INFRAORDER *CIMICOMORPHA* (HEMIPTERA, *HETEROPTERA*): PRELIMINARY NOTES ON THE CLASSIFICATION

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Abstract. *Cimicomorpha* infraorder includes insects with a major ecological role in agroecosystems, having a cosmopolitan (worldwide) distribution. In general, the vast majority of species have phytophagous food habits, but a relatively large number are predators with an intermediate stage in the food chains of their respective communities. Some species may have economic importance as phytophagous and as predators. Therefore, the knowledge of the species composition of the true bugs fauna and their taxonomic classification is of major importance for the specialists in the field. This research focused on alfalfa crops, to determine the true bugs harmful species, also the predatory ones and of course their dominance in Western Romania. The biological material for the present study was collected between 2015 and 2019, using the sweep net method, the Barber traps and direct observation method. After collecting and identifying the biological material, an updated list of Romanian *Cimicomorpha* species from alfalfa crop was generated, with 833 samples belonging to 21 species and 4 families. Considering the old classification given by Dafour (1833), which emphasized that the *Cimicomorpha* infraorder can be divided into two series and analyzing the alternative new classification proposed in 1995 by Sorensen, the insects collected from fields are part of 2 suprafamilies: *Cimicoidea, Miroidea*. All species identified in the studied area have a wide spread in the territory of Romania, with one exception – *Nabis capsiformis* (Germar, 1837), collected for the first time.

Keywords*: true bugs, Cimicomorpha infraorder, alfalfa, classification, western Romania*

INTRODUCTION

The first data on *Heteroptera* fauna in Romania was published in Transylvania by FUSS G. (1853, 1855 and 1862).

In Banat area, investigations on heteropterous species were initiated in the second half of the 19th century, by the famous Hungarian entomologists: FRIVALDSZKY J. (1877) and HORVATH G. (1896, 1897, 1899).

In the early 20th century MONTANDON A.L. (1885, 1886, 1892, 1895, 1907) studied the *Heteroptera* fauna from Dobrogea, Muntenia and Moldova.

Valuable contributions to the knowledge of this group of insects in our country have been made by: MARCU O. (1932 - 33); SIENKIEWICZ I. (1956, 1960.1964); SCHNEIDER E. (1973); PERJU T. & SCHNEIDER E. (1972); KIS B. (1976).

In the last period of time, based on modern taxonomic research, a series of scientific papers have been published: STĂNESCU AURORA (1997), TOGĂNEL FLORENTINA (2006), OTAVĂ F. (2019), targeting the heteropterous species on various host plants, but there have not been any paper issued focusing on a particular crop, so far.

The goal of this paper is to present an updated taxonomic checklist for *Cimicomorpha - Heteroptera* species collected from alfalfa crops from 4 counties located in the western part of Romania. This checklist is provided based on literature reports and on original biological material collected by the authors from fields. Regarding the western part of Romania, where

the research was carried out, there is a lack of knowledge concerning this fauna, since only a few significant taxonomic surveys of alfalfa true bugs species have been published up to date.

MATERIAL AND METHODS

For species identification and information about sex distribution, a detailed bibliographic analysis was performed, specimens from different collection being examined. Not all collected species were included in this paper, as for some of them the data were incomplete, thus future research will follow in order to allow us to deepen some issues regarding sex determination.

Insects in the present study were collected in the 2015 – 2019 periods, at monthly intervals, from alfalfa fields in western Romania, using the sweep net method, Barber traps and some ware handpicked. Extensive and intensive surveys were conducted in 8 localities from 4 counties: Hunedoara County – Nălaț Vad and Brad; Arad County – southern part of Arad city and Chișlaca; Timiș County - Gătaia and Ciacova; and Caraș - Severin County – Berzovia and Caransebeș. Fact sheets have been drafted mentioning for each species - biogeographical data, habitat, food diet, collection method, sex ratio. All collected material was preserved in 70% alcohol. The following keys were used for *Cimicomorpha* species identification: SCHUH & SLATER (1995); AUKEMA & RIEGER (1995 - 2006); AUKEMA ET AL. (2013).

To determine de sexes, the dry – mounted specimens were studied under a Kern microscope. The external male and female genitalia were examined after removing the abdomen and cleaning it with hot KOH. Subsequently the abdomen was washed with distilled water and transferred in 70% alcohol. This procedure was followed by microscope analysis of external genitalia and sex separation of the specimens (WYNIGER, 2004).

RESULTS AND DISCUSSIONS

After processing the data from the investigated period, an updated list of western Romania *Cimicomorpha* species from alfalfa crops was generated, which includes 21 species from 12 genera and 4 families, representing 2 suprafamilies (*Cimicoidea, Miroidea*).

Nabis capsiformis (Germar, 1837) known until recently only on Serbian territory (Banat - Vojvodina) (PROTIC ET AL., 2008) is reported for the first time on Romanian territory, in Gătaia, a locality near the Serbian border (table 1).

The collected species are listed in the following discussion. Furthermore, information about general distribution, abundance, collecting methods, type of diet and sex ratio are given. The following abbreviations are used: Collecting methods: SN – sweep net, BT – Barber trap, H – handpicking; Food diet: Zoo – zoophagous; Pr – predator, Ph – phytophagous, P – polyphagous, O – oligophagous, M – monophagous.

Infraorder *Cimicomorpha* Leston, Pendergrast & Southwood, 1954
Suprafamily *Cimicoidea* Jordan (1912) and Ferris & Usinger (1939)
Family *Anthocoridae* Fieber, 1836
Subfamily *Anthocorinae* Fieber, 1836
Tribe *Anthocorini* Fieber, 1836
Genus *Anthocoris* Fallen, 1814

***Anthocoris nemorum* Linnaeus, 1761**

Material examined: Euro – Siberian distribution, 34 spec. Gătaia (15.05, 19.06, 22.07.2016; 22.06, 15.07.2017); 23 spec. Ciacova (26.04, 22.07.2016; 03.05, 22.06.2017); 16 spec. S Arad (13.05, 10.06.2015; 19.05, 22.06, 19.08.2016); 6 spec. Chișlaca (22.06, 30.07.2016); 8 spec. Berzovia (12.06.2017; 07.07, 17.08.2018); SN; Zoo - Pr, P; 44♀: 43♂

Table 1

True bugs species collected from alfalfa crops in western part of Romania

Species	Timiș		Arad		Caraș - Severin		Hunedoara	
	Gă*	Ci*	S Ar*	Ch*	Be*	Ca*	Br*	Nă*
Family *Anthocoridae* Fieber, 1837								
Anthocoris nemorum	*	*	*	*	*	-	-	-
Orius minutus	*	*	*	-	-	*	-	-
Orius niger	*	*	-	-	*	-	-	-
Family *Lyctocoridae* Reuter, 1884								
Xylocoris galactinus	*	-	-	-	-	-	-	-
Family *Nabidae* Costa, 1852								
Nabis ferus	*	*	*	*	-	-	*	*
Nabis capsiformis	*	-	-	-	-	-	-	-
Family *Miridae* Hahn, 1831								
Deraeocoris lutescens	-	*	-	-	-	-	*	*
Deraeocoris serenus	-	-	*	*	-	-	-	*
Deraeocoris trifasciatus	-	-	-	-	-	-	-	*
Adelphocoris lineolatus	*	*	*	*	*	*	*	*
Adelphocoris seticornis	*	*	*	-	-	-	*	*
Adelphocoris quadripunctaus	-	-	-	-	-	-	*	*
Liocoris tripustulatus	*	*	-	-	*	*	-	-
Lygocoris pabulinus	-	-	-	-	-	-	-	*
Lygus lineolaris	-	-	*	-	-	-	*	*
Lygus pratensis	*	*	*	*	*	*	*	*
Lygus rugulipennis	*	*	*	*	-	-	*	*
Orthops basalis	*	*	-	-	-	-	-	
Orthops campestris	-	*	-	-	-	-	-	-
Stenodema laevigata	-	-	-	*	-	*	-	*
Halticus aptrus	*	*	-	-	*	-	-	-
							Total specimens	833

*Abbreviations: Gă – Gătaia; Ci – Ciacova; S Ar – southern part of Arad; Ch – Chișlaca; Be – Berzovia; Ca – Caransebeș; Br – Brad; Nă – Nălaț Vad

Tribe *Oriini* Carayon, 1958

Genus *Orius* Wolff, 1811

***Orius minutus* Linnaeus, 1758**

Material examined: Palearctic distribution; 10 spec. Gătaia (15.05, 19.06, 25.08.2016); 25 spec. Ciacova (19.06.2016; 22.06, 15.07.2017); 5 spec. S Arad (13.05.2015; 22.06.2016); SN; Zoo - Pr, P; 18♀: 22♂

***Orius niger* Wolff, 1811**

Material examined: Holopalearctic distribution; 6 spec. Gătaia (19.06, 25.08.2016; 15.07.2017); 5 spec. Ciacova (22.07, 25.08.2016); SN + H; Zoo - Pr, P; 3♀: 8♂

Family *Lyctocoridae* Reuter, 1884

Subfamily *Lyctocorinae* Reuter, 1884

Tribe *Xylocorini* Carayon, 1972

Genus *Xylocoris* Dufour, 1831

***Xylocoris galactinus* Fieber, 1861**

Material examined: Holopalearctic distribution; 1 spec. Gătaia (25.08.2016); SN; Zoo - Pr, P; 1♀

Family *Nabidae* Costa, 1853
Subfamily *Nabinae* Costa, 1853
Tribe *Nabini* Costa, 1853
Genus *Nabis* Latreille, 1802

***Nabis ferus* Linnaeus, 1758**
Material examined: N-Anatolian-European distribution, 3 spec. Gătaia (15.07.2017); 1 spec. Ciacova (19.06.2016); 48 spec. S Arad (25.04, 13.05,10.06.2015; 19.05, 30.07.2016); 15 spec. Chișlaca (10.06.2015; 30.07, 19.08.2019); 15 spec. Brad (30.07, 20.08.2019); 36 spec. Nălaț Vad (07.07, 20.08, 28.09.2019); SN, Zoo - Pr, P; 73♀: 48♂

***Nabis capsiformis* Germar, 1838**
Material examined: cosmopolitan species with neoarctic and neotropical origins, 2 spec., Gătaia (22.06.2017), SN; Zoo - Pr, P

Suprafamily *Miroidea* Hahn, 1833
Family *Miridae* Hahn, 1833
Subfamily *Deraeocorinae* Douglas & Scott, 1865
Tribe *Deraeocorini* Douglas **& Scott, 1865**
Genus *Deraeocoris* Kirschbaum, 1856

***Deraeocoris lutescens* Schilling, 1837**
Material examined: Euro-Mediterranean distribution; 2 spec. Ciacova (22.06.2017); 4 spec. Brad (30.07, 20.08.2019); 19 spec. Nălaț Vad (20.08, 28.09.2019); SN; Zoo – Pr, P; 12♀: 13♂

***Deraeocoris serenus* Douglas & Scott, 1868**
Material examined: Palaeomediterranean distribution; 2 spec. S Arad (10.06.2015); 1 spec. Chișlaca (22.06.2016); 16 spec. Nălaț Vad (20.08, 28.09.2019); SN + H; Zoo – Pr, P; 10♀: 9♂

***Deraeocoris trifasciatus* Linnaeus, 1767**
Material examined: Holopalaearctic distribution; 28 spec. Nălaț Vad (20.08.2019); SN + H; Zoo – Pr, P; 9♀: 19♂

Subfamily *Mirinae* Hahn, 1833
Tribe *Mirini* Hahn, 1833
Genus *Adelphocoris* Reuter, 1896

***Adelphocoris lineolatus* Goeze, 1778**
Material examined: Holopalearctic distribution; 16 spec. Gătaia (19.06, 22.07.2016; 15.07, 08.08.2017); 22 spec. Ciacova (15.05, 19.06.2016; 22.06, 15.07, 08.08.2017); 32 spec. S Arad (25.04, 13.05.10.06.2015; 16.04, 19.05, 2206.2016); 24 spec. Chișlaca (10.06.2015; 19.05, 22.06, 30.07.2016); 16 spec. Berzovia (12.06, 10.07.2017; 10.06, 07.07, 28.07.2018); 7 spec. Caransebeș (28.07, 17.08, 09.09.2018); 15 spec. Brad (30.07, 20.08, 28.09.2019); 65 spec. Nălaț Vad (06.06, 30.07, 20.08, 28.09.2019); SN; Ph – P; 99♀: 98♂

***Adelphocoris seticornis* Fabricius, 1775**
Material examined: Paleartic distribution; 11 spec. Gătaia (15.05.2016; 03.05, 22.06.2017); 3 spec. Ciacova (22.07.2016); 5 spec. S Arad (10.06.2015; 22.06.2016); 9 spec. Brad (06.06, 30.07.2019); 7 spec. Nălaț Vad (30.07, 20.08.2019); SN; Ph – O; 15♀: 20♂

***Adelphocoris quadripunctaus* Fabricius, 1794**
Material examined: Mediterranean distribution; 1 spec. Brad (20.08.2019); 7 spec. Nălaț Vad (20.08, 28.09.2019); SN; Ph – O; 1♀: 7♂

Genus *Liocoris* Fieber, 1858
***Liocoris tripustulatus* Fabricius, 1781**
Material examined: Euro – Siberian distribution; 4 spec. Gătaia (22.06.2017); 2 spec Ciacova (22.07.2016); 1 spec. Berzovia (10.07.2017); 2 spec. Caransebeș (28.07.2018); SN; Ph – M; 2♀: 7♂

Genus *Lygocoris* Reuter, 1875
***Lygocoris pabulinus* Linnaeus, 1761**
Material examined: Holartic distribution; 21 spec. Nălaț Vad (30.07, 20.08, 28.09.2019); SN; Ph – P; 15♀: 6♂

Genus *Lygus* Hahn, 1833
***Lygus lineolaris* Palisot de Beauvois, 1818**
Material examined: Palaearctic distribution; 1 spec. S Arad (10.06.2016); 1 spec Brad (06.06.2019); 4 spec. Nălaț Vad (20.08.2019); SN + H; Ph – P; 6♀

***Lygus pratensis* Linnaeus, 1758**
Material examined: Holopalearctic distribution; 38 spec. Gătaia (15.05, 19.06, 25.08.2016; 03.05, 22.06.15.07. 2017); 20 spec. Ciacova (26.04, 19.06, 22.07.2016; 22.06, 15.07, 08.08.2017); 11 spec. S Arad (13.05, 10.06.2015; 16.04, 19.05, 30.07.2016); 9 spec. Chișlaca (19.08.2016); 11 spec. Berzovia (12.06, 10.07.2017; 07.07.2018); 8 spec. Caransebeș (28.07, 17.08.2018); 13 spec. Brad (30.07, 20.08.2019); 30 spec. Nălaț Vad (06.06, 30.07, 28.09.2019); SN + H; Ph – P; 54♀: 86♂

***Lygus rugulipennis* Poppius, 1911**
Material examined: Holopalaearctic distribution; 3 spec. Gătaia (08.08.2017); 8 spec. Ciacova (22.06, 15.07.2017); 5 spec. S Arad ((13.05.2015; 22.06.2016); 2 spec. Chișlaca (19.05.2016); 12 spec. Brad (06.06, 30.07.2019); 11 spec. Nălaț Vad (30.07, 20.08.2019); SN + H; Ph – P; 17♀: 24♂

Genus *Orthops* Fieber, 1858
***Orthops basalis* Costa, 1834**
Material examined: Holomediterranean distribution; 5 spec. Gătaia (19.06.2016; 15.07.2017); 8 spec. Ciacova (19.06, 22.07.2016; 03.05.2017); BT + H; Ph – O; 5♀: 8♂

***Orthops campestris* Linnaeus, 1758**
Material examined: Palearctic distribution; 3 spec. Ciacova (22.06.2017); BT; Ph – O; 3♂

Tribe *Stenodemini* China, 1943
Genus *Stenodema* Laporte, 1833
***Stenodema laevigata* Linnaeus, 1758**
Material examined: Holopalaearctic distribution; 1 spec. Chișlaca (30.07.2016); 1 spec. Caransebeș (28.07.2018); 1 spec. Nălaț Vad (30.07.2019); SN; Ph – O; 1♀: 2♂

Subfamily *Orthotylinae* Van Duzee, 1916 (1865)
Tribe *Halticini* Costa, 1853
Genus *Halticus* Hahn, 1832

***Halticus apterus* Linnaeus, 1758**

Material examined: Euro – Siberian distribution; 11 spec. Gătaia (15.05, 25.08.2016); 6 spec. Ciacova (22.07.2016; 15.07.2017); 5 spec. Berzovia (19.08.2017; 28.07.2018); BT; Ph – O; 18♀: 4♂

CONCLUSIONS

The present data are part of a more complex research, which targets the *Heteroptera* fauna from alfalfa crops – 42 true bugs species from 31 genera and 12 families, representing 5 suprafamilies (*Cimicoidea*, *Miroidea*, *Coreoidea*, *Lygaeoidea*, *Pentatomoidea*) and 2 infraorders (*Cimicomorpha* and *Pentatomorpha*) were identified.

After interpreting the data we can point out that the largest number of species, 14 were collected from Timiș County and 12 species from Hunedoara County.

A species that is new for the Romanien fauna - *Nabis capsiformis* (Germar, 1838), was captured in Gătaia locality, in late June, eating aphids and thrips in different development stages.

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