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On the biogeography of Romanian spiders (Araneae)

Andreea Tatole[1]

Abstract: The biogeographical structure of the Romanian spider fauna is analyzed differentially: first at macro-regional level, in order to outline the global distribution of the species, and secondly at the level of Palearctic subregions, to show the affinities of the species with different types of climate and habitats. The results show that Palearctic and Holarctic elements dominate among Romanian spiders as 81.16% of the species are widespread and occur throughout Europe.

Key words: spiders, zoogeographical analysis, macro-regions, Palearctic subregions, Romania

Introduction

One of the most obvious features of the living world is its lack of uniformity in distribution – plants and animals showing both spatial and temporal distribution patterns (Bănărescu, Boşcaiu 1973; Cox, Moor 1985). As the anthropic pressure is growing, controlling its effects on the different species of plants and animals is becoming more and more important, and biogeography plays a significant role in conservation (Bănărescu, Tatole 1996).

Material and Methods

The zoogeographical analysis of the Romanian spider fauna was carried out using the checklist published by Weiss, Urák (2000), which was renewed following the data from the catalog of Platnick (2004). The intra-Palearctic analysis was made using the map of the biogeographic subregions given by the European Environmental Agency (online at http://dataservice.eea.eu.int/atlas/viewdata/viewpub.asp?id=221)

Results and Discussion

The biogeographical analysis of the spider fauna has been made in two steps: first at macro-regional level in order to depict the global distribution of the species, and secondly at the level of Palearctic subregions to emphasize their climatic affinities.

Macro-regional level

The general accepted system in biogeography is the one defined by Wallace (1876) for mammals (Fig. 1), but the limits of the zoogeographic regions are still a subject of debate, since a single geographic element may or may not represent a barrier for a certain group of organisms. Nevertheless, most of the zoologists are using this system as a matter of standardization.

Cox (2001) suggested the reconsideration of the zoogeographic regions for various reasons: (1). The Wallace's system is based on the dispersion patterns of terrestrial mammals, whose dis-

[1] Ministry of Environment and Water Management, Department of Protected Areas, 12, Libertatii Blvd., Bucharest, Romania. E-mail: andreea.tatole@gmail.com

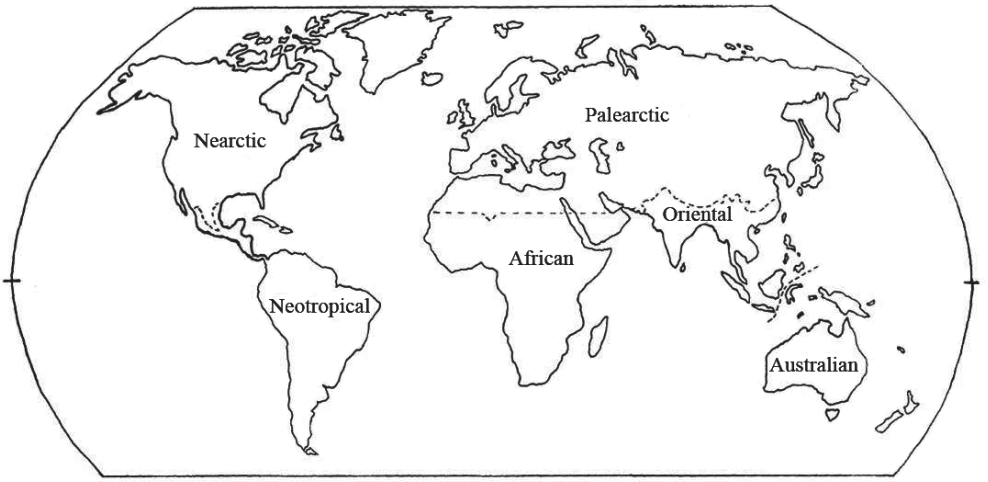

Fig. 1. Map of the zoogeographic regions as defined by Wallace (after Cox, 2001).

tribution is limited to the continental area, and which do not have the means to cross the oceans. The majority of all the other groups of terrestrial animals have distribution patterns closer to those of the flowering plants, being able to disperse either actively, or passively (e.g. on or inside the body of the birds). Thus, "it seems to be inappropriate to call Wallace's Regions "Zoogeographic regions", with the implication that these are the patterns of distribution of animals in general. It would, therefore, be better to refer to them more specifically as "Mammal zoogeographic regions", with the implication that other groups of animals may have different patterns (as they do)" (Cox 2001); (2). As the mammals are limited to the continental plates, and the regions correspond to them, it would be more accurate to name the regions after the names of the continents; (3). The Wallace's Line does not reflect the reality and it has not had a positive effect on the zoogeographical researches. Many scientists tried to find "the better" place to draw it – a futile action, since there is no such place, and the studies did not lead to the further development of biogeography, being a mere comparative study of the competitive and dispersion abilities of the different groups of animals colonizing the area. The best solution is represented by the exclusion of these islands from both regions, limiting the Oriental and the Australian to the continental plates, and the area in between to be named Wallacea; (4). From the historical point of view, the area occupied now

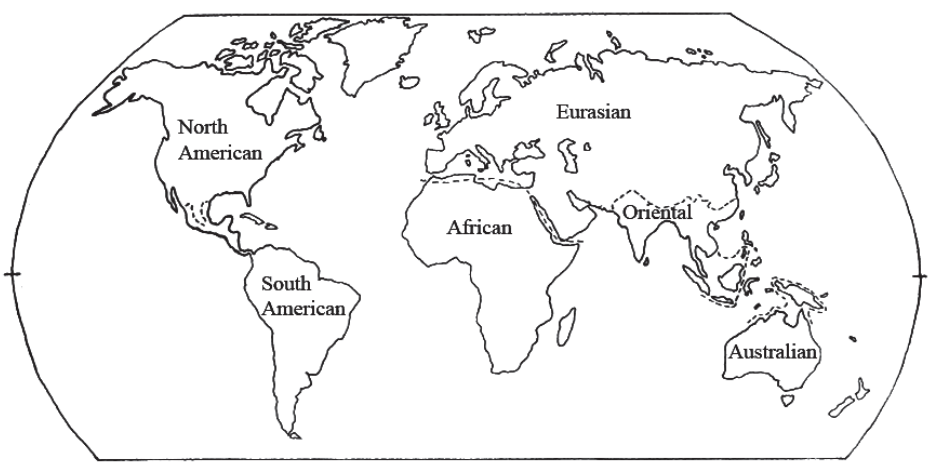

Fig. 2. Map of zoogeographic regions after Cox (2001).

by the Sahara Desert has represented a crossover region between the European and African flora. Once the climatic regime had changed during Pliocene, the South of Europe became at first warm-temperate, afterwards changing into the nowadays Mediterranean, and the desert has grown northwards including the area just to the south of it. Thus, the Sahara is an area where the former tropical flora of North Africa has disappeared, and logically is considered a part of the African Region. Fig. 2 shows the model of Cox (2001).

Because Cox's ideas have not been widely accepted yet, we have analyzed the zoogeographical structure of the Romanian spider fauna in accordance to both models. The results obtained following the Wallace's model are presented in Fig. 3. As seen from the figure, the Palearctic elements (85.74%) are dominant, followed by the Holarctic ones (11.34%), while the affinities between the Palearctic Region and all the other ones are much weaker than those with the Nearctic Region. Following Cox's model, the results are only slightly different (Fig. 4) – the North African species being included in the African Region and not in the Palearctic one.

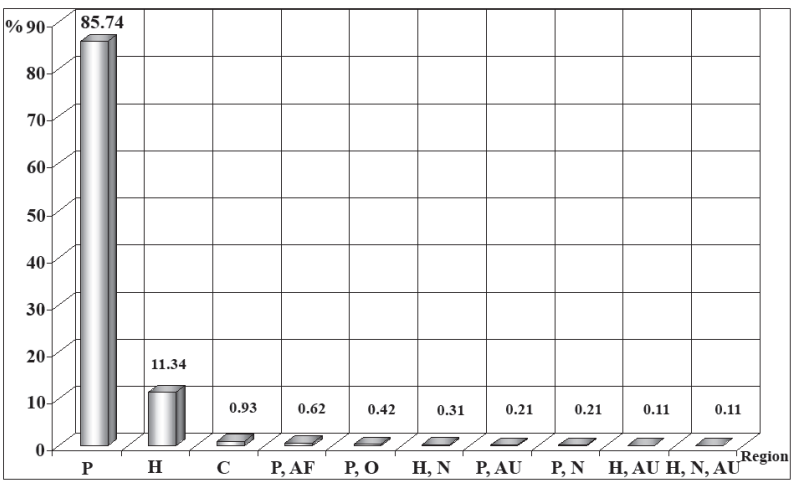

Fig. 3. Comparative share of the zoogeographical elements in the Romanian spider fauna. AF=African; AU=Australian; C=Cosmopolitan; H=Holarctic; N=Neotropical; O=Oriental; P=Palearctic.

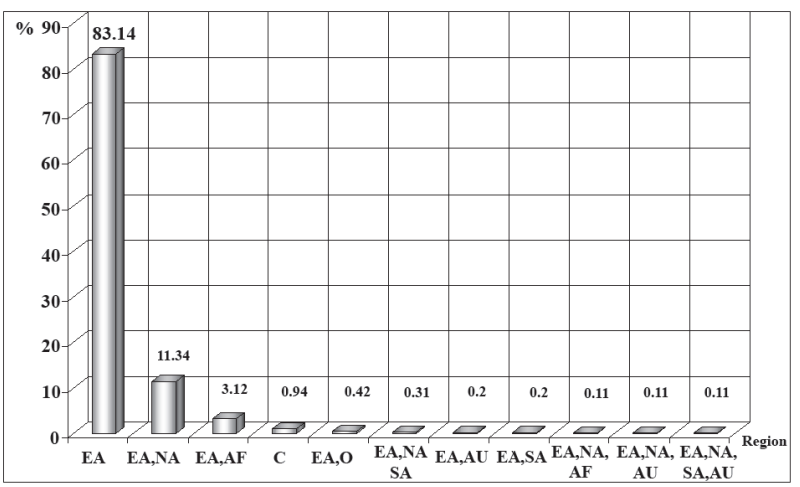

Fig. 4. Comparative share of the zoogeographical elements in the Romanian spider fauna (after Cox's biogeographic division). EA=Eurasian; NA=North American; SA=South American; AF=African; AU=Australian; O=Oriental; C=Cosmopolitan.

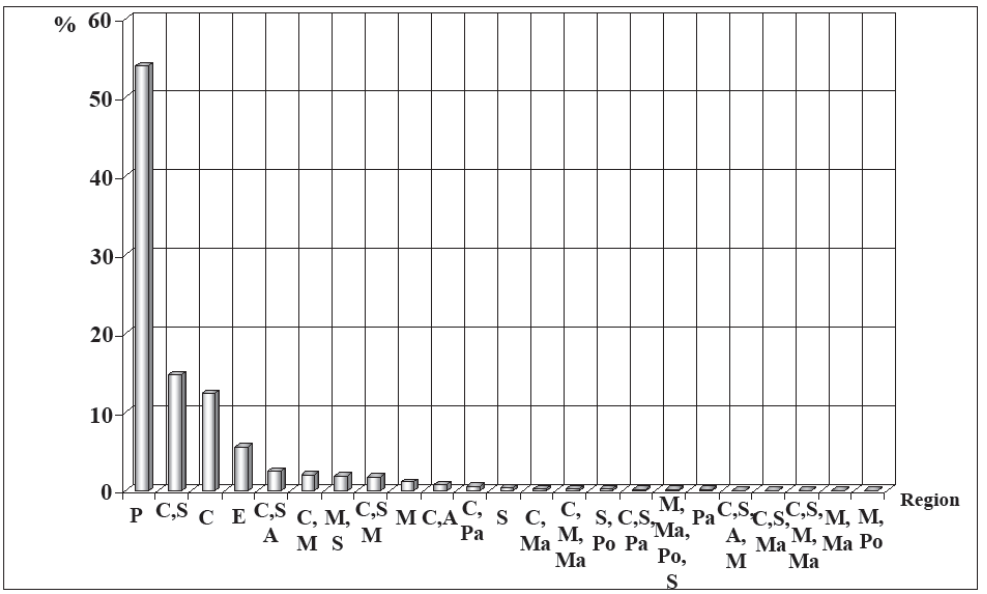

Fig. 5. Comparative share of the intra-Palearctic zoogeographical elements in the Romanian spider fauna. P=Palearctic; C=Continental; S=Steppic; E=Endemic; A=Alpine; M=Mediterranean; Ma=Macaronezian; Pa=Pannonian; Po=Pontic.

Palearctic sub-regions level

To analyze the structure at this stage, we considered the biogeographic subregions given by the European Environmental Agency. The Palearctic Kingdom is divided into 11 subregions, the following 5 falling within the borders of Romania: Continental, Alpine, Pannonian, Steppic, and Pontic. Analyzing the obtained data, one can observe that the vast majority of species have extended areals, a fact proven by the sheer dominance of Palearctic elements – 54%, followed by the Continental and Steppe ones – 14.78%, and the Continental ones – 12.38% (Fig. 5). Thus, out of 961 species hitherto registered in Romania, 780 (81.16%) are widely distributed throughout Europe. The occurrence of a certain species in quite different areas (e.g. *Meta bourneti* is known from four different regions – Continental, Steppe, Alpine, Mediterranean) suggests that in fact its areal is still insufficiently known and the species has larger ecological plasticity, which allows a much wider distribution.

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Биогеографски анализ на аранеофауната на Румъния (Araneae)

А. Татоле

(Резюме)

Биогеографската структура на аранеофауната на Румъния е анализирана на макониво по класическото разделяне на царствата, предложено от Уолъс през 1876 г., и на ниво „подрегиони" в Палеарктичното царство. Анализът показва, че палеарктичните и холарктичните елементи доминират в румънската фауна, като 81.16% от видовете имат широко разпространение в Европа.