

1.10. STRUCTURAL AND ECOLOGICAL STUDY ON THE MOLLUSC FAUNA OF THE HARDWOOD GALLERY FORESTS (FRAXINO PANNONICAE ULMETUM SOÓ 1960) IN THE GREAT HUNGARIAN PLAIN

Bába, K.

1.10.1. INTRODUCTION

Gallery forests used to be the most extent type of forests in the Great Hungarian Plain (Soó 1968). Previous studies showed that these forests were inhabited by 26 (54%) of 48 stenotolerant mountain species, due to the faunatransport of the rivers.

1.10.2. MATERIAL AND METHODS

Our researches were completed in the Great Hungarian Plain's 79 gallery forest plots. In every study site data were collected in ten 25 × 25 cm quadrats. Microclimate measurements were carried out by Andó and Bába (1962). The fauna of the climate regions of the Great Hungarian Plain was compared with Pócs-Ramsey chi²-test (Bába 1992). The author studied the role of stream deposit fauna, soil reaction and pollution of rivers on the settlement of mollusc species (Bába 1970, 1973, 1977, 1982), the effects of mineralogic succession (Bába 1980, 1985, 1986) and forest management (Bába 1992a, 1994). Following from Lozek's (1964) classification of mollusc species into ecological groups I made a division regarding species' habitat types: HF - forest dwellers (hygrofil), B - bush forest dwellers (light demanding), RU - riparian ubiquitous and St - steppe dwellers. A further classification was done considering species' feeding habits on the grounds of Frömming (1954): O - omnivorous, H - herbivore, Sp - saprophagous. The species composition of gallery forests was arranged by reason of the level of constancy with the indication of the dominance (Table 1 and 2).

1.10.3. ECOLOGICAL FACTORS AFFECTING THE OCCURENCE OF MOLLUSC SPECIES IN THE GREAT HUNGARIAN PLAIN

Csiki (1906) reported 56 mollusc species from the Great Hungarian Plain. Later studies (Soós, Czogler, Rotarides, Richnovszky, Kovács) added five more species to this list. Since 1956, when Tisza Project (long term study project) started, I found 104 mollusc species in nearly 800 Hungarian and foreign study sites from the Great Plain. In the Great Hungarian Plain 97 species were present from the above mentioned 104 species. The number of species in study sites were 66, accounting for 68.04 per cent of the total number of species. Besides the gallery forests data were also collected from 27 managed forests and plantations (Table 2), where 22 species (33 per cent) were indicated. As a consequence of forest management (eg. thinning of 40-60 year-old forests) and plantations Shannon-Wiener diversity values of the gallery forests' mollusc fauna considerably decreased.

Table 1. Mollusc species of gallery forests (*Fraxino pannonicae-Ulmetum*) arranged considering their feeding habits and constancy-dominancy level

No	Eg	Fh	K%	D%	Species
1	HF	O	54,02	6,50	<i>Bradybanea fruticum</i> (O. F. Müller 1774)
2	B	H	50,70	1,58	<i>Cepaea vindobonensis</i> (Ferussac 1821)
3	HF	O	47,88	12,70	<i>Perforatella vicina</i> (Rossmässler 1842)
4	RU	O	45,07	4,47	<i>Succinea oblonga</i> Draparnaud 1801
5	B	O	43,66	8,45	<i>Aegopinella minor</i> (Stabile 1864)
6	B	H	32,8	1,49	<i>Helix pomatia</i> Linné 1758
7	HF	O	33,8	0,80	<i>Arion subfuscus</i> (Draparnaud 1805)
8	B	O	30,9	2,73	<i>Cochlicopa lubrica</i> (O. F. Müller 1774)
9	B	O	29,5	3,12	<i>Vitrina pellucida</i> (O. F. Müller 1774)
10	B	O	29,5	2,19	<i>Nesovitrea hammonis</i> (Ström 1765)
11	RU	H	22,5	4,39	<i>Perforatella rubiginosa</i> (A. Schmidt 1853)
12	St	Sz	22,5	3,05	<i>Vallonia pulchella</i> (O. F. Müller 1774)
13	HF	Sz	22,5	4,88	<i>Vitrea crystallina</i> (O. F. Müller 1774)
14	HF	Sz	21,1	1,24	<i>Cochlodina laminata</i> (Montagu 1803)
15	B	H	19,7	1,27	<i>Euomphalia strigella</i> (Draparnaud 1801)
16	RU	Sz	18,3	3,69	<i>Carychium tridontatum</i> (Risso 1826)
17	RU	O	16,9	1,27	<i>Carychium minimum</i> O. F. Müller 1774
18	B	Sz	16,9	0,65	<i>Punctum pygmaeum</i> (Draparnaud 1801)
19	RU	O	15,4	3,17	<i>Zonitoides nitidus</i> (O. F. Müller 1774)
20	HF	O	14,8	0,81	<i>Arion subfuscus</i> (Draparnaud 1805)
21	HF	O	14,2	0,61	<i>Arion sylvaticus</i> Lohmander 1937
22	HF	O	14,1	0,58	<i>Arion circumscriptus</i> Johnston 1868
23	RU	O	14,1	1,02	<i>Deroceras agreste</i> (Linné 1758)
24	RU	O	14,0	0,99	<i>Deroceras reticulatum</i> (O. F. Müller 1774)
25	RU	H	12,6	4,20	<i>Columella edentula</i> (Draparnaud 1805)
26	HF	O	12,6	0,41	<i>Limax cinereoniger</i> Wolf 1803
27	B	H	12,2	0,53	<i>Helix lutescens</i> Rossmässler 1837
28	HF	H	12,6	1,78	<i>Chilostoma banaticum</i> (Rossmässler 1838)
29	HF	H	10,4	1,85	<i>Hygromia kovácsi</i> Varga et Pintér 1972
30	B	O	9,8	1,07	<i>Aegopinella pura</i> (Alder 1830)
31	HF	O	8,4	4,66	<i>Oxychilus glaber</i> (Rossmässler 1835)
32	HF	Sz	8,4	0,05	<i>Clausilia pumila</i> C. Pfeiffer 1828
33	St	O	8,4	0,41	<i>Vallonia costata</i> (O. F. Müller 1774)
34	RU	O	7,0	7,49	<i>Oxyloma elegans</i> (Risso 1826)
35	St	Sz	7,0	0,19	<i>Chondrula tridens</i> (O. F. Müller 1774)
36	HF	Sz	7,0	0,17	<i>Acanthimula acuhata</i> (O. F. Müller 1774)
37	B	Sz	5,6	0,65	<i>Pomatius rivulare</i> (Eichwald 1829)
38	HF	H	5,6	0,85	<i>Perforatella incarnata</i> (O. F. Müller 1774)
39	HF	O	5,6	0,12	<i>Deroceras laeve</i> (O. F. Müller 1774)
40	St	H	5,6	0,21	<i>Monacha carthusiana</i> (O. F. Müller 1774)
41	HF	O	4,2	0,83	<i>Perforatella bidentata</i> (Gmelin 1788)
42	HF	H	4,2	0,31	<i>Arianta arbustorum</i> (Linné 1758)
43	HF	O	4,2	0,14	<i>Lehmania nyctelia</i> (Bourguinat 1861)
44	St	O	4,2	0,31	<i>Cochlicopa lubricella</i> (Porro 1838)
45	St	Sz	4,2	0,21	<i>Truncatellina cylindrica</i> (Ferussac 1807)
46	B	O	4,2	0,14	<i>Arion hortensis</i> Ferussac 1819
47	RU	Sz	4,2	0,14	<i>Vertigo angustior</i> Jeffreys 1830
48	B	O	4,2	0,12	<i>Euconulus fulvus</i> (O. F. Müller 1774)
49	B	H	4,2	0,29	<i>Trichia hispida</i> (Linné 1758)
50	RU	O	2,8	0,09	<i>Succinea putris</i> (Linné 1758)
51	HF	Sz	2,8	0,09	<i>Vertigo pusilla</i> O. F. Müller 1774
52	St	H	2,8	0,05	<i>Granaria frumentum</i> (Draparnaud 1801)
53	St	Sz	2,8	0,02	<i>Ceciloides acicula</i> (O. F. Müller 1774)
54	B	H	2,8	0,05	<i>Cepaea hortensis</i> (O. F. Müller 1774)

Table 1. (continued)

55	B	O	2,8	0,05	<i>Aegopinella ressmanni</i> (Westerlund 1883)
56	B	Sz	1,4	0,39	<i>Balea biplicata</i> (Montagu 1803)
57	HF	Sz	1,4	0,04	<i>Hygromia transsylvanica</i> (Westerlund 1876)
58	HF	Sz	1,4	0,04	<i>Daudebardia rufa</i> (Draparnaud 1805)
59	HF	O	1,4	0,02	<i>Malacolimax tenellus</i> O. F. Müller 1774
60	B	Sz	1,4	0,02	<i>Vitrea contracta</i> (Westerlund 1871)
61	HF	H	1,4	0,02	<i>Trichia unidentata</i> (Draparnaud 1805)
62	HF	Sz	1,4	0,02	<i>Ruthenica filigrana</i> (Rossmässler 1836)
63	B	Sz	1,4	0,02	<i>Discus rotundatus</i> (O. F. Müller 1774)
64	RU	O	1,4	0,02	<i>Vertigo moulinsiana</i> (Dupuy 1849)
65	B	O	1,2	0,02	<i>Truncatellina claustralis</i> (Gredler 1856)
66	HF	Sz	1,2	0,02	<i>Acicula polita</i> (Hartmann 1840)

Table 2. Mollusc fauna of managed forests planted after clearing of gallery forests arranged by constancy values

No	Fd	Fh	K%	D%	Species
1	St	Sz	100	8,11	<i>Vallonia pulchella</i> (O. F. Müller 1774)
2	B	O	55,5	29,05	<i>Cochlicopa lubrica</i> (O. F. Müller 1774)
3	RU	O	44,4	14,31	<i>Deroceras agreste</i> (Linné 1758)
4	B	H	44,4	2,99	<i>Helix pomatia</i> Linné 1758
5	B	H	44,4	1,49	<i>Cepaea vindobonensis</i> (Ferussac 1821)
6	RU	O	33,3	6,19	<i>Succinea oblonga</i> Draparnaud 1801
7	BE	O	33,3	5,12	<i>Aegopinella minor</i> (Stabile 1864)
8	RU	O	22,2	8,76	<i>Zonitoides nitidus</i> (O. F. Müller 1774)
9	B	O	22,2	8,76	<i>Vitrina pellucida</i> (O. F. Müller 1774)
10	B	O	22,2	6,49	<i>Oxychilus draparnaudi</i> (Beck 1837)
11	St	O	22,2	1,49	<i>Vallonia costata</i> (O. F. Müller 1774)
12	St	O	22,2	0,42	<i>Cochlicopa lubricella</i> (Porro 1838)
13	St	H	11,1	1,70	<i>Pupilla muscorum</i> (Linéé 1758)
14	B	O	11,1	1,28	<i>Limax maximus</i> Linné 1758
15	B	Sz	11,1	1,06	<i>Acanthinula aculeata</i> (O. F. Müller 1774)
16	St	Sz	11,1	0,85	<i>Truncatellina cylindrica</i> (Ferussac 1807)
17	B	O	11,1	0,42	<i>Arion hortensis</i> Ferussac 1819
18	St	Sz	11,1	0,42	<i>Chondrula tridens</i> (O. F. Müller 1774)
19	B	O	11,1	0,42	<i>Euconulus fulvus</i> (O. F. Müller 1774)
20	HF	O	11,1	0,21	<i>Perforatella vicina</i> (Rossmässler 1842)
21	HF	O	11,1	0,21	<i>Arion subfuscus</i> (Draparnaud 1805)
22	B	Sz	11,1	0,21	<i>Punctum pygmaeum</i> (Draparnaud 1801)

Gallery forests grow on pH=6-7 alluvial brown forest soil in the relatively higher parts of the flood plains between the dams. Their fauna is much affected by the faunatransport of the rivers, which in addition depends on the river's water output (Bába 1998). Polluted rivers, like the Sebes Körös, lack faunatransport. In the neutral parts of the riverbanks there are better conditions for the settlement of the species (Andó and Bába 1962).

Due to forest management, deforestation, river regulations and clearing in the surroundings of the river sources (Romania, Ukraine) the climate of the gallery forest altogether with that of the Great Hungarian Plain turned drier and the number of gallery forests decreased (Bába 1978). At the same time the number of constant- and dominant species decreased while the number of accessory species increased. From the climateregions defined by Kakas (1960) the A1-A2 (Crisicum, Praematricum) and B1, B4, A4 (Colocense, Titelicum, Samicum, Nyírségense) types significantly differed from the warm and dry A1-2 regions using χ^2 -test. Warm and dry climate disables the faunatransport and the settlement of species (Bába 1996).

1.10.4. THE SPECIES COMPOSITION AND LEVELS OF CONSTANCY OF MOLLUSCS IN THE GALLERY FORESTS

The list of species arranged considering the constancy levels in gallery forest and managed forests is indicated in Tables 1-2. Percentage frequencies of constant, subconstant and accessoric species are shown in Fig. 1. There are different constant species in plantations and managed forests, their ratio is different, too. The number of species decrease due to human effects, although the ratios of the three categories are similar. In north-eastern part of the Great Hungarian Plain among the constant species are *Chilostoma*, *Nesovitrea*, in the region of the river Körös and Érmellék *Hygromia kovácsi*, *Vitrea crystallina* and in the Körös-Maros interfluve area *Hygromia kovácsi* and *Cochlicopa lubrica*.

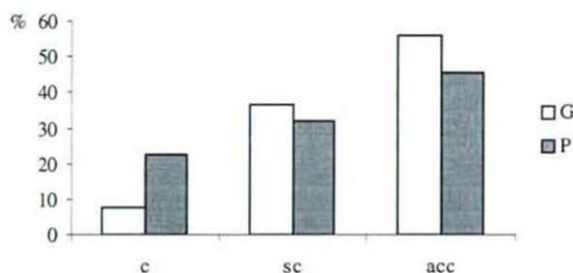


Fig. 1. Distribution of constant, subconstant and accessoric species of gallery forests and managed forests. G: gallery forest; P: plantation; c: constant; sc: subconstant; acc: accessoric

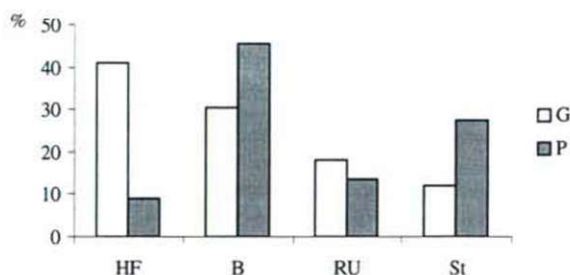


Fig. 2. Distribution of species on the basis of habitat types in gallery forests and managed forests. G: gallery forest; P: plantation; HF: forest dweller; B: bush forest dweller; RU: riparian ubiquitous; St: steppe dweller

1.10.5. DISTRIBUTION OF SPECIES ON THE BASIS OF HABITAT TYPE AND FEEDING HABITS

While forest dweller (HF) species were dominant in gallery forests, bush forest dwellers (B) and steppe dwellers (St) dominated in plantations and managed forests (Fig. 2). The distribution of species' feeding habits well indicated the human effects and it was different in gallery forest and managed habitats (Fig. 3). In the latter case the percentage frequency of omnivorous species increased while that of herbivorous and saprophagous species decreased.

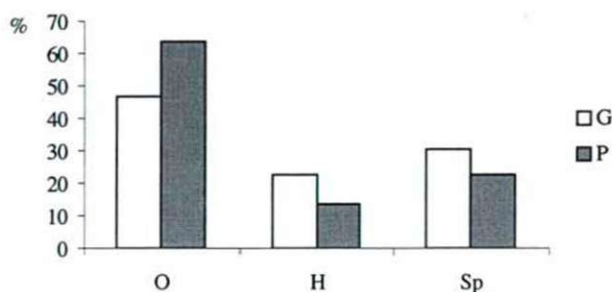


Fig. 3. Distribution of mollusc species on the basis of feeding habits in gallery forests and managed forests and plantations. G: gallery forest; P: plantation; O: omnivore; H: herbivore; Sp: saprofagous.

1.10.6. SUMMARY

The authors investigations in 79 gallery forest study sites 66 mollusc species were recorded representing 68.04 per cent of the total number of the molluscs in the Great Hungarian Plain, which stressed the importance of gallery forests as ecological corridors. Constant species in certain regions may differ from the summarized list of species shown in Table 1. The distribution of species on the basis of the habitat types and feeding habits differs considerably between plantations and managed forests and unmanaged gallery forests indicating human influence. 54.16 per cent of the river transported mountain fauna was present in seminatural stands.

1.10.7. REFERENCES

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