

## THE DISTRIBUTION OF CADDISFLY FAUNA (INSECTA: TRICHOPTERA) IN ANINEI MOUNTAINS (SOUTHWESTERN ROMANIA)

Mălina DUMBRAVĂ-DODOACĂ\*, Manuela Floriana OGRIN\*, Jörn Andre PÜTZSCHLER\*\*, Lucian PÂRVULESCU\*

\* West University of Timișoara, Faculty of Chemistry Biology and Geography, Department of Biology, Timișoara, Romania

\*\* University of Regensburg, Biology I, Institute of Zoology, Regensburg, Germany

Corresponding author: Mălina Dumbravă-Dodoacă, West University of Timișoara, Faculty of Chemistry Biology and Geography, Department of Biology, 16A Pestalozzi, 300115 Timișoara, Romania, tel.: 0040256592622, e-mail: malinadumbrava@yahoo.com

**Abstract.** The wide distribution and large tolerance to physical-chemical factors makes it possible to use caddisflies as bioindicators. This article aims to present a list regarding the caddisfly species (in the larval stage) in Aninei Mountains (Romania). The samples were localized along 3 hydrographic basins (Bârzava, Caraș and Nera) and 20 species have been identified. The most frequent ones were *Potamophylax latipennis* and *Sericostoma personatum*. The presence of each one of them has been correlated with the altitude, so the results of this paper are integrated in the ones described in literature.

**Keywords:** caddisfly, altitude, Aninei Mountains, Mountains of Banat, Caraș-Severin county

### INTRODUCTION

The necessity of studying caddisflies resides in the fact that they form an important source of food for fish, bottom feeding and plankton feeding animals, as well as being helpful in filtering the water [8, 9]. They are also successfully used as biological indicators [8, 9, 11].

Ciubuc is the one who publishes a first list of caddisfly species identified on the territory of Romania [2]. Later on, this list is added to by different authors [3, 17, 19].

Aninei Mountains, part of the Mountains of Banat (being situated in their western area), are located mostly in the territory of Caras-Severin County. In 1959, Botoșăneanu has studied the caddisfly fauna in the hydrographic basins of the Mountains of Banat [8]; their presence has also been noted by other authors [16], but the data is far from being complete.

The aim of this paper is to bring new information and to complete the existing data on the distribution of fauna trichopterans in Romania, given that this subject is little known in our country.

### MATERIAL AND METHODS

The samples were collected between 16 June-1 August 2009, from the hydrographic basins (HB) of 3 rivers that cross Aninei Mountains (AM): Bârzava (17 stations), Caraș (19 stations) and Nera (11 stations) (Fig. 1). Qualitative samples were collected using a hand net with meshes of 250 $\mu$ m. The samples were preserved in ethanol 70%. Identification of the samples up to species level was accomplished in the laboratory [8, 15, 22, 23]. 193 larvae were processed. The frequency was calculated by using the formula  $F = N_i * 100 / N$ , where  $N_i$  is the number of stations where the species under discussion has been found, while  $N$  is the total number of stations [18].

The localization of the collection stations, according to the code number, is the following:

**HB Bârzava:** A1: Bârzava river, sources, 45°07'15" N 21°59'23" S, 900 m altitude; A2: Molidului stream, 45°10'06" N 21°59'59" S, 700 m alt.; A3: Bârzava river, upstream from Văliug lake, 45°12'03" N 22°00'42" S,

700 m alt.; A4: Crivaia stream, 45°12'10" N 22°00'38" S, 700 m; A5: Văliug stream, 45°13'50" N 22°00'49" S, 600 m; A6: Grindești stream, 45°13'14" N 22°00'33" S, 630 m; A7: Bârzava river, downstream from Văliug lake, 45°13'11" N 22°01'28" S, 560 m; A8: Breazova stream, 45°15'10" N 22°02'58" S, 480 m; A9: Crainicului stream, 45°15'23" N 22°02'37" S, 460 m; A10: Liscov stream, 45°17'32" N 22°02'33" S, 380 m; A11: Stârnice stream, 45°18'13" N 22°02'43" S, 330 m; A12: Râul Alb stream, 45°17'32" N 21°59'41" S, 430 m; A13: Secu stream, 45°17'48" N 21°58'14" S, 300 m; A14: Bârzava river, upstream from Reșița, 45°17'39" N 21°56'15" S, 275 m; A15: Cuptoare stream, 45°16'36" N 21°57'35" S, 360 m; A16: Doman stream, 45°15'38" N 21°54'18" S, 320 m; A17: Bârzava river, downstream from Reșița, 45°20'36" N 21°50'08" S, 190 m;

**HB Caraș:** A18: Gelugu stream, 45°16'01" N 21°48'31" S, 230 m altitude; A19: Clocotici stream, 45°14'43" N 21°50'28" S, 270 m; A20: Nermed stream, 45°13'59" N 21°52'26" S, 275 m; A21: Caraș river, downstream from Chei (the gorge), 45°12'06" N 21°52'27" S, 240 m; A24: Oravița stream, 45°03'07" N 21°45'02" S, 390 m; A25: Jitin stream, 45°07'13" N 21°48'02" S, 395 m; A26: Natra stream, 45°06'21" N 21°46'09" S, 295 m; A27: Lisava stream, 45°06'22" N 21°46'39" S, 300 m; A28: Călugăra stream, 45°01'45" N 21°45'15" S, 300 m; A29: Vicinic stream, 44°58'28" N 21°44'37" S, 292 m; A30: Candeni stream, 44°56'49" N 21°44'08" S, 295 m; A40: Comarnic stream, 45°10'46" N 21°57'10" S, 470 m; A41: Toplița stream, 45°10'56" N 21°56'56" S, 465 m; A42: Răviștea stream, 45°03'10" N 21°52'35" S, 475 m; A43: Celnicu Mare stream, 45°06'48" N 21°51'46" S, 435 m; A44: Gârliște river, 45°06'23" N 21°50'53" S, 420 m; A45: Buhui river, downstream from Mărghitaș lake, 45°07'31" N 21°54'00" S, 530 m; A46: Buhui river, sources, 45°03'51" N 21°53'20" S, 660 m; A47: Caraș river, sources, 45°07'23" N 21°56'00" S, 500 m;

**HB Nera:** A22: Stejer stream, 45°02'38" N 21°51'34" S, 540 m; A23: Miniș stream, sources, 45°01'29" N 21°49'24" S, 540 m; A31: Beiu river, 44°55'22" N 21°46'28" S, 240 m; A32: Nera river, 44°50'19" N 21°51'18" S, 200 m; A33: Bresnic stream, 44°50'27" N 21°51'21" S, 200 m; A34: Ducin stream, 44°52'31" N 21°53'47" S, 280 m; A35: Moceris stream,

44°53'36"N 21°53'53"S, 298 m; A36: Lăpușnic stream, 44°55'03"N 21°55'37"S, 298 m; A37: Poneasca stream, 45°03'29"N 21°57'36"s, 465 m; A38: Predilcova stream, 45°01'57"N 21°52'39"S, 505 m; A39: Babii stream, 45°01'18"N 21°54'24"S, 350 m;

The typical habitat was different for each station: beech forest (station 8, 9, 38), mixed forest (station 1-7, 12, 23, 46), deciduous forest (station 10-11, 13-14, 17, 19-22, 24-33, 35-37, 39, 40-45, 47-48), agricultural land (station 16, 18, 34, 49-52).

The degree of vegetation cover has values from 5-50% (station 3, 5, 17, 20, 25, 33-37, 39, 42-44, 52) until 55-98% for the remaining stations that were included in the research.

The average values of the width (m) and depth (m) of the HB where the stations were placed were: Bârzava: 2.3 [95%CI: 1.52-3.08], 0.26 [95%CI: 0.17-0.35]; Caraș: 1.93 [95%CI: 1.38-2.48], 0.22 [95%CI: 0.15-0.29]; Nera: 2.15 [95%CI: 1.15-3.15] and 0.34 [95%CI: 0.09-0.59] respectively.

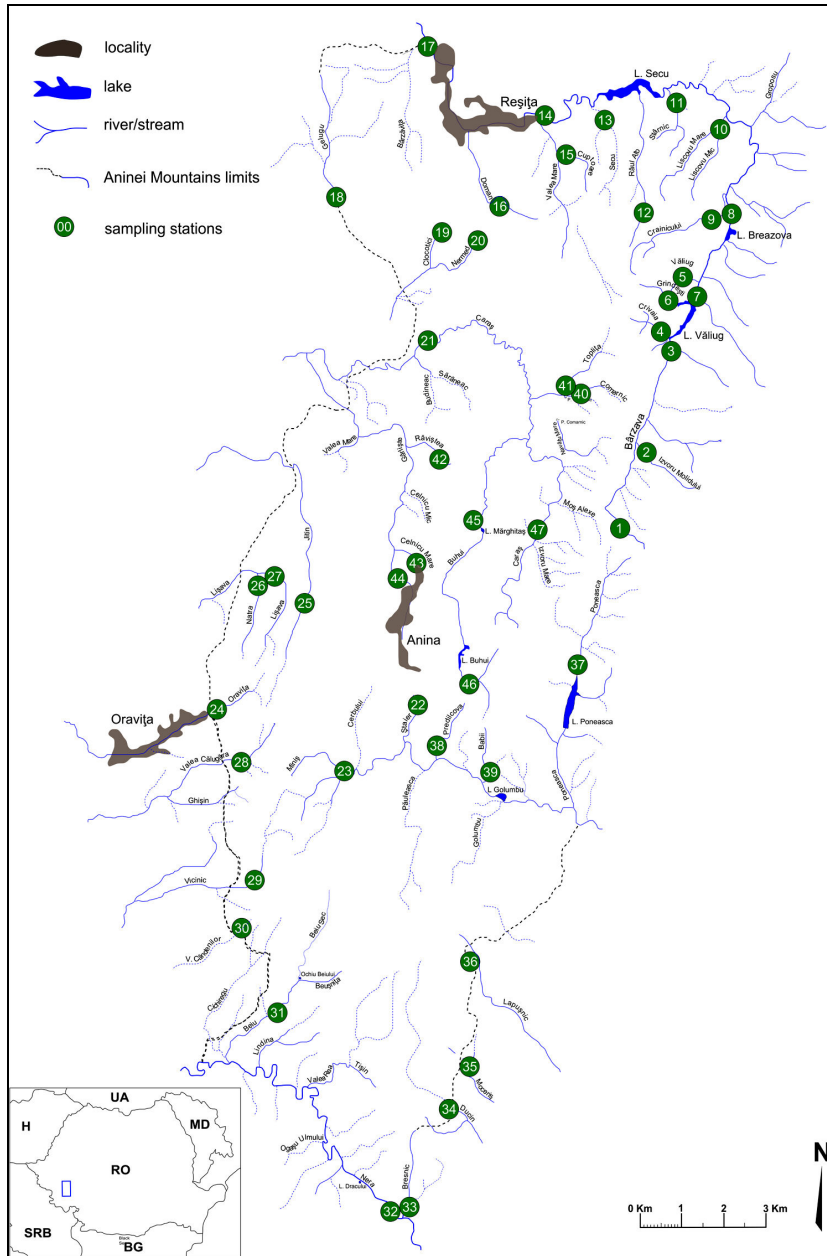


Figure 1. Location of the collection sites in Aninei Mountains

## RESULTS

Average values of the air and water temperature (°C) for each of the 3 HB were calculated: Bârzava: 23.59 [95%CI: 22.27-24.91] and 16.8 [95%CI: 15.55-18.05]; Caraș: 19.68 [95%CI: 17.77-21.59] and 15.04 [95%CI: 14.01-16.07]; Nera: 21.62 [95%CI: 19.7-23.54] and 15.35 [95%CI: 13.98-16.72].

20 species included in 6 families were identified: Fam. Brachycentropodidae: *Brachycentrus* genus (*B. subnubilis* Curtis, 1834); Fam. Hydropsychidae: *Hydropsyche* genus (*H. botosaneanui* Marinkovic, 1966; *H. bulbifera* McLachlan, 1878; *H. fulvipes* Curtis, 1834; *H. incognita* Pitsch, 1993; *H. instabilis* Curtis, 1834; *H. pellucidula* Curtis, 1834; *H. saxonica* McLachlan, 1884); Fam. Leptoceridae: *Athripsodes* genus (*A. bilineatus* Linnaeus, 1758); Fam.

Limnephilidae: *Chaetopteryx* genus (*C. villosa* Fabricius, 1789); *Glyphotaelius* genus (*G. pellucidus* Retzius, 1783); *Halesus* genus (*H. digitatus* Schrank, 1781); *Limnephilus* genus (*L. affinis* Curtis, 1834; *L. auricula* Curtis, 1834; *L. sparsus* Curtis, 1834);

*Potamophylax* genus (*P. latipennis* Curtis, 1834); Fam. Rhyacophilidae: *Rhyacophyla* genus (*R. dorsalis* Curtis, 1834; *R. fasciata* Hagen, 1859; *R. vulgaris* Pictet, 1834); Fam. Sericostomatidae: *Sericostoma* genus (*S. personatum* Kirby&Spencer, 1826).

**Table 1.** The distribution of caddisfly fauna in Aninei Mountains according to the sampling stations

HB Bârzava																						
Sampling stations	<i>B. subnubilis</i>	<i>H. botosaneanui</i>	<i>H. bulbifera</i>	<i>H. fulvipes</i>	<i>H. incognita</i>	<i>H. instabilis</i>	<i>H. pellucidula</i>	<i>H. saxonica</i>	<i>A. bitineatus</i>	<i>C. villosa</i>	<i>G. pellucidus</i>	<i>Halesus digitatus</i>	<i>L. affinis</i>	<i>L. auricula</i>	<i>L. sparsus</i>	<i>P. latipennis</i>	<i>R. dorsalis</i>	<i>R. fasciata</i>	<i>R. vulgaris</i>	<i>S. personatum</i>	UN	
A1															x					x		
A2														x		x					x	
A3																						x
A4																x					x	
A5															x						x	
A6															x	x					x	
A7											x					x					x	
A8											x					x					x	
A9															x	x					x	
A10																x						
A11						x							x			x						
A12																x					x	
A13																						x
A14																						x
A15								x		x						x		x				
A16															x							
A17																						x
HB Caraș																						
A18																						x
A19																x						
A20			x	x				x								x						
A21								x														
A24																						x
A25									x							x						
A26																x						
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A30																					x	
A40																x						
A41											x					x					x	
A42																						x
A43																						x
A44																						x
A45																x						
A46								x								x						
A47																x						
HB Nera																						
A22																x						
A23									x													
A31																					x	
A32	x																				x	
A33						x	x						x									
A34								x				x			x	x			x		x	
A35						x					x						x	x			x	
A36											x					x						x
A37		x				x																
A38																						x
A39						x																

Those items that were in the first life stages were not identified, as they did not show the completely developed morphologic features in order to make a good determination possible. They were noted as unidentifiable larvae (UN).

**DISCUSSION**

In this study, the lowest diversity was established for HB Caraș (7 species belonging to 5 genera), followed by HB Bârzava (9 species included in 7

genera). The highest diversity was identified for HB Nera (16 species included in 8 genera). The distribution of the species identified in each station that was analyzed is presented in Table 1.

The highest frequency (%) was registered for the species *Potamophylax latipennis* (53.19%), identified in 25 of the 47 stations that were part of this research. In literature, this species is associated with altitude values comprised between 150 and 3100 m [10]. Jozef Lukáš & Il'ja Krno (2003) [13] have identified this species at altitudes of 200-450 m and at over 450 m. In AM, it was found at altitudes of 320-900 m (HB Bârzava), 270-530 m (HB Caraș) and 280-540 m (HB Nera), respectively.

*Sericostoma personatum* (34.04%) has been identified in 16 stations. This species is mentioned in literature [6, 21], at altitudes lower than 600 m. Graf *et al.* (2008) [10] associate it with altitude values comprised between 200-3000 m. In AM, it was identified between 430-900 m (HB Bârzava), limits narrowed to 295-300 m (HB Caraș) and between 200-505 m (HB Nera).

The species *Limnephilus sparsus* and *Glyphotaelius pellucidus* have registered the same frequency (10.64%-5 stations each). Graf *et al.* (2008) [10] have encompassed both species within altitudes of 150-800 m and over 800 m. In our research, *Limnephilus sparsus* has only been identified in HB Bârzava (320-630 m) and HB Nera (280 m). *Glyphotaelius pellucidus* has been identified in all 3 HB, at altitudes of 298 m (HB Nera), 465 m (HB Caraș), 480 and 560 m (HB Bârzava).

In the case of *Hydropsyche* genus, the highest frequency was determined for *Hydropsyche saxonica* (10.64%, in 5 stations), followed by: *H. instabilis* (6.38%-3 stations) and *H. incognita* (4.26%, in 2 stations). *H. botosaneanui* (2.13%) has only been identified in one station. The same situation was also established for *H. bulbifera*, *H. fulvipes*, *H. pellucidula*, with a frequency of 2.13% each.

Graf *et al.* (2008) [10] associate the species *H. bulbifera*, *H. fulvipes*, *H. incognita*, *H. instabilis* and *H. pellucidula* with large altitude spans (150-1500 m), *H. saxonica* with values that do not cross 800 m, locating *H. botosaneanui* at altitudes of over 200 m. The literature [14] associated the species *H. instabilis* at altitudes comprised between 180-660 m. Other research stated that *H. incognita* has its distribution limits between 150-700 m, while *H. pellucidula* between 500-1270 m [1]. We have established the following situation: *H. saxonica* was present in all HB (360-Bârzava; 240, 275 and 660 m-Caraș; 280 m-Nera); *H. bulbifera* and *H. fulvipes* (both at 275 m-Caraș); *H. botosaneanui* (465 m-Nera) and *H. incognita* (298 and 465 m-Nera), *H. instabilis* (330 m-Bârzava; 205 and 350 m-Nera) and *H. pellucidula* (280 m-Nera).

*Chaetopteryx villosa* and *Limnephilus auricula* have been found in 2 stations (4.26% each). *Chaetopteryx villosa* is quoted by Graf *et al.* (2008) [10] up to values of 3000 m, while *Limnephilus auricula* up to altitudes of 1500 m and over. We identified *C. villosa* in HB Nera (595 m) and HB

Bârzava (360 m). *L. auricula* was found in HB Bârzava (700 m) and HB Nera (205 m).

Values of the 2.13% frequency have also been determined for the species *Brachycentrus subnubilis*, *Athripsodes bilineatus*, *Halesus digitatus*, *Limnephilus affinis*, *Rhyacophila dorsalis* and *R. vulgaris*, identified in one station.

*Brachycentrus subnubilis* is mentioned in literature as being present at altitudes of over 800 m, but not under 200 m [10]; it was identified by us in HB Nera (200 m). *Athripsodes bilineatus*, *Limnephilus affinis* are associated by Graf *et al.* (2008) [10] with large altitude spans (150-1500 m); the exception is *Halesus digitatus*, which was not identified at values below 200 m [12]. The altitude values for these species were: 280 m (*Athripsodes bilineatus*-HB Caraș), 330 m (*Limnephilus affinis*-HB Bârzava) and 395 m (*Halesus digitatus*-HB Nera).

*Rhyacophila dorsalis* is quoted in literature as being present up to 1500 m altitude [10]. García de Jalón (1982) [7] has identified the species *R. dorsalis* at altitudes of under 500 m, whereas Décamps (1967) [4] between 220-1200 m. In this research, it was found at 298 m (HB Nera).

*R. vulgaris* has been described up to 835 m [20]. Elliott (2005) [5] describes this species as being widely spread with respect to altitude, without specifying the exact value. It was identified in HB Nera at an altitude of 280 m.

Unlike *R. dorsalis*, Graf *et al.* (2008) [10] quote the species *R. fasciata* (4.26%-2 stations) at altitudes that can surpass 1500 m. In this research, it was determined at 298 m (HB Nera) and 360 m (HB Bârzava).

In conclusion, 20 species, belonging to 10 genera, have been identified: *Brachycentrus*, *Hydropsyche*, *Athripsodes*, *Chaetopteryx*, *Glyphotaelius*, *Halesus*, *Limnephilus*, *Potamophylax*, *Rhyacophila* and *Sericostoma*.

The most frequent species were *Potamophylax latipennis* (25 stations) and *Sericostoma personatum* (16 stations).

The presence of each species identified in AM was correlated with the altitude, so the results of this paper are integrated in the ones described in literature.

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