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# THE CICADA FAUNA (HOMOPTERA: AUCHENORRHYNCHA) FROM THE "CHEILE TURULUI" AREA AND THE "CHEILE TURZII" NATURE RESERVE, ROMANIA

### VALENTIN POPA, ROXANA COJOCNEANU

**Abstract.** This article represent a faunistic, zoogeographical and biological studies on the cicada species from the "Cheile Turului" and the "Cheile Turzii" areas. These areas are located in the Trascău Mountains, in the central part of Romania. 107 cicada species were identified. These species belong to 9 families and 15 subfamilies. The great majority of species, from the studied areas, are European and Palaearctic. The maximum adult activity was registered in spring and autumn, for the bivoltine species and in summer and autumn for the monovoltine ones. The adult maximum activity varies from a species to another.

**Résumé.** Cet article représente une étude faunistique, zoogeographique et biologique sur les cicadines de "Cheile Turului" et "Cheile Turzii", localisés dans la régione centrale de la Roumanie. 107 espèces de cicadines ont été identifiées. Ces espèces sont encadrées en 9 famillies et 15 sousfamillies. La plupart des espèces sont Européenes et Paleartiques. L'activité maximale des adults est enregistrée pendant le printemps et l'automne pour les espèces bivoltines et pendant l'été et l'automne pour les espèces monovoltines. La durée d'activité maximale des adults est variable d'une espèces à l'autre.

Keywords: cicada, taxonomy, biology, zoogeography, monovoltine and bivoltine species.

In the areas of Trascău Mountains ("Cheile Turului" and "Cheile Turzii"), in the central part of Romania, we made zoogeografical and biological studies on the cicada species. From here, we identified 107 species.

## MATERIAL AND METHOD

"Cheile Turului" is the last limestone extension of the Trascău Mountains, the gorges being the result of the erosive action of the "Pârâul Racilor" river. From these gorges we have collected samples from the following stations:

- 1.a. A <u>coppice</u> along the valley, with shrubs and trees mainly belonging to the species *Salix*, *Alnus*, *Coryllus*, and with herbaceous vegetation dominated by *Petasites hybridus*.
- 2.a. On the left slope, which has southern aspect, there is a <u>meadow</u> rich in steppe herbaceous species.
- 3.a. Also on the left slope there is a <u>meadow with *Artemisia*</u> on a nytrophyllous substrate, the layer of soil being almost non-existent.
- 4.a. The Săndulești plateau located on the way out from the Turului gorges towards "Cheile Turzii", is a pasture Festucetum sulcatae calcophilum (Fig. 1).
- 5.a. We have also collected biological samples from the <u>shrubs alongside the river</u>.

"Cheile Turzii" is a northeastern extension of the Trascău Mountains, located in a hilly area in the northwestern part of Romania. The gorges are the result of the

erosion of the Hășdate river in the Jurassic limestone, and have a length of approximately 3.5 km (Fig. 2). Aside from the Jurassic limestone, here there also are cretaceous layers and pyroclastites. From a geomorphologic point of view, the relief is very varied, which determines a great diversity of habitats, and a great ecologic diversity. The variety of the ecologic factors brings about great floristic and faunal diversity.

Until now, in our country there have never been conducted studies on cicadas in this area, and this determined us to perform studies of fauna, biology and ecology.

In "Cheile Turzii", we collected biological samples from the following stations:

- 1.b. <u>Spruce forest</u> it is actually a 70 years old coniferous plantation, located at the lower region of the Mischiu forest (Nyárády, 1930) on the right slope of the gorges. The dominant wooden species are *Pinus nigra*, *Pinus sylvestris* and *Picea excelsa*. The herbaceous layer is weak represented, and the litter layer is very thick.
- 2.b. Coppice located on both sides of the Hăşdate river, it also covers the abrupt slopes that flank the riverbanks. The coppice is made up of some important vegetal associations, As. Salici-Populetum (Tx. 1931) Meyer-Drus (Bechet, 1980) with an arborescent layer of approximately 20 m in height, with species such as Populus nigra, Acer pseudoplatanus, Fraxinus excelsior, and shrubs like: Salix alba, Salix purpurea, Spirea ulmifolia, Alnus glutinosa, Alnus incana, Crataegus monogyna. The herbaceous layer is represented by Cherophyllum aromaticum, Anthryscus sylvestris, Rubus caesius, Brachypodium sylvaticum, Astragallus glycyphyllos, association As. Lolio Potentilletum anserinae Knapp, 1946 located on the humide side of the Hăşdate river in the form of clusters (Bechet, 1980), association As. Lolio Plantaginetum majoris (Linkola, 1921) Beger, 1930, located on more elevated grounds, and association As. Calamagrostietum arundinaceae Soó, 1960, on the abrupt slopes of the valley (Bechet, 1980).
- 3.b. <u>Oak forest</u> located on an inclined slope with southern aspect. The forest is composed of young trees, between 10 and 12 m high. The association that characterises this station is *Querco petrae Carpinetum* Soó and Pocs, 1957 (Bechet, 1980). The soil layer is very thin, the shrubs are represented by *Crataegus monogyna*, *Acer tataricum*, *Cornus mas*, *Ligustrum vulgare*, and the herbaceous layer is composed of *Convalaria majalis*, *Brachypodium sylvaticum*, *Dactylis glomerata*, *Stelaria holostea*, *Asarum europaeum*, *Galeobdolon luteum*.
- 4.b. <u>Forest of deciduous trees</u> located on the right bank of the Hăşdate river, on the way out from the gorges towards the Tourist Complex. The forest is mainly composed of oak, hornbeam, maple, alder, the herbaceous layer is well developed, the soil is rich and the humidity is high.
- 5.b. A pasture called "Coasta Tâţâlii" is located at the entrance of the gorges from Petreşti village, and has western aspect. This pasture is made up on a very thin layer of soil, pierced here and there by underlying limestone bedrock. In the herbaceous layer, the characteristic association is *Avenastretum decori* Domin, 1932 (Bechet, 1980). The pasture lacks any wooden vegetation, with the exception of the shrubs located on the upper region: *Crataegus monogyna, Prunus spinosa*.
- 6.b. <u>Steppe meadow</u> called "Povârnişul lui Pop" located at the foot of the plateau on the left slope of the gorges. It has an inclination of 45°, southern aspect, the layer of soil is thin and underneath there are blocks of pyroclastites. The composition of the herbaceous layer proves the steppe-like thermophyllous character of this meadow: *Stipa pulcherrima*, *Botriochloa ischaemum*,

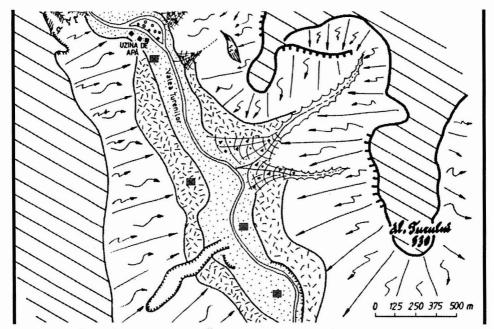


Fig. 1 - The "Cheile Turului" area with the sampling sites (Cocean, 1995)

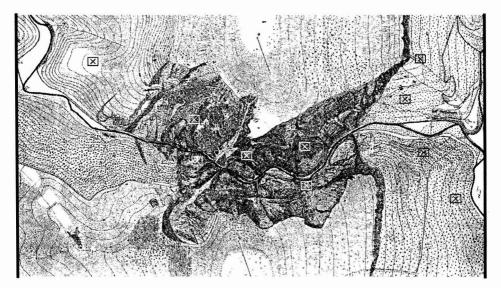


Fig. 2 - The "Cheile Turzii" Nature Reserve area with the sampling sites (Nyárády, 1939)

Brachypodium pinnatum. The shrubs that are located on the upper part of the meadow are represented by Cornus mas and Prunus tenella. We have also taken quantitative samples from these shrubs.

7.b. Meadow on plateau on the left slope—located at an altitude of 706 m and an inclination of 4-8°. The underlying limestone rocks pierce the thin soil layer. The sunstroke is high, during summer the temperature at the soil level is often above 30°C and the humidity is very low. In the herbaceous layer we found a great floral associations diversity, located on limited areas: As. Stipetum pulcherrimae calcicolum Pop and Hodişan, 1960 (Bechet, 1980), located on the edge of the "Marginea Ercsei" plateau (Nyárády, 1939), As. Stipetum joannis calcicolum Pop, Csürös et all., 1964 (Bechet, 1980), situated on the upper part of the ridge, the herbaceous layer is represented by Carex humilis, Potentilla arenaria, Alyssum alyssoides, Stipa joannis, Inula ulmifolia; As. Caricetum humilis transsylvanicum Zalyamy, 1939 (Bechet, 1980) on the edge and on the upper part of the plateau, and association Carici humilis — Brachypodietum pinnati transsylvanicum Soó, 1942 (Bechet, 1980) located on the upper region of the plateau, in the form of small clusters.

8.b. Shrubs located on the plateau, on the left slope – form a vegetable association *Pruno spinosae* – *Crataegetum* Hueck, 1931 (Bechet, 1980), which develops on a layer of soil with low alkalinity or poorly eroded slopes. From this association we have taken quantitative samples.

From the biotops mentioned above we have taken quantitative and qualitative biological samples, using the entomological net for the herbaceous layer and shrubbery, and the umbrella net for the tree canopies. The sampling of biological material was performed between May and September 1999. The collected biological material was preserved in alcohol 80% and identified in the laboratory using specific literature (Ossiannilsson, 1978, 1981; Ribaut, 1936, 1952; Della Giustina, 1989). We have performed faunistic, ecological and biological studies. In this paper we present the faunistic, zoogeographic and biological results of our studies.

## RESULTS AND DISCUSSIONS

In the biocoenoses from "Cheile Turului" and "Cheile Turzii" we have identified 107 cicada species, which belong to 9 families and 15 subfamilies (Tab. 1). It is an extremely rich fauna, if we relate it to the entire cicada fauna of our country, which is represented by 512 species (Cantoreanu, 1970).

The 9 families and 15 subfamilies are represented by an unequal number of species. If we analyse the distribution of species in families, we find out that 78 of species belong to family Cicadellidae, 12 species belong to family Delphacidae, 8 species to family Cercopidae, 4 species to family Issidae, the other families Cixiidae, Dictyopharidae, Tettigometridae and Tropiduchidae with only one species. The differences between the families are in relation to the size of the families in Romanian and European fauna (Nast, 1987).

In this paper, we make a second mention in the Romania fauna of a species from the Tropiduchidae family (*Trypetimorpha fenestrata* Costa) in a new locality, "Cheile Turzii", the first sighting being in the southeastern region of Romania, near the city of Galați (Cantoreanu, 1967). In fig. 3 we present the taxonomic spectrum of family Cicadellidae in the studied areas, compared to the Cicadellidae fauna in Europe (Nast, 1987).

 ${\it Table~1}$  Cicada species identified in the "Cheile Turului" area and "Cheile Turzii" Nature Reserve

Crt	Taxa	Data of	Studied area											Z**		
nr.		caught	Chelle Turulul   Chelle Turzii     1a*   2a   3a   4a   5a   1b   2b   3b   4b   5b   6b   7b   8b										01	1		
$\dashv$	L.C		1a*	2a	3a	4a	5a	1b	2b	3b	4b	5b	6b	7b	8b	
	Infraorder Fulgoromorpha Evans, 1946 Family Cixildae Spinola,1839				-	-	-	-	-	-		-				_
	Pentastiridius pallens (Germar, 1821)	28.08.1999	-	_	-	-	-	_	-				1	_	_	ES
	Family Delphacidae Leach, 1865		$\vdash$								_	-	-			
	Subfamily Stenocraninae Wagner, 1963															
	Stenocranus major (Kirschbaum, 1868)	17.09.1999								3						E
	Subfamily Delphacinae Wagner, 1963															
3	Eurysa lineata (Perris, 1857)	10.07.1999								1						PAL
4	Metropis mayri Fieber, 1866	16.05.1999										1				ES
		10.07.1999												1		
5	Laodelphax striatellus (Fallen, 1826)	15.05.1999	-		_				_					1		PAL
		28.08.1999			_	<u> </u>	_	_	_	_	1	_	_	3		
_	Mulicadalahay aybai (Damia 1957)	17.09.1999	_	_	-	-	-	_	-	_	-	$\vdash$	-	2	-	ES
ь	Muirodelphax aubei (Perris, 1857)	28.08.1999 17.09.1999		-	-	-	-	1	-	_		-	-	12	-	ES
7	Dicranotropis(s. str.) hamata(Boheman, 1847)	09.06.1999	-	-	$\vdash$	1	-	+	-	-		$\vdash$	$\vdash$	-	-	ES
-	Dicianolopis (s. str.) namata (Donaman, 1047)	28.08.1999		-	$\vdash$	<del> </del> •	-	-	<del>                                     </del>	$\vdash$	-	$\vdash$	-	1	_	
8	Xanthodelphax flaveolus (Flor, 1861)	10.07.1999			_	$\vdash$	-	_	+-	_	_	_		2	-	ES
	Criomorphus albomarginatus Curtis, 1833	09.06.1999		_	_	1	-		_	_				-		E
	Javesella pellucida (Fabricius, 1794)	28.08.1999												1		HOI
	Javesella dubia (Kirschbaum, 1868)	28.08.1999	-						1							PAL
12	Ribautodelphax albostriatus (Fieber, 1866)	16.05.1999										4				Т
13	Ribautodelphax angulosus (Ribaut, 1953)	16.05.1999	9									1				PAL
	Family Dictyopharidae Spinola, 1839															
_	Subfamily Dictyopharinae Spinola, 1839															
14	Dictyophara europaea (Linnaeus, 1767)	28.08.1999	)		_	-	_		_	1					_	PAI
	Family Tettigometridae Germar, 1821		_	_	_	1_		_	_	_		_	-	_	_	_
15	Tettigometra griseola Fieber, 1865	28.08.1999	4_	_	-	L.	_	_	_	1	-	₩	_	-	-	PAI
	Family Issidae Spinola, 1839		_	-	+	_	_	-	_	_	-	-	-	├	-	-
16	Subfamily Issinae Spinola, 1803	15 OF 1000	+	+	$\vdash$	$\vdash$	-	2	-	⊢	+-	+	12	4	-	PAI
	Issus coleoptratus (Fabricius, 1781)	15.05.1999		+-	+-	+-	+	1-	+	┼	+-	1	1	7	+	PAI
17	Issus muscaeformis (Schrank, 1781)	10.07.199		+	+	+	+	+-	1	+	+	+	1	+	+	E
	Dalmatrium maculiceps (Melichar, 1906)	09.06.1999		-	2	+-	+-	+	<del>+ ·</del>	+	+	+	+-	-	+-	MEI
	Agalmatium flavescens (Olivier, 1791)	10.07.1999		+	+-	+	+	+-	+-	+	+-	+-	+	3	+-	ME
	Family Tropiduchidae Stal, 1866	10.00	+	+	+	+	+	+	+-	$^{\dagger}$	+	+	+-	+-	+	-
20	Trypetimorpha fenestrata A. Costa, 1862	28.08.199	9	1	T	$\vdash$		T	T	T	1	T	7		1	E
		17.09.199	9	1	$\top$		1					T	23			
	Infraorder Cicadomorpha Evans, 1947			T		T	T	$\top$					$\top$			
	Family Cercopidae Leach, 1815															
	Subfamily Cercopinae Leach, 1815														_	
21	Cercopis sanguinolenta (Scopoli, 1763)	15.05.199										13	1	3		ME
_		09.06.199		4	5	-	1_	1_	1	1	1	2	1	2	4_	1_
_	0.15 11 0.1 1.1 1.00 11 10.00	10.07.199	9	╀-	1	+	-	+	1	_	+	_	9	9	+	-
22	Subfamily Aphrophorinae Amyot&Serville, 1843  Lepyronia coleoptrata (Linnaeus, 1758)	00.00.400	<u> </u>	+	7	+-	+	-	+	+	+	140	+-	+	+	1
22	Lepyronia coleoptrata (Linnaeus, 1756)	09.06.199 10.07.199		1	+-	+	+	+	+	+	+	10	73	1	+	HC
_		28.08.199		+ '	+	+-	-	+	+	+-	+	+	12		+	+-
_		17.09.199		+	+	+-	+	+-	+	╁	+-	+	1	+-	+-	+-
23	Neophilaenus albipennis (Fabricius, 1798)	10.07.199	_	+-	+	+-	+-	+	+	+-	+-	+	÷	5	+	E
	Neophilaenus campestris (Fallen, 1805)	09.06.199		+-	+	4	+	+	+-	+	+	10	1	Ť	+	E
		10.07.199		1	+	+	+	+	+	+	+	+-	6	41		+-
		28.08.199		+	+	+	+	+	+	+	+-	1	3			_
		17.09.199		1	$\top$			$\top$	+	$\top$	1	_	1	3		
25	Neophilaenus exclamationis (Thunberg, 1784)	28.08.199	9									2			T	PA
26	Neophilaenus minor (Kirschbaum, 1868)	10.07.199	9	16	3	I	Ι			I	I	I	2	I	I	ME
27	Aphrophora alni (Fallen, 1805)	09.06.199	9 2		1		1			$\Box$		$\perp$				PA
		10.07.199					$\Box$			1	_		10	_		
		28.08.199							5	$\overline{}$	$\overline{}$		2	1	4	
_		17.09.199		1	1	1		T	1	2	1		1			1
28	Philaenus spumarius (Linnaeus, 1758)	09.06.199		-	1	5	-	4	1	1	-	1	_	-	_	HC
-		10.07.199		+	+	-	+	+	+	+	+	+	1			1
$\vdash$	ver lateralia	28.08.199	_	+	+	+	+	+	2	1	+	1-1		7	1	-
	var. lateralis	10.07.199		+	+	+	+	+	+	+	+	1	+	1	+	-
1																

Table 1(continued)

Crt	Taxa	Data of											Z			
nr.		caught				orge			_			Gor				
4			1a	2a	3a	4a	5a	1b	2b	3b	4b	5b	6b	7b	8b	
	Family Membracidae Rafinesque, 1815								_	_						-
	Subfamily Centrotinae Amyot&Serville, 1843	10.07.1000	-		-	-	_	_	-	-	-	-	1	-	-	E
	Centrotus comutus (Linnaeus, 1758)	10.07.1999	-	-	-	-	-				_	-	٠,	-	-	
	Family Cicadellidae Latreille, 1825 Subfamily Ulopinae Le Peletier&Serville, 1825		-		-	-	-		$\vdash$	-		-	-	-		
	Ulopa trivia Germar, 1820	10.07.1999	-	_	-							-	-	1	_	MED
-	oropa arria German, roza	28.08.1999		_	_				_	_				1		
-		17.09.1999	_				$\vdash$						_	1		
1	Subfamily Macropsinae Evans, 1935		$\overline{}$													
	Pediopsis tiliae (Germar, 1831)	10.07.1999							1							PAL
		28.08.1999									1					
	Subfamily Agaliinae Kirkaldy, 1901															
32	Anaceratagallia venosa (Fourcroy, 1785)	10.07.1999												3		PAL
_		17.09.1999												11		
	Anaceratagallia ribauti (Ossiannilsson, 1938)	17.09.1999				_	_			_	_		1	4		Ε
	Subfamily Dorycephalinae Oman, 1943		_	_	_	<u> </u>	_	_	<u> </u>		_	_	_			
34	Eupelix cuspidata (Fabricius, 1775)	28.08.1999	_	_	_	_	_	_	-	_	_	_	⊢	1		PAL
-	0.14 11 4.1 11 11 11 1007	17.09.1999	-	-	-	_	⊢	-	-		-	-	⊢	1		
	Subfamily Aphrodinae Haupt, 1927	29 09 1000		-		-	$\vdash$	-		-	_	2	-	-	-	HOL
	Approdes bicinctus (Schrank, 1776)	28.08.1999	-	-	-	+-	-	$\vdash$	1	-	-	+-	-	-	-	E
	Anoscopus flavostriatus (Donovan, 1799) Planaphrodes trifasciatus (Fourcroy, 1785)	28.08.1999		-	-	+	$\vdash$	-	+	-	-	3	-	2	-	E
	Subfamily Cicadellinae Latreille, 1825	20.00.1933	-	$\vdash$	├	+-	-	┢	+-	-		ř	1	-	╌	-
	Cicadella viridis (Linnaeus, 1758)	17.09.1999	-	-	-	$\vdash$	$\vdash$	-	1	-	1		$\vdash$	-		HOL
	Subfamily Typhlocybinae Kirschbaum, 1868	11110011000		1	-	-	1		<u> </u>		<u> </u>		_		$\vdash$	1102
	Trib Dikraneurini Mc Atee, 1926			$\vdash$	1	1		-	_		_	$\vdash$	1		-	
	Erythria montandoni (Puton, 1880)	17.09.1999						1		1			$\vdash$	1	1	E
	Emeljanoviana mollicula (Boheman, 1845)	15.05.1999				1						6		1		MED
	· · · · · · · · · · · · · · · · · · ·	28.08.1999											1	5		
		17.09.1999										14		1		
	Forcipata forcipata (Flor, 1861)	17.09.1999						1					$\Gamma$			PAL
	Trlb Empoascini Distant, 1908								_							
	Empoasca vitis (Gothe, 1875)	28.08.1999		_	_			_	1	_	5	_	_	_	_	E
43	Kybos rufescens Melichar, 1896	09.06.1999		_	_	_	3	_	_	_	_	_	1_	1_		E
		10.07.1999	-			_	_	_	_	_	_	_	1		_	
	011 2 121 1 15 11 1000	17.09.1999	-	-	-	_	-	1	-	-	-	1	_	-	-	_
44	Chlorita viridula (Fallen, 1806)	09.06.1999	_	-	22	-	-	1	₩	-	+	20	4	╀	┼	E
-		10.07.1999		_	-	+	1	1	-	1	١.	-	+-	-	-	-
		28.08.1999 17.09.1999		⊢	+	+-	+-	+-	+-	╀	1	-	+-	2	$\vdash$	
	Trib Typhlocybini Kirschbaum, 1868	17.09.1998	<del>' </del> -	+	+-	+	⊢	+-	+	+-	╁	+-	+	+-	$\vdash$	-
45	Fagocyba douglasi (Edwards, 1878)	09.06.1999	+	+	+	+	2	+	+-	+-	+-	+-	+-	+	+	E
75	ragocyba dooglasi (Edwards, 1070)	10.07.199		+-	+-	+-	1-	1	+	+	+-	+	+-	+	+-	-
46	Edwardsiana flavescens (Fabricius, 1794)	10.07.1999		+	+	+	+	Ť	1	5	+	+	+	$\vdash$	+	E
	Eupteryx aurata (Linnaeus, 1758)	09.06.199	_	$\vdash$	+	1	+	+	2	Ť	+	+	+	+	+	PAL
		10.07.199				+		T	7	1		+	+-	T	+	1
		28.08.199	9		$\top$				3	1	29	1				
		17.09.199	9	1	1		$\top$		$\top$		13			1		
48	Eupteryx alticola ? (Ribaut, 1936)	28.08.199	9						4							PAL
49	Eupteryx curtisii Flor, 1861	09.06.199	9						1							E
50	Eupteryx immaculatifrons (Kirschbaum, 1868)	28.08.199	9			T					1			T		E
		17.09.199	-		$\perp$		$\perp$		$\perp$		9	_	$\perp$			
	Eupteryx notata Curtis, 1837	17.09.199		L		1	1			L	L	1	1	1		ES
52	Eupteryx stachydearum (Hardy, 1850)	10.07.199		1	1	4	1	1	$\perp$	1	1	1	1	1	1	E
		28.08.199		1	1	1	1	1	_	1	5		1	1	1	-
-	5	17.09.199	_	+	-	1	-	+	+	1	4	+	_	1	1	-
53	Eupteryx vittata (Linnaeus, 1758)	09.06.199	_	+-	+	+1	+	+	+	1	+	+	+	+	+	E
-		28.08.199 17.09.199		+	+	+-	+	+	1		+	1 2	+	-	+	+-
5.4	Eupteryx sp.	09.06.199		+	+	+	1	+	1	+	+	+	+	+	+	-
34	Trib Erythroneurini Young, 1952	09.00.199	-	+	+-	+-	+'	+	+	+	+	+	+	+	+	+-
55	Alnetoidia alneti (Dahlbom, 1850)	10.07.199	9	+-	+	+	+	+	+	+	+	+	+	+	+	E
133	Pariotodia anieu (Daniooni, 1650)	28.08.199		+	+	+	+	+	1	+-	+	+	+	+'	+	1 -
56	Zyginidia pullula (Boheman, 1845)	17.09.199		+	+	+	+	+	+ '	+	+	- 5	;+	3	+	E
	Zygina sp.	10.07.199		+	+	+	+	+	+1	+	+	+	+	+	+	+-
1	-yamo op.	28.08.199		+	+	+	+	+	+	+	+	+	+	+	+	+-
100	Arboridia parvula (Boheman, 1845)	15.05.199		+	+	+	+	+	+	+	+	+	+-	1	+-	ES
58										1		- 1				
58		09.06.199		+	1		$\top$	$\top$		_		$\top$		_	$\neg$	

Table 1(continued)

Crti	Taxa	Data of						Stuc	lied :						Z	
nr.		caught	. 1	Ture	ni Go	orge				Tur	da's	Gor				
-			1a	2a	3a	4a	5a	1b	2b		4b	5b	6Ь	7b	8b	
59	Arboridia velata (Ribaut, 1952)	28.08.1999								2						Е
		28.08.1999											1		-	
	<del></del>	17.09.1999											14	2		
	Subfamily Deltocephalinae Fieber, 1869															
	Trib Macrostelini Kirkaldy, 1906															
60	Balclutha punctata (Fabricius, 1775)	15.05.1999						1						1		U
_		16.05.1999										2				
_		09.06.1999	1	_												
		10.07.1999	_						1	_				2		
_		28.08.1999	_	-	$\vdash$	-	_	1	-	_	_			1	Н	
_		17.09.1999	-	1	-	-	-	-	_	_	$\vdash$	$\vdash$	-	2		-
04	Bololista diagnas Mannas 1030	28.08.1999	-	-	-	-		-	-	2	-	-	-	7	-	E
01	Balclutha rhenana Wagner, 1939		-	-	-	-	_	-	-	-	-	-	-	-		
		17.09.1999	_	-	_	-	-	-	-	_	1	-	-	<u> </u>	_	-
	Macrosteles maculosus (Then, 1897)	09.06.1999		-	-	-	_	-	_	_		1		<u> </u>		E
	Macrosteles laevis (Ribaut, 1927)	17.09.1999		_	_	_	L_	_		_				1	_	НО
64	Macrosteles sp.	09.06.1999	L		_	1	$\perp$	_	_	_	_		_			
	Trib Deltocephalini Fieber, 1869							_		_				_		
65	Deltocephalus pulicaris (Fallen, 1806)	10.07.1999												1		PA
		17.09.1999						1						1		
	Trib Doraturini Ribaut, 1952															
66	Doratura horvathi Wagner, 1939	28.08.1999												3		PA
	Doratura exilis Horvath, 1903	17.09.1999		T										3		ES
	Doratura impudica Horvath, 1897	10.07.1999		1									1			Ε
	Land Market Control	28.08.1999						1				60	1	31		
69	Doratura stylata (Boheman, 1847)	17.09.1999		1	-	$\vdash$	-		-		-	1	_	1	1	PA
	Trib Athysanini Van Duzee, 1892	11.00.1000	-	+	_	-	-	+-	-	-	-	┼	-	<u> </u>		
70	Lamprolettix nitidulus (Fabricius, 1787)	28.08.1999	1	1	-	+-	-	+	-	-	1	+-	-	-	-	E
	Allygidius (s. str.) atomarius (Fabricius, 1794)			+-	+-	+ -	┼	-	├-	├-	<u>'</u>	⊢	+-	-	-	PA
		09.06.1999	-	+-	ـ	1	├-	₩		-	$\vdash$	-	+-	⊢	⊢	
	Allygidius (Dicrallygus) mayri (Kirschbaum, 1868)	28.08.1999		╄	١.	+-	├-	-	-	⊢	-	+	3	١.	-	E
73	Graphocraerus ventralis (Fallen, 1806)	09.06.1999	-	_	1	1	┺	-	_	-	_	↓_	<b>├</b>	1		E
_		10.07.1999		_	_	_	ــــ	_	_	_	┖		_	21	_	
		28.08.1999			_	_		_	_		_			2		
	Phlepsius intricatus (Herrich-Schaffer, 1838)	28.08.1999		_			_	_		_	1_	_	4	340		PA
75	Rhopalopyx vitripennis (Flor, 1861)	10.07.1999	)											9		ME
		17.09.1999									П	9	1	12	П	
76	Mocydia crocea (Herrich-Schaffer, 1837)	15.05.1999							T					1	Т	ME
		28.08.1999			$\top$			$\top$	1	2	1	3	1	5		
		17.09.1999			Т					1		6	1	2	1	
77	Mocydiopsis longicauda Remane, 1961	17.09.1999			_	T			1	1	1	2	1	+	1	E
	Speudotettix subfusculus (Fallen, 1806)	15.05.1999	-	+	+	+	+-	1	1	2	1	+-	1	$\vdash$	$\vdash$	Ē
	Athysanus argentarius Metcalf, 1955	17.09.1999		+	+-	+	+-	+ •	÷	1-	+-	+	+	3	1	ES
	Handianus flavovarius (Herrich-Schaffer, 1835)	09.06.1999	-	+-	+-	+	+	+-	+-	╁	-	┿	+-	1	+	E
00	Translatios havovarios (Terrich-Schaller, 1035)	10.07.1999		+	+	+	+	+-	+	$\vdash$	+-	+	+-	2	-	+=
01	Hondianus limanii (2) Emplianau 1064			+	+	+	+	+-	+-	$\vdash$	+	+-	+-		+-	+-
	Handianus limonii (?) Emeljanov, 1964	10.07.1999		+	┰	+	+	+-	-	-	⊢	+	3	3	-	T
	Limotettix striola (Fallen, 1806)	28.08.1999	_	+	1	1	-	+	-	1	4	4	1	1	1	HC
	Euscelis incisus (Kirschbaum, 1858)	28.08.1999		+	-	-	-	-	-	-	-	1	1	11	-	PA
	Euscelis sp.	16.05.1999		1	1	-	1		_		-	5		1	_	_
	Streptanus confinis (Reuter, 1880)	17.09.1999		1										1		E
	Artianus interstitialis (Germar, 1821)	17.09.1999												3		ME
87	Selenocephalus obsoletus (Germar, 1817)	28.08.1999	9		$\Gamma$	$\perp$			$\Gamma$			$\Gamma$	1			E
	Trib Paralimnini Distant, 1908				Г	T	T					T	T		T	1
88	Arocephalus (s. str.) languidus (Flor, 1861)	17.09.199	9		T	T		T	T	T	T	T	1	Т		E
	Arocephalus (s. str.) longiceps (Kirschbaum, 1868)	10.07.1999		$\top$	1		1	1	$\top$	1		+	1	1		E
90		28.08.199		+	1	+	1	1	+	+	+	+	+	1	+	H
91		15.05.199		+	+	+-	+	+	+	+-	+	+	+-	4		TE
-	Table 1004)	16.05.199		+	+	+-	+	+-	+	+	+	4	+-	+	+	+-
-		09.06.199		+-	+	18	1	+-	+	+	+	+-	+	+	+-	+
-				+	+	118	4	+	+	+	+	+	+	+-	+	+
-		10.07.199		+	+	+	+	+	+	+-	+	+-	+	39	_	+
_		28.08.199	_	+	+-	+	+	+	4-	+	+	6	_	3		-
-	0	17.09.199		+	4	+	+	$\perp$	4-	-	+	2	1	43		-
	Psammotettix confinis (Dahlborn, 1850)	10.07.199		_	1	1	-	1	1	-	_	1	-	2	_	P/
93	Psammotettix striatus (Linnaeus, 1758)	09.06.199	-		$\perp$	16	3						$\perp$		$\perp$	M
		28.08.199	9		I		$\mathbf{I}$			I	I			7		
		17.09.199	9									6	1	14	1	
	Psammotettix sp.	09.06.199	9			4				1			$\top$	1		$\top$
94			_	+	+	6	-	+	+	+	+	$\top$	1	+-	+	I P.
	Adarrus multinotatus (Boheman, 1847)	109.06.199														
	Adarrus multinotatus (Boheman, 1847)	10.07.199		+-	+	+	+	_	+	+	+-	+-	+-	+	_	
	Adarrus multinotatus (Boheman, 1847)	10.07.199	9	‡	‡	#	1	1	Ŧ	Ŧ	1	11	1	#		1

Table 1(continued)

Çrt	Taxa	Data of						Stu	died	area	į.					Z
nr.		caught	- 25	Ture	ni G	orge	5		00	Tur	da's	Gor	ges			
			1a	2a	3a	4a	5a	1b	2b	3b	4b	5b	6b	7b	8b	
97	Turrutus socialis (Flor, 1861)	09.06.1999				8										PAL
183.5		10.07.1999				2000	-0							249		
		28.08.1999										6		23		
		17.09.1999										44		193		
98	Jassargus (Obtujargus) obtusivalvis (Kirschbaum, 1868)	09.06.1999				1			1							MED
		17.09.1999										21		1		
99	Jassargus (Aurkius) repletus (Fieber, 1869)	15.05.1999								2			2			MED
		10.07.1999											9			
		28.08.1999				$\Box$								1		
		17.09.1999					П						6			
100	Jassargus (Arrailus) alpinus (Then, 1896)	10.07.1999			Г		П	Г			П			2		E
101	Mendrausus pauxillus (Fieber, 1869)	10.07.1999										П		2		E
102	Verdanus abdominalis (Fabricius, 1803)	10.07.1999												14		PAL
103	Verdanus nigrifrons (Kirschbaum, 1868)	10.07.1999											6	6		E
		28.08.1999										6				
104	Rhoananus hypochlorus (Fieber, 1869)	10.07.1999			П	Т							4			E
105	Enantiocephalus cornutus (Herrich-Schaffer, 1838)	28.08.1999									1					ES
106	Mocuellus (s. str.) collinus (Boheman, 1850)	17.09.1999												2		E
107	Mocuellus (s. str.) quadricomis Diabola, 1949	10.07.1999											9			Ε
		28.08.1999											2			
		17.09.1999	Т			П	Т						1			

<sup>\*</sup> The simbols 1a, 1b... are identical with simbols from the

It can be observed in both cases the fact that the majority of species (over 50%) belong to subfamily Deltocephalinae, followed by subfamily Typhlocybinae. The other subfamilies are more weakly represented, both in the studied area and in European fauna. Only the Macropsinae subfamily are less represented in the studied areas.

A zoogeographic analysis of the cicada species from "Cheile Turului" and "Cheile Turzii" shows that most of the species are European (40%) and Palaearctic (26%). The rest of the species belong to other zoogeographic categories (Fig. 4).

We notice a significant infusion of euro-siberian and turanic species. From the analysis of the zoogeographic spectrum, we can conclude that the studied areas are located in a place at the interference of species with different origin and distribution. This spectrum that mostly contains species with broad distribution reflects the great diversity of the biotops in the studied areas. It is also observed the existence of a high percentage of species with euro-siberian distribution, which are found in xero-thermophyllous biotops with a strong steppe-like character.

The rich biological material collected in the field allowed us to also perform studies concerning the adults activity periods of some species (Tab. 2), in relation to the number of generations per year.

Given the ecological conditions in the researched area, Laodelphax striatellus and Rhopalopyx vitripennis are bivoltine. Species like Stenocranus major, Muirodelphax aubei, Ribautodelphax albostriatus, Trypetimorpha fenestrata, Handianus limonii, Mendrausus pauxillus, Verdanus nigrifrons and Rhoananus hypochlorus are monovoltine. For Ribautodelphax albostriatus, the flight period

introductive part of article

<sup>\*\*</sup> Zoogeographical caracteristics of species

E-european

ES-eurosiberian

MED-mediteraneean

PAL-palearctic

HOL-holarctic U-ubiquist

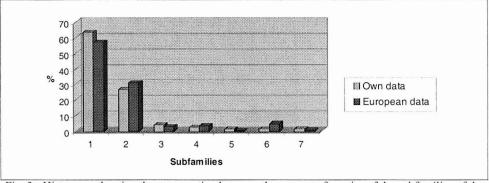


Fig. 3 - Histogram showing the comparation between the percent of species of the subfamilies of the family Cicadellidae from the studied areas with european reports

1 - Deltocephalinae, 2 - Typhlocybinae, 3 - Aphrodinae, 4 - Agaliinae,

5 - Dorycephalinae, 6 - Macropsinae, 7 - Ulopinae

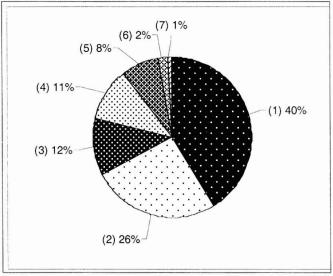


Fig. 4 - Zoogeographical spectrum of the cicada species from the studied areas 1 - European, 2 - Palaearctic, 3 - Mediterranean, 4 - Eurosiberian, 5 - Holarctic, 6 - Turanic, 7 - Ubiquist

takes place in May and the beginning of June; for *Rhopalopyx vitripennis*, *Handianus limonii*, *Mendrausus pauxillus*, *Verdanus nigrifrons* and *Rhoananus hypochlorus* during the summer months June and July, and for *Trypetimorpha fenestrata*, *Muirodelphax aubei* and *Stenocranus major* during the autumn months. The different flight periods suggest that the biological cycle of these species does not overlap in time and differs in length. For instance, for *Verdanus nigrifrons* the duration of the summer flight is longer than in other species. Also, for *Trypetimorpha fenestrata* the duration of the autumn flight is longer than for

Table 2

The adults maximum activity in the studied areas

Nr.	Species			Months							
crt.	Species	V	VI	VII	VII VIII						
1	Stenocranus major			•							
2	Laodelphax striatellus										
3	Muirodelphax aubei										
4	Ribautodelphax albostriatus										
5	Trypetimorpha fenestrata										
6	Rhopalopyx vitripennis										
7	Handianus limonii										
8	Mendrausus pauxillus										
9	Verdanus nigrifrons										
10	Rhoananus hypochlorus										

Stenocranus major. The results of our studies coincide in most aspects with the results of other researchers (Schiemenz, 1987, 1996). For *Muirodelphax aubei*, in the researched area there is only one generation per year, while in Germany (Schiemenz, 1987) there are two generations per year. It is possible that the different number of generation be determined by the climatic differences.

#### Conclusions

- 1. In the studied biocoenoses from "Cheile Turului" and "Cheile Turzii" there are a number of 107 cicada species, number that indicates an extremely rich fauna compared to other similar areas in Romania and even in Europe.
- 2. The taxonomic spectrum of the Cicadellidae family shows a great concentration of the species belonging to subfamily Deltocephalinae in the researched area, and a weak representation of subfamily Macropsinae, compared to the European fauna.
- 3. The zoogeographic spectrum of the cicada species in the researched areas shows the existence of a great number of European and Palaearctic species.
- 4. The cicada fauna from "Cheile Turului" and "Cheile Turzii" contains bivoltine species with two flight periods, during spring and autumn, and also monovoltine species with flight periods mostly during summer and autumn.
- 5. For the monovoltine species, the flight period differs both in time and length.

## FAUNA DE CICADINE (HOMOPTERA: AUCHENORRHYNCHA) DIN ZONA CHEILE TURULUI SI REZERVATIA NATURALĂ CHEILE TURZII, ROMÂNIA

#### REZUMAT

Această lucrare reprezintă un studiu faunistic, biologic și zoogeografic asupra cicadinelor din zona Cheile Turului și Rezervația Naturală Cheile Turzii din Munții Trascău, România. Au fost identificate un număr total de 107 specii de cicadine, care aparțin la 9 familii și 15 subfamilii. Majoritatea speciilor sunt europene sau palearctice. Perioada de activitate a adultilor este mai intensă primăvara și toamna pentru speciile bivoltine, vara și toamna pentru cele monovoltine. Durata perioadei de zbor variază de la o specie la alta.

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