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11. Subalpine meadows - **Mulgedio-Aconitetea**

Prodromus

Mulgedio-Aconitetea HADAC & KLIKA in KLIKA & HADAC 1944

Calamagrostietalia villosae PAWLOWSKI *et al.* 1928

Calamagrostion arundinaceae OBERD 1950

Betonici macranthae-Calamagrostietum arundinaceae ass.nov.

B.m.-C.a. typicum subass.nov

B.m.-C.a. veronicetosum peduncularis subass.nov.

Rumicetalia alpini MUCINA in KARNER & MUCINA 1993

Rumicion alpini RUBEL ex KLIKA in KLIKA & HADAC 1944

Anthrisko sylvestris-Rumicetum alpini ass.nov.

A.s.-R.a. typicum subass.nov.

A.s.-R.a. senecionetosum platyphylloides subass.nov.

Cephalario giganteae-Ligusticetum alani ass.nov.

Poetum longifoliae ass.nov.

Subalpine meadows and tall herbaceous communities are well represented in the Teberda Reserve. Such diagnostic species of the class as *Millium effusum*, *Geranium sylvaticum*, *Campanula latifolia*, *Rumex alpestris* are common in the Caucasian communities (BUSLIK 1990, KARNER & MUCINA 1993). We consider the communities within two orders - *Calamagrostietalia villosae* and *Rumicetalia alpini* (Table. 11.1.)

11.1. *Betonici macranthae-Calamagrostietum arundinaceae*

The association comprises closed subalpine meadow with *Calamagrostis arundinacea* as one of the common dominants. Due to high frequency of this species and presence of some other diagnostic species (*Anthoxanthum odoratum*, *Silene vulgaris*, *Anemone narcissiflora*, *Deschampsia flexuosa* etc.), we consider the associations within *Calamagrostietalia villosae* and *Calamagrostion arundinaceae*

Floristic features

The set of diagnostic species includes many that are frequent in the subalpine zone (*Betonica macrantha*, *Bupleurum falcatum*, *Anthemis macroglossa*, *Trifolium canescens*, *Thesium alpinum*, *Tragopogon*

reticulatus). Some of the species are shared with *Viola altaicae-Festucetum varia* (*Leontodon hispidus*, *Myosotis alpestris*, *Festuca varia*, *Campanula collina*, *Polygala alpicola*), but these species distinguish the association from the communities of *Rumicion alpini*. (Tables 11.1., 11.2.). We subdivide the association into two subassociations.

B.m.-C.a. typicum includes communities with high frequency of *Pulsatilla aurea*, *Pedicularis condensata*, *Ranunculus oreophilus*, *Pyrethrum coccineum* etc. (Table 11.2.). They tend to occupy the upper part of the subalpine zone (2250-2650 m a.s.l., mean 2460 m). Typus, or nomenclature type, is releve No. 68/94).

B.m.-C.a. veronicetosum peduncularis is typical for the lower part of the subalpine zone within the elevation range 1950-2300 m a.s.l. (mean 2120 m). A considerable diagnostic set (*Veronica peduncularis*, *Polygonum alpinum*, *Seseli libanotis*, *Digitalis ciliata*, *Macrotomia echioides* etc.) distinguishes this syntaxon from the previous one. Typus, or nomenclature type, is releve No. 3/88.

In general, the communities of the association are floristically very rich. We registered 183 vascular plant species and 15 bryophytes in 20 relevés (Table 11.2.). The average species numbers per releve were 37 and 1 for vascular plants and bryophytes correspondingly. Lichens were completely absent. Ratio vascular plants / (bryophytes + lichens) is high (12.2). The role of bryophytes is also very low in term of plant cover. Vascular plant cover is high (50-100%, mean 84%).

Ecological features

The communities are typical of the subalpine zone within the altitude range of 1950 to 2650 m. They occupy mainly steep slopes (7°-35°, mean 26°) of near southern exposure. Stone and bare soil cover is low. The communities are rather productive, but due to their position in the landscape they may sometimes lack sufficient water supply. The communities can easily degrade if overgrazed. Due to their rich floristic composition, which includes a number of attractive wildflowers (*Lilium monadelphum*, *Pulsatilla aurea*, *Pyrethrum coccineum*, *Aetheopappus vvedenskii*), the communities must be placed under especially strong protection in the reserve area.

Table 11.1.
Diagnostic table of *Mulgedio-Aconitetea*

	1	2	3	4	5	6
<i>D.sp. B.m.-C.a. typicum</i>						
<i>Pulsatilla aurea</i>	IV	-	-	-	-	-
<i>Pedicularis condensata</i>	IV	-	-	-	I	-
<i>Ranunculus oreophilus</i>	IV	I	-	-	-	-
<i>Gentiana biebersteinii</i>	III	-	-	-	-	-
<i>Pyrethrum coccineum</i>	III	-	-	-	-	-
<i>Erigeron caucasicus</i>	III	-	-	-	-	-
<i>Daphne glomerata</i>	III	I	-	I	-	-
<i>Pedicularis comosa</i>	II	-	-	-	-	-
<i>Senecio caucasicus</i>	II	-	-	-	-	-
<i>Aetheopappus vvedenskii</i>	II	-	-	-	-	-
<i>Helictotrichon versicolor</i>	II	-	-	-	-	-
<i>D.sp. B.m.-C.a. veronicetosum peduncularis</i>						
<i>Veronica peduncularis</i>	-	V	-	-	-	I
<i>Polygonum alpinum</i>	-	V	-	-	I	-
<i>Seseli libanotis</i>	-	IV	-	-	-	-
<i>Digitalis ciliata</i>	I	IV	-	-	I	-
<i>Macrotomia echioides</i>	-	III	-	-	-	-
<i>Clinopodium vulgare</i>	-	III	-	-	-	-
<i>Cirsium chlorocomos</i>	-	III	-	-	-	-
<i>Asyneuma campanuloides</i>	-	III	-	-	I	-
<i>Stachys germanica</i>	I	III	-	-	-	-
<i>Pimpinella rhodantha</i>	I	III	-	-	II	-
<i>Geranium platypetalum</i>	-	II	-	-	-	-
<i>Heracleum freynianum</i>	-	II	-	-	-	-
<i>Pastinaca pimpinellifolia</i>	-	II	-	-	-	-
<i>Origanum vulgare</i>	-	II	-	-	-	-
<i>Lilium monadelphum</i>	-	II	-	-	I	-
<i>D.sp. Betonici macranthae-Calamagrostietum arundinaceae</i>						
<i>Betonica macrantha</i>	V	V	-	-	IV	I
<i>Bupleurum falcatum</i>	IV	IV	-	-	-	-
<i>Leontodon hispidus</i>	IV	II	-	-	-	-
<i>Myosotis alpestris</i>	IV	III	-	-	I	I
<i>Campanula collina</i>	V	III	-	-	-	-
<i>Anthemis macroglossa</i>	III	III	-	-	-	-
<i>Hedysarum caucasicum</i>	IV	II	-	-	I	-
<i>Festuca varia</i>	IV	II	-	-	-	-
<i>Trifolium canescens</i>	IV	II	-	-	-	-
<i>Geranium renardii</i>	III	II	-	-	-	-
<i>Thesium alpinum</i>	III	II	-	-	-	-
<i>Tragopogon reticulatus</i>	III	II	-	-	-	-
<i>Polygala alpicola</i>	III	II	-	-	-	-
<i>Rhinanthus minor</i>	II	III	-	-	-	-
<i>Primula veris</i>	II	II	-	-	-	-
<i>Festuca djimilensis</i>	II	IV	-	I	II	-
<i>Gentiana septemfida</i>	V	II	-	-	I	I

Table 11.1. (continued)

	1	2	3	4	5	6
<i>D.sp. Calamagrostion arundinaceae, Calamagrostietalia villosae</i>						
<i>Calamagrostis arundinacea</i>	IV	V	-	-	III	-
<i>Anthoxanthum odoratum</i>	V	-	-	-	-	I
<i>Silene vulgaris</i>	IV	IV	I	I	III	-
<i>Anemone narcissiflora</i>	III	-	-	-	-	-
<i>Deschampsia flexuosa</i>	III	-	-	-	-	-
<i>Hieracium prenanthoides</i> gr.	II	I	-	-	I	-
<i>Solidago virgaurea</i>	I	-	-	-	-	-
<i>D.sp. A.s.-R.a. typicum</i>						
<i>Galeopsis bifida</i>	-	-	III	-	I	II
<i>Symphytum asperum</i>	-	-	III	I	-	I
<i>D.sp. A.s.-R.a. senecionetosum platyphylloides</i>						
<i>Senecio platyphylloides</i>	-	-	-	V	I	-
<i>D.sp. Anthrisco sylvestris-Rumicetum alpini</i>						
<i>Urtica dioica</i>	-	-	V	II	I	III
<i>Anthriscus sylvestris</i>	-	I	III	IV	II	II
<i>D.sp. Cephalario giganteae-Ligusticetum alani</i>						
<i>Ligusticum alatum</i>	-	-	-	-	IV	-
<i>Aconitum orientale</i>	-	-	II	II	IV	I
<i>Vicia cracca</i>	I	II	I	-	IV	II
<i>Dactylis glomerata</i>	-	II	II	-	IV	I
<i>Cephalaria gigantea</i>	II	V	I	-	V	-
<i>Lapsana communis</i>	-	I	-	I	II	-
<i>D.sp. Poetum longifoliae</i>						
<i>Alopecurus pratensis</i>	-	-	I	-	I	IV
<i>Poa longifolia</i>	III	III	I	-	III	V
<i>Senecio subflocosus</i>	-	-	-	-	-	II
<i>D.sp. Rumicion alpini, Rumicetalia alpini</i>						
<i>Rumex alpinus</i>	-	I	V	V	II	II
<i>Lamium album</i>	-	I	II	-	III	II
<i>Veratrum album</i>	I	-	I	I	III	-
<i>Heracleum asperum</i>	-	-	I	III	I	III
<i>Veronica filiformis</i>	-	I	I	II	II	II
<i>Cerastium davuricum</i>	-	-	I	-	I	II
<i>D.sp. Mulgedio-Aconitetea</i>						
<i>Millium effusum</i>	-	-	V	V	V	II
<i>Geranium sylvaticum</i>	II	IV	I	III	V	IV
<i>Rumex alpestris</i>	III	III	-	I	V	-
<i>Campanula latifolia</i>	-	I	I	II	III	-
<i>Aconitum nasutum</i>	I	I	-	-	I	-
<i>Achillea millefolium</i>	-	III	-	-	I	IV
<i>Athyrium distentifolium</i>	-	-	-	I	-	-
<i>Astrantia maxima</i>	IV	V	-	I	IV	I

Syntaxa:

1 - *Betonici macranthae-Calamagrostietum arundinaceae typicum*, 2 - *B.m.-C.a. veronicetosum peduncularis*, 3 - *Anthrisco sylvestris-Rumicetum alpini typicum*, 4 - *A.s.-R.a. senecionetosum platyphylloides*, 5 - *Cephalario giganteae-Ligusticetum alani*, 6 - *Poetum longifoliae*

Table 11.2.

Betonici macranthae-Calamagrostietum arundinaceae

Releve No.	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0		
	69	49	68	14	12	13	86	67	9	65	57	3	48	94	7	5	6	2	25	
Year	94	93	94	88	88	95	94	95	84	95	93	88	93	94	93	93	93	93	93	94
Altitude (* 10)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
	50	50	50	30	30	50	65	60	40	55	20	20	30	20	05	05	05	10	95	
Steepness	30	30	30	35	35	10	30	30	20	25	30	35	25	20	30	30	30	7	10	
Exposition	se	se	sw	sw	sw	sw	sw	sw	ne	ne	se	sw	e	se	sw	sw	se	se	se	
Vascular plant cover	50	80	80	90	95	85	80	90	95	95	99	90	90	70	65	75	90	85	95	
Bryophyte cover	0	0	0	+	5	0	+	+	10	0	0	0	0	0	0	0	0	+	0	
Lichen cover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Stone cover	0	5	0	+	+	0	0	+	0	0	+	+	+	15	0	1	0	+	+	
Bare soil	+	0	30	0	0	15	5	5	0	5	0	0	0	2	0	0	0	0	0	1
<i>D.sp. B.m.-C.a. typicum</i>																				
<i>Pulsatilla aurea</i>				1	1	1	1	1	2	1										
<i>Pedicularis condensata</i>	+		+	1	1	+		+	1											
<i>Ranunculus oreophilus</i>	1	+	1	1	1		1	+	1		+									
<i>Gentiana biebersteinii</i>	+	+			+		+		+											
<i>Pyrethrum coccineum</i>	+	+	+	1	1					+										
<i>Erigeron caucasicus</i>	+		+	+			+	+												
<i>Daphne glomerata</i>		+	+	+		+	+	+						+						
<i>Pedicularis comosa</i>	+	+		1			+													
<i>Senecio caucasicus</i>							+	2		1										
<i>Aetheopappus vvedenskii</i>			+	+	+		2													
<i>Helictotrichon versicolor</i>	+	+					+													
<i>D.sp. B.m.-C.a. veronicetosum peduncularis</i>																				
<i>Veronica peduncularis</i>													+	+	+	+	+	+	+	+
<i>Polygonum alpinum</i>													+	+	1	+	+	1	+	+
<i>Seseli libanotis</i>													+	1	1	+	+	1		
<i>Digitalis ciliata</i>			1										1	1	+	+	+	+		
<i>Macrotomia echioides</i>														+	+	1		1		
<i>Clinopodium vulgare</i>														+	+				+	
<i>Cirsium chlorocomos</i>														+		1		1		+
<i>Asyneuma campanuloides</i>														+		+	+	+		
<i>Stachys germanica</i>							+							+	1			+		1
<i>Pimpinella rhodantha</i>			+															1	+	+
<i>Geranium platypetalum</i>																2	2	1		
<i>Heracleum freynianum</i>															+			r		
<i>Pastinaca pimpinellifolia</i>																+	+			
<i>Origanum vulgare</i>																+		+		
<i>Lilium monadelphum</i>																+	+			
<i>D.sp. Betonici macranthae-Calamagrostietum arundinaceae</i>																				
<i>Betonica macrantha</i>	1	1	+	2	2	+	2	2	1	+	1	1	1	1	1	2	1	1	2	
<i>Bupleurum falcatum</i>	1	1	+	1	1	1	+		1		1	1	2	1	r	1	+			
<i>Leontodon hispidus</i>	1	1	1	+	1	+		+	1			1	+	+						
<i>Myosotis alpestris</i>	+		+	+	+	+	+	+				+			r		+	+	+	
<i>Campanula collina</i>	+	1	1	1	1	+	+	+	+		+	+	+	+						
<i>Anthemis macroglossa</i>	+	1	+			+	1		1		+	+	1	+						+
<i>Hedysarum caucasicum</i>		1	3	2	1		2	1	2	1	1	2			+					
<i>Festuca varia</i>	2	2	2	2			2	1	2		1			1						
<i>Trifolium canescens</i>	1	1	+	1	1	+			+					1						+

Table 11.2. (continued)

Releve No.	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
	69	49	68	14	12	13	86	67	9	65	57	3	48	94	7	5	6	2	25
Year	94	93	94	88	88	95	94	95	84	95	93	88	93	94	93	93	93	93	94
<i>Geranium renardii</i>	2	2	2	2	1		1				1	1	2						
<i>Thesium alpinum</i>	+	r	+				+		+		+	1	+						
<i>Tragopogon reticulatus</i>	1		+		+	+	+				+								+
<i>Polygala alpicola</i>		+	+	+		+			+		+			+					
<i>Rhinanthus minor</i>			+	+	+						+	+	+						+
<i>Primula veris</i>							+	1		+					+	+			
<i>Festuca djimilensis</i>				2	3	2				2	2	2	3		1	2	+		
<i>Gentiana septemfida</i>	+	+		+	+	+	1	+	+	+							+	+	
D.sp. <i>Calamagrostion arundinaceae</i> , <i>Calamagrostietalia villosae</i>																			
<i>Calamagrostis arundinacea</i>	3	3	2	1		2	3		1	1	3	3	1	4	2	2	1		2
<i>Anthoxanthum odoratum</i>	+	+	1		+	1	+	+	1	+									
<i>Silene vulgaris</i>	1		1		1	+		+	1	+	1	1			+		+	+	1
<i>Anemone narcissiflora</i>						2	+	2	1	3									
<i>Deschampsia flexuosa</i>	1	1		1			1		1										
<i>Hieracium prenanthoides</i>	+		+		1	+													+
<i>Solidago virgaurea</i>			+						1										
D.sp. <i>Mulgedio-Aconitetea</i>																			
<i>Geranium sylvaticum</i>					1	1		1		1	+	1			2	1		2	1
<i>Rumex alpestris</i>	+		+				+	+	1	+	1		+					1	1
<i>Campanula latifolia</i>																			+
<i>Aconitum nasutum</i>								+									+		
<i>Achillea millefolium</i>																+	+	1	+
<i>Astrantia maxima</i>		+		2	1	+	1	1	1	1	+	1	1	+	+	1		1	+
Other species																			
<i>Agrostis vinealis</i>					1		+	+	+				1	+				+	+
<i>Alchemilla vulgaris aggr.</i>					+	+	1				+			1	+			1	+
<i>Botrychium lunaria</i>		r			+														+
<i>Bromopsis variegata</i>	1	1									1				+	+	2		+
<i>Carduus adpressus</i>				+							+	1			+	+	+	r	+
<i>Carex atrata</i>			+				+	+											
<i>Carex umbrosa</i>		+													r	+	+		
<i>Cephalaria gigantea</i>		1	+		1	+					1	1	1		1	2	+	1	1
<i>Chaerophyllum aureum</i>											+				+	1	+	+	+
<i>Cicerbita racemosa</i>													+		+	+			
<i>Cirsium munitum</i>			+	1	1	+		+											
<i>Cruciata laevipes</i>	+	+			1	+	+			+	+		+	+	+	+	+	+	+
<i>Dactylis glomerata</i>											1							2	+
<i>Dianthus cretaceus</i>			+	+							+								
<i>Euphrasia ossica</i>		+			+				+										
<i>Festuca brunnescens</i>			+				+	+											+
<i>Fritillaria lutea</i>	+								+						+			+	
<i>Galium verum</i>	+												+	+				+	
<i>Gentiana verna</i>	+						+	+											
<i>Geranium gymnocaulon</i>								1	2	+									
<i>Hieracium macrolepis</i>	+	+	+																
<i>Luzula multiflora</i>		+						+	+										
<i>Nardus stricta</i>	+	+	1						1										
<i>Poa longifolia</i>						+	+	+	+	+			1			+	2	1	1

Table 11.2. (continued)

Releve No.	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
	69	49	68	14	12	13	86	67	9	65	57	3	48	94	7	5	6	2	25
Year	94	93	94	88	88	95	94	95	84	95	93	88	93	94	93	93	93	93	94
<i>Polygonum bistorta</i>	+	+	+	1	1	1												1	2
<i>Primula ruprechtii</i>				1	+				+										
<i>Scabiosa caucasica</i>	+	2	1								1								
<i>Senecio kolenatianus</i>				+				+				+							
<i>Thalictrum foetidum</i>														+	+	+			
<i>Trifolium ambiguum</i>	1		1		1				1		+	1							+
<i>Trifolium medium</i>														1	1	1			
<i>Trisetum flavescens</i>					+				+		+	+			+			+	+
<i>Vaccinium myrtillus</i>							+	1					+						
<i>Valeriana cardamines</i>														+	+	+			
<i>Veronica gentianoides</i>	+	+	1	1	+	1	+	1	+									+	
<i>Vicia cracca</i>		+											1	1					+

Sporadic species (number of releve in parenthesis, abundance are shown after ":", unless it is not "+", Braun-Blanquet scale)

Achyrophorus maculatus (3/83:1), *Alchemilla caucasica* (69/94, 49/93), *Alyssum murale* (69/94), *Anthemis marshalliana* (69/94, 68/94), *Anthriscus sylvestris* (6/93), *Anthyllis vulneraria* (49/93), *Arenaria rotundifolia* (67/95, 2/93), *Astragalus oreades* (68/94, 194/94), *Astragalus* sp. (57/93, 6/93), *Bartramia ithyphylla* (14/88), *Brachythecium erythrorhizon* (186/94, 2/93), *Brachythecium reflexum* (67/95), *Brachythecium velutinum* (14/88, 12/88:1), *Briza media* (49/93), *Bromopsis riparia* (25/94), *Bryum capillare* (12/88:1), *Carex brevicollis* (25/94), *Carex caryophylla* (69/94, 68/94), *Carex caucasica* (48/93:1), *Carex mingrelica* (13/95, 5/93), *Carex pallescens* (2/93), *Carex panicea* (194/94), *Carex sempervirens* (186/94), *Carlina vulgaris* (3/88), *Carum meifolium* (68/94, 9/84:1), *Centaurea cheiranthifolia* (69/94:1, 49/93), *Centaurea leucophylla* (3/88), *Centaurea nigrifimbria* (13/95), *Centaurea salicifolia* (49/93, 2/93), *Centaurea salviifolia* (194/94), *Cerastium arvense* (69/94, 6/93), *Cirsium obvallatum* (7/93, 5/93:1), *Coeloglossum viride* (68/94), *Coronilla orientalis* (186/94), *Cotoneaster integerimus* (194/94), *Crocus reticulatus* (13/95), *Draba hispida* (67/95), *Draba sibirica* (49/93, 6/93), *Dracocephalum ruyschiana* (3/88:1), *Euphorbia iberica* (25/94), *Euphorbia macroceras* (194/94), *Eurhynchium pulchellum* (186/94), *Festuca ovina* (25/94), *Gymnadenia conopsea* (49/93), *Helianthemum nummularium* (49/93:1, 3/88:1), *Hypericum linarioides* (69/94), *Inula orientalis* (9/84:1), *Juniperus communis* (49/93, 3/88), *Kemulariella caucasica* (9/84:1, 65/95), *Lamium album* (2/93), *Lapsana communis* (25/94), *Lathyrus cyaneus* (25/94), *Lathyrus pratensis* (14/88:1), *Lophocolea minor* (14/88), *Lotus comiculatus* (49/93:1, 3/88:1), *Minuartia recurva* (68/94), *Nonea intermedia* (5/93:1), *Orobanche grossheimii* (14/88), *Orobanche purpurea* (2/93), *Orobanche* sp. (57/93), *Pedicularis wilhelmsiana* (2/93), *Phleum alpinum* (9/84), *Phleum phleoides* (49/93), *Plagiomnium affine* (9/84:1), *Plantago atrata* (69/94, 68/94), *Poa palustris* (5/93:1, 6/93:1), *Poa pratensis* (7/93), *Polygala anatolica* (69/94), *Polygonatum verticillatum* (3/88), *Polytrichum juniperinum* (186/94), *Populus tremula* (3/88), *Primula meyeri* (67/95:1), *Pseudoleskea incurvata* (67/95), *Rhodobryum roseum* (14/88), *Rhododendron caucasicum* (9/84:1), *Rhynchocorys elephas* (13/95), *Rosa* sp. (3/88, 7/93), *Rosa villosa* (194/94), *Rumex alpinus* (48/93), *Scabiosa ochroleuca* (69/94, 194/94), *Sedum spurium* (194/94), *Sempervivum caucasicum* (69/94, 194/94), *Senecio aurantiacus* (67/95), *Seseli alpinum* (49/93, 6/93), *Silene italica* (194/94), *Taraxacum confusum* (69/94), *Taraxacum stevenii* (49/93), *Tayloria serrata* (9/84:1), *Thalictrum minus* (25/94:1), *Thymus nummularius* (14/88, 194/94), *Tortella tortuosa* (14/88), *Tortula subulata* (12/88), *Traunsteinera sphaerica* (68/94, 3/88), *Trifolium alpestre* (2/93), *Trifolium hybridum* (49/93), *Trifolium pratense* (12/88:1), *Trollius ranunculinus* (12/88), *Valeriana alpestris* (7/93, 5/93:1), *Veratrum album* (65/95), *Verbascum pyramidatum* (194/94), *Veronica chamaedrys* (6/93, 2/93), *Veronica filiformis* (2/93), *Vicia cassubica* (2/93), *Vicia sepium* (2/93), *Viola canina* (6/93:r), *Weissia controversa* (14/88, 12/88).

Date (day.month), size (sq.m) and location of the releves.

69/94 - 16.07, 25, Bol.Khatipara; 49/93 - 10.08, 16, M.Khatipara; 68/94 - 16.08, 25, Bol.Khatipara; 14/88 - 16.08, 64, Musat-Cheri; 12/88 - 16.08, 64, Musat-Cheri; 13/95 - 03.07, 25, Alibek; 186/94 - 09.09, 25, Kichi-Murudzhu; 67/95 - 13.07, 25, Baduk; 9/84 - 26.08, 25, M.Khatipara; 65/95 - 13.07, 25, Baduk (A.Egorov); 57/93 - 16.08, 16, Baduk; 3/88 - 30.07, 25, Ullu-Murudzhu; 48/93 - 10.08, 16, M.Khatipara; 194/94 - 10.09, 25, Kichi-Murudzhu; 7/93 - 08.07, 25, Ullu-Murudzhu (N.Drenova); 5/93 - 07.07, 25, Ullu-Murudzhu (E.Kuraeva); 6/93 - 07.07, 25, Ullu-Murudzhu (D.Sukhova); 2/93 - 04.07, 25, M.Khatipara (A.Egorov); 25/94 - 09.07, 25, Dombay-Ulgen (A.Egorov).

11.2. *Rumicetalia alpini*, *Rumicion alpini*

These syntaxa comprise subalpine tall herbaceous communities. Their development is often connected with existing or recent anthropogenic influence. We propose three new associations within the alliance.

11.2.1. *Anthriscus sylvestris*-*Rumicetum alpini*

Floristic features

The ruderal tall herbaceous communities form this association. *Rumex alpinus* is the main dominant, but diagnostic species (*Urtica dioica*, *Anthriscus sylvestris*) are also very common components of the communities. We distinguish two subassociations within the syntaxon (Table 11.3.).

A.s.-R.a. typicum (Typus, or nomenclature type, No. 56/93) combines communities with high frequency of *Urtica dioica*, *Galeopsis bifida*, *Symphytum asperum*.

A.s.-R.a. senecionetosum platyphylloidis (Typus, or nomenclature type, No. 31/95) includes communities with *Senecio platyphylloides*.

As a whole this community has low floristic richness. We registered only 69 vascular plant species and 3 bryophytes in 20 relevés. Lichens are completely absent and the role of bryophytes is negligible. Mean floristic richness was 10 species per releve (Table 11.3.). Tall (1.5-2.5 m) and dense (80-100%, mean 95%) vascular plant cover prevents establishment of other plants in this community.

Ecological features

The community occupies gentle (2°-20°, mean 6°) slopes of various exposures. It occurs at the sites of former livestock enclosures and sheepfolds, where plant cover has been drastically changed and soil has been manured. A few tall and highly productive species have established at such sites, since grazing was stopped. The community is very stable due to the high competitive ability of the dominants.

The community is typical of the subalpine zone in the altitude range of 1850 to 2600 m (mean 2300 m). It occupies the lower portions of slopes, valley bottoms and depressions on slopes with significant winter snowpack

accumulation. Stable water supply from the upper part of slopes is an important factor increasing its productivity.

Wild ungulates use the community as a pasture very seldom, if at all. Among large mammals only bear often feed on some plants (*Millium effusum*, *Heracleum asperum*, *Anthriscus sylvestris*), especially in the spring (BOBYR, personal communication).

11.2.2. *Cephalario giganteae-Ligusticetum alani*

Floristic features

The association combines multispecific tall herbaceous communities. *Ligusticum alatum*, *Aconitum orientale*, *Cephalaria gigantea*, *Lapsana communis*, *Dactylis glomerata*, *Vicia cracca* (Table 11.4.), represent diagnostic species. All species typically occur on rich soils.

Floristic richness is the highest among other communities of the alliance. We registered 77 vascular plant species and 4 bryophytes in 10 relevés. Average numbers were 25 vascular plant species and 1 bryophyte per relevé. As in other associations of the class, lichens were completely absent. Plant cover is tall (1.5-2 m) and dense (90-100%, mean 97%). Typus, or nomenclature type, is relevé No. 79/95.

Ecological features

The communities occupy bottoms of U-shaped valleys, alluvial fans and gentle (2°-20°, mean 8°) slopes of various but mainly southern exposure within the subalpine zone (1900-2600 m, mean 2170 m). Their high production is supported by ample water and nutrient supply brought from the upper slopes by snow avalanches and meltwater flows.

Table 11.3.

Anthriscus sylvestris-Rumicetum alpini

Releve No.	0 0 0 0 0 0 0 0 1 0	0 0 0 0 0 0 0 1 2
	15 16 80 93 55 56 3 49 93 58	73 28 45 14 31 99 65 76 02
Year	93 93 93 94 93 93 95 95 94 83	93 94 93 95 95 95 94 94 94
Altitude (* 10)	2 2 2 2 2 2 2 2 2 1	2 2 2 2 2 2 2 2 2
	25 25 35 35 15 15 00 35 35 85	45 00 60 50 45 35 40 38 38
Steepness	5 5 5 3 5 5 5 20 2 15	3 3 2 5 5 5 7 5 20
Exposition	w sw so nw sw e s w sw s	se s e sw sw se e nw ne
Vascular plant cover	99 99 99 80 99 99 99 95 90 90	98 98 99 99 99 99 90 90 90
Bryophyte cover	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 + 0 2
Stone cover	+ 0 0 + + 5 0 + 0 0	+ 0 0 0 0 0 2 10 10
Bare soil	0 0 0 + 0 0 0 5 0 0	0 0 0 0 0 0 + 0 0
<i>D.sp. A.s.-R.a. typicum</i>		
<i>Galeopsis bifida</i>	r + + + +	
<i>Symphytum asperum</i>	+ 1 + 1 1	1
<i>D.sp. A.s.-R.a. senecionetosum platyphylloides</i>		
<i>Senecio platyphylloides</i>		+ + 1 2 1 1 2 1 1
<i>D.sp. Anthriscus sylvestris-Rumicetum alpini</i>		
<i>Urtica dioica</i>	2 1 2 + 1 + 1 4 1 3	2 1
<i>Anthriscus sylvestris</i>	3 3 3 2 3 1	3 3 3 3 3 2 2
<i>D.sp. Rumicion alpini, Rumicetalia alpini</i>		
<i>Rumex alpinus</i>	4 5 3 4 3 2 4 2 3 2	4 4 3 4 4 4 3 3 1
<i>Lamium album</i>	1 1 1	
<i>Veratrum album</i>	1 +	1
<i>Heracleum asperum</i>	+	1 + 1 2
<i>Veronica filiformis</i>	1 +	+ +
<i>Cerastium davuricum</i>	+ +	
<i>D.sp. Mulgedio-Aconitetea</i>		
<i>Millium effusum</i>	4 5 3 2 3 2 2 2 3	3 3 3 2 2 1 2 4 4
<i>Geranium sylvaticum</i>	1 r	+ + + + +
<i>Rumex alpestris</i>		
<i>Campanula latifolia</i>	2	1 1
<i>Aconitum nasutum</i>		
<i>Achillea millefolium</i>		
<i>Athyrium distentifolium</i>		1
<i>Astrantia maxima</i>		+
Other species		
<i>Aconitum orientale</i>	+ 3 3	1 1
<i>Carduus adpressus</i>	+ r 1	+ +
<i>Cirsium munitum</i>		+ + +
<i>Dactylis glomerata</i>	+ + + 1	

Sporadic species (number of releve in parenthesis, abundance is shown after ":", unless it is not "+", Braun-Blanquet scale)

Agropyron caninum (58/83), *Alchemilla vulgaris* aggr. (73/93, 202/94:1), *Alopecurus pratensis* (49/95:1, 58/83:1), *Angelica tatiana* (55/93:2), *Arctium tomentosum* (49/95), *Asperugo procumbens* (49/95:1), *Brachythecium reflexum* (202/94:1), *Bromopsis benekenii* (58/83:1), *Campanula glomerata* (14/95:1), *Capsella bursa-pastoris* (49/95:1), *Cardamine uliginosa* (93/94), *Cephalaria gigantea* (80/93:2, 55/93), *Chaerophyllum aureum* (80/93:1, 58/83:1), *Chaerophyllum confusum* (49/95), *Chamerion angustifolium* (73/93), *Cicerbita racemosa* (202/94), *Cuscuta europaea* (58/83), *Daphne glomerata* (14/95), *Descurainia sophia* (49/95:2), *Euphorbia macroceras* (176/94), *Festuca djimilensis* (202/94), *Fritillaria latifolia* (14/95), *Fritillaria lutea* (176/94:r), *Galium aparine* (58/83:1), *Geranium gymnocaulon* (202/94:2), *Geranium pusillum* (58/83), *Geum rivale* (14/95), *Hesperis matronalis* (49/95), *Inula orientalis* (99/95, 202/94:1), *Lapsana communis* (202/94), *Myosotis amoena* (3/95, 193/94:1), *Myosotis caespitosa* (56/93:1),

Myosotis sparsiflora (49/95), *Pedicularis atropurpurea* (202/94), *Poa annua* (49/95), *Poa longifolia* (93/94, 49/95), *Poa pratensis* (49/95), *Polygonum aviculare* (49/95:1), *Potentilla elatior* (202/94), *Pseudoleskea incurvata* (65/94), *Pseudoleskea radicata* (202/94:1), *Rubus idaeus* (16/93, 58/83:1), *Scrophularia scopolii* (14/95), *Silene vulgaris* (58/83:1, 202/94:1), *Stellaria media* (49/95), *Stellaria nemorum* (56/93), *Thlaspi arvense* (49/95), *Trisetum flavescens* (73/93), *Valeriana officinalis* (14/95), *Vicia cracca* (80/93, 58/83), *Vicia sepium* (28/94).

Date (day.month), size (sq.m) and location of the releves.

15/93 - 08.07, 25, Ullu-Murudzhu (N.Illarionova); 16/93 - 08.07, 25, Ullu-Murudzhu (E.Kuraeva); 80/93 - 22.08, 25, M.Khatipara; 93/94 - 20.07, 25, Goralykol (D.Sukhova); 55/93 - 16.08, 25, Baduk; 56/93 - 16.08, 25, Baduk; 3/95 - 01.07, 25, Alibek; 49/95 - 09.07, 25, Epchik; 193/94 - 10.09, 25, Kichi-Murudzhu; 58/83 - 14.09, 100, M.Khatipara; 73/93 - 17.08, 25, Baduk; 28/94 - 09.07, 25, Dombay-Ulgen; 45/93 - 10.08, 25, M.Khatipara; 14/95 - 03.07, 25, Alibek; 31/95 - 06.07, 100, Chuchkhur; 99/95 - 25.07, 25, Khadzhibey (O.Cherednichenko); 65/94 - 15.07, 25, Bol.Khatipara; 176/94 - 08.09, 25, Klukhor; 202/94 - 11.09, 25, Klukhor.

11.2.3. *Poetum longifoliae*

Floristic features

The association comprises subalpine grasslands with a tall grass - *Poa longifolia* - as a main dominant. The diagnostic species set includes *Alopecurus pratensis* and *Senecio subflocosus* as well. Floristic richness here is intermediate between the two previous associations.

We registered 52 vascular plant species and 7 bryophytes in 8 releves. Mean numbers per releve were 15 and 1 species respectively. Vascular plant cover is high (10-90%, mean 67%), role of bryophytes is low.

Typus, or nomenclature type, is releve No. 146/94.

Ecological features

The community forms on recently or currently grazed sites. The impact of grazing is obvious: high frequency of non-palatable plants (*Alchemilla vulgaris* aggr., *Achillea millefolium*, *Lamium album*, *Urtica dioica* etc.), presence of a dense network of cattle paths, and cattle dung. This association is an example of human-altered vegetation within the preserve.

The grasslands occupy gentle (2°-10°, mean 5°) slopes of various (mainly northwestern) exposure within the subalpine zone near the timberline (altitude range 2150-2420 m, mean 2320 m). Significant snowpack accumulation and abundant water supplies from the upper portion of the ridge create a favourable water regime.

Table 11.4.

Cephalario giganteae-Ligusticetum alani and *Poetum longifoliae*

Releve No.	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	1	1	1
	59	79	38	60	77	78	98	45	15	44	18	21	22	90	97	46	19	45
Year	83	95	95	95	95	95	95	83	95	93	95	91	91	94	94	94	95	94
Altitude (* 10)	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	90	15	90	20	15	20	35	10	15	60	30	30	30	15	40	42	30	42
Steepness	20	10	2	5	3	10	5	15	10	2	5	3	2	10	2	5	5	5
Exposition	ne	s	w	se	e	se	se	se	se	se	nw	n	nw	ws	n	e	nw	ws
Vascular plant cover	95	99	90	99	95	98	99	90	99	98	90	80	75	40	10	60	90	90
Bryophyte cover	0	0	15	0	+	0	0	0	0	0	7	0	0	0	1	2	5	0
Lichen cover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stone cover	+	+	2	0	3	2	0	0	0	+	0	0	0	1	90	2	0	1
Bare soil	0	0	0	0	5	0	+	0	0	0	0	0	0	1	+	0	0	0
D.sp. <i>Cephalario giganteae-Ligusticetum alani</i>																		
<i>Ligusticum alatum</i>	2	2	2	2	2	+	1											
<i>Aconitum orientale</i>	2	2	2	1	+	1		1										+
<i>Vicia cracca</i>	1	1	1	+	+	2		1	1				1			+		
<i>Dactylis glomerata</i>	2		1	+	+	1		1	1				1					
<i>Cephalaria gigantea</i>	2	+	2	1	+	2	+	2	3	+								
<i>Lapsana communis</i>	+	+	+							+								
D.sp. <i>Poetum longifoliae</i>																		
<i>Alopecurus pratensis</i>				+	+							r	1		+	1	+	+
<i>Poa longifolia</i>			2		+	+	+			2	1	3	3	2	3	4	4	2
<i>Senecio subflocossus</i>														+	+			
D.sp. <i>Rumicion alpini, Rumicetalia alpini</i>																		
<i>Rumex alpinus</i>	+	1		+						1	1			+				
<i>Lamium album</i>	1	+	+	+				1	+				1	+	+			
<i>Veratrum album</i>		1		1	1	+		1		2								
<i>Heracleum asperum</i>	2		1								+			+	+			+
<i>Veronica filiformis</i>		1	+	+							1	r						
<i>Cerastium davuricum</i>	1								+					1		1		1
D.sp. <i>Mulgedio-Aconitetea</i>																		
<i>Millium effusum</i>	2	2	2	2	+	1	+	2	2	2	1			1				1
<i>Geranium sylvaticum</i>	1	+	1	+	+	2	2	2	2	2	+		1	1			+	+
<i>Rumex alpestris</i>	+	+		+	1	1	1	1	+	1								
<i>Campanula latifolia</i>		2		3	1	+	1			1								
<i>Aconitum nasutum</i>										+								
<i>Achillea millefolium</i>	+							+				1	1		1	+	1	
<i>Astrantia maxima</i>		+	+		+	1	+	+	1	1	+							
Other species																		
<i>Alchemilla vulgaris aggr.</i>	1	+	1		+	1	+	+	1	2	1	2	2	2	2			3
<i>Anthriscus sylvestris</i>	1							2	1	2				1	+			
<i>Betonica macrantha</i>	1				+	2	+	1	2	1						+		
<i>Brachythecium salebrosum</i>			1		+						1							1
<i>Bromopsis variegata</i>											+		1		+			
<i>Calamagrostis arundinacea</i>	1		1			2	+	1	+									
<i>Carduus adpressus</i>	1	+	1	+					1									
<i>Chaerophyllum aureum</i>		1	1	+	+	1												
<i>Chamerion angustifolium</i>	1		1								5						2	4
<i>Cirsium munitum</i>					+	1	+			2								
<i>Cirsium obvallatum</i>	1		1												+			1
<i>Cruciata laevipes</i>	+		+						+	+			+	+	+			

Table 11.4. (continued)

Releve No.	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	1	1	1	
	59	79	38	60	77	78	98	45	15	44	18	21	22	90	97	46	19	45	
Year	83	95	95	95	95	95	95	83	95	93	95	91	91	94	94	94	95	94	
<i>Deschampsia caespitosa</i>											+	1						+	
<i>Festuca djimilensis</i>						1	1		1										
<i>Galeopsis bifida</i>										+	+	r							
<i>Inula orientalis</i>	1				3	4													
<i>Myosotis amoena</i>		1	1							+									
<i>Phleum alpinum</i>										+	+	+							
<i>Pimpinella rhodantha</i>	+								1	+									
<i>Polygonum bistorta</i>				+	+	2				+	1			+	2			+	
<i>Ranunculus caucasicus</i>						1				1		1							
<i>Rubus idaeus</i>	1		1						2				1					+	
<i>Silene vulgaris</i>					+	2	+	1	1	1									
<i>Trisetum flavescens</i>							+	+	1				1		1	+			
<i>Trollius ranunculinus</i>					+	1	1												
<i>Urtica dioica</i>			+						1			1					1	1	1
<i>Vicia sepium</i>			+						1	+				1					

Sporadic species (number of releve in parenthesis, abundance is shown after ":", unless it is not "+", Braun-Blanquet scale)

Agropyron caninum (59/83), *Agrostis stolonifera* (98/95, 118/95:2), *Agrostis vinealis* (21/91:1, 22/91:2), *Angelica tatiana* (79/95:3, 60/95:1), *Anthoxanthum odoratum* (22/91), *Aquilegia olympica* (59/83:1, 78/95:1), *Asyneuma campanuloides* (138/95), *Betula litwinowii* (45/83), *Brachythecium reflexum* (138/95:1, 77/95), *Brachythecium starkei* (118/95:1, 119/95:1), *Bryum subelegans* (146/94), *Campanula rapunculoides* (59/83:1, 45/83), *Cardamine impatiens* (79/95), *Cardamine uliginosa* (59/83), *Carduus nutans* (115/95), *Carex atrata* (44/93, 90/94), *Carex mingrellica* (79/95), *Carex umbrosa* (22/91), *Carum meifolium* (44/93), *Colchicum speciosum* (45/83), *Digitalis ciliata* (59/83), *Draba sibirica* (22/91, 97/94), *Dryopteris filix-mas* (59/83:1, 45/83), *Euphrasia ossica* (22/91:r), *Festuca ovina* (22/91), *Fragaria vesca* (59/83), *Fritillaria lutea* (22/91:r), *Galium verum* (119/95), *Gentiana septemfida* (115/95, 22/91:r), *Geranium gymnocaulon* (44/93:2), *Hedysarum caucasicum* (78/95), *Hieracium prenanthoides* gr. (77/95, 78/95:1), *Juniperus communis* (138/95), *Lathyrus pratensis* (115/95:1), *Leskeella nervosa* (97/94), *Lilium monadelphum* (78/95), *Linum hypericifolium* (45/83), *Luzula multiflora* (22/91), *Myosotis alpestris* (59/83, 22/91), *Nardus stricta* (22/91), *Orobanche grossheimii* (45/83), *Pedicularis condensata* (44/93), *Poa nemoralis* (118/95:1, 146/94), *Polygonum alpinum* (115/95), *Pulmonaria mollissima* (59/83:1), *Radula complanata* (97/94), *Rhodobryum roseum* (138/95), *Rumex longifolius* (146/94), *Sanionia uncinata* (97/94, 146/94:1), *Senecio platyphylloides* (59/83:1, 98/95), *Silene saxatilis* (22/91:1), *Symphytum asperum* (90/94), *Tortula ruralis* (138/95, 146/94), *Trifolium ambiguum* (44/93:1, 22/91:1), *Veronica gentianoides* (21/91:r, 22/91), *Veronica peduncularis* (22/91).

Date (day.month), size (sq.m) and location of the releves.

59/83 - 10.09, 25, Mukhu; 79/95 - 14.07, 25, Baduk; 138/95 - 31.08, 25, Ullu-Murudzhu; 60/95 - 12.07, 25, Baduk; 77/95 - 14.07, 25, Baduk (A.Egorov); 78/95 - 14.07, 25, Baduk; 98/95 - 25.07, 25, Khadzhibey (O.Cherednichenko); 45/83 - 08.09, 25, Bol.Khatipara; 115/95 - 19.08, 25, M.Khatipara; 44/93 - 10.08, 25, M.Khatipara; 118/95 - 29.08, 25, Nazalykol; 21/91 - 16.08, 25, Nazalykol; 22/91 - 16.08, 25, Nazalykol; 90/94 - 20.07, 25, Goralykol; 97/94 - 20.07, 25, Goralykol; 146/94 - 04.09, 25, Oriuchat; 119/95 - 29.08, 25, Nazalykol; 145/94 - 04.09, 25, Oriuchat.