

THE BIODIVERSITY STUDY OF THE ENTOMOFAUNA (superfamily PENTATOMOIDEA - HETEROPTERA) FROM BĂNEASA FOREST, BUCHAREST

STUDIUL BIODIVERSITĂȚII ENTOMOFAUNEI (superfamilia PENTATOMOIDEA - HETEROPTERA) DIN PĂDUREA BĂNEASA, BUCUREȘTI

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Abstract. *Among the factors that cause biodiversity loss, human activity in the sensitive ecosystem of forests can be easily monitored. The research carried out during 2016 focused on the study of Heteroptera, superfamily Pentatomoidea fauna in the Baneasa forest, where the natural environment was modified by human intervention through both recreational activity and constructions, insect collection being made by mowing with the entomological net, determining the structure of the systematic groups of the Heteroptera identified in the Baneasa forest, and a characterization of the zoogeographical origin of the species. In the Baneasa forest, the area hardly affected by the human activity, but less researched in terms of Heteroptera fauna, 52 species of Pentatomoidea were found, in our opinion 12 seem to originate from Manchurian refuge Usuric subcenter, 37 of the Mediterranean arboreal refuge, 2 come from the Caucasian arboreal refuge and one species could originate from the eremial Aralo-Caspic refuge (Turanic).*

Key words: Heteroptera-Pentatomoidea, biodiversity, forest Băneasa

Rezumat. *Printre factorii ce determină pierderi în cadrul biodiversității, activitatea omului în ecosistemul sensibil al pădurilor poate fi cu ușurință monitorizată. Cercetările, efectuate în cursul anului 2016, s-au axat pe studiul faunei de heteroptere din pădurea Băneasa, acolo unde mediul natural a fost modificat de intervenția omului atât prin activitatea de recreație cât și construcțiile realizate, colectarea insectelor făcându-se prin cosire cu fileul entomologic, determinându-se structura grupurilor sistematice ale heteropterelor identificate în pădurea Băneasa, și s-a făcut o caracterizare a originii zoogeografice a speciilor. În pădurea Băneasa, zonă relativ puternic afectată de activitatea umană, dar mai puțin cercetată din punct de vedere al faunei de heteroptere, au fost identificate 52 de specii ale suprafamiliei Pentatomoidea, după părerea noastră, 10 par să fie originare din refugiul Mancurian subcentrul Usuric, 37 din refugiul arboreal Mediteranean, 2 provin din refugiul arboreal Caucazian și o specie ar putea fi originară din refugiul eremial Aralo-Caspic (Turanic).*

Cuvinte cheie: Heteroptera-Pentatomoidea, biodiversitate, pădurea Băneasa

INTRODUCTION

Emphasizing the vital importance of ecosystems for the health and well-being of people, the EU is launching a very clear message on the severity of

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biodiversity losses, recalling among the main factors determining the loss of biological diversity and inadequate water management water resources. They have to show the deforestation of the forests, the steppes have exerted a particular influence on the heteroptera, especially by changing the natural conditions of existence, the number of species, individuals, the evolution of these, may include the group as an indicator of biodiversity. Landscape fragmentation is one of the major reasons which lead to the drastic degression or loss of biodiversity over the world. It blocked gene flow among populations, caused inbreeding depression; and altered bio-geographical environments the species depended on, and minished the living space of the species (Liu *et al.*, 2005). Biodiversity measurement is commonly used to evaluate and monitor the health of ecosystems and as a tool for conservation planning (Magurran, 1988; Hoffmann, 2010). Like any other biologically successful group of organisms, the Heteropteran are prolific and diverse and have adapted to a variety of habitats. Heteropteran have complex and important roles in the balance of nature, the majority of them occupy an intermediate position in the ecological food chain; they use food producers (plants) and serve as food sources for parasites and other animals, Heteropteran are essentially nonsocial insects, a few species utilize plant-feeding insects as food (Froeschner, 2017). Morrison *et al.* (2012) identified Hemiptera and Coleoptera as effective indicator taxa of greater invertebrate richness in old field habitats in Michigan and the Great Lakes region. Duelli and Obrist (1998) showed that heteropteran diversity is a strong indicator of arthropod richness in semi natural and cultivated habitats in Switzerland.

MATERIAL AND METHOD

Insect collection was carried out by mowing with the entomological net in some areas of the Băneasa forest, where the natural environment was less or even altered by human intervention. In the entomological mesh, large species were caught by hand, and the small ones with the entomological vacuum cleaner were then placed in chloroform killing containers and then sorted. After sorting, some heteropteran species were stored in 70° alcohol, others were prepared on entomological needles and preserved in insect collection boxes and determined in the laboratory. Considering that not all specimens could be determined at the species level, their classification was gender and family. The determination of the heteropteran species was carried out with the help of determiners books or papers (Kiritshenko, 1951; Wagner, 1967; Benedek, 1969; Puchkov, 1961, 1965, Fuente, 1971, 1972 a, b, 1973 a, b; Kis B., 1984; Stichel, 1955-1962).

Characterization of the zoogeographical origin of the Heteropteran collected species was done taking into consideration papers of different authors (De Lattin, 1967; Hoberlandt, 1955; Banarescu, 1970; Banarescu and Boșcaiu, 1973; Roșca, 1979). The centers for the spreading of the faunistic elements, namely the glacial refuges of the arboreal and eremial fauna in the Holarctic region are presented in figure 1.

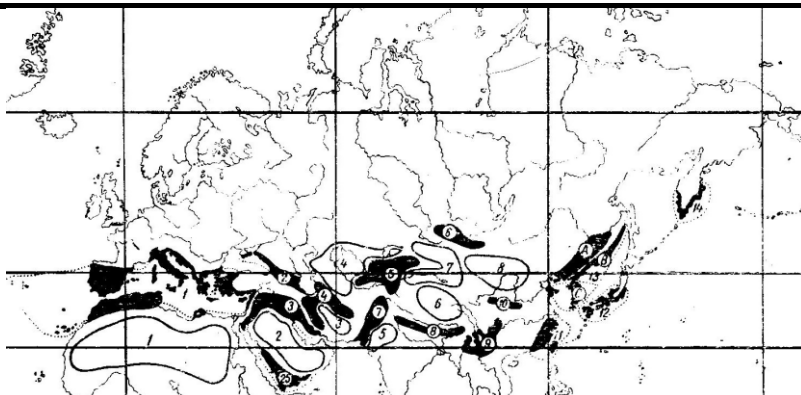


Fig. 1 The centers for the spreading of the faunistic elements, the glacial refuges of the arboreal and eremial fauna in the Holarctic region (Black=arboreal refuges: 1, Mediterranean; 2, Caspian (Caucasian); 3, Syrian; 4, Iranian; 5, Turkestanic; 6, Mongol; 7, Sinic; 8, Nepal; 9, Yunnan; 10, Sino-tibetan; 11, Sino-Pacific; 12, Japanese; 13, Manchurian (with 3 sub-centers, the main one being Usuric); 14 Kamciatkan; 16, 25, Yemenite; White=eremial centers: 1, Afro-eremial; 2, Siro-eremial (Arabic); 3, Irano-eremial; 4, Turano-eremial; 5, Sino-eremial; 6, Tibetan-eremial; 7, Mongolo-eremial; 8, Sino-eremial) (de Lattin, 1967)

RESULTS AND DISCUSSIONS

The superfamily Pentatomoidea, REUTER, 1910, has been and is relatively well studied today, and from a systematic point of view it is well known both in Romania and abroad the five families of the group: Scutelleridae, Pentatomidae, Acanthosomatidae, Cydnidae and Plataspidae which were the subject of special attention from us, in this study. Under the circumstances of our country importance of studying the Heteropteran order, it is particularly important if it is considered that in present there is any specialist deals with the study of Heteropteran species. Heteropteran species of superfamily Pentatomoidea species which were found in the Băneasa forest are presented below.

Superfamily PENTATOMOIDEA, Reuter, 1910

Family SCUTELLERIDAE Leach, 1815

Subfamily Odontoscelinae

1. *Odontoscelis dorsalis* F., 1803, comes from the Mediterranean arboreal refuge.

Subfamily Odontotarsinae

2. *Odontotarsus purpureolineatus* R., 1790, originates from the Mediterranean arboreal refuge.

Subfamily Eurygasterinae

3. *Psacasta exanthematica* Scop., 1763 originates from the Mediterranean arboreal refuge.

4. *Psacasta* (Cryptodonus) *neglected* H-S, 1837, originating from the Mediterranean arboreal refuge, more precisely from the Ponto-Mediterranean sub-center, extending westward along the southern continent of Europe.

5. *Eurygaster integriceps* Pt., 1881, originating from the Caucasian arboreal refuge.

6. *Eurygaster maura* L., 1758, originating from the Mediterranean arboreal refuge.

7. *Eurygaster austriaca* Schr., 1778, originated from the Mediterranean arboreal refuge, more precisely from the Atlantic-Mediterranean sub-center, limited to the original area because it is not extended to the north and east.

8. *Eurygaster testudinaria* G., 1875, originated from the Mediterranean arboreal refuge, but extended to the north and especially to the Far East.

Family PENTATOMIDAE Lech, 1815

Subfamily Podopinae

9. *Vilpianus galli*, W. 1802, a faunistic element originating from the Mediterranean arboreal refuge, withdrawn from the southern part of the initial area and now only spread in the northern Mediterranean.

10. *Ancyrosoma leucogrames* Gml. 1789, an element from the Mediterranean arboreal refuge, extending eastward to the Carpathians Altai, and westward to the Canary Islands.

11. *Graphosoma lineatum* L. 1758. That is why we consider Wagner to be an element from the Mediterranean arboreal refuge, which is very extensive, although Kis considers it Palearctic.

12. *Derula flavoguttata* Ms. et Rey, 1857, species originating from the Mediterranean arboreal refuge.

Subfamily Pentatomidae

Tribe Sciocorini

13. *Sciocoris cursitans* F. 1794, Mediterranean species, withdrawn from North Africa and extended to the north and especially to the east.

14. *Sciocoris helferi* Fb. 1851, Faunistic element from the Mediterranean arboreal refuge extended to the east until Kopet-Dag mountains.

15. *Sciocoris deltocephalus* Fb. 1861, a faunistic element from the Caucasian glacial arboreal refuge, extending north through the Black Sea to the west to Hungary, and east to south of Kazakhstan and the mountainous region of Russia as Hoberlandt shows us, is a species characteristic of steppe formations with rare vegetation.

16. *Sciocoris sulcatus* Fb. 1851, a species from the Mediterranean arboreal refuge, so most authors regard it as a Holomediterranean or Mediterranean species extending eastwards to Turkestan.

17. *Sciocoris* (*Aposciocoris*) *macrocephalus* Fb. 1851, a species originating from the Mediterranean arboreal refuge, and Hoberlandt describes it as a Holomediterranean species.

18. *Sciocoris* (*Aposciocoris*) *microphthalmus* Fl. 1860, the species originates from the Mediterranean refuge, but being adapted to a cold climate, it is withdrawn from North Africa, Western Europe, Asia Minor and the Near East.

19. *Dryoderes umbraculatus* F. 1775, originates from the Mediterranean arboreal refuge.

Tribe Aelini

20. *Aelia acuminata* L. 1758. Wagner regards it as a Holo-Palearctic, Hoberlandt as Euro-Siberian and Kis as Palearctic species. Species could originate from the eremial Aralo-Caspic (Turanic) refuge.

21. *Aelia rostrata* Bh. 1852, originating from the Mediterranean arboreal refuge, is actually an Aralo-Caspic (Turanic) faunistic element.

22. *Neottiglossa bifida* C. 1847, element derived from the Mediterranean arboreal refuge.

23. *Neottiglossa pusilla* Gml. 1789, element derived from the Mediterranean arboreal refuge.

Tribe Eysarcorini

24. *Stagonomus amoenus*, Br. 1832, element of the Mediterranean arboreal refuge.

25. *Stagonomus pusillus*, H-S. 1830, a member of the Mediterranean arboreal refuge.

26. *Stagonomus bipunctatus*, L. 1758, element derived from the Mediterranean arboreal refuge.

27. *Eysarcoris fabricii*, Kirk. 1904 (*E. venustissimus* Schreck), originating from the Manchurian arboreal refuge, Usuric subcenter.

28. *Eysarcoris inconspicuus*, H-S. 1844, an element from the Mediterranean arboreal refuge.

29. *Eysarcoris aeneus*, Scop. 1844 entered in our fauna through the extension of the species from Manchurian arboreal refuge, the Usuric subcenter, to the west.

Tribe Cappaeini

30. *Halyomorpha halys* Stål 1855, a species considered to be invasive, first reported in Romania in 2015, originating in the Far East, Manchurian arboreal refuge (Usuric subcenter)

Tribe Carpocorini

31. *Staria lunata* Hahn. 1835, comes from the Mediterranean arboreal refuge.

32. *Rubiconia intermedia* W. 1811, a species derived from the Manchurian arboreal refuge, the Usuric subcenter.

33. *Holcostethus vernalis* W. 1804, originates from the Mediterranean glacial shelter, partially withdrawn from the south of the initial area and extended to the north and especially to the east.

34. *Holcostethus* (*Drycoris*) *sphacelatus* F. 1794, species originating from the Mediterranean arboreal refuge, with less ecological valences than the previous species, as it is less extended to the north and especially to the east.

35. *Carpocoris purpureipennis* Deg. 1773, the species has expanded from the Manchurian arboreal refuge, the Usuric subcenter, to the west.

36. *Carpocoris fuscispinus* Boh. 1849, a species derived from the Manchurian arboreal refuge, the Usuric subcenter.

37. *Carpocoris pudicus* Pd. 1761, a faunistic element from the Mediterranean arboreal refuge.

38. *Dolycoris baccarum* L. 1758, the species originates from the Mediterranean arboreal refuge.

39. *Palomena viridissima* Pd. 1701, the species originates from the Manchurian arboreal refuge, the Usuric subcenter.

40. *Palomena prasina* L. 1761, species derived from the Manchurian arboreal refuge, Usuric subcenter.

Tribe Eurydemini (Strachini)

41. *Eurydema ornatum* L. 1758, species originating from the Mediterranean arboreal refuge.

42. *Eurydema oleraceum* L. 1758, species originating from the Mediterranean arboreal refuge.

Tribe Pentatomini

43. *Piezodorus lituratus* F. 1794, the native species was a Manchurian, Usuric element, possibly re-adapted to the Mediterranean arboreal refuge.

44. *Rhaphigaster nebulosa* Pd. 1761, species originating from the Mediterranean arboreal refuge.

Subfamily Asopinae

45. *Arma custos* F. 1794, faunistic element derived from Manchurian arboreal refuge Usuric subcenter.

46. *Rhacognatus punctatus* L. 1758, faunistic element derived from Manchurian arboreal refuge Usuric subcenter.

47. *Zicrona coerulea* L. 1758, the species originated from the Mediterranean arboreal refuge, the refuge from which a large part of the Heteropteran species existed in Romania are coming.

Family ACANTHOSOMATIDAE Stål, 1865

48. *Acanthosoma haemorrhoidale* L. 1758, originates from the eastern region where it has expanded its area northwards into the Manchurian arboreal refuge, the Usuric subcenter,

Family PLATASPIDAE Dallas, 1851

49. *Coptosoma scutelleatum* Geoffr. 1785, species originating from the Mediterranean arboreal refuge.

Family CYDNIDAE Billberg, 1820

50. *Aethus nigritus* F. 1794, species originated from the Mediterranean arboreal refuge.

51. *Cydnus aterrimus* Forst. 1771, a faunistic element originally from the eastern region of the Mediterranean arboreal refuge.

52. *Tritomegas bicolor* L. 1758, an element originating from the Mediterranean arboreal refuge with the Euro-Siberian spreading, withdrew from the southern areas of the area and extended along the mountain ranges to the east.

In the Băneasa forest, the relatively hardly affected area of the human activity, but less researched from the point of view of the Heteropteran fauna, 52

species of the superfamily Pentatomoidea family were identified, in our opinion 12 seem to originate from Manchurian refuge Usuric subcenter, 37 of the Mediterranean refuge, 2 come from the Caucasian arboreal refuge and one species could originate from the Aralo-Caspic (Turanic) refuge.

Bugs (Heteropteran species), like any other species, responding to the action of all environmental factors, can avoid by adapting their unfavorable influence. This adaptation is made by behavioral features, widening ecological amplitude and enhancing ecological valency, migrations, restructuring of the development cycle, to some species of different hemocromy, mimetism, even mymecophilia and arachnofilia. We must show that the deforestation of the forests, the desertification of the steppes exerted a particular influence on the heteroptera, especially by changing the natural conditions of existence. It can be said that with all the activity of studying the Heteroptera in Romania, there is at present a large field of activity, both in terms of the systematic of this order and in terms of their ecology and biology.

CONCLUSIONS

1. Characterization of the zoogeographical origin of the Heteropteran collected species from forest Băneasa was done.

2. 52 species of the superfamily Pentatomoidea family were identified in Băneasa forest, in our opinion 12 seem to originate from Manchurian refuge Usuric subcenter, 37 of the Mediterranean refuge, 2 come from the Caucasian arboreal refuge and one species could originate from the Aralo-Caspic (Turanic) refuge.

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