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Review of Zygentoma in Bulgaria with report of four new species

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INTRODUCTION & AIM

Zygentoma is a small ancient order of primitive hexapods with over 500 described species, distributed worldwide. The original data about Bulgarian Zygentoma is scarce and refers to only four species: *Atelura montana* (Nicoletiidae), *Coletina bulgarica* (Nicoletiidae), *Ctenolepisma lineatum* (Lepismatidae) and *Neoasterolepisma balcanicum* (Lepismatidae).

In this study, the fauna of Zygentoma from Bulgaria is reviewed and extended by new distributional data with the addition of four more species: *Ctenolepisma calvum*, *C. ciliatum*, *C. longicaudatum* and *Lepisma saccharinum*. The newly established species are from the Lepismatidae family and are synanthropic, showing increased spreading trends in recent years, except the *Ctenolepisma ciliatum*, which is not synanthropic, but in Bulgaria it was found only in the vicinity of human dwellings.

METHOD

The material was collected in different habitats, both urban and natural, by hand collecting, exhauster and tweesers. The specimens were preserved in 70-80% ethanol and deposited in the collection of the Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences (IBER). Photo-identifiable records in social media (SM) posts are also included.

RESULTS & DISCUSSION

Family Nicoletiidae

Eyeless. Occur in natural habitats: under stones, in soil and also in caves.

Atelura montana Stach, 1939

Published data: Lyulin Mts, Pirin Mts – Melnik Belasitsa Mts – Petrich, Vitosha Mts, Western Rodopes Mts – Krichim, W Stara Planina Mts – Lakatnik, Varna.

New data: 3 ex., W Stara planina Mts, Lokorsko Village, 01.10.2022, V. Vassilev obs. & photo; 3 ex., Balsha Village, 08.10.2024, I. Georgiev leg.; 3 ex. Targovishte, 22.10.2022, V. Vassilev obs., 2 ex. 16.09.2023, V. Vassilev leg; 1 ex. Sofia, 17.10.2023, V. Vassilev leg.

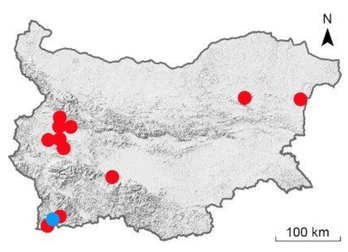

Fig. 1. Records of *Atelura montana* (red dots) and *Coletinia bulgarica* (blue dots) in Bulgaria.

Coletinia bulgarica (Kozaroff, 1939)

Kozarov (1939) described *Coletina bulgarica* Kozarov, 1939 (sub *Nicoletia b.*) form a small locality in SW Bulgaria (Kozhuh Hill). The species is still known only from its first, description and is defined as endemic (Molero *et al.* 2013). The type material considered lost.

Family Lepismatidae

With well developed eyes. Some species are synanthropic, others are found only in natural habitats.

Ctenolepisma calvum (Ritter, 1910)

New data: 1 ♂ (IBER), Sofia, 10.04.2023, M. Naumova leg; 1 ex., Sofia, 22.04.2022, SM; 1 ex., Sofia, 21.06.2023, SM;1 ex., Sofia, 13.01.2024, SM, 1 ex. (IBER), 22.02.2023, M. Yanakieva leg.; 1 ex., Ruse, 14.03.2024, SM.

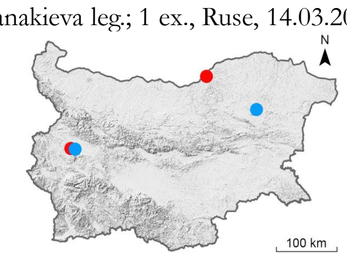

Fig. 2. Records of *C. calvum* (red dots) and *C. ciliatum* (blue dots) in Bulgaria.

Ctenolepisma ciliatum (Dufour, 1831)

New data: 1 ♀ (IBER), Sofia, 22.04.2023, M. Naumova leg.; 1 indiv., Shumen, 22.04.2023, SM.

Ctenolepisma lineatum (Fabricius 1775)

Published data: Balchik, Kostenets, Krichim, Sofia, Varna.

New data: 1 ex., Dobrich, 22.02.2024, SM; 1 ex., Gorna Oryahovitsa, 01.06.2024, SM; 1 ex., Herakovo Village, 29.01.2024, SM; 1 ♀, Pazardzhik, 29.06.2024, SM; 1 ex., Radomir, 21.04.2020, SM; 1 ex., Shumen, 13.08.2018, SM; 1 ♂, Sofia, 06.09.2024, SM; 1 ex., Yambol (Kermen Village), 11.12.2023, SM; 1 ♂, Popovo (Medovina Village), 14.03.2024, SM; 1 ex., Targovishte, 30.08.2024, SM; 1 ex., Svoge, 02.07.2023, SM; 1 ex., Petarch, 19.05.2023, SM; 1 ex., Varna, 11.05.2023, SM.

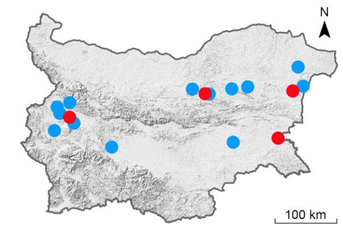

Fig. 3. Records of *C. lineatum* (blue dots) and *C. longicaudatum* (red dots) in Bulgaria.

Ctenolepisma longicaudatum Escherich, 1905

New data: 1 ex., Burgas, 01.06.2021, SM; 1 ♂ (IBER), Sofia, 17.08.2022, Ts. Tsvetanov leg; 1 ex., Provadia, 29.05.2023, SM; 1 ex., Gorna Oryahovitsa, 04.09.2024, SM.

Lepisma saccharinum Linnaeus, 1758

New data: 1 ♀ (IBER), Sofia, 07.07.2019, M. Naumova leg.; 1 ♂, 1 ♀ (IBER), Sofia, 05.04.2020, M. Naumova leg.; 5 ex., Sofia, 07.07.2021, M. Naumova obs.; 1 ex., Blagoevgrad, 26.05.2024, SM; 1 ex., Burgas, 15.04.2022, SM; 1 indiv., Kozloduy, 22.05.2022, SM; 1 ex., Varna, 07.05.2022, SM.

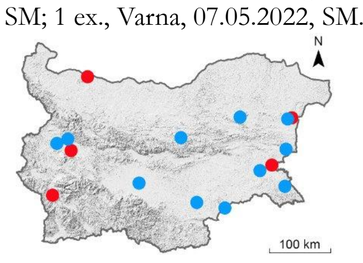

Fig. 4. Records of *L. saccharinum* (red dots) and *N. balcanicum* (blue dots) in Bulgaria.

Neoasterolepisma balcanicum (Stach, 1922)

Published data: Hisarlaka, Sandanski.

New data: 1 indiv., Dimitrovgrad, 02.08.2018, SM, 1 indiv., ditto, 07.10.2021, SM; 1 indiv., Plovdiv, 01.09.2021, SM; 1 ♀ (IBER), S Black Sea Coast, St. Vlas Resort, 24.09.2021, M. Naumova leg.; 1 ♂ (IBER), Sakar Mts., Matochina Village, Bukelon Fortress, 25.05.2022, M. Naumova leg.; 2 indiv., Burgas distr., Suhodol Village, 22.10.2022, 1 indiv., 22.09.2023, V. Vassilev obs. & photo; 1 indiv., S Black Sea Coast, Slanchev Bryag Resort, 01.04.2023, SM (photo); 5 indiv. (IBER), S Black Sea Coast, Begliktash, M. Naumova leg.; 1 indiv., Plovdiv, SM (photo); 3 indiv. Targovishte, 22.10.2022, V. Vassilev obs.; 1 indiv. Veliko Tarnovo, 26.10.2023, SM; 1 indiv., Varna, 11.05.2023, SM, ditto, 26.12.2023, SM; 3 ind (IBER), Dragoman, Tri Ushi Hills, 27.10.2024, M. Naumova leg.; 8 indiv. (IBER), 12 indiv. (obs.), W Stara planina Mts, Balsha Village, 08.10.2024, I. Georgiev leg. & obs.

CONCLUSION

The doubling of the Zygentoma species known from Bulgaria shows that their diversity is far from static. In the last decades many species modulated their distribution due to human activity and the climate change. The expansion of global trade and transport has facilitated the spread of alien species, in particular synanthropic ones. We can therefore expect more new species, both synanthropes like *Thermobia aegyptiaca* and naturally expanding ones like *Tricholepisma* spp., that occur in neighboring territories.

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