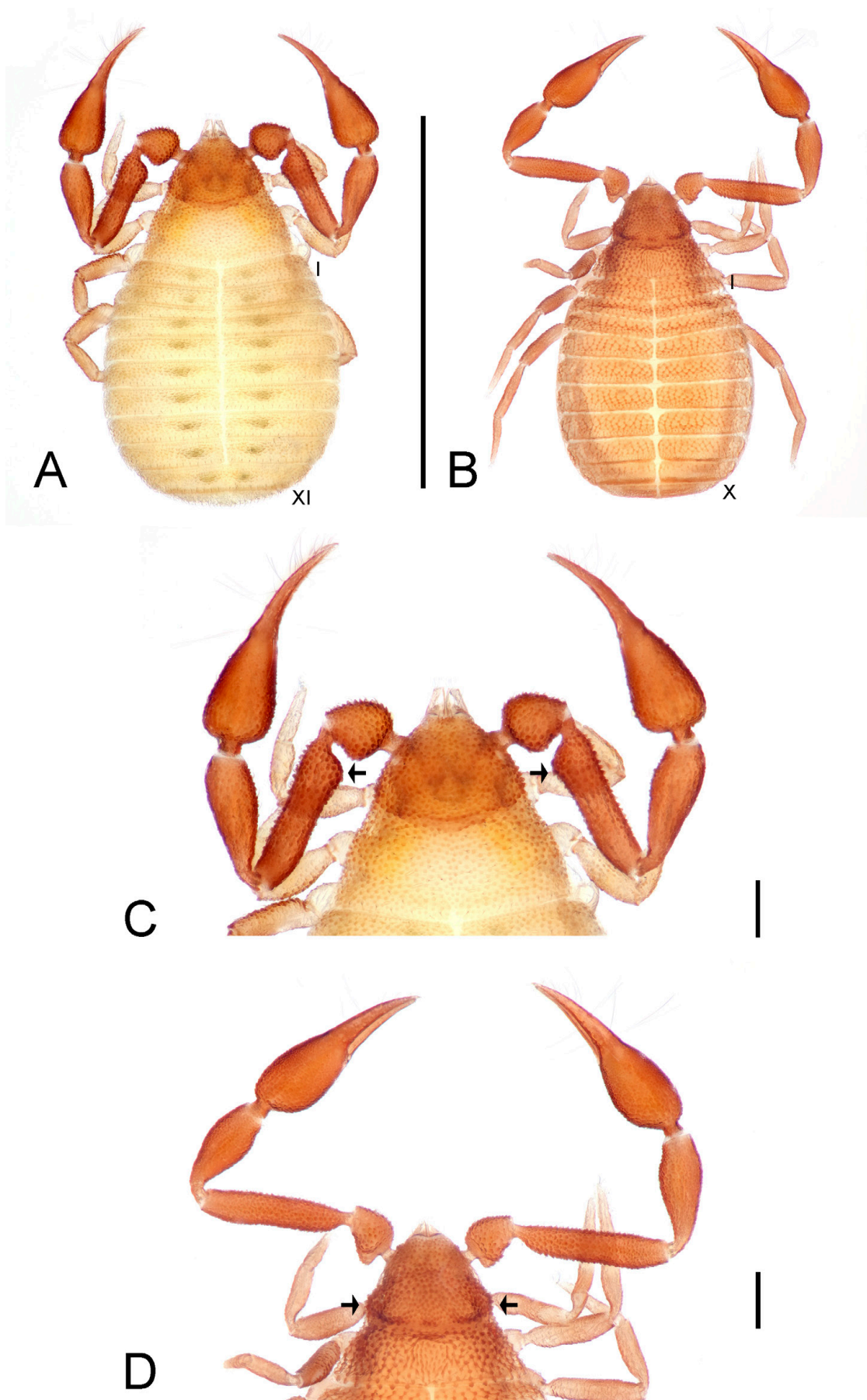
## Discussion

*Apocheiridium ferum* is mainly a European species and its distribution reaches Turkey, Azerbaijan, Iran, and Uzbekistan (Harvey 2013; Nassirkhani 2015; Fig. 4). Its type locality is in France (Simon 1879) (Fig. 4). In Central Europe, the species' occurrence has not been reported until now from Hungary, Slovakia, and Slovenia. The present record from Hungary adds to the

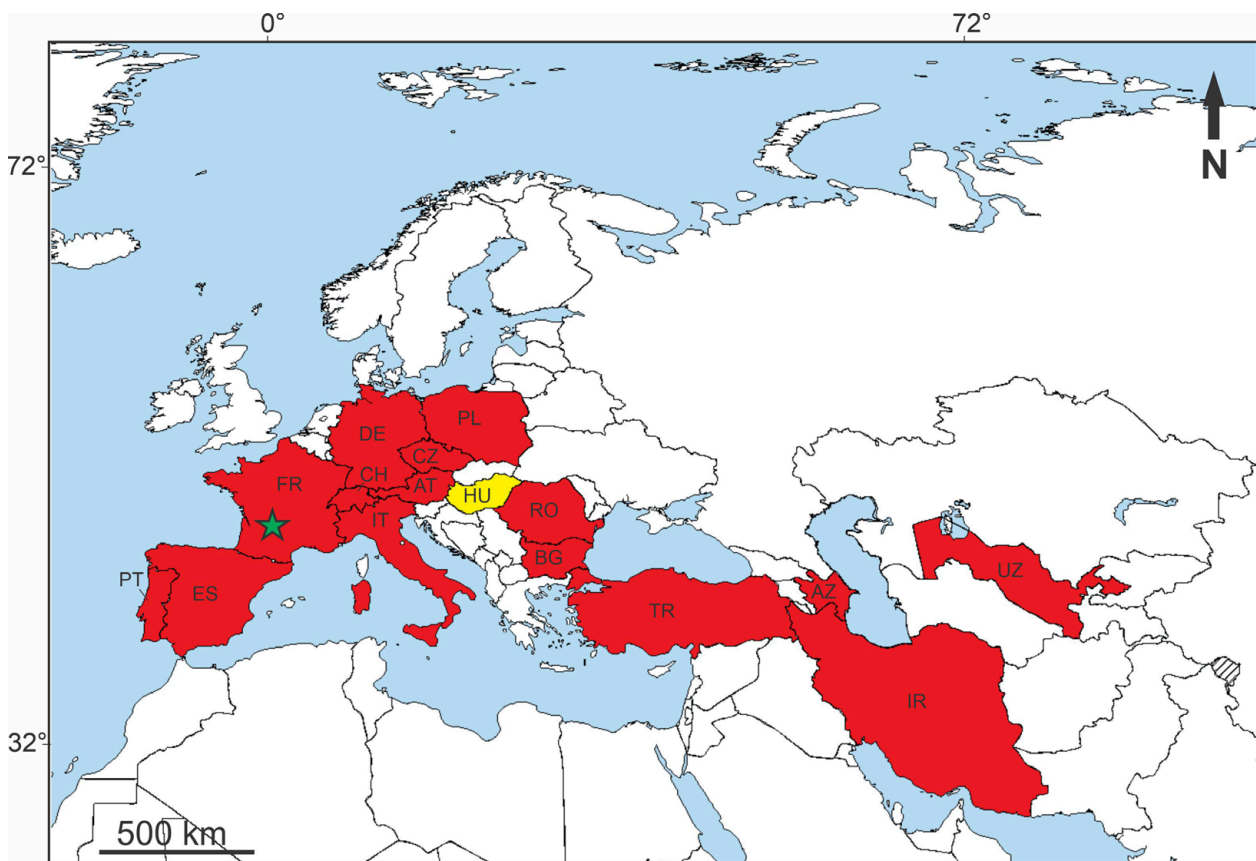
distribution data about the species in Central Europe. The occurrence of both known cheiridiid species in Hungary is shown in Figure 1. Findings of *Cheiridium museorum* together with *A. ferum* at the same locality represent a new locality of its occurrence in Hungary. Summarizing all data, *C. museorum* is known from eight localities in Hungary (Fig. 1) (Tömösváry 1883; Pillich 1914; Szalay 1968; Kárpáthegyí 2007; Novák 2013b, 2015, 2018). The comparison of both species was done not only because of their similar diagnostic characteristics but also because they were collected together from underneath the bark of the same tree. Both species differ in their habitat preferences. *Cheiridium museorum* occurs in synanthropic habitats, such as houses, shops, barns, grain-stores, and stables, as well as in the nests of domestic birds, such as house sparrows, pigeons, barn swallows, and house martins (e.g. Beier 1963; Legg and Jones 1988; Christophoryová 2010; Christophoryová et al. 2011a, 2017). The species is quite common and probably widespread in countries of its distribution, but might be overlooked because of its small size (Legg and Jones 1988); it is the book-scorpion of Aristotle (Legg and Jones 1988). The published findings of *C. museorum* from Hungary correspond with the known ecological preferences of the species, e.g. it was collected from a fowl-house (Kárpáthegyí 2007), an owl pellet and bat guano in a church tower (Novák 2013b), a house (Novák 2015), and a horse stable (Novák 2018). On the contrary, *A. ferum* commonly lives under the bark of different trees. Noticeably, this species could be found in greater numbers under the dry bark of trees in autumn and winter months (e.g. Beier 1963; Droglá and Lippold 2004; Machač et al. 2018; Novák et al. 2019). Interestingly, both species were found together under the tree bark. Many individuals were observed, and only some of them were collected. The presence of cheiridiids is documented by their typical silk chambers (Fig. 2B). Summarizing all results, there are three first records from Hungary reported herein: i) first record of both species in the same habitat type, ii) first record of *C. museorum* under a tree bark, and iii) first record of *Apocheiridium* and *A. ferum* in Hungary. According to the new record, there are currently 54 known species and 21 genera in the Hungarian fauna of Pseudoscorpiones.

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**Figure 3.** Some morphological characteristics of *Apocheiridium ferum* and *Cheiridium museorum*. **A.** Female of *A. ferum* with numbered tergites (scale bar = 1 mm). **B.** Female of *C. museorum* with numbered tergites (scale bar = 1 mm). **C.** Details of carapace and pedipalps of *A. ferum*, arrows point to the shape of palpal femur (scale bar = 0.1 mm). **D.** Detail of carapace and pedipalps of *C. museorum*, arrows point to humeral angles (scale bar = 0.1 mm).



**Figure 4.** Distribution of *Apocheiridium ferum* in Europe, the Caucasus, the Middle East, and Central Asia (red fill = published distribution, yellow fill = new distribution in Hungary). Green star = type locality in France.

## Authors' Contributions

JCH collected the specimens; JCH and MČ identified and photographed the specimens. JCH wrote the manuscript. Both authors discussed the results and contributed to the final version of the manuscript.

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