

## NEW RECORDS OF CHERNETID AND CHELIFERID SPECIES (ARACHNIDA: PSEUDOSCORPIONES) FROM NORTH MACEDONIA

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Three pseudoscorpion species from the families Cheliferidae and Chernetidae, *Hysterochelifer tuberculatus* (Lucas, 1849), *Allochernes bulgaricus* Hadži, 1939 and *Chernes hahnii* (C. L. Koch, 1839), are new for the pseudoscorpion fauna of North Macedonia. North Macedonia is the second known country of the distribution of *A. bulgaricus* in Europe.

**Key words:** Balkans, Cheliferidae, Chernetidae, distribution, faunistics, new records

Červená, M., Selnekovič, D. & Christophoryová, J.: Novi nalazi vrsta lažištipavaca (Arachnida: Pseudoscorpiones) iz Sjeverne Makedonije. *Nat. Croat.*, Vol. 30, No. 1, 251–256, 2021, Zagreb

Tri vrste lažištipavaca iz porodica Cheliferidae i Chernetidae, *Hysterochelifer tuberculatus* (Lucas, 1849), *Allochernes bulgaricus* Hadži, 1939 i *Chernes hahnii* (C. L. Koch, 1839), nove su za faunu lažištipavaca Sjeverne Makedonije. Sjeverna Makedonija je druga poznata europska zemlja u kojoj obitava *A. bulgaricus*.

**Ključne riječi:** Balkan, Cheliferidae, Chernetidae, rasprostranjenost, faunistika, novi nalazi

### INTRODUCTION

The pseudoscorpion fauna of North Macedonia previously consisted of 48 species from five families (ČURČIĆ *et al.*, 2004; HARVEY, 2013b; CHRISTOPHORYOVÁ & JABLONSKI, 2018; GARDINI, 2020). Most of these species belongs to the families Neobisiidae (23 species) and Chthoniidae (18 species) indicating that research on pseudoscorpions in the country was focused mainly on the soil or subterranean habitats (ČURČIĆ *et al.*, 2004; HARVEY, 2013b; GARDINI, 2020). Many chthoniid and neobisiid species are considered to be endemic (ČURČIĆ *et al.*, 2009; 2011). There was little research interest in pseudoscorpions from tree microhabitats, synanthropic habitats, compost heaps, dead wood, or nests, in which chernetid or cheliferid species are the typical inhabitants. From the family Chernetidae, the species *Allochernes balcanicus* Hadži, 1938, *Chernes similis* (Beier, 1932) and *Lamprochernes chyzeri* (Tömösváry, 1883) were documented (HARVEY, 2013b; CHRISTOPHORYOVÁ & JABLONSKI, 2018). Three species were known from the family Cheliferidae – *Chelifer cancroides* (Linnaeus, 1758), *Hysterochelifer meridianus* (L. Koch, 1873) and *Rhacochelifer maculatus* (L. Koch, 1873) (HARVEY, 2013b). One species of Atemnidae, *Atemnus politus* (Simon, 1878) was recorded by ČURČIĆ *et al.* (2004).

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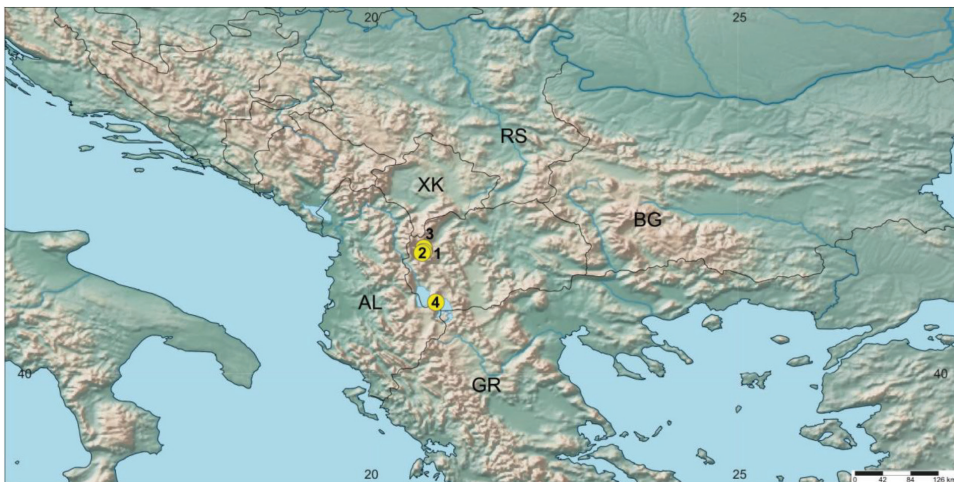
The aim of this study is to present new findings of chernetid and cheliferid species of pseudoscorpions from the western part of North Macedonia.

## MATERIAL AND METHOD

In all, 25 specimens of pseudoscorpions were collected in North Macedonia during two field trips in 2018 and 2019 at four localities situated in the western part of the country (Fig. 1). Pseudoscorpions were found in two natural habitats: leaf litter and tree bark. Specimens under tree bark and from leaf litter were sampled individually using forceps but a sample of leaf litter was sifted first. Specimens were studied as temporary slide mounts using lactic acid for clearing. After the study, they were first rinsed in water and then returned to 75% ethanol. Some specimens remained in 95% ethanol without mounting. All specimens were examined using a Zeiss Stemi 2000 stereomicroscope; for identification the keys in BEIER (1963) and CHRISTOPHORYOVÁ *et al.* (2011) and species descriptions in HADŽI (1939) and PETROV & ŠTÁHLAVSKÝ (2007) were used. Digital photographs were taken using a Canon EOS 5D Mark II camera attached to a Zeiss Axio Zoom V16 stereomicroscope and a Canon EOS 1100D digital camera connected to a Zeiss Stemi 2000-C stereomicroscope. Image stacks were produced manually, combined using the Zerene Stacker software, and subsequently edited in Adobe Photoshop CC. Nomenclature for all species and order of families follow HARVEY (2013a, 2013b). Specimens are deposited in the zoological collection of the Department of Zoology, Comenius University in Bratislava, Slovakia.

The localities in North Macedonia studied:

1. Mavrovo – 41.65163°N, 20.71172°E, beech forest, 1616 m a.s.l.
2. Mavrovo – 41.65166°N, 20.73277°E, above Sarkova dupka Cave, elm-beech forest, 1231 m a.s.l.
3. Mavrovo Anovi – 41.70069°N, 20.73531°E, spruce-beech forest, 1134 m a.s.l.
4. Tsarina – 40.96470°N, 20.89980°E, beech forest, 874 m a.s.l.



**Fig. 1.** Map of all studied localities in North Macedonia. For the locality codes, see Material and Method. Abbreviations: Albania (AL), Bulgaria (BG), Greece (GR), Kosovo (XK), Serbia (RS).

## RESULTS AND DISCUSSION

### **Cheliferidae** Risso, 1827

#### *Hysterochelifer tuberculatus* (Lucas, 1849) (Fig. 2)

Present record: 4: 06 August 2019, 1 ♀, leaf litter, J. Christophoryová leg.

The species is recorded from North Macedonia for the first time. *Hysterochelifer tuberculatus* is known from the Mediterranean area (HARVEY, 2013b). Regarding the Balkans, the species is known from Croatia, Bosnia and Herzegovina, Montenegro, Bulgaria and Greece (HARVEY, 2013b). The species was recorded from soil and leaf litter of shore vegetation and forests but mainly from tree bark (BEIER, 1963; PETROV, 2004; ZARAGOZA, 2007). From the genus *Hysterochelifer* Chamberlin, 1932, only *H. meridianus* (L. Koch, 1873) was previously reported from North Macedonia (HARVEY, 2013b).

### **Chernetidae** Menge, 1855

#### *Allochernes bulgaricus* Hadži, 1939 (Fig. 3)

Present record: 3: 19 August 2018, 1 ♂, 1 tritonymph, under the bark of a decaying tree, M. Červená, D. Selnekovič leg.

The species is recorded from North Macedonia for the first time and it is only the second record from Europe. *Allochernes bulgaricus* was considered an endemic species of Bulgaria (PETROV & ŠTÁHLAVSKÝ, 2007; HARVEY, 2013b). It was originally described by HADŽI (1939) from Mt Vitoshka and subsequently quoted from Rila and Pirin by PETROV & ŠTÁHLAVSKÝ (2007). Like the finding reported here, the species was recorded from a tree hollow and under the bark of a rotten trunk (PETROV & ŠTÁHLAVSKÝ, 2007). In regard to body size, *A. bulgaricus* represents the smallest species of the genus. From the genus *Allochernes*, only *A. balcanicus* Hadži, 1938, was reported from North Macedonia (HARVEY, 2013b).



Fig. 2. *Hysterochelifer tuberculatus*, female. Scale: 1 mm.



Fig. 3. *Allochernes bulgaricus*, male. Scale: 1 mm.



Fig. 4. *Chernes hahnii*, male. Scale: 1 mm.

*Chernes hahnii* (C. L. Koch, 1839) (Fig. 4)

Present records: 1: 15 August 2018, 1 ♀, under the bark of a tree stump, M. Červená leg.; 2: 18 August 2018, 4 ♀♀, 13 ♂♂, 3 tritonymphs, 1 deutonymph, under the bark of decaying trees, M. Červená, D. Selnekovič leg.

These findings represent the first record of *C. hahnii* from North Macedonia. *Chernes hahnii* is widely distributed all over Europe and Asia (HARVEY, 2013b). Within the Balkans, the species has been recorded only from Bosnia and Herzegovina, Bulgaria, and Romania (CHRISTOPHORYOVÁ *et al.*, 2018; OPATOVÁ & ŠTÁHLAVSKÝ, 2018). This species is strictly associated with tree microhabitats, which was confirmed by many findings under tree bark, in tree hollows and dead wood (BEIER, 1963; CHRISTOPHORYOVÁ *et al.*, 2017b, 2018; MACHAČ *et al.*, 2018; NOVÁK *et al.*, 2019). It is also recorded from bird nests, ant nests, leaf litter, soil (CHRISTOPHORYOVÁ *et al.*, 2017a; KRAJČOVIČOVÁ *et al.*, 2018; ČERVENÁ *et al.*, 2020) and in phoretic association (ČERVENÁ *et al.*, 2018). From the genus *Chernes* Menge, 1855, only *C. similis* (Beier, 1932) was previously known from North Macedonia (HARVEY, 2013b).

From an aggregation of available published data (ĆURČIĆ *et al.*, 2004; HARVEY, 2013b; CHRISTOPHORYOVÁ & JABLONSKI, 2018; GARDINI, 2020) and the present records, the pseudoscorpion diversity of North Macedonia has increased to 51 species belonging to 13 genera and five families.

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