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ON THE ANT EATING SPIDERS (ARANEAE: ZODARIIDAE) OF ROMANIA: NEW FAUNISTICAL DATA

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SUMMARY. Although Romania has 5 biogeographic regions, more than in any neighboring country, till 2006 were recorded only four *Zodarion* species. This study reveals the existence of *Zodarion morosum* Denis 1935 and *Zodarion cyprium* Kulczynski 1908 in Romanian fauna. The biogeography of the Romanian species of *Zodarion* is discussed and notes of their habitat are given.

Keywords: Arachnida, *Zodariidae*, *Zodarion cyprium*, *Zodarion morosum*, habitats, Romania

Introduction

From a total of eleven biogeographic regions found in Europe according to the European Environment Agency, in Romania five are present: continental, alpine, pannonian, pontic and steppic, more than in any other country on the old continent (except Russia). So we would expect to find here a great biodiversity of flora and fauna.

In spite of this potential till 2006 there were only four species of *Zodarion* recorded in our fauna Weiss and Petrişor (1999). From these *Zodarion geticum* Weiss, 1987 and *Zodarion aurorae* Weiss, 1982 were described for the first time from Romania by Weiss (1982), (1987). Recently Duma (2007) added to the list *Zodarion rubidum* Simon, 1914 but still this number is very small in comparison to the species known from the neighboring countries: Bulgaria has 11 recorded species according to Deltshev (2005), Macedonia (part of the former Yugoslavia) – 10 species, Blagoev (2002), Ukraine - 5 species, Kovblyuk (2003).

This paper adds further two species of the genus *Zodarion* for the Romania: *Zodarion cyprium* Kulczynski 1908 and *Zodarion morosum* Denis 1935.

Also the biogeography of all *Zodarion* species known from Romania is discussed and notes on their habitat are presented.

Material and Method

The spiders were collected in the summers (July) of 2004 and 2007 from South-Eastern Romania (Dobrogea and Muntenia regions) and then preserved in ethylic alcohol 70%. All specimens of *Zodarion* were gathered by hand from the vicinity of ant trails or nests.

For the determination of the material we used online papers of Nentwig & all. (2003) and Weiss (1982), (1987).

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The geographical coordinates of the collection places were obtained with a Magellan and Yakumo Global Positioning System units or from the maps provided by Google Earth program.

The plant associations are according to the Habitats of Romania by Donita & all. (2005).

Abbreviations used in the figures.

Abbreviations used for the countries in the Balkan Peninsula:

RO – Romania, UKR – Ukraine, BG – Bulgaria, SRB – Serbia, MK – Macedonia, GR –Greece, T – Turkey, AB – Albania, CR – Croatia, MTN– Monte Negro, BOS – Bosnia and Herzegovina, SL – Slovenia.

Abbreviations used to specify the biogeographical distribution of the Zodarion species found in Romania.

EUR – Species with European distribution, BLK – species from Balkan area, P-MED – Ponto-Mediterranean species, STP – species with east European distribution found in Steppic regions.

Material deposition

All specimens collected are now deposited in the collection of Department of Biology, Faculty of Chemistry-Biology-Geography, West University of Timişoara.

Results

The spiders collected were identified as:

Zodarion cyprium Kulczynski 1908: 1♂ (7 July 2004, Agigea - 44º04′58″N 28º38′28″ E) and 1♀ (13 July 2007, Histria - 44º32′55″N 28º46′09″E).

Zodarion morosum Denis 1935 2♂♂ (4 July 2007, Eforie Nord - 44º03′39″N 28º38′20″E) 2♀♀ (one on 5 July 2007 at Agigea -44º05′24″N 28º38′31″E and one on 15 July 2007 in 2 Mai - 43º46′49″N 28º34′24″E) (fig. 1).

Zodarion geticum Weiss 1987 1♂ (27 August 2007, Bujoru 43º42′48″N 25º33′25″E) (these coordinates were taken from the Google earth program).

Zodarion cyprium Kulczynski 1908 and *Zodarion morosum* Denis 1935 were found on marine sand dunes along the Black Sea coast (fig. 1) in habitats with *Atripliceto hastatae - Cakiletum euxinae* Sanda & Popescu 1999, *Ephedro - Caricetu colchicae* (Prodan 1939 n.n. Morariu, 1959) Sanda & Popescu 1973, *Secali sylvestri - Alyssetum borzeani* (Borza 1931) Morariu 1959, *Schoenetum nigricans* W. Koch 1926, Doniţă & all. (2005). Unfortunately these habitats are under constant human pressure and their surface is diminishing year after year due to the development of tourist resorts especially in the southern part of Romanian Black Sea coast.

With our new findings the total number of *Zodarion* spiders known in Romania rises to seven species.

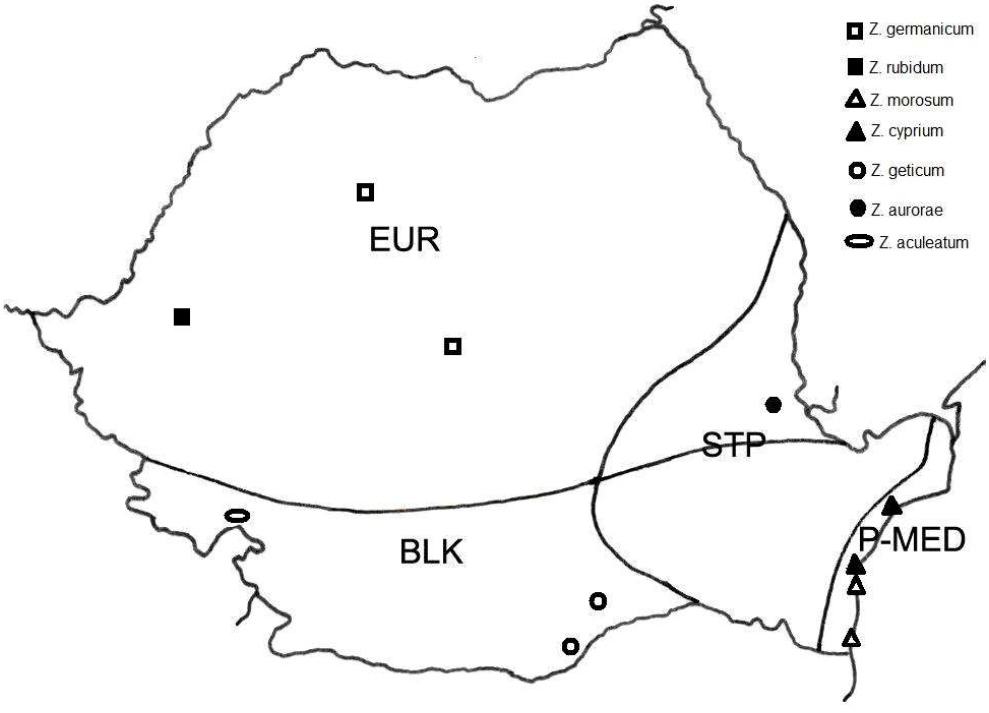

Figure 1. The distribution of *Zodarion* species in Romania

Zodarion geticum Weiss 1987 described from material gathered near capital Bucureşti by Dumitrescu is another rare species found in our searches (fig. 1). Till now it was recorded in Romania only from the Ceagău forest (Comana Natural Park) by Weiss (1987). From the moment it was described, no other report on this species has been published till present study. Unfortunately like Dumitrescu in 1987 we have collected just a male specimen and so the female remains still unknown to science. Present article adds a new distribution point for this rare species in Romania and brings new data on the habitat of the species. If Dumitrescu found his specimens in Moesian silver lime woods (Natura 2000) with the following plant associations: *Ornithogalo-Tilio-Quercetum* A. Dihoru 1976, *Quercetum pedunculiflorae* Borza 1937, *Querco pedunculiflorae-Tilietum tomentosae* Doniță 1970 we have found it in an orchard near the town of Alexandria at Bujoru (Teleorman district).

Discussions

The spiders of the Zodariidae family belong to a group of a few specialized arachnids that feed on ants. Their specialization seems to be so complex that at least some species don't grow well on any ant diet as shown by Pekar (2004). This

may lead to the conclusion that the dispersal of a *Zodarion* species is conditioned by the presence of certain species of ants. However in the end we believe that both ants and spiders have their distribution conditioned by the climate and habitat conditions and in this context we shall discuss the distribution of the ant eating spiders in Romania.

The presence of *Z. cyprium* and *Z. morosum* in Romania shows that the South-Eastern Romania has strong Mediterranean influences being home of many rare species for the country.

Although with present study *Z. geticum* has one more distribution point on the map of Romania we still know little about this species and the female remains still unknown to the science.

In 2001 it seems that was found also in Bulgaria Tzonev & Lazarov (2001) in the Osogovo Mountain (south-Western Bulgaria) at 950 meters altitude in a glade but this findings are not recognized by Platnick (2007) who still considers *Z. geticum* as a species limited to the Romanian territory.

Zodarion aurorae Weiss 1982 described by Weiss (1982) after material collected at Hanu Conachi reserve (fig. 1), in Galati district, on 5 May – 18 June 1977 by Marcu Aurora & Weiss (1979) remains the rarest species from the Zodariidae family in Romania.

The habitat of this species are sand dunes with *Brometum tectori* Bojko 1934, *Plantaginetum arenariae* (Buia et. al. 1960) Popescu Sanda 1987, *Mollugietum cervianae* Borza 1963, *Festucetum beckeri* Popescu et Sanda 1997. From its description till now it has never been recorded again by any arachnologist from Romania or abroad. It is the only species that has a present known distribution restricted to the southern Moldova region and till other faunistical data remains a Romanian endemic species. However judging the climate conditions from Hanu Conachi (medium annual rainfall between 500 and 400mm, average sunny days per year between 150-170 days, average temperature in January of -4ºC), and habitats in which *Z. aurorae* was found it can be inferred that it is a Steppic element and should be present and in nearby Ukraine.

Zodarion germanicum C.L. Koch 1837 seems to be the most common species in Romania (fig. 1) being found in Weiss's collection from Brukenthal Museum in Sibiu, Weiss (1976), in Fuhn's collection deposited now in the National History Museum "Grigore Antipa" from Bucuresti and also in private collections of other arachnologists: Urák (2002). It is however restricted to those regions that have continental influences (Western, Central and Northern Romania).

Zodarion rubidum Simon 1914 found till now just in the Banat region (fig. 1) of Romania by Duma (2007) may be a common and widespread species in all western and northern parts of the country especially along rivers. Our affirmation is based on its European distribution.

Zodarion aculeatum Kulczynski 1897 is a species restricted to the southern Romania being found till this day only by Fuhn according to the spider checklist

made by Weiss & Petrisor (1999) (fig. 1). This species seem to be restricted to the northern Balkan Peninsula being cited in the faunas of Serbia, Macedonia, Bulgaria and of course Romania.

From the biogeographical point of view Romania has a great faunistical potential. Its position in the northern Balkan Peninsula and the various climate influences has great repercussions on the fauna (fig. 2). In the western and northern regions where strong continental influences are present, European species are found: *Z. germanicum* and *Z. rubidum*. Further other widespread species may also be present.

The South-Eastern Romania has the greatest *Zodarion* diversity. Here are found ponto-mediteraneean species along the Black Sea coast: *Z. cyprium* and *Z. morosum*, then Steppic species: *Z. aurorae* and also Balkanic ones: *Z. aculeatum* and *Z. geticum*.

Conclusions

1. The total number of *Zodarion* species known from Romania until present is of seven.

2. Analyzing the geographical distribution of *Zodarion* species from our country it can be inferred that the greatest diversity of species is found in the South-Eastern Romania where are present ponto-mediteranean, steppic and balkanic species.

3. *Zodarion cyprium* and *Zodarion morosum* are ponto-mediteraneean species and therefore restricted to the Dobrogea region.

4. *Zodarion aurorae*, remains the rarest species from the genus *Zodarion* in Romania. Although it was found in a single place: Hanu Conachi reserve (Southern Moldova) it is a Steppic element and might be present in Ukraine also.

5. *Zodarion aculeatum* and *Zodarion geticum* are Balkan species with the northernmost distribution in Romania.

6. Due to the rarity of the species: *Zodarion geticum* and *Zodarion aurorae* and also because their habitat is under constant pressure we suggest that these species should have a place on a red list of Romanian spiders that must be done in near future.

7. Although with recent findings the number of *Zodarion* species rose to seven each of these has just a few known distribution points and so further faunistical studies on this family are needed for clarifying their status.

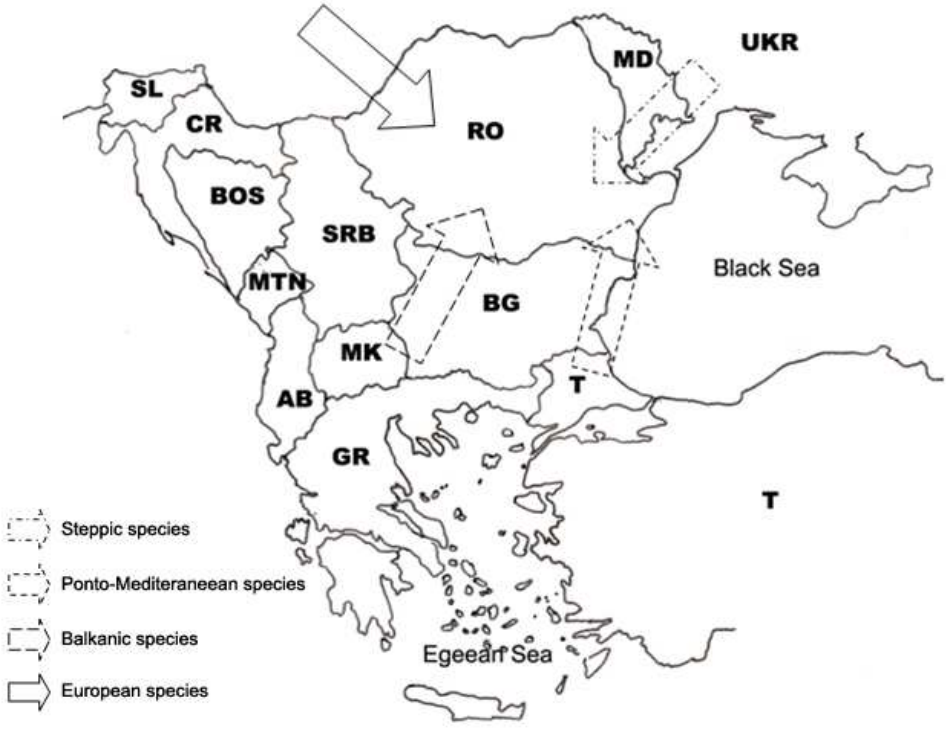

Figure 2. The position of Romania in the Balkan Peninsula and the influences on the *Zodarion* spider fauna

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