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# THE SPIDER FAUNA (ARACHNIDA, ARANEAE) OF ABANDONED MILITARY BUNKERS IN ALBANIA

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**Geci, D., Ibrahimi, H., Bilalli, A., Musliu, M., Grapci-Kotori, L. & Gashi, A.: The spider fauna (Arachnida, Araneae) of abandoned military bunkers in Albania. Nat. Croat., Vol. 31, No. 1, 71-78, Zagreb, 2022.**

We investigated 11 pillbox bunkers in Dibër Municipality and one military tunnel near Tirana (Albania). We found 101 spider specimens belonging to 15 species, of which two species are reported for the first time from Albania: *Leviellus thorelli* (Ausserer, 1871) (Araneidae) and *Meta bourneti* Simon, 1922 (Tetragnathidae).

This paper contributes new information on the diversity, distribution and natural history of spider fauna in the bunkers of Albania.

**Key words:** spiders, pillbox bunkers, Albania

**Geci, D., Ibrahimi, H., Bilalli, A., Musliu, M., Grapci-Kotori, L. & Gashi, A.: Fauna paukova (Arachnida, Araneae) napuštenih vojnih bunkera u Albaniji. Nat. Croat., Vol. 31, No. 1, 71-78, Zagreb, 2022.**

Istraživali smo 11 samostojnih bunkera u općini Dibër i jedan vojni tunel blizu Tirane (Albanija). Pronašli smo 101 primjerak paukova iz 15 porodica, od kojih su 2 vrste zabilježene po prvi puta za Albaniju: *Leviellus thorelli* (Ausserer, 1871) (Araneidae) i *Meta bourneti* Simon, 1922 (Tetragnathidae).

Ovaj rad donosi nove informacije o raznolikosti, rasprostranjenosti i prirodoslovnim osobinama faune paukova u bunkerima u Albaniji.

**Ključne riječi:** pauci, bunkeri, Albanija

## INTRODUCTION

In Albania from the 1960s to the 1980s a total of 173,371 concrete bunkers were constructed around the country, mostly for military purposes (Wheeler, 2007). After the fall of communism in 1990, those bunkers were abandoned. While some of them were dismantled by local people for the sake of harvesting the metal parts, others survived this destruction and are used nowadays for tourism purposes or even for domestic issues such as car garages or shelters for animals. The rest of them are left as historically valuable mementoes. Due to their buffered climatic and habitat conditions, they also act as shelters for different organisms (Naumova, 2020a).

The goal of this paper was to investigate the diversity of spiders in pillbox bunkers. This adds to a recent upsurge of stues about the spider fauna of Albania (Vrenozi &

Haxhiu, 2008; Deltshevet *et al*., 2011; Vrenozi & Deltshev 2012a; Vrenozi & Deltshev 2012b; Naumova *et al*., 2016; Blick 2018; Naumova 2020a, b; Kůrka *et al*., 2020). (Vrenozi & Haxhiu, 2008; Deltshevet *et al*., 2011; Vrenozi & Deltshev 2012a; Vrenozi & Deltshev 2012b; Naumova *et al*., 2016; Blick 2018; Komnenov, 2018; Naumova 2020a, b; Kůrka *et al*., 2020).

According to Araneae-Spiders of Europe Version 03.2022 (Nentwig *et al*.,, 2022) Albania has 576 species of spiders, but we have discarded all the data without references and can now say that without including this paper Albania has 370 species of spiders.

Albania has four endemic species of spiders such as: *Bassaniodes blagoevi* Naumova, 2020, *Harpactea albanica* (Caporiacco, 1949), *Liocranoeca vjosensis* Komnenov, 2018, *Mesiotelus deltshevi* Naumova, 2020b and one subspecies: *Lycosa praegrandis discoloriventer* Caporiacco, 1949.

## MATERIALS AND METHODS

### Study area

Bunkers number I, II, III are located in Arras village, Dibër Municipality. Their entrances open to dry grassland but were obstructed by *Rubus fruticosus.*

Bunker number IV is located between Dovolan and Erëbarë villages. Vegetation at the entrance was dominated by *Quercus cerris* and *Rubus fruticosus*.

Bunker number V is located in Arras village, 2 km away from bunkers I, II and III. It is located in a forest of *Qercus petrea*.

Bunkers VI and VII are located in Boçovë village, in cultivated grassland. At the entrance of bunker number VI, we observed *Cornus sanguinea*. The entrance of bunker VII was blocked and thus the spiders we collected were taken from the loopholes.. Here, we also found a specimen of *Rhinolophus ferrumequinum*.

Bunker VIII, from Zogaj Village; was at the forest edge, in the midst of *Quercus frainetto, Pteridinium aqulinium* and *Rubus fructicosus*.

Bunker IX was at the forest edge near the village of Sinë e Poshtme. Bunker was surrounded by *Quercus frainetto* trees

Bunkers X and XI were located near the main road from Peshkopia to Muhurr, near Kuben Village. In bunker XI we founded three *Rhinolophus ferrumequinum* bats, in the lactation season. Site XII is a military tunnel.

### Data sampling and processing

We hand collected spiders and preserved them in 70% alcohol. For each bunker, we performed searches for 20 minutes. We identified specimens to the species level by using an Olympus Stereomicroscope and a GXCAPTURE camera, following standard identification keys (Nentwig *et al*., 2022; World spider catalog, 2022). Specimens are preserved at the University of Prishtina, Department of Biology (Republic of Kosovo). Spider families and species are listed alphabetically. We conducted all analyses and visualizations in R (R Core Team, 2020), with the packages "ggplot2" (Wickham, 2016), "rnaturalearth" (South, 2017), endemic species list is done using the package "arakno" (Cardoso & Pekár, 2022).

**Fig. 1.** Bunker XI

**Tab. 1.** Locality data for the eleven sampling stations

| Bunker number | Longitude ° N | Latitude ° E | Altitude m |
|---|---|---|---|
| I, II and III | 41.731312 | 20.321234 | 485 |
| IV | 41.629369 | 20.458421 | 690 |
| V | 41.731312 | 20.321234 | 485 |
| VI and VII | 41.539839 | 20.420595 | 518 |
| VIII | 41.716099 | 20.306022 | 541 |
| IX | 41.724396 | 20.302808 | 513 |
| X and XI | 41.686033 | 20.353738 | 419 |
| XII | 41.2913889 | 19.8155556 | 350 |

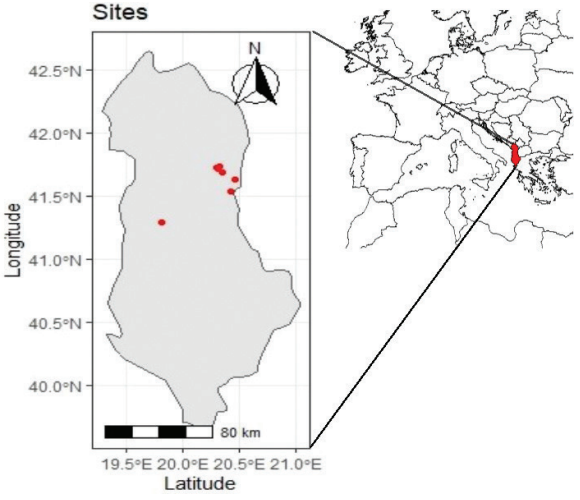


**Fig. 2.** Map of the sampling sites.

## RESULTS AND DISCUSSION

Overall, we collected and identified 101 specimens (51 ♀♀, 14 ♂♂ and 36 jj). In total, these belonged to 15 species (13 genera, 10 families). Families and species are listed alphabetically.

**Tab. 2.** Number of species and specimens per family

| Family | Number of species | Number of specimens |
|---|---|---|
| Agelenidae | 3 | 23 |
| Araneidae | 2 | 3 |
| Dysderidae | 1 | 2 |
| Gnaphosidae | 1 | 2 |
| Lycosidae | 1 | 1 |
| Liocranidae | 1 | 1 |
| Oecobiidae | 1 | 22 |
| Pholcidae | 3 | 28 |
| Scytodidae | 1 | 1 |
| Tetragnathidae | 1 | 2 |
| Theridiidae | 1 | 16 |

**Tab. 3.** List of spiders collected in 11 bunkers. First records for Albania are indicated with an asterisk; abbreviations sa and jj stand for sub adult respectively for juvenile.

| No. | Taxa | No. of specimens/sex | Bunker number | Date of collection |
|---|---|---|---|---|
| **Family Agelenidae** | | | | |
| 1 | *Tegenaria domestica* (Clerck, 1757) | 1♂ | V | 08.08.2020 |
| 2 | *Tegenaria bosnica* Kratochvil & Miller, 1940 | 1♂+2jj | XI | 11.08.2020 |
| | | 2♀♀+3jj+1sa♂ | VI | 09.08.2020 |
| | | 2 jj | VII | 10.08.2020 |
| | | 10 jj | X | 11.08.2020 |
| | | 1 jj | II | 06.08.2020 |
| **Family Araneidae** | | | | |
| 3 | *Argiope bruennichi* (Scopoli, 1772) | 1♀ | II | 06.08.2020 |
| 4 | *Leviellus thorelli* (Ausserer, 1871)* | 2♀♀ | IV | 07.08.2020 |
| **Family Dysderidae** | | | | |
| 5 | *Harpactea* sp. | 2 jj | V | 08.08.2020 |
| **Family Gnaphosidae** | | | | |
| 6 | *Scotophaeus scutulatus* (Koch, 1866) | 2 ♂♂ | IV | 07.08.2020 |
| **Family Liocranidae** | | | | |
| 7 | *Sagana rutilans* Thorell, 1875 | 1♀ | IX | 10.08.2020 |
| | | 1♂ | I | 06.08.2020 |
| **Family Lycosida*e*** | | | | |
| 8 | *Hogna radiata* (Latreille, 1817) | 1♀ | IX | 10.08.2020 |
| **Family Oecobiidae** | | | | |
| 9 | *Uroctea durandi* (Latreille, 1809) | 2♀♀+ 20 jj | VIII | 10.08.2020 |

**Tab. 3.** Continued

| No. | Taxa | No. of specimens/sex | Bunker number | Date of collection |
|---|---|---|---|---|
| **Family Pholcidae** | | | | |
| 10 | *Pholcus opilionoides* (Schrank, 1781) | 2♀♀+3♂♂ | V | 08.08.2020 |
| | | 2♂♂ | II | 06.08.2020 |
| | | 2♀♀ | VI | 09.08.2020 |
| | | 2♀♀+1♂ | VII | 09.08.2020 |
| | | 1♀ | I | 06.08.2020 |
| 11 | *Pholcus phalangioides* (Fuesslin, 1775) | 1♀ | IX | 10.08.2020 |
| | | 1♀ | VII | 10.08.2020 |
| | | 2♀♀ | VI | 09.08.2020 |
| 12 | *Hoplopholcus forskali* (Thorell, 1871) | 4♂♂+3♀♀+1sa♂ | IV | 07.08.2020 |
| | | 1♂+2♀♀ | XI | 11.08.2020 |
| **Family Scytodidae** | | | | |
| 13 | *Scytodes thoracica* (Latreille, 1802) | 1♀ | III | 06.08.2020 |
| **Family Theridiidae** | | | | |
| 14 | *Steatoda triangulosa* (Walckenaer, 1802) | 2 ♀♀ | V | 08.08.2020 |
| | | 1♀ | XI | 11.08.2020 |
| | | 6♀♀ | VI | 09.08.2020 |
| | | 2♀♀+1jj | VII | 09.08.2020 |
| | | 3♀♀+1♂ | III | 06.08.2020 |
| **Family Tetragnathidae** | | | | |
| 15 | *Meta bourneti* Simon, 1922* | 2♀♀ | XII | 07.03.2021 |

In this article we report 2 species for the spider fauna of Albania for the first time, *Meta bourneti* Simon, 1922, and *Leviellus thorelli* (Ausserer, 1871**),** which is also a first record of the genus for Albania.

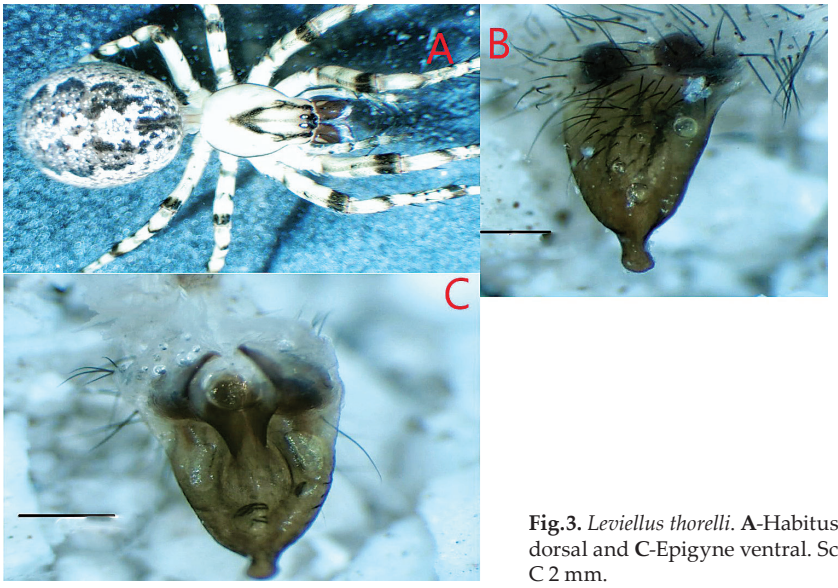


**Fig.3.** *Leviellus thorelli*. **A**-Habitus, **B**-Epigyne dorsal and **C**-Epigyne ventral. Scale on B and C 2 mm.

Araneidae Clerck, 1757

*Leviellus* Wunderlich, 2004

*Leviellus thorelli* (Ausserer, 1871)

Global distribution (WSC 2022): France, Central, Southern and South-Eastern Europe

**Balkan distribution**: It is known from Bulgaria (Blagoev *et al*., 2018), Slovenia (Kostanjšek & Kuntner, 2015), just recently has beenreported from Kosovo (Geci & Naumova, 2021b), No records exist from other countries in the Balkan Peninsula (Bosnia and Herzegovina**,** Croatia, Greece, Montenegro**,** North Macedonia, Romania**,** Serbia).

**Habitat:** Warm places, mostly inside houses or similar environments.

Tetragnathidae Menge, 1866

*Meta* C. L. Koch, 1836

*Meta bourneti* Simon, 1922

Global distribution (WSC 2022): Europe, Georgia, North Africa

**Balkan distribution**: Official reports are known from Bulgaria (Blagoev *et al*., 2018), Croatia (Kratochvíl, 1942), Greece (Mammola *et al*., 2021) Montenegro (Deeleman-Reinhold, 1974) and Turkey (Europe) (Danişman *et al*., 2021a).

**Habitat**: Caves, troglophile species (Mammola *et al*., 2018), cave walls closer to the entrance, with higher prey availability (Mammola & Isaia, 2014).

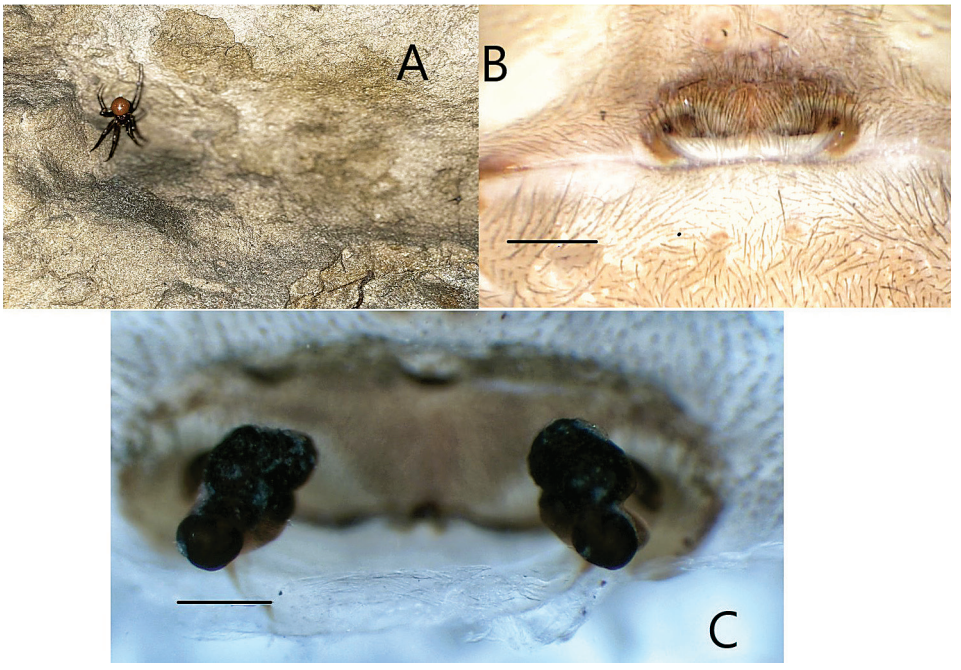


**Fig.4.** *Meta bourneti* **A**-Habitus, **B**- Epigyne ventral, and **C**- Epigyne dorsal, Scale on B and C 1 mm

From our investigation we can say that bunkers have an important biological value serving as habitats or shelter for spider species or other cave-roosting species, such are bats. We suggest that there is a need to better investigate military shelters as a potential habitat for spiders, including species typically adapted to subterranean habitats (Naumova, 2020a).

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