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MALACOCENOSES OF THE VALLEY OF THE STREAM PIENIŃSKI POTOK, PIENINY NATIONAL PARK

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ABSTRACT: Land gastropod fauna of the valley of Pieniński Potok, tributary to the Dunajec River, was studied qualitatively and quantitatively in 1995–1998. Among plant communities Carpathian beech forest dominates. Forty nine species (42 in quantitative samples) of 16 families were recorded, Clausiliidae, Zonitidae and Helicidae being the most numerously represented. The density ranged from 106 to 253 individuals per m^2, the dominants being *Vestia gulo* (Bielz), *Macrogastra ventricosa* (Drap.), subdominants *Balea biplicata* (Mont.) and *Vitrea diaphana* (Studer); dominants among litter species being *Vitrea diaphana*, *Aegopinella pura* (Alder) and *Carychium tridentatum* (Risso). These species are the most typical and indicative of the malacocenosis of the Carpathian beech forest. The malacocenosis is multicomponent, polymictic (TDI = 0.93). Simpson's diversity index is high (I = 0.065).

KEY WORDS: Pieniny National Park, terrestrial gastropods, density, dominance, frequency, species diversity, ecological groups, zoogeographic elements

INTRODUCTION

The stream Pieniński Potok is located in the Pieniny National Park, at the bottom of a valley separating the mountains Pieninki from the massif of Trzy Korony. Its sources are located below the Chwała Bogu pass. The stream is 2.5 km long and falls into the Dunajec river next to a fluviatile fan overgrown with a Carpathian alder forest *Alnetum incanae*.

The dominant plant community of the valley bottom is Carpathian beech forest, typical variant *Fagetum carpathicum* (*Dentario glandulosae-Fagetum*) *typicum*. The sources of the stream and its upper section are located within a patch of Carpathian beech forest, poor variant – *Fagetum carpathicum* (*Dentario glandulosae-Fagetum*) *oxalidetosum*. There are small patches of eutrophic fen *Valeriano-Caricetum flavae* and a thermophilous Pieniny meadow *Anthyllido-Trifolietum*. This part of the valley is below referred to as locality 1. The mid part – locality 2 – is covered by *Fagetum carpathicum* (*Dentario glandulosae-Fagetum*) *typicum*. On the left bank, there are fragments of *Carici-Fagetum*. In the mid part of the valley, there is also a community of *Petasitetum albi*. The lower section of the valley – locality 3 – is covered, besides the Carpathian beech forest, by a sycamore forest *Phylitido-Aceretum*, patches of *Carici-Fagetum*, and at the mouth of the stream there grows Carpathian alder forest *Alnetum incanae*.

Land gastropods of the valley of the stream Pieniński Potok were studied qualitatively and quantitatively in order to determine species richness and diversity and the structure of malacocenosis on the background of the plant communities.

MATERIAL AND METHODS

Studies on terrestrial gastropods of the valley of Pieniński Potok were carried out in 1995–1998. The material was collected at three localities: the upper (1), mid (2) and lower (3) section of the valley. Quali-

tative studies consisted in searching for gastropods in their possible shelters: soil, litter, moss, on plants, rocks, live trees and rotting trunks, under bark and stones. Each collecting session lasted 90 minutes. Quantitative samples were taken with Oekland frame of 25 cm side. The samples were taken at random; all the ground cover plus superficial soil layer were placed in a linen bag. A total of 16 samples added up to 1m^2. The material was sorted under the stereomicroscope. Only live gastropods were taken into consideration; they were preserved in 75% ethyl alcohol. The specimens were identified based on the following publications: LOKEK (1956, 1964), URBAŃSKI (1957), LIKHAREV (1962), WIKTOR (1973), KERNEY et al. (1983) and POKRYSZKO (1990). The nomenclature and systematic arrangement follow KERNEY et al. (1983). Division into ecological groups follows LOKEK (1964, 1976, 1982), RIEDEL (1982) and ALEXANDROWICZ (1987). Zoogeographical classification was adopted after RIEDEL (1988).

In order to characterize the malacocenoses I applied the following methods and indices described in detail in DZIĘCZKOWSKI (1972), PIELOU (1974, 1976), KASPRZAK & NIEDBAŁA (1981), ŁUCZAK & WIERZBOWSKA (1981), ALEXANDROWICZ (1987) and TROJAN (1992): abundance (total number of collected live specimens) and density (number of specimens per 1 m^2); dominance (D): percentage of specimens of a given species in relation to the total number of specimens. The dominance classes were adopted after DZIĘCZKOWSKI (1972); frequency (constancy of occurrence – C): percentage of samples containing a given species in relation to the total number of samples. The constancy classes follow DZIĘCZKOWSKI (1972); Q index which combines dominance and frequency indices and is used in order to simplify interpretation of malacocenosis structure; standardized index of diversity TDI; index of malacofauna diversity ADI; Simpson's index of species diversity; Shannon-Weaver species diversity index; equitability (Pielou's index), Marczewski-Steinhaus similarity index.

RESULTS

A total of 49 land gastropod species representing 16 families were found to occur in the valley of the Pieniński Potok. The most abundantly represented were clausiliids, with 15 species, followed by zonitids and helicids, each with 8 species. Representatives of these families constituted 63% species found. Species from quantitative samples constituted 87.8% all taxa found. The total number of specimens collected was 1,452; 557 of these were obtained from quantitative samples. The species composition of the malacofauna is presented in Table 1. Species numbers in the table correspond to their numbers used elsewhere in the paper.

There are no eudominants in the malacocenosis. The dominants are *Vestia gulo* and *Macrogastra ventricosa*, subdominants *Balea biplicata* and *Vitrea diaphana*. There are 19 recedent species, the remaining species being subrecedents (Table 2). The diversity index TDI is high and amounts to 0.93 which indicates a polymictic character of the malacocenosis. Simpson's index of species diversity is 0.065. The deviation of actual from potential species diversity is 95.4%; thus the observed diversity is only by 4.6% lower than the potential.

Gastropods of the valley of Pieniński Potok include 50% of typically woodland species, very rarely penetrating other habitats (Fig. 1). Species occurring mainly in woodlands but common also in parks, as well as shade-loving species, typical of very humid habitats, sometimes even marshy, constitute 34% all

Table 1. Species composition, abundance and dominance of terrestrial malacofauna in the valley of Pieniński Potok

No.	Taxon	Individuals in quantitative samples	Individuals in qualitative samples	Total	D %
	Aciculidae				
1.	*Acicula polita* (Hartmann, 1840)	22	-	22	1.51
2.	*A. parcelineata* (Clessin, 1911)	1	-	1	0.07
	Ellobiidae				
3.	*Carychium tridentatum* (Risso, 1826)	66	-	66	4.54
	Succineidae				
4.	*Succinea oblonga* Draparnaud, 1801	3	4	7	0.48
	Vertiginidae				
5.	*Vertigo substriata* (Jeffreys, 1833)	1	-	1	0.07
6.	*Columella edentula* (Draparnaud, 1805)	7	-	7	0.48

	Pupillidae				
7.	*Argna bielzi* (Rossmässler, 1859)	5	-	5	0.34
	Valloniidae				
8.	*Acanthinula aculeata* (O. F. Müller, 1774)	10	-	10	0.69
	Enidae				
9.	*Ena montana* (Draparnaud, 1801)	4	12	16	1.10
	Endodontidae				
10.	*Discus rotundatus* (O. F. Müller, 1774)	5	6	11	0.76
11.	*D. perspectivus* (Mühlfeld, 1816)	1	-	1	0.07
12.	*Punctum pygmaeum* (Draparnaud, 1801)	4	-	4	0.28
	Arionidae				
13.	*Arion subfuscus* (Draparnaud, 1805)	1	1	2	0.14
	Vitrinidae				
14.	*Eucobresia nivalis* (Dumont et Mortillet, 1852)	5	5	10	0.69
	Zonitidae				
15.	*Aegopinella epipedostoma* (Fagot, 1879)	3	5	8	0.55
16.	*Ae. pura* (Alder, 1830)	63	2	65	4.48
17.	*Vitrea crystallina* (O. F. Müller, 1774)	13	3	16	1.10
18.	*V. transsylvanica* (Clessin, 1877)	31	5	36	2.48
19.	*V. subrimata* (Reinhardt, 1871)	22	-	22	1.52
20.	*V. diaphana* (Studer, 1820)	96	-	96	6.61
21.	*Oxychilus orientalis* (Clessin, 1887)	4	34	38	2.62
22.	*Daudebardia rufa* (Draparnaud, 1805)	6	1	7	0.48
	Euconulidae				
23.	*Euconulus fulvus* (O. F. Müller, 1774)	4	3	7	0.48
	Clausiliidae				
24.	*Cochlodina laminata* (Montagu, 1803)	-	42	42	2.89
25.	*C. orthostoma* (Menke, 1830)	1	10	11	0.76
26.	*Ruthenica filograna* (Rossmässler, 1836)	20	9	29	1.99
27.	*Macrogastra tumida* (Rossmässler, 1836)	9	36	45	3.10
28.	*M. latestriata* (A. Schmidt, 1857)	9	8	17	1.17
29.	*M. plicatula* (Draparnaud, 1801)	4	50	54	3.72
30.	*M. ventricosa* (Draparnaud, 1801)	11	182	193	13.29
31.	*Clausilia dubia* Draparnaud, 1805	-	18	18	1.24
32.	*C. pumila* C. Pfeiffer, 1828	1	-	1	0.07
33.	*Laciniaria plicata* (Draparnaud, 1801)	21	18	39	2.69
34.	*Balea biplicata* (Montagu, 1803)	36	72	108	7.44
35.	*B. stabilis* (L. Pfeiffer, 1847)	3	6	9	0.62
36.	*Bulgarica cana* (Held, 1836)	4	9	13	0.90
37.	*Vestia gulo* (E. A. Bielz, 1859)	30	201	231	15.91
38.	*V. turgida* (Rossmässler, 1836)	5	25	30	2.07
	Bradybaenidae				
39.	*Bradybaena fruticum* (O. F. Müller, 1774)	-	10	10	0.69
	Helicidae				
40.	*Chilostoma faustinum* (Rossmässler, 1835)	4	11	15	1.03
41.	*Isognomostoma isognomostoma* (Schröter, 1784)	13	19	32	2.20
42.	*Trichia unidentata* (Draparnaud, 1805)	4	8	12	0.83
43.	*T. villosula* (Rossmässler, 1838)	-	5	5	0.34
44.	*Perforatella incarnata* (O. F. Müller, 1774)	2	7	9	0.62
45.	*P. vicina* (Rossmässler, 1842)	2	12	14	0.96
46.	*Arianta arbustorum* (Linnaeus, 1758)	-	5	5	0.34
47.	*Helix pomatia* Linnaeus, 1758	-	25	25	1.72
	Limacidae				
48.	*Limax cinereoniger* Wolf, 1803	1	6	7	0.48
49.	*Bielzia coerulans* (M. Bielz, 1851)	-	20	20	1.38
	Total:	557	895	1452	

Table 2. Abundance (N), dominance (D), frequency (C)and Q index (Q) of components of malacocenoses of the valley of Pieniński Potok, quantitative samples

No.	Taxon	Locality 1			Locality 2			Locality 3			Total			
		N	D	C	N	D	C	N	D	C	N	D	C	Q
1.	*Acicula polita*	13	5.2	37.5	2	1.9	6.3	7	3.5	37.5	22	4.0	27.1	10.4
2.	*A. parcelineata*	-	-	-	-	-	-	1	0.5	6.3	1	0.2	2.1	0.6
3.	*Carychium tridentatum*	39	15.4	50.0	8	7.5	31.3	19	9.6	37.5	66	11.9	39.6	21.7
4.	*Succinea oblonga*	3	1.2	12.5	-	-	-	-	-	-	3	0.5	4.2	1.4
5.	*Vertigo substriata*	1	0.4	6.3	-	-	-	-	-	-	1	0.2	2.1	0.6
6.	*Columella edentula*	7	2.8	18.8	-	-	-	-	-	-	7	1.3	6.3	2.9
7.	*Argna bielzi*	-	-	-	3	2.8	6.3	2	1.0	6.3	5	0.9	4.2	1.9
8.	*Acanthinula aculeata*	6	2.4	12.5	-	-	-	4	2.0	18.8	10	1.8	14.6	5.1
9.	*Ena montana*	2	0.8	12.5	-	-	-	2	1.0	6.3	4	0.7	6.3	2.1
10.	*Discus rotundatus*	2	0.8	6.3	1	0.9	6.3	2	1.0	6.3	5	0.9	6.3	2.4
11.	*D. perspectivus*	-	-	-	-	-	-	1	0.5	6.3	1	0.2	2.1	0.6
12.	*Punctum pygmaeum*	-	-	-	-	-	-	4	2.0	12.5	4	0.7	4.2	1.7
13.	*Arion subfuscus*	1	0.4	6.3	-	-	-	-	-	-	1	0.2	2.1	1.4
14.	*Eucobresia nivalis*	5	2.0	12.5	-	-	-	-	-	-	5	0.9	4.2	1.9
15.	*Aegopinella epipedostoma*	1	0.4	6.3	-	-	-	2	1.0	12.5	3	0.5	6.3	1.8
16.	*Ae. pura*	36	14.3	68.8	10	9.4	37.5	17	8.6	43.8	63	11.3	50.0	23.8
17.	*Vitrea crystallina*	9	3.6	43.8	4	3.8	12.5	-	-	-	13	2.3	18.9	6.6
18.	*V. transsylvanica*	12	4.7	31.3	10	9.4	56.3	9	4.5	37.5	31	5.6	41.7	15.3
19.	*V. subrimata*	7	2.8	12.5	10	9.4	37.5	5	2.5	25.0	22	4.0	25.0	10.0
20.	*V. diaphana*	49	19.4	75.0	28	26.4	68.8	19	9.6	56.3	96	17.3	66.7	34.0
21.	*Oxychilus orientalis*	-	-	-	3	2.8	12.5	1	0.5	6.3	4	0.7	6.3	2.1
22.	*Daudebardia rufa*	1	0.4	6.3	1	0.9	6.3	4	2.0	18.8	6	1.1	10.4	3.4
23.	*Euconulus fulvus*	3	1.2	18.8	1	0.9	6.3	-	-	-	4	0.7	8.3	2.4
25.	*Cochlodina orthostoma*	1	0.4	6.3	-	-	-	-	-	-	1	0.2	2.1	0.6
26.	*Ruthenica filograna*	12	4.8	37.5	7	6.6	25.0	1	0.5	6.3	20	3.6	22.9	9.1
27.	*Macrogastra tumida*	4	1.6	25.0	1	0.9	6.3	4	2.0	12.5	9	1.6	14.6	4.8
28.	*M. latestriata*	-	-	-	-	-	-	9	4.5	18.8	9	1.6	6.3	3.1
29.	*M. plicatula*	-	-	-	2	1.9	12.5	2	1.0	12.5	4	0.7	8.3	2.4
30.	*M. ventricosa*	1	0.4	6.3	-	-	-	10	5.1	12.5	11	2.0	6.3	3.5
32.	*Clausilia pumila*	-	-	-	1	0.9	6.3	-	-	-	1	0.2	2.1	0.6
33.	*Laciniaria plicata*	-	-	-	-	-	-	21	10.6	12.5	21	3.8	4.2	4.0
34.	*Balea biplicata*	14	5.6	25.0	2	1.9	12.5	20	10.1	25.0	36	6.5	20.1	11.4
35.	*B. stabilis*	-	-	-	-	-	-	3	1.5	6.3	3	0.5	2.1	1.0
36.	*Bulgarica cana*	-	-	-	-	-	-	4	2.0	12.5	4	0.7	4.2	1.7
37.	*Vestia gulo*	16	6.3	43.8	4	3.8	12.5	10	5.1	25.0	30	5.4	27.1	12.1
38.	*V. turgida*	5	2.0	12.5	-	-	-	-	-	-	5	0.9	6.3	2.4
40.	*Chilostoma faustinum*	1	0.4	6.3	-	-	-	3	1.5	18.8	4	0.7	8.3	2.4
41.	*Isognomostoma isognomostoma*	-	-	-	6	5.7	18.9	7	3.5	31.3	13	2.3	16.7	6.2
42.	*Trichia unidentata*	-	-	-	1	0.9	6.3	3	1.5	6.3	4	0.7	4.2	1.7
44.	*Perforatella incarnata*	-	-	-	-	-	-	2	1.0	12.5	2	0.4	4.2	1.3
45.	*P. vicina*	1	0.4	6.3	1	0.9	6.3	-	-	-	3	0.4	4.2	1.3
48.	*Limax cinereoniger*	1	0.4	6.3	-	-	-	-	-	-	1	0.2	2.1	0.6
Total specimens		253			106			198			557			
Total species		28			21			30			42			

species. The remaining species are snails of humid but not marshy habitats of varied degree of shading (8%) and euryoecious species (8%). Among the 1,452 collected specimens the most numerous were those of ecological groups 1 and 3: typically woodland species and woodland shade-loving species, typical of very humid habitats. They constituted 76% collected specimens (Fig. 1).

The malacocenosis includes 3 higrophilous species (7%) (Fig. 2): *Macrogastra tumida*, *M. ventricosa* and *Trichia villosula*. The most numerous group consists of species of moderately humid habitats (47%).

Indifferent species constitute a fairly high proportion (37%). The remaining 9% species are mesophile and associated with low-humidity habitats.

The malacocenosis includes the following zoogeographic groups (RIEDEL 1988): European: *Carychium tridentatum, Aegopinella pura, Vitrea crystallina, V. substriata, Cochlodina laminata, Limax cinereoniger, Arion subfuscus*; C European: *Acicula polita, Ena montana, Macrogastra ventricosa, M. plicatula, Clausilia dubia, Balea biplicata*; W & C European: *Discus rotundatus*; E & C European: *Cochlodina orthostoma, Clausilia pumila, Laciniaria plicata*; E European: *Ruthenica filograna, Bradybaena fruticum*; E & SE European: *Bulgarica cana*; C & SE European: *Perforatella incarnata*; C & NW European: *Arianta arbustorum*; S & SE European: *Daudebardia rufa*; SE & C European: *Helix pomatia*; N & E European: *Vertigo substriata*; Alpine & C European: *Aegopinella epipedostoma*; Alpine-Carpathian: *Isognomostoma isognomostoma, Trichia unidentata, Vitrea diaphana*; Carpathian-E Alpine: *Discus perspectivus*; Carpathian: *Acicula parcelineata, Eucobresia nivalis, Trichia villosula, Perforatella vicina, Chilostoma faustinum, Bielzia coerulans, Vestia turgida, Macrogastra latestriata, M. tumida, Oxychilus orientalis, Vitrea transsylvanica*; Carpathian endemics: *Argna bielzi, Vestia gulo, Balea stabilis*; Holarctic: *Columella edentula, Euconulus fulvus, Punctum pygmaeum*; Eurosiberian: *Succinea oblonga*; W Palaearctic: *Acanthinula aculeata*.

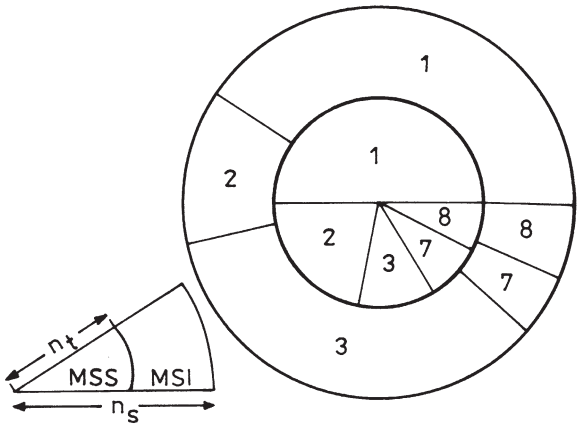

Fig. 1. Ecological spectrum of the malacocenosis of the valley of Pieniński Potok: n_t – number of taxa, n_s – number of specimens, MSS – species spectrum, MSI – individual spectrum; Ecological groups 1–8: 1 – typically forest species, very rarely found in other habitats, 2 – species occurring mainly in forests but found also in parks; 3 – forest shade-loving species, typical of very humid or even marshy habitats; 7 – euryoecious species of open or shaded habitats of medium humidity; 8 – species of humid but not marshy habitats of various degree of shading

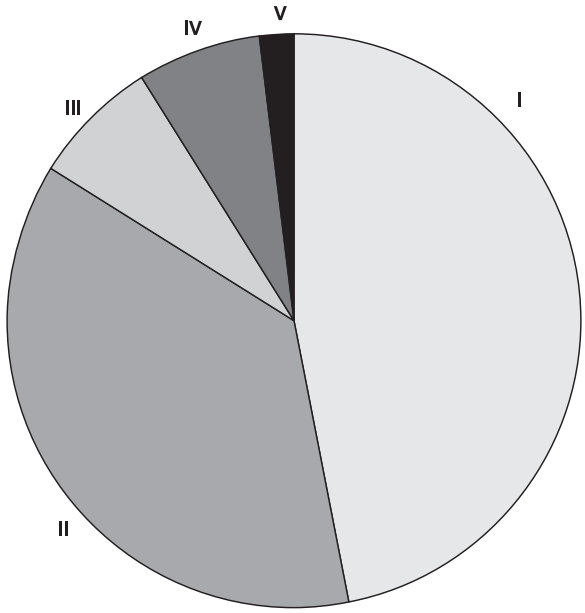

Fig. 2. Division of the malacocenosis with respect to humidity preferences and requirements; I – species of moderately humid habitats; II – indifferent species; III – higrophilous species; IV – mesophilous species; V – mesophile species associated with habitats of low humidity

According to ALEXANDROWICZ's (1987) division, a great majority is constituted by C European species (31%), as well as montane, Alpine and Carpathian species (31%). The remaining species fall in the following groups: European (16%), S European & Mediterranean (8%), Holarctic (4%), Palaearctic (4%), Eurosiberian (2%), Pontio-Caspian & Balkan (2%) and Boreo-Alpine (2%).

The quantitative studies involved taking 16 random samples along the stream at each of the three localities. The species collected in this way are listed in Table 2. The gastropods represent 14 families. At locality 1 – Carpathian beech forest, poor variant – I found 27 species of the total of 42 obtained from all the samples. The total density was 253 specimens per 1 m^2. Dominants (D_4) of the highest constancy (C_4) were Alpine-Carpathian *Vitrea diaphana* and European *Aegopinella pura*, both typically woodland species. European *Carychium tridentatum* of humid, shady habitats was a subconstant (C_3) dominant (Table 3). Subdominants at this locality were: subconstant *Vestia gulo* and accessory *Balea biplicata* and *Acicula polita*.

Table. 3. Structure of the malacocenosis expressed as distribution of constancy (C) and dominance (D) at locality 1; 1–49 species numbers

	C1	C2	C3	C4	C5
D5					
D4				16, 20	
D3		1, 43	37		
D2	4, 6, 8, 14, 19, 23, 38	18, 26, 27	17		
D1	5, 9, 10, 15, 22, 25, 30, 40, 45, 48				

Twenty one species were obtained from the samples at locality 2 – Carpathian beech forest, typical variant, with patches of *Petasitetum albi* and *Carici-Fagetum*. The total density was 106 specimens per 1 m^2 (Table 2). *Vitrea diaphana* was a constant eudominant (Table 4); there were no dominants. Subdominants – *Vitrea subrimata, V. transsylvanica, Aegopinella pura, Carychium tridentatum, Ruthenica filograna* and *Isognomostoma isognomostoma* – represent three constancy classes: accidental, accessory and subconstant (Table 2). The eudominant and subdominants are typically woodland species, except *Carychium tridentatum*, and represent European, Carpathian-Alpine and Carpathian zoogeographical elements.

Locality 3 included a variety of habitats: Carpathian beech forest, sycamore forest, patches of *Carici-Fagetum* and Carpathian alder forest. The 198 specimens collected from 1 m^2 represented 30 species (Table 2). Dominants were accidental *Laciniaria plicata* and accessory *Balea biplicata* (Table 5). The former is an euryoecious species of shaded, moderately humid habitats, EC European, the latter mostly woodland, C European species. Subconstant, accessory and accidental subdominants included *Vitrea diaphana, Carychium tridentatum, Aegopinella pura, Vestia gulo* and *Macrogastra ventricosa*. Among subdominants two higrophilous clausiliids are noteworthy: Carpathian *Vestia gulo* and C European *Macrogastra ventricosa*.

The following leaf litter species were characterized by the highest dominance and frequency (Table 2): *Vitrea diaphana* (Q – 34.0), *Aegopinella pura* (Q – 23.8) and *Carychium tridentatum* (Q – 21.7). The TDI index of diversity for leaf litter species at localities 1–3 amounts to 0.90, 0.89 and 0.94, respectively, which confirms the multicomponent and polymictic character of the malacofauna. The similarity between the samples at localities 1–3 is 0.83, 0.87 and 0.87, respectively. Consequently, unit communities of particular samples are only slightly similar. The species composition at particular localities is similar, the similarity being s = 0.441 for localities 1 and 2, and s = 0.415 for localities 2 and 3 and 1 and 3. Out of 42 species obtained from the samples, 12 are shared: *Acicula polita, Carychium tridentatum, Discus rotundatus, Aegopinella pura, Vitrea transsylvanica, V. subrimata, V. diaphana, Daudebardia rufa, Ruthenica filograna, Balea biplicata, Vestia gulo, Macrogastra tumida*. In the valley of Pieniński Potok, 71% specimens found in the samples and 73% species represent ecological groups 1 and 3, i.e. species typical of forests and of very humid habitats (Fig. 3).

Table. 4. Structure of the malacocenosis expressed as distribution of constancy (C) and dominance (D) at locality 2; 1–49 species numbers

	C1	C2	C3	C4	C5
D5				20	
D4					
D3	41	3, 16, 26	18, 19		
D2	1, 7, 17, 21, 29, 34, 37				
D1	10, 22, 23, 27, 32, 42, 45				

Table 5. Structure of the malacocenosis expressed as distribution of constancy (C) and dominance (D) at locality 3; 1–49 species numbers

	C1	C2	C3	C4	C5
D5					
D4	33	34		16, 20	
D3	30	37	3, 16, 20		
D2	8, 12, 22, 27, 28, 35, 36, 40, 42	1, 18, 19, 41			
D1	2, 7, 9, 10, 11, 15, 21, 26, 29, 44				

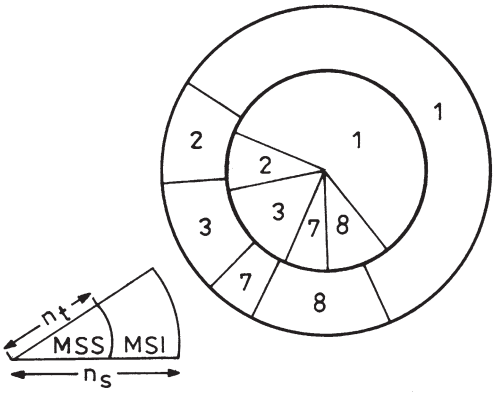

Fig. 3. Ecological spectrum of the malacocenosis of the valley of Pieniński Potok – quantitative samples

DISCUSSION

In the Pieniny beech forests, DZIĘCZKOWSKI (1972) found 58 gastropod species in quantitative samples. Adding those found during qualitative studies by URBAŃSKI (1939) and RIEDEL (1976, 1982) sets the number of species at 100. The malacocenosis of the valley of Pieniński Potok comprises 49 species. According to DZIĘCZKOWSKI (1972) the gastropod density in the litter of the Pieniny beech forests ranged from 160 to 230 individuals per 1 m^2. In the valley of Pieniński Potok, where the rich herb layer of the beech and beech-fir forest passes into the *Petasites* community, the maximum density is 253 indiv./m^2. The high ADI values for particular samples and the high species diversity TDI testify to conditions favourable for snails. Shannon-Weaver species diversity index calculated for the studied malacocenosis is 5.60, while the equitability (Pielou's index) is equal to 0.80. DYDUCH-FALNIOWSKA (1991) reports values of Shannon-Weaver index ranging from 0.54 to 4.23 for malacocenoses of the Tatra Mts, the values for beech forest malacocenoses being the highest. The equitability (J) of Tatra beech forest malacocenoses ranges from 0.68 to 0.84. The high value of the diversity index (H'), equitability (J) and the species richness of the valley of Pieniński Potok are similar to the respective values for the Tatra beech forest malacocenoses which confirms that such values are charactersitic of natural habitats not degraded by man.

The richness of the malacofauna of the valley of Pieniński Potok is also evidenced by the presence of 18 different zoogeographic elements, the highest proportion (39%) being constituted by Carpathian, Carpathian-E Alpine, Alpine-Carpathian and Alpine & C European species i.e. typically mountain species which give the Pieniny malacofauna its specific character. The group of widely distributed species of Holarctic, Palaearctic and European distribution includes 12 species i.e. 20%.

Three families are the most abundantly represented: Clausiliidae, Zonitidae and Helicidae; a similar phenomenon was observed by DZIĘCZKOWSKI (1972) in Carpathian beech forests of the Pieniny Mts. The occurrence of 13 out of 16 clausiliid species recorded from the Pieniny Mts in the valley of Pieniński Potok is noteworthy. During searches for a definite time the most often observed clausiliids were *Vestia gulo* and *Macrogastra ventricosa* – higrophilous species.

Dominant species in quantitative samples were *Vitrea diaphana, Aegopinella pura* and *Carychium tridentatum*. Two of them – *V. diaphana* and *Ae. pura* – were listed by DZIĘCZKOWSKI (1972) as dominants in Carpathian beech forests.

The upper, mid and lower sections of the valley differ somewhat with respect to their plant communities. The fairly high qualitative similarity of their malacofauna suggests that the discussed habitats close to the stream offer similar conditions for the malacofauna.

The small area of the valley of Pieniński Potok harbours 49% species recorded from the Pieniny Mts which constitutes 29% land gastropods known from Poland.

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