THE *HIERACIO TRANSSYLVANICI – ABIETETUM* (BORHIDI 1971) COLDEA 1991 ASSOCIATION FROM THE "OBCINELE BUCOVINEI" TERRITORY

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The authors present the *Hieracio transsylvanici – Abietetum* association from the "Obcinele Bucovinei" territory, an association that has never been noted before in this area. At the same time, they would like to propose a coenotaxonomic framing of this association into the *Abieti – Piceion* alliance, *Athyrio – Piceetalia* order.

Key words: phytocoenology, *Hieracio transsylvanici – Abietetum*.

INTRODUCTION

The territory named "Obcinele Bucovinei" is situated between the Suceava's Valley (in the North), the Golden Bistriţa's Valley (in the West), the Mestecăniş Pass – Putna's Valley – the Moldova's transversal Valley (in the South) and Suceava's Plateau (in the East).

The main feature of the "Obcinele Bucovinei" relief is the parallelism of its summits and valleys on the NW – SE direction, similar to that of the geological structure. The average height is about 1000 – 1150 m in "Obcina Mestecănişului", 1 100 m in "Obcina Feredeului" and 870 m in "Obcina Mare" [1].

From the climatic point of view, the "Obcinele Bucovinei" territory is situated towards the North-Eastern extremity of the Central-European province, having a temperate-moderate-continental climate, which may bear some influences from the Eastern continental climate and from the Northern sub Baltic (boreal) one. According to its height, the territory can be included in the climatic area of the middle height mountains from the outskirts of this province, which is characterized by a temperate-boreal-mountain climate [1].

This area has been the object of both floral and phytocoenological or ecological studies. References to the investigated territory have been made either in studies having a general character and which regard Suceava County or the whole "Obcinele Bucovinei" territory [4, 13] or in studies that analyse more restricted areas [5, 9, 10, 12, 16].

RESULTS AND DISCUSSIONS

The fir and spruce fir mixed forests have been included by Gh. Coldea [6] in the *Hieracio rotundati – Abietetum* association, having as a starting point the analysis of some personal notes, as well as other relevés, included before in other associations [2, 3, 7, 14].

According to the reference material, the same author [6] cites the association in rather few places from the Eastern Carpathians (Rodnei Mountains, Stânişoarei Mountains) and from the Meridional Carpathians (Penteleu Mountains, Piatra Mare, Parâng, Retezat). The association has not been cited in the Eastern mountainside of the Eastern Carpathians, except for the two relevees from the Bicaz area (Neamț county) [14] used in the elaboration of the synthetic figure of the association.

Even though its area has been estimated as being rather restricted in Romania [6], we consider that the association is more frequent in the "Obcinele Bucovinei" territory. The phytocoenoses that are described in this paper are located in the superior drainage basin of River Moldova (Botuşel Valley, Orata rivulet valley, Delnița, Pojorâta) and in the drainage basin of River Moldovița (Săcrieş Hill, Lunguleț, Vulcan, Dragoşa). The average height at which the phytocoenological relevees have been made is about 800 m, with variations between 750 m and 950 m; the exposition is mainly Western and the slope can reach up to 45°–50°, but it is usually situated between 5° and 35°.

The tree stratum, in which the *Abies alba* and *Picea abies* species are often codominant, covers an area between 60–90% and in most of the relevees, it has been noticed the presence of an important regenerative stratum, dominated by the same species.

Most of the floral composition of the association is the same as that presented in the specific reference material [6]. It has been noticed a significant number of species characteristic to the *Vaccinio – Piceetea* class and its subordinated coenotaxons, a fact which confirms its coenotaxonomic framing (Table 1). On the other hand, the analysis of the floral composition points out an important number of species characteristics to *Querco – Fagetea* class. This can be explained by taking into account the altitudinal location of this association phytocoenosis (average height = 800 m), as well as the ecological features of the *Abies alba* species. Therefore, these phytocoenoses are practically situated in a transitional area from the beech and coniferous mixed forests, belonging to the *Querco – Fagetea* class, to the pure spruce fir forests, included in the *Vaccinio – Piceetea* class.

The dominant geographic element is Euro-Asian, but the circumpolar one has a significant proportion too, in correlation with the latitudinal and altitudinal location of the phytocoenoses, followed by the Central – European geographic element (Fig. 1a).

In regard to the bioform spectrum, this is dominated by the hemicryptophytes and the geophytes, while the phanerophytes can be found in a smaller number (Fig. 1b). Even though they are in a smaller number of species, the phanerophytes dominate the phytocoenoses analysed as a number of individuals and as their spread.

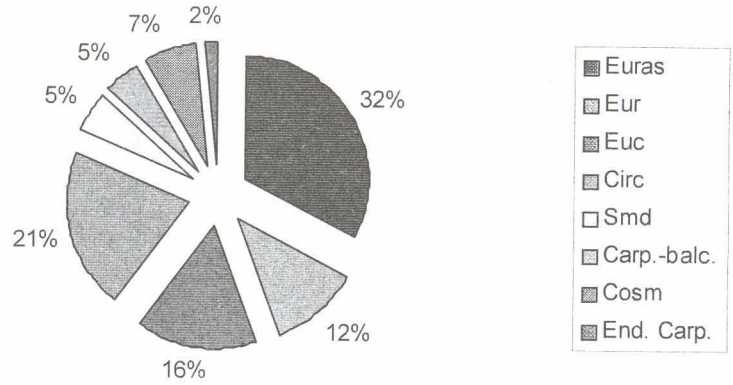

Fig. 1a – The geographic elements spectrum.
Euras – Euro-Asian, Eur – European, Euc – Central – European, Circ – circumpolar, Smd – Sub-Mediterranean, Carp.-balc. – Carpathian-Balkan, Cosm – ubiquist, End. Carp. – endemical for the Carpathian mountains.

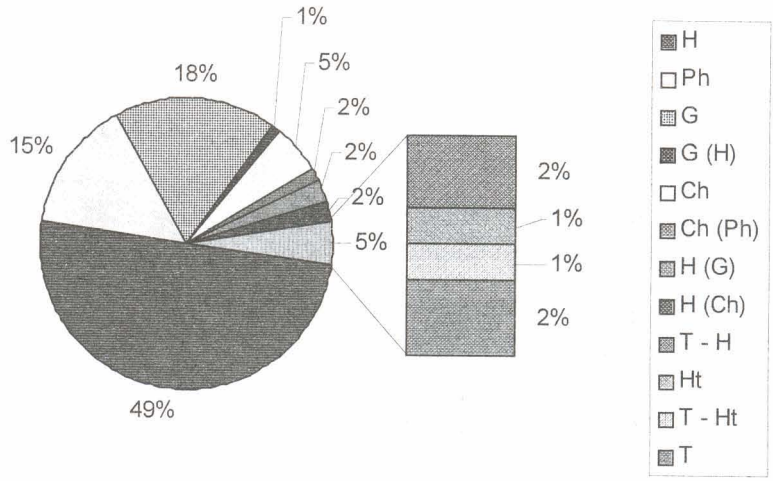

Fig. 1b – The bioform spectrum. H – hemicryptophytes, G – geophytes, Ph – phanerophytes, T – therophytes, Ch – chamephyte, Ht – hemitherophytes.

The analysis of the ecological indexes was based on the system adopted by Ellemberg H. [8]. Thus, in regard to the light, most of the phytocoenoses species live in half shadow and prefer an intermediate climate (characteristic to the submountain floor in Central Europe). In what concerns the continental aspect, according to this system, most of the species belong to the suboceanic type (found in all Central Europe). Most of the analysed phytocoenoses species prefer soils that have an average humidity, neutral soils with a relatively high content of nitrogen (Fig. 1c).

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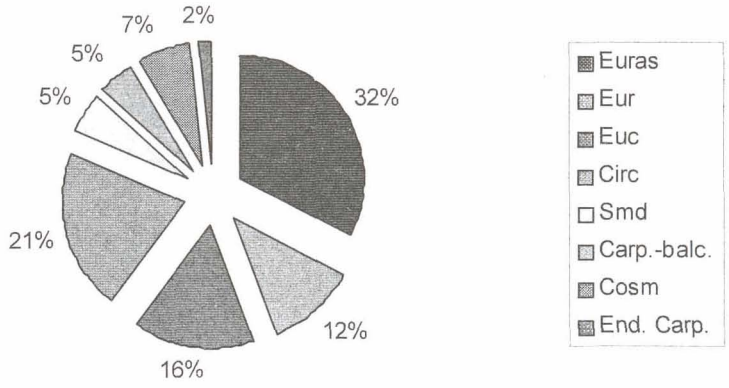

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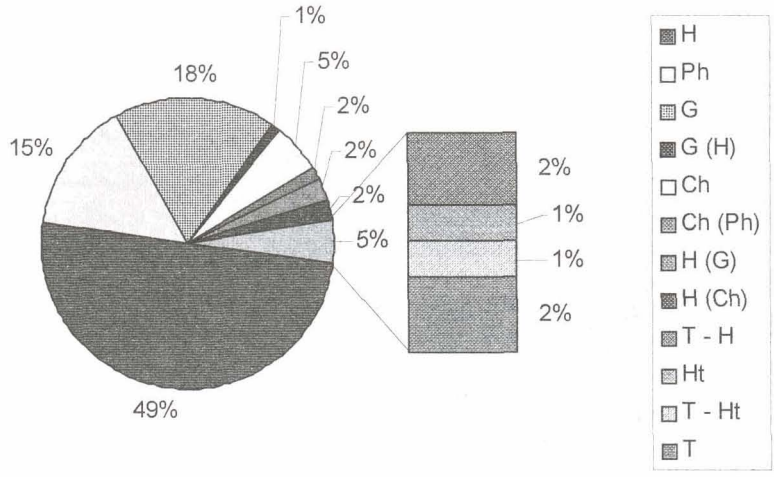

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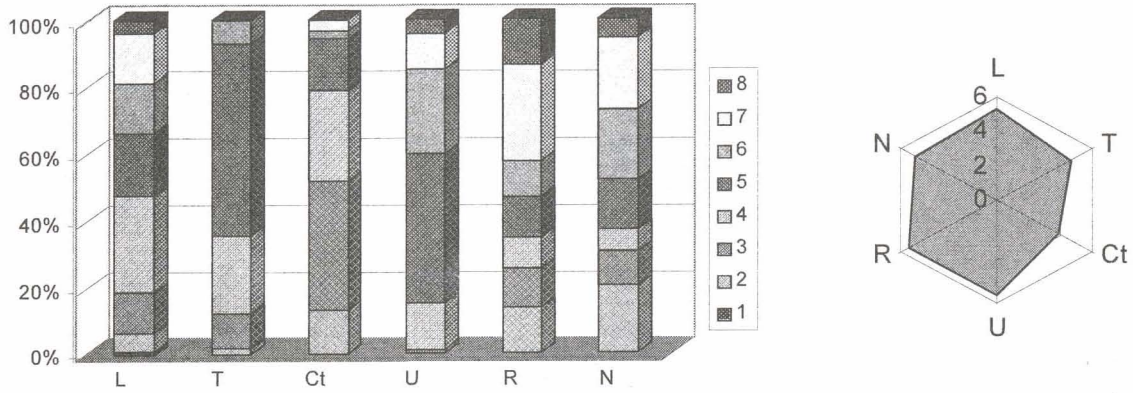

Fig. 1c – The ecological indexes spectrum, with percentage of species for each ecological index (in columns) and with medium values for the association (in radar) L – light, T- temperature, Ct – continentality, U – humidity, R – pH, N – soil trophicity, based on nitrogen contents.

Table 1

Cl. Vaccinio-Piceetea Br.-Bl. 1939

Ord. Athyrio – Piceetalia Hadač 1962

Al. Abieti – Piceion (Br. – Bl. in Br. – Bl. *et al.* 1939) Soó 1964

Ass. *Hieracio transsylvanici – Abietetum* (Borhidi 1971) Coldea 1991

Relevé no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Height (m.s.m.)	950	950	900	900	900	900	850	850	900	900	900	900	750	750	750	800	
Orientation	V-	V-	SE	SE	S	V	V	V	V	S	V	V	E	-	-	-	
Slope (degrees)	NV	NV	20	15	10	35	45	45-50	25-	5	15	15	10	-	-	-	
Covering of tree	35	15	85	70	80	70	80	70	30	80	90	85	90	60	85	80	
stratum (%)	80	75	-	1	1	1	-	-	80	-	-	-	1	-	1	2-3	K
Covering of shrub	-	10	5	15	10	50	-	1	1	-	3	5	1	40	-	-	
stratum (%)	50	85	20	40	50	20	60	70	-	2	10	10-15	10	10	30	40	
Regenerative stratum	70	20	1000	100	100	1000	1000	1000	3	1000	1000	1000	1000	100	100	100	
(%)	100	100	39	0	0	48	36	32	1000	18	22	23	43	0	0	0	
Covering of grassy	0	0		35	38				26					31	28	33	
stratum (%)	15	34															
Surface (m^2)																	
No. of species																	
Association's characteristics																	
Hieracium transsylvanicum	+	1	+	+	1	+	+	+	1	+	+	-	+	+	-	-	V
Abieti –Piceion																	
Abies alba	1	2	2	2	2	+	+	-	4	3	2	1	2	1	4	4	V
Abies alba (juv.)	+	5	1	+	+	+	+	+	-	-	-	-	-	+	+	-	IV
Picea abies	4	3	3	3	3	3	2	2	1	1	3	4	3	3	1	1	V
Picea abies (juv.)	3	4	1	2	1	3	+	+	-	-	-	-	-	+	+	-	III
Corylus avellana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	I
Corylus avellana (juv.)	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	I
Lonicera xylosteum	-	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	III
Brachypodium sylvaticum	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	I
Sanicula europaea	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	I
Athyrio-Piceetalia																	
Athyrium filix-femina	-	+	1	1	1	+	+	+	+	+	+	-	+	+	+	+	V

Daphne mezereum	-	-	+	+	+	+	-	-	-	-	-	-	+	+	-	-	II
Fragaria vesca	-	+	+	+	+	+	+	+	-	-	+	+	+	+	-	-	IV
Leucanthemum waldsteinii	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	I
Mercurialis perennis	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	II
Rosa pendulina	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	+	I
Streptopus amplexifolius	-	+	+	-	+	-	+	+	-	-	-	-	-	-	-	-	II
Valeriana tripteris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I
Piceion excelsae																		
Dryopteris dilatata	+	1	+	+	+	+	+	+	-	-	-	-	-	+	-	-	III
Gymnocarpium dryopteris	-	+	+	+	+	-	+	-	-	-	-	-	-	-	-	-	II
Lonicera nigra	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	I
Luzula sylvatica	+	+	+	-	-	-	-	-	-	-	+	+	+	-	-	-	II
Melampyrum sylvaticum	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	I
Dicrano-Pinion																		
Betula pendula	+	+	-	-	-	-	+	1	-	-	-	-	-	-	-	-	II
Betula pendula (juv.)	+	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	I
Goodyera repens	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	I
Veronica officinalis	-	-	-	+	+	+	-	+	+	+	-	-	-	-	-	-	II
Piceetalia excelsae																		
Calamagrostis villosa	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	2	I
Lonicera caerulea	-	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	III
Phegopteris connectilis	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	I
Ranunculus carpaticus	-	-	-	-	-	+	-	-	-	-	-	-	+	-	-	-	I
Vaccinio-Piceetea																		
Campanula abietina	-	+	-	+	+	-	-	-	-	-	-	-	-	-	-	-	I
Corallorhiza trifida	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	I
Homogyne alpina	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	I
Luzula luzulina	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	I
Lycopodium annotinum	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-	-	I
Lycopodium selago	-	+	+	-	-	+	+	+	-	-	-	-	-	-	-	-	II
Moneses uniflora	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	I
Orthilia secunda	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	I

Sorbus aucuparia	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	I
Sorbus aucuparia (juv.)	2	+	-	+	+	+	+	+	-	-	-	-	-	+	-	+	III
Vaccinium myrtillus	4	+	-	-	-	+	-	-	+	+	-	-	-	-	-	-	II
Vaccinium vitis-idaea	1	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	I
Vaccinio-Piceetea et Querco-Fagetea																	
Calamagrostis arundinacea	+	+	+	+	+	-	4	4	-	-	-	-	-	-	-	-	III
Circaea alpina	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-	II
Euphorbia carniolica	-	-	-	-	-	+	-	-	-	-	-	-	+	-	-	-	I
Luzula luzuloides	+	+	+	+	+	+	+	-	+	+	+	+	-	+	-	-	IV
Oxalis acetosella	1	1	1	2	2	+	+	+	+	+	+	+	1	1	-	1	V
Polygonatum verticillatum	+	+	+	+	+	+	+	-	-	-	+	-	+	-	-	-	III
Querco-Fagetea s.l.																	
Acer pseudoplatanus	-	+	+	-	-	+	+	-	-	-	-	-	-	-	-	+	II
Acer pseudoplatanus (juv.)	-	+	+	+	+	+	+	+	-	-	-	-	+	-	+	-	III
Actaea spicata	-	-	+	-	-	+	+	-	-	-	-	-	+	-	-	+	II
Campanula rachelium	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	I
Carex sylvatica	-	-	-	-	-	-	-	-	+	+	-	+	+	-	-	+	II
Dentaria glandulosa	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	I
Dryopteris arthusiana	-	-	-	-	+	-	+	+	-	-	-	-	-	+	-	-	II
Dryopteris filix-mas	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	V
Epilobium montanum	-	-	+	+	-	-	+	-	-	-	-	-	-	-	-	-	I
Equisetum sylvaticum	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	I
Euphorbia mygdaloides	-	-	+	-	-	-	-	-	-	-	-	+	+	+	+	+	II
Fagus sylvatica	-	+	+	+	+	+	+	-	+	+	+	+	1	-	+	+	V
Fagus sylvatica (juv.)	-	+	-	+	+	+	+	+	-	-	-	-	-	-	-	-	II
Festuca altissima	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	I
Galium odoratum	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	I
Galium schultesii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	+	I
Lamium galeobdolon	-	-	+	+	-	+	+	+	-	-	-	-	-	+	-	-	II
Lathyrus venetus	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	I
Maianthemum bifolium	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	V
Moehringia trinervia	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	I
Paris quadrifolia	-	-	+	-	+	+	-	-	-	-	-	-	+	-	-	-	II
Pulmonaria officinalis	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	I
Pulmonaria rubra	-	-	-	-	-	+	+	+	-	-	-	-	+	-	1	-	II

Ribes uva-crispa	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	I
Scrophularia nodosa	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	I
Spiraea salicifolia	-	+	+	+	+	+	-	+	-	-	-	-	-	-	-	-	II
Stellaria holostea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	I
Symphytum cordatum	-	-	+	+	+	-	-	-	-	-	+	+	-	-	-	+	II
Viburnum opulus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	I
Querco-Fagetea et Mulgedio-Aconietea																	
Geum montanum	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	I
Hypericum maculatum	-	-	-	-	-	-	-	-	-	-	+	-	+	-	+	+	II
Milium effususm	-	+	-	-	+	-	-	-	-	-	-	-	+	-	-	-	I
Myosotis sylvatica	-	-	-	-	-	-	-	-	-	-	+	-	+	-	-	-	I
Ranunculus repens	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	I
Senecio ovatus	-	+	-	+	+	+	+	+	+	+	-	-	+	-	-	+	IV
Stellaria nemorum	-	+	+	-	-	-	-	-	-	-	-	-	+	-	-	-	I
Thalictrum aquilegifolium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	I
Veronica urticifolia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I
Querco-Fagetea et Galio-Urticetea																	
Aegopodium podagraria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	I
Chaerophyllum hirsutum	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	I
Circaea lutetiana	-	-	+	+	+	1	-	-	-	-	+	-	-	-	-	-	II
Cirsium erysithales	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	I
Festuca gigantea	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	I
Geranium phaeum	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	I
Geranium obertianum	-	+	+	+	+	-	+	-	-	-	+	+	+	-	-	-	III
Glechoma hederacea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	I
Impatiens noli-tangere	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	I
Lapsana communis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	I
Mycelis muralis	-	+	+	+	+	+	+	+	-	-	-	+	+	+	+	-	IV
Poa nemoralis	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	I
Salvia glutinosa	-	-	-	-	-	-	-	-	+	-	-	+	+	+	1	+	II
Telekia speciosa	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	I
Urtica dioica	-	-	+	+	-	-	-	-	-	-	-	+	-	-	-	-	I
Viola reichenbachiana	-	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-	I
Querco-Fagetea et Trifolio-Geranietea																	
Astragalus lycyphyllos	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	I
Campanula persicifolia	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	I

Campanula rapunculoides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I
Campanula rotundifolia	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	I
Pulmonaria mollis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	I
Veronica chamaedrys	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	I
Vicia sepium	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	I
Epilobietea angustifoliae																	
Galeopsis speciosa	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	I
Hypericum hirsutum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I
Populus tremula	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	I
Rubus hirtus	-	-	-	-	+	-	-	-	+	+	+	+	+	-	-	-	II
Rubus idaeus	+	+	+	-	+	-	+	+	-	-	-	-	-	+	+	+	III
Salix capraea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I
Companions																	
Ajuga reptans	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	I
Carex remota	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	I
Cystopteris fragilis	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	I
Cystopteris montana	-	-	-	-	-	-	-	-	+	-	+	+	+	+	-	-	II
Epipactis purpurata	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	I
Fragaria viridis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	I
Gentiana asclepiadea	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-	I
Gymnocarpium robertianum	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	I
Hypericum perforatum	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	I
Lycopodium clavatum	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	I
Platanthera bifolia	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	I
Polypodium vulgare	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	I
Prunella vulgaris	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	I
Pteridium aquilinum	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	I
Ranunculus acris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	I
Solidago virgaurea	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	I
Spiraea chamaedryfolia	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	+	I
Tussilago farfara	-	-	-	-	-	+	+	+	-	-	+	-	-	-	-	-	II
Veronica montana	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	I

Place of the relevés: 1, 2 – Botuşel Valley; 3, 4, 5 – Orata rivulet valley; 6 – Delniţa; 7, 8 – Pojorâta; 9, 10, 11, 12 – Săcrieş Hill; 13 – Lungulet; 14 – Vulcan; 15, 16 – Dragoşa

CONCLUSIONS

In regard to the coenotaxonomic framing of the association in the *Vaccinio – Piceetea* class, we consider that it would be more accurate to include it into the *Abieti – Piceion* alliance of the *Athyrio – Piceetalia* order, characteristic for the inferior mountain areas [11], than to include it into the *Piceion excelsae* alliance, *Piceetalia excelsae* order [6]. This proposal is based on the comparative analysis of the species which characterize both the *Abieti – Piceion* alliance (*Abies alba, Picea abies, Sanicula europaea, Corylus avellana, Lonicera xylosteum, Brachypodium sylvaticum*) and the *Athyrio – Piceetalia* order (*Athyrium filix-femina, Streptopus amplexifolius, Leucanthemum waldsteinii, Daphne mezereum, Mercurialis perennis, Fragaria vesca, Valeriana tripteris, Rosa pendulina*), as well as that of the species which characterize the *Piceion excelsae* alliance (*Dryopteris dilatata, Luzula sylvatica, Gymnocarpium dryopteris, Melampyrum sylvaticum*) and the *Piceetalia excelsae* order (*Calamagrostis vilosa, Lonicera caerulea, Ranunculus carpaticus, Phegopteris conectilis*). This analysis shows the significant number of characteristic species of the *Abieti – Piceion* alliance and of the *Athyrio – Piceetalia* order in comparison to that of the *Piceion excelsae* alliance and *Piceetalia excelsae* order.

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