BIHAREAN BIOLOGIST 16 (2): 65-70
Article No.: e221206

http://biozoojournals.ro/bihbiol/index.html

A contribution to the pseudoscorpion fauna of Balikesir Province, Turkey (Arachnida: Pseudoscorpiones)

Mehmet Emin BULUT[1], Jana CHRISTOPHORYOVÁ[2]*, Katarína KRAJČOVIČOVÁ[2], Serdar SAK[1] and Ersen Aydın YAĞMUR[3]

1. Faculty of Science and Arts, Balıkesir University, Balıkesir, 10145, Turkey
2. Department of Zoology, Faculty of Natural Sciences, Comenius University, Ilkovičova 6, 842 15 Bratislava, Slovakia
3. Alaşehir Vocational School, Celal Bayar University, Alaşehir, Manisa, 45600, Turkey
* Corresponding author: J. Christophoryová, E-mail: christophoryova@gmail.com

Received: 02 June 2022 / Accepted: 06 October 2022 / Available online: November 2022 / Printed: December 2022

Abstract. Pseudoscorpion research was conducted in Balıkesir Province in Turkey from 2017 to 2018. Altogether, 4183 specimens belonging to nine taxa and six families were collected; *Roncus* sp. was identified only to the genus level. One species, *Ephippiochthonius tuberculatus* (Hadži, 1937), was recorded for the first time in the country. The second known locality of *Pselaphochernes balcanicus* Beier, 1932 in Turkey is reported. The data presented here represent the first records of each taxon in the Balıkesir Province.

Keywords: Anatolia, distribution, diversity, faunistics, new record.

Introduction

The first study on the pseudoscorpion fauna of Turkey was initiated by Beier (1949), who identified material from Eastern Thrace and Anatolia. Beier (1949) described seven new species, of which five are still valid, and documented the first pseudoscorpion records in Turkey. Subsequently, Beier (1963, 1964, 1967, 1969, 1973) published a series of papers that added, at that time, new records to Turkish pseudoscorpion fauna and many species new to science. Mahnert (1979) described a new species, *Neobisium hians* Mahnert, 1979, from a cave near Antalya, and new localities were recorded for some other cave-dwelling species. The developmental stages of three pseudoscorpion species were described in detail by Sezek & Özkan (2006, 2007, 2008); two of them represented new records for Turkish fauna. The most important milestone was the elaboration of the first pseudoscorpion checklist of Turkey, comprising 98 species and five sub-species belonging to 10 families (Kunt et al. 2008). This work summarized available published data, and new locality records were given for Turkish species (Kunt et al. 2008). Ćurčić et al. (2009) described a new species, *Neobisium yozgati* Ćurčić and Seyyar, 2009, from piny mixed litter and soil in the Yozgat. Kunt et al. (2010) summarized the data on Turkish biospeleology with a checklist of cave-dwelling invertebrates containing nine pseudoscorpion species. Sezek & Özkan (2011) recorded two *Neobisium* species from Turkey, *N. peloponnesiacum* (Beier, 1928) and *N. granulatum* Beier, 1937, for the first time. Girişgin et al. (2013) found *Neobisium validum* (L. Koch, 1873) for the first time in the habitat of a honeybee hive in Turkey.

The World Pseudoscorpion Catalogue (WPC 2022) listed 103 pseudoscorpion species belonging to 12 families for the fauna of Turkey. To date, only 21 pseudoscorpion species from Turkey have been recorded. Not surprisingly, many of these are cavernicolous species, as cave ecosystems are typical, and such species are highly endemic (Kunt et al. 2010, WPC 2022). Despite previous research, there are still many regions in Turkey where the extent of pseudoscorpion diversity is unknown. The present study aimed to explore the pseudoscorpion fauna of the Balıkesir Province in Turkey.

Material and methods

Pseudoscorpion research was conducted by the Turkish authors at 21 localities in 17 districts in Balıkesir Province in northwest Turkey from 2017 to 2018 (Table 1, Fig. 1). Pseudoscorpions were collected individually (under the bark of Turkish pines *Pinus brutia* Tenore, 1811) and by sifting and extraction in Berlese funnels (leaf litter, soil, wood-mould, and debris from tree hollows or cavities). The examined material was preserved in 75% ethanol. The pseudoscorpions were studied on temporary slide mounts prepared by immersing the specimens in lactic acid for clearing. After the study, they were rinsed in water and returned to 75% ethanol. Morphological and morphometric analyses were performed using a Leica DM1000 compound microscope with an ICC50 Camera Module (LAS EZ application, 1.8.0) and an Olympus BX50 DIC (Differential Interference Contrast) microscope. 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 Zerene Stacker software, and edited in Adobe Photoshop CC. Only adult specimens were identified using Beier (1932a, 1932b, 1963), Hadži (1937, 1939), Christophoryová et al. (2011), and Gardini & Gavalas (2021). The material is deposited in the Zoological collections of Alaşehir Zoological Museum, Manisa (AZMM).

Results

During the present research, 4183 specimens belonging to nine taxa from six families were identified; *Roncus* sp. was identified only to the genus level. All taxa represent new records for the Balıkesir Province, and the species *Ephippiochthonius tuberculatus* was recorded for the first time in Turkey. The list of collected taxa is given below, with habitat type, locality code (see Table 1), date, and the number of females (♀) and males (♂).

Faunistic data of the collected taxa

Chthoniidae Daday, 1889

Chthonius shelkovnikovi Redikorzev, 1930 (Fig. 2A)

Leaf litter and soil: **2:** 31.05.2018: 3 ♀♀, 12 ♂♂; **6:** 02.10.2017: 19 ♀♀, 13 ♂♂; 09.11.2017: 4 ♀♀, 21 ♂♂; 27.04.2018: 2 ♀♀, 16 ♂♂;

22.05.2018: 4 ♀♀, 11 ♂♂; **7:** 21.06.2017: 7 ♀♀, 17 ♂♂; 21.05.2018: 11 ♀♀, 10 ♂♂; **9:** 15.10.2017: 17 ♀♀, 12 ♂♂; 10.11.2017: 23 ♀♀, 19 ♂♂; 01.05.2018: 11 ♀♀, 9 ♂♂; 30.05.2018: 12 ♀♀, 1 ♂; **11:** 01.05.2018: 15 ♀♀, 8 ♂♂; **12:** 21.06.2017: 9 ♀♀, 17 ♂♂; **13:** 21.10.2017: 13 ♀♀, 15 ♂♂; **15:** 22.06.2017: 2 ♀♀, 8 ♂♂; **16:** 09.11.2017: 21 ♀♀, 27 ♂♂; 31.05.2018: 8 ♀♀, 14 ♂♂; **17:** 19.10.2017: 12 ♀♀, 41 ♂♂; 09.11.2017: 5 ♀♀, 24 ♂♂; 27.04.2018: 25 ♀♀, 38 ♂♂; 22.05.2018: 15 ♀♀, 12 ♂♂; **18:** 15.10.2017: 3 ♀♀, 9 ♂♂; 10.11.2017: 24 ♀♀, 13 ♂♂; 01.05.2018: 6 ♀♀, 19 ♂♂; 30.05.2018: 2 ♀♀, 16 ♂♂; **19:** 16.10.2017: 5 ♀♀, 18 ♂♂; 26.11.2017: 8 ♀♀, 13 ♂♂; 30.04.2018: 17 ♀♀, 26 ♂♂; 31.05.2018: 5 ♀♀, 9 ♂♂; **20:** 02.10.2017: 1 ♀, 4 ♂♂; 09.11.2017: 2 ♀♀, 6 ♂♂; 27.04.2018: 2 ♀♀, 6 ♂♂; 22.05.2018: 2 ♀♀, 1 ♂; **21:** 10.11.2017: 34 ♀♀, 49 ♂♂; 01.05.2018: 6 ♀♀, 13 ♂♂; 30.05.2018: 17 ♀♀, 29 ♂♂.

Table 1. List of the studied localities in Balıkesir Province in Turkey.

Code	Locality	N	E	a.s.l. (m)	Environment
1	Ayvalık District, Karaayıt village	39°15'49"	26°52'58"	203	pine forest
2	Balya District, Medrese village	39°39'42"	27°32'56"	336	oak forest
3	Bandırma District, Çakılköy village	40°20'56"	28°08'39"	262	mixed forest
4	Bigadiç District, Bademli village	39°26'17"	28°04'08"	249	mixed forest
5	Burhaniye District, Yabancılar village	39°22'15"	26°59'17"	342	bush
6	Dursunbey District, Akbaşlar village	39°34'36"	28°25'21"	569	oak forest
7	Edremit District, Çamlıbel village	39°36'19"	26°52'12"	173	pine-oak forest
8	Erdek District, Yukarıyapıcı village	40°27'36"	27°54'36"	202	mixed forest
9	Erdek District, Yukarıyapıcı village	40°27'36"	27°54'17"	375	beech forest
10	Gömeç District, Hacıhüseyinler village	39°21'23"	26°55'10"	294	pine forest
11	Gönen District, Gökçesu village	40°06'52"	27°45'20"	125	mixed forest
12	Havran District, Eğmir village	39°34'45"	27°16'14"	249	bush
13	İvrindi District, Gökçeyazı village	39°36'36"	27°36'29"	470	oak forest
14	İvrindi District, Osmanlar village	39°36'44"	27°25'43"	310	oak forest
15	Kepsut District, Dereli village	39°44'48"	28°14'53"	84	mixed forest
16	Kepsut District, Mestanlar village	39°44'43"	28°15'03"	113	mixed forest
17	Kepsut District, Mestanlar village	39°44'34"	28°14'12"	142	oak forest
18	Manyas District, Hamamlı village	40°06'29"	27°53'53"	74	mixed forest
19	Savaştepe District, Dikmenler village	39°22'45"	27°44'47"	484	oak forest
20	Sındırgı District, Bayırlı village	39°13'27"	28°07'22"	237	mixed forest
21	Susurluk District, Ekinlik village	39°54'32"	28°12'49"	452	mixed forest

Figure 1. Map of Turkey with marked Balıkesir Province (red fill).

Distribution in Turkey: Amasya Province: Amasya; Ankara Province: Kizilcahamam; Antalya Province: Kaş, Yarpuz; Bolu Province: Abant Gölü; Bursa Province: Uludağ; Erzincan Province: Üzümlü; Hatay Province: Antakya; Konya Province: Akşehir; Mersin Province: Namrun, Silifke; Muğla Province: Marmaris; Tokat Province: Tokat, Turhal (Beier 1963, 1964, 1967, 1969).

Comments: *Chthonius shelkovnikovi* is distributed from Greece to Turkmenistan (WPC 2022). In Turkey, it was collected under stones, moss, leaf litter, and near an anthill (Beier 1963, 1964, 1967, 1969). Kunt et al. (2008) did not list the species on the checklist of Turkish pseudoscorpions. During the present study, 948 specimens were collected in leaf litter from oak, pine, and plane trees.

Ephippiochthonius tuberculatus (Hadži, 1937) (Figs 2B, 3, 4)

Leaf litter and soil**: 1:** 21.06.2017: 27 ♀♀, 19 ♂♂; 25.11.2017: 2 ♀♀, 8 ♂♂; 26.04.2018: 11 ♀♀, 17 ♂♂; **2:** 16.10.2017: 6 ♀♀, 22 ♂♂; 26.11.2017: 37 ♀♀, 45 ♂♂; 30.04.2018: 18 ♀♀, 27 ♂♂; 31.05.2018: 4 ♀♀, 11 ♂♂; **4:** 22.06.2017: 12 ♀♀, 8 ♂♂; 02.10.2017: 11 ♀♀, 16 ♂♂;

09.11.2017: 8 ♀♀, 1 ♂; 27.04.2018: 13 ♀♀, 7 ♂♂; 22.05.2018: 8 ♀♀, 3 ♂♂; **7:** 03.10.2017: 16 ♀♀, 29 ♂♂; 25.11.2017: 3 ♀♀, 17 ♂♂; 21.05.2018: 7 ♀♀, 16 ♂♂; **8:** 15.10.2017: 18 ♀♀, 1 ♂; 10.11.2017: 22 ♀♀, 47 ♂♂; 01.05.2018: 18 ♀♀, 22 ♂♂; 30.05.2018: 9 ♀♀, 25 ♂♂; **10:** 25.11.2017: 8 ♀♀, 6 ♂♂; 21.05.2018: 27 ♀♀, 19 ♂♂; **11:** 15.10.2017: 32 ♀♀, 19 ♂♂; 10.11.2017: 39 ♀♀, 46 ♂♂; 30.05.2018: 21 ♀♀, 9 ♂♂; **12:** 21.06.2017: 34 ♀♀, 11 ♂♂; 03.10.2017: 27 ♀♀, 3 ♂♂; 25.11.2017: 23 ♀♀, 45 ♂♂; 26.04.2018: 18 ♀♀, 9 ♂♂; 21.05.2018: 22 ♀♀, 31 ♂♂; **14:** 26.07.2017: 32 ♀♀, 17 ♂♂; 16.10.2017: 17 ♀♀, 11 ♂♂; **15:** 02.10.2017: 12 ♀♀, 14 ♂♂; 27.04.2018: 7 ♀♀, 11 ♂♂; 22.05.2018: 2 ♀♀, 5 ♂♂; **16:** 19.10.2017: 11 ♀♀, 28 ♂♂; **18:** 15.10.2017: 12 ♀♀, 34 ♂♂; 10.11.2017: 6 ♀♀, 27 ♂♂; 01.05.2018: 8 ♀♀, 3 ♂♂; 30.05.2018: 9 ♀♀, 27 ♂♂; **20:** 22.06.2017: 5 ♀♀, 7 ♂♂; 02.10.2017: 5 ♀♀, 3 ♂♂.

Distribution in Turkey: New record for the pseudoscorpion fauna of Turkey.

Comments: *Ephippiochthonius tuberculatus* is distributed in Bulgaria, Germany, Greece, Hungary, North Macedonia, Romania, and Slovakia (Gardini & Gavalas 2021). In Turkey, 1353 specimens were collected in leaf litter from oak, pine, and plane trees.

Specimens were identified using the known descriptions (Hadži 1937, 1939; Beier 1963) and species redescription made by Gardini & Gavalas (2021). The species was described by Hadži (1937) based on specimens from North Macedonia and compared with *Ephippiochthonius microtuberculatus* (Hadži, 1937). They differ only by the number of setae on the carapacial posterior margin, four in *E. tuberculatus* and two in *E. microtuberculatus* (Hadži 1937).

The main character to distinguish the two species, not considered by Hadži (1937), is the isolated subdistal tooth (*di*) on the movable cheliceral finger (Gardini & Gavalas 2021). The tooth is present in *E. tuberculatus* (also visible in Fig. 12c in Hadži 1937) and absent in *E. microtuberculatus* (Fig. 11b in Hadži 1937). Gardini & Gavalas (2021) stated that according to this main character, it is likely that *E. microtuberculatus* from Bulgaria (Hadži 1939, Figs 3c,d) is referred to as *E. tuberculatus* for the presence of the tooth. The description by Gardini & Gavalas (2021) revealed a higher variation in carapacal chaetotaxy regarding the number of microsetae in the anterior row and setae number on the posterior row. That is why the main diagnostic of Turkish specimens are described in Figure 4.

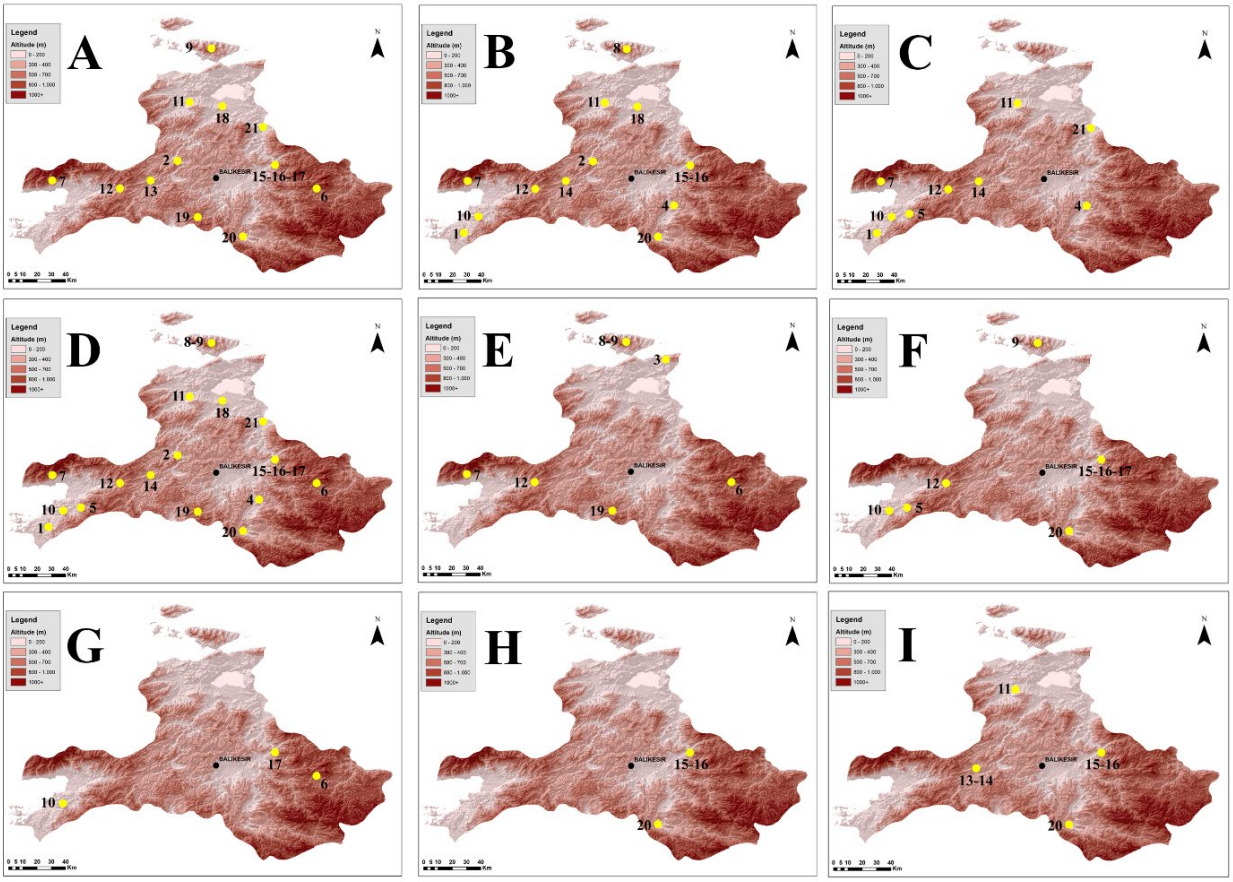

Figure 2. Distribution of the recorded pseudoscorpion taxa in Balıkesir Province. A. *Chthonius shelkovnikovi*; B. *Ephippiochthonius tuberculatus*; C. *Geogarypus minor*; D. *Neobisium sylvaticum*; E. *Roncus* sp.; F. *Atemnus politus*; G. *Rhacochelifer lobipes*; H. *Pselaphochernes balcanicus*; I. *Pselaphochernes scorpioides*.

Geogarypidae Chamberlin, 1930

Geogarypus minor (L. Koch, 1873) (Fig. 2C)

Leaf litter and soil: **1:** 03.10.2017: 2 ♀♀, 3 ♂♂; 26.04.2018: 5 ♀♀, 3 ♂♂; **4:** 02.10.2017: 1 ♀; 22.05.2018: 5 ♀♀, 2 ♂♂; **5:** 21.06.2017: 2 ♀♀; **7:** 21.06.2017: 11 ♀♀, 4 ♂♂; 03.10.2017: 2 ♀♀, 5 ♂♂; 26.04.2018: 3 ♀♀, 2 ♂♂; 21.05.2018: 3 ♀♀, 7 ♂♂; **10:** 21.06.2017: 3 ♀♀; 03.10.2017: 2 ♀♀, 5 ♂♂; 26.04.2018: 3 ♀♀, 6 ♂♂; **11:** 15.10.2017: 1 ♀; 30.05.2018: 2 ♀♀, 6 ♂♂; **12:** 21.06.2017: 5 ♀♀, 6 ♂♂; 03.10.2017: 1 ♀; 25.11.2017: 3 ♀♀, 3 ♂♂; 21.05.2018: 3 ♀♀, 6 ♂♂; **14:** 26.07.2017: 2 ♀♀, 1 ♂; **21:** 10.11.2017: 1 ♀, 3 ♂♂; 30.05.2018: 5

♀♀, 2 ♂♂.

Distribution in Turkey: İstanbul Province: Burgaz Island, Büyükada, Üsküdar; Muğla Province: Dalyan; Yalova Province: Armutlu (Beier 1949, 1967).

Comments: *Geogarypus minor* is distributed in Albania, Algeria, Austria, Bulgaria, Croatia, France, Greece, Italy, Malta, Monaco, Morocco, Portugal, Spain, and Turkey (WPC 2022). In Turkey, it was found in leaf litter and under the bark of cypress trees (Beier 1967). During the present study, 129 specimens were collected in leaf litter from oak and pine trees.

Figure 3. *Ephippiochthonius tuberculatus*. Scale line: 1 mm.

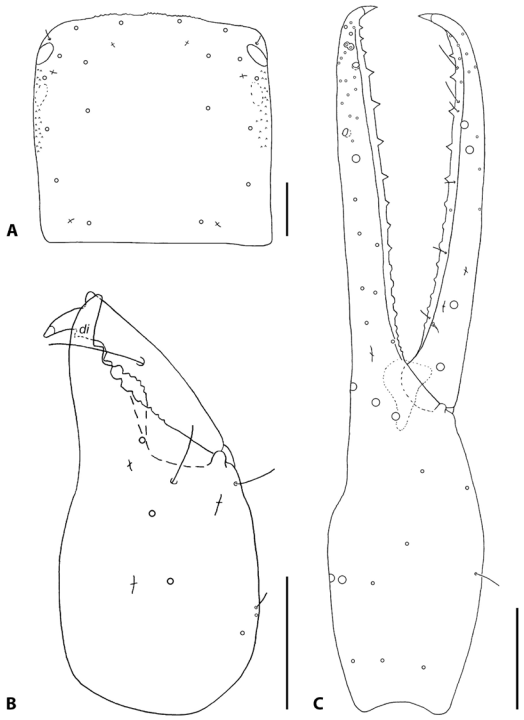

Figure 4. *Ephippiochthonius tuberculatus*. A. Carapace; B. Chelicera (*di* – isolated subapical tooth); C. Pedipalp. Scale lines: 0.10 mm.

Neobisiidae Chamberlin, 1930

Neobisium* (*Neobisium*) *sylvaticum (C.L. Koch, 1835) (Fig. 2D)

Leaf litter and soil: **1:** 25.11.2017: 4 ♀♀, 10 ♂♂; **2:** 16.10.2017: 3 ♀♀, 5 ♂♂; 26.11.2017: 3 ♀♀; 30.04.2018: 13 ♀♀, 14 ♂♂; 31.05.2018: 16 ♀♀, 12 ♂♂; **4:** 02.10.2017: 2 ♀♀, 5 ♂♂; 09.11.2017: 3 ♀♀; 27.04.2018: 2 ♀♀, 5 ♂♂; **5:** 25.11.2017: 5 ♀♀, 19 ♂♂; 26.04.2018: 9 ♀♀, 14 ♂♂; 21.05.2018: 17 ♀♀, 2 ♂♂; **6:** 02.10.2017: 5 ♀♀, 9 ♂♂; 09.11.2017: 32 ♀♀, 11 ♂♂; 27.04.2018: 18 ♀♀, 7 ♂♂; 22.05.2018: 11 ♀♀, 13 ♂♂; **7:** 03.10.2017: 13 ♀♀, 9 ♂♂; 25.11.2017: 17 ♀♀, 15 ♂♂; 26.04.2018: 9 ♀♀, 3 ♂♂; **8:** 15.10.2017: 19 ♀♀, 33 ♂♂; 10.11.2017: 19 ♀♀, 38 ♂♂; 01.05.2018: 16 ♀♀, 9 ♂♂; 30.05.2018: 15 ♀♀, 18 ♂♂; **9:** 20.10.2017: 21 ♀♀, 14 ♂♂; 10.11.2017: 11 ♀♀, 21 ♂♂; **10:** 25.11.2017: 11 ♀♀, 28 ♂♂; 21.05.2018: 14 ♀♀, 8 ♂♂; **11:** 15.10.2017: 17 ♀♀, 24 ♂♂; 10.11.2017: 13 ♀♀, 35 ♂♂; 01.05.2018: 21 ♀♀, 5 ♂♂; **12:** 25.11.2017: 13 ♀♀, 34 ♂♂; 26.04.2018: 16 ♀♀, 28 ♂♂; **14:** 16.10.2017: 4 ♀♀; **15:** 02.10.2017: 8 ♀♀, 3 ♂♂; 09.11.2017: 22 ♀♀, 9 ♂♂; 22.05.2018: 15 ♀♀, 4 ♂♂; **16:** 30.04.2018: 15 ♀♀, 9 ♂♂; 31.05.2018: 12 ♀♀, 9 ♂♂; **17:** 9.10.2017: 18 ♀♀, 27 ♂♂; 09.11.2017: 18 ♀♀, 21 ♂♂; 27.04.2018: 17 ♀♀, 26 ♂♂; 22.05.2018: 19 ♀♀, 29 ♂♂; **18:** 15.10.2017: 12 ♀♀, 7 ♂♂; 10.11.2017: 23 ♀♀, 41 ♂♂; 01.05.2018: 31 ♀♀, 10 ♂♂; **19:** 16.10.2017: 6 ♀♀, 16 ♂♂; 26.11.2017: 15 ♀♀, 22 ♂♂; 30.04.2018: 19 ♀♀, 27 ♂♂; **20:** 02.10.2017: 3 ♀♀, 1 ♂; 27.04.2018: 5 ♀♀, 3 ♂♂; 22.05.2018: 7 ♀♀, 1 ♂; **21:** 15.10.2017: 7 ♀♀, 21 ♂♂; 10.11.2017: 11 ♀♀, 26 ♂♂; 01.05.2018: 12 ♀♀, 17 ♂♂; 30.05.2018: 19 ♀♀, 8 ♂♂.

Distribution in Turkey: Ankara Province: Kızılcahamam; Bilecik Province; Bolu Province: Abant Lake; Bursa Province: Uludağ; Kastamonu Province: Çangal Mountain (Beier 1963, 1964, 1969).

Comments: *Neobisium sylvaticum* is distributed throughout Europe to Armenia and Turkey in southwest Asia (WPC 2022). In Turkey, it has been collected from litter in mixed forests and under walnut trees (Beier 1963, 1964, 1969). During the present study, 1491 specimens were collected in leaf litter from oak trees.

***Roncus* sp.** L. Koch, 1873 (Fig. 2E)

Leaf litter and soil: **3:** 05.10.2017: 3 ♀♀; **6:** 27.04.2018: 1 ♀, 2 ♂♂; **7:** 03.10.2017: 5 ♀♀, 2 ♂♂; 26.04.2018: 2 ♀♀, 1 ♂; **8:** 10.11.2017: 6 ♀♀, 11 ♂♂; 01.05.2018: 5 ♀♀, 1 ♂; 30.05.2018: 3 ♀♀, 6 ♂♂; **9:** 20.10.2017: 8 ♀♀, 11 ♂♂; 10.11.2017: 6 ♀♀, 9 ♂♂; **12:** 03.10.2017: 4 ♀♀, 1 ♂; **19:** 16.10.2017: 3 ♀♀, 9 ♂♂; 30.04.2018: 3 ♀♀, 8 ♂♂.

Comments: In general, the genus includes several species complexes, and the diagnostic boundaries between them are often unclear (Šťáhlavský et al. 2013). Modern methods, such as cytogenetics and DNA sequencing, could reveal the extent of species diversity in this genus and resolve relations between closely related species (Šťáhlavský et al. 2013). For this reason, the specimens were identified only to the genus level. During the present study, 110 *Roncus* specimens were found in leaf litter and soil.

Atemnidae Kishida, 1929

Atemnus politus (Simon, 1878) (Fig. 2F)

Leaf litter and soil: **5:** 26.04.2018: 3 ♀♀; **9:** 20.10.2017: 3 ♀♀; **10:** 21.06.2017: 2 ♀♀; 03.10.2017: 5 ♀♀; 25.11.2017: 1 ♀; 26.04.2018: 4 ♀♀; 21.05.2018: 5 ♀♀; **12:** 21.06.2017: 1 ♀; 05.11.2017: 5 ♀♀, 2 ♂♂; 26.04.2018: 6 ♀♀; **15:** 02.10.2017: 2 ♀♀, 2 ♂♂; 09.11.2017: 8 ♀♀, 3 ♂♂; 27.04.2018: 5 ♀♀, 2 ♂♂; **16:**

19.10.2017: 5 ♀♀, 7 ♂♂; **17:** 09.11.2017: 3 ♀♀, 1 ♂; **20:** 09.11.2017: 1 ♀, 1 ♂.

Distribution in Turkey: Afyonkarahisar Province: Sultandağ; Gaziantep Province: Sakçagözü; Kilis Province: Çörten; Konya Province: Akşehir, Beyşehir; Malatya Province: Battalgazi (as Eskimalatya), Yeşilyurt; Mersin Province: Mut, Namrun; Niğde Province: Alihoca; Tokat Province: Tokat (Beier 1963, 1964, 1967, 1969, Kunt et al. 2008).

Comments: *Atemnus politus* is distributed in Southern Europe, North Africa, and Asia (WPC 2022). In Turkey, it has been collected from leaf litter, tree mould, under stones, and tree bark (Beier 1963, 1964, 1967, 1969). During the present study, 77 specimens were found in leaf litter from oak trees.

Cheliferidae Risso, 1827

Rhacochelifer lobipes (Beier, 1929) (Fig. 2G)

Under the tree bark: **6:** 02.10.2017: 1 ♀; 09.11.2017: 5 ♀♀, 2 ♂♂; **10:** 25.11.2017: 6 ♀♀, 1 ♂; **17:** 19.10.2017: 1 ♀; 09.11.2017: 1 ♀.

Distribution in Turkey: Adana Province: Çamlıbel; Amasya Province: Amasya; Ankara Province: Kizilcahamam; Antalya Province: Elmalı; İzmir Province: Bornova; Konya Province: Akşehir, Beyşehir; Kütahya Province: Hisarcık; Mersin Province: Mut, Namrun; Niğde Province: Alihoca; Tokat Province: Tokat (Beier 1963, 1964, 1967, 1969).

Comments: *Rhacochelifer lobipes* are known only from Turkey (WPC 2022). It was found under tree bark, moss, and leaf litter (Beier 1963, 1967, 1969). During the present study, 17 specimens were collected from under the bark of Turkish pine trees.

Chernetidae Menge, 1855

Pselaphochernes balcanicus Beier, 1932 (Fig. 2H)

Wood-mould and leaf litter: **15:** 02.10.2017: 1 ♀; 09.11.2017: 1 ♀; 22.05.2018: 2 ♀♀; **16:** 09.11.2017: 3 ♀♀; **20:** 22.06.2017: 5 ♀♀.

Distribution in Turkey: İstanbul Province: Bebek – Bosphorus (Beier 1949).

Comments: *Pselaphochernes balcanicus* is known in Bulgaria and Turkey (WPC 2022). Beier (1949) did not mention the species habitat type in Turkey. During the current research, 12 specimens were found in leaf litter and wood mould of plane tree hollows.

Pselaphochernes scorpioides (Hermann, 1804) (Fig. 2I)

Leaf litter and soil: **11:** 10.11.2017: 1 ♀; **13:** 21.10.2017: 2 ♀♀, 1 ♂; **14:** 26.07.2017: 3♀♀; **15:** 22.06.2017: 11 ♀♀, 5 ♂♂; 22.05.2018: 2 ♀♀, 3 ♂♂; **16:** 09.11.2017: 3 ♀♀, 7 ♂♂; 30.04.2018: 2 ♀♀, 1 ♂; **20:** 22.06.2017: 3 ♀♀, 1 ♂; 02.10.2017: 1 ♀.

Distribution in Turkey: Ankara Province: Ankara; Antalya Province: Elmalı; Kastamonu Province: Kastamonu; Malatya Province: Darende; Mersin Province: Namrun; Muğla Province: Köyceğiz, Marmaris; Niğde Province: Eskigümüş (Beier 1964, 1967, 1969, 1973).

Comments: *Pselaphochernes scorpioides* is distributed in the Holarctic region (WPC 2022). In Turkey, it was found in wood-decay fungi, leaf litter, deadwood, and under tree bark (Beier 1964, 1967). During the present study, 46 specimens were collected in leaf litter from oak and plane trees.

Discussion

All nine taxa in the present paper represent new records in the Balıkesir Province. Only one species, *Calocheiridius libanoticus* Beier, 1955 (Olpiidae), has been previously recorded from Balıkesir Province, but its precise habitat was not specified (Beier 1973). Its occurrence was not confirmed in the area during our study. Some of the neobisiid pseudoscorpions discovered during the current research were identified only to the genus level, such as *Roncus* specimens. Three *Roncus* species, *Roncus microphthalmus* (Daday, 1889), *Roncus parablothroides* Hadži, 1938 and *Roncus troglophilus* Beier, 1931, are known to occur in Turkey so far (WPC 2022). *Roncus parablothroides* was listed as a cave-dwelling species (Kunt et al. 2010), while *R. troglophilus* has the status of a true troglobiont species (Beier 1963). The specimens collected during the present study were discovered by sifting litter and soil in oak, pine-oak, beech, mixed forests, and bush. *Roncus microphthalmus* has the status of an epigean species and, to date, has been found in Rize Province and Artvin Province in Turkey (Beier 1973, Kunt et al. 2008). The species was first described in Azerbaijan and is also distributed in Georgia, Iran, Russia, and Turkey (WPC 2022). Recently, Nassirkhani & Mumladze (2019) redescribed the species, discovering hidden polymorphism with a wide variety of morphology and morphometric characteristics. Previous studies on the cytogenetics of *Roncus* revealed the species complexes inside the genus and confirmed the importance of karyological characters in recognition of morphologically questionable species (Zaragoza & Šťáhlavský 2008, Šťáhlavský et al. 2013). These facts led us to make the decision to identify the specimens only at the genus level.

Acknowledgment

This study was supported by Balıkesir University Scientific Research Projects Coordination Unit (BAP project no. 2017-055) and VEGA grant 1/0704/20. We thank Kadir Boğaç Kunt for his contributions to this study and Alica Christophoryová for technical assistance with Figure 3. We are thankful to our colleague Giulio Gardini for his advice about *Ephippiochthonius tuberculatus* and to both anonymous reviewers for their valuable suggestions and comments. This study constitutes a part of the master thesis of the first author (The Institute of Natural Sciences of Balıkesir University).

References

Beier, M. (1932a): Pseudoscorpionidea I. Subord. Chthoniinea et Neobisiinea. Tierreich 57: 1-258.

Beier, M. (1932b): Pseudoscorpionidea II. Subord. C. Cheliferinea. Tierreich 58: 1-294.

Beier, M. (1949): Türkiye Psevdoscorpion'lari hakkinda. Türkische Pseudoscorpione. Revue de la Faculté des Sciences de l'Université d'Istanbul (B) 14 (1): 1-20.

Beier, M. (1963): Pseudoskorpione aus Anatolien. Annalen des Naturhistorischen Museums in Wien 66: 267-277.

Beier, M. (1964): Anadolu'nun Pseudoscorpion faunasi. Die Pseudoscorpioniden-Fauna Anatoliens. Revue de la Faculté des Sciences de l'Université d'Istanbul (B) 29 (3-4): 81-105.

Beier, M. (1967): Ergebnisse zoologischer Sammelreisen in der Türkei. Annalen des Naturhistorischen Museums in Wien 70: 301-323.

Beier, M. (1969): Weitere Beiträge zur Kenntnis der Pseudoskorpione Anatoliens.

Annalen des Naturhistorischen Museums in Wien 73: 189-198.
Beier, M. (1973): Beiträge zur Pseudoscorpioniden-fauna Anatoliens. Fragmenta Entomologica 8 (5): 223-236.
Christophoryová, J., Šťáhlavský, F., Fedor, P. (2011): An updated identification key to the pseudoscorpions (Arachnida: Pseudoscorpiones) of the Czech Republic and Slovakia. Zootaxa 2876: 35-48.
Ćurčić, B.P.M., Seyyar, O., Lemaire, J.-M., Dimitrijević, R.N., Demir, H., Aktaş, M. (2009): *Neobisium yozgati* n. sp., and *N. anaisae* n. sp. (Neobisiidae, Pseudoscorpiones), from Turkey and Macedonia (FYROM), respectively. Archives of Biological Sciences, Belgrade 61 (3): 523-529.
Gardini, G., Gavalas, I. (2021): The pseudoscorpions of the Island of Iraklia (Cyclades, Greece). Parnassiana Archives 9: 43-78.
Girişgin, A.O., Girişgin, O., Harvey, M.S. (2013): The first record of pseudoscorpions in honeybee hives in Turkey. Turkish Journal of Veterinary and Animal Sciences 37: 608-610.
Hadži, J. (1937): Pseudoskorpioniden aus Südserbien. Glasnik Skopskog Naucnog Drustva 17: 151-187.
Hadži, J. (1939): Pseudoskorpioniden aus Bulgarien. Mitteilungen aus dem Königl. Naturwissenschaftlichen Institut in Sofia 13: 18-48.
Kunt, K.B., Bayram, A., Yağmur, E.A., Danışman, T. (2008): Checklist of the pseudoscorpions of Turkey (Pseudoscorpionida; Arachnida). Turkish Journal of Arachnology 1 (1): 70-84.
Kunt, K.B., Yağmur, E.A., Özkütük, S., Durmuş, H., Anlaş, S. (2010): Checklist of the cave dwelling invertebrates (Animalia) of Turkey. Biological Diversity and Conservation 3 (2): 26-41.
Mahnert, V. (1979): Pseudoskorpione (Arachnida) aus Höhlen der Türkei und des Kaukasus. Revue Suisse de Zoologie 86 (1): 259-266.
Nassirkhani, M., Mumladze, L. (2019): Notes on *Roncus microphthalmus* (Daday, 1889) (Pseudoscorpiones: Neobisiidae), a polymorphic species, with a key to the *Roncus* species from the Middle East and the Caucasus region. Revista Ibérica de Aracnología 34: 97-101.
Sezek, F., Özkan, M. (2006): A new record for the Turkish pseudoscorpion fauna; *Lamprochernes savignyi* (Simon, 1881) (Arachnida, Pseudoscorpionida). Turkish Journal of Zoology 30 (3): 255-259.
Sezek, F., Özkan, M. (2007): The morphological features of the development stages of *Pselaphochernes scorpioides* (Hermann, 1804) (Arachnida, Pseudoscorpionida). Turkish Journal of Zoology 31 (1): 19-25.
Sezek, F., Özkan, M. (2008): Developmental stages of *Neobisium erythrodactylum* (Koch, 1873): New to Turkish fauna. Turkish Journal of Zoology 32 (1): 27-32.
Sezek, F., Özkan, M. (2011): Two new records for Pseudoscorpion fauna of Turkey. Türkiye Entomoloji Dergisi 35 (3): 509-518 [in Turkish].
Šťáhlavský, F., Christophoryová, J., Henderickx, H. (2013): A karyological study of four European species of *Roncus* (Pseudoscorpiones: Neobisiidae). European Journal of Entomology 110 (3): 393-399.
WPC (2022): World Pseudoscorpiones Catalog. Natural History Museum, Bern. https://wac.nmbe.ch/order/pseudoscorpiones/3, accessed at: 2022.05.23.
Zaragoza, J.A., Šťáhlavský, F. (2008): A new *Roncus* species (Pseudoscorpiones: Neobisiidae) from Montseny Natural Park (Catalonia, Spain), with remarks on karyology. Zootaxa 1693: 27-40.