

Zeitschrift: Veröffentlichungen des Geobotanischen Institutes der Eidg. Tech. Hochschule, Stiftung Rübel, in Zürich

Herausgeber: Geobotanisches Institut, Stiftung Rübel (Zürich)

Band: 130 (2002)

Artikel: Alpine vegetation of the Teberda Reserve, the northwestern Caucasus = Die Alpine Vegetation des Teberda Reservates, Nordwest-Kaukasus

Autor: Onipchenko, V.G.

Kapitel: 5: Fens : "Scheuchzerio-Caricetea fuscae"

DOI: <https://doi.org/10.5169/seals-308994>

Nutzungsbedingungen

Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften auf E-Periodica. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. Das Veröffentlichen von Bildern in Print- und Online-Publikationen sowie auf Social Media-Kanälen oder Webseiten ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. [Mehr erfahren](#)

Conditions d'utilisation

L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. La reproduction d'images dans des publications imprimées ou en ligne ainsi que sur des canaux de médias sociaux ou des sites web n'est autorisée qu'avec l'accord préalable des détenteurs des droits. [En savoir plus](#)

Terms of use

The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. Publishing images in print and online publications, as well as on social media channels or websites, is only permitted with the prior consent of the rights holders. [Find out more](#)

Download PDF: 26.03.2026

ETH-Bibliothek Zürich, E-Periodica, <https://www.e-periodica.ch>

5. Fens - *Scheuchzerio-Caricetea fuscae*

Prodromus

Scheuchzerio-Caricetea fuscae TÜXEN 1937

Caricetalia fuscae KOCH 1926 em BRAUN-BLANQUET 1949

Caricion fuscae KOCH 1926 em KLIKA 1934

Caro caucasici-Caricetum nigrae ass.nov.

C.c.-C.n. salictosum kazbekensis subass.nov.

C.c.-C.n. typicum subass.nov.

Swertio ibericae-Caricetum nigrae ass.nov.

Scheuchzerietalia palustris NORDHAGEN 1937

Caricion lasiocarpae Vanden BERGHEN in LEBRUN *et al.* 1949

Caricetum rostratae OSVALD 1923 em DIERSSEN 1982

Communities of *Scheuchzerio-Caricetea fuscae* are common along small rivers and springs and near lakes on the flat bottoms of U-shaped valleys. They occupy few areas, but they are typical components of the vegetation. Among diagnostic species of the class (DIERSSEN 1982; STEINER 1993) are *Carex nigra*, *Aulacomnium palustre* and *Bryum pseudotriquetrum*, all well represented (Table 5.1.).

5.1. *Caricetalia fuscae*, *Caricion fuscae*

Most of the alpine and subalpine fens of the reserve belong to the alliance *Caricion fuscae*. *Carex echinata*, *Carex canescens*, *Sphagnum warnstorffii* and *Parnassia palustris* all are diagnostic species of the alliance. As typical fen species, we also consider *Primula auriculata*, *Cirsium simplex*, and *Briza marcowiczii*. Many meadow and grassland species are common in the fen communities (*Nardus stricta*, *Phleum alpinum*, *Anthoxanthum odoratum*, *Luzula multiflora*, *Carum caasicum* etc.). The fens are widespread in the Caucasus (KIMERIDZE 1963; AKATOV 1991).

Overall, floristic richness of the alpine fens is the lowest of all the alpine communities (ONIPCHENKO & SEMENOVA 1995). The mean number of vascular plant species was estimated as 4, 10 and 23 for 0.01, 1 and 100 m² plots respectively. Similar values were obtained for *Carex nigra* fens in Davos.

Table 5.1.
Diagnostic table of *Scheuchzerio-Caricetea fuscae*

	1	2	3	4
D.sp. <i>Caro caucasici-Caricetum nigrae</i>				
<i>Carum caucasicum</i>	III	V	II	-
<i>Polygonum viviparum</i>	V	III	-	-
<i>Cerastium cerastioides</i>	III	V	-	-
<i>Sibbaldia procumbens</i>	I	IV	-	-
D.sp. <i>C.c.-C.n. salicetosum kazbebensis</i>				
<i>Salix kazbekensis</i>	V	I	-	-
<i>Ligularia sibirica</i>	III	-	I	I
<i>Saxifraga hirculus</i>	II	-	-	-
D.sp. <i>C.c.-C.n. typicum</i>				
<i>Agrostis vinealis</i>	-	V	I	-
<i>Phleum alpinum</i>	II	V	-	-
<i>Taraxacum stevevii</i>	-	IV	I	II
<i>Epilobium anagallidifolium</i>	-	II	-	-
D.sp. <i>Swertio ibericae-Caricetum nigrae</i>				
<i>Potentilla erecta</i>	-	-	V	IV
<i>Swertia iberica</i>	III	-	V	IV
<i>Crepis glabra</i>	-	I	IV	III
<i>Campylium stellatum</i>	I	I	III	-
<i>Dactylorhiza urvilleana</i>	-	II	IV	-
<i>Pinguicula vulgaris</i>	-	-	II	-
<i>Veratrum album</i>	-	I	III	-
<i>Geranium sylvaticum</i>	-	-	II	-
<i>Eleocharis quinqueflora</i>	-	-	II	-
<i>Scapania irrigua</i>	-	-	II	-
D.sp. <i>Caricetalia fuscae, Caricion fuscae</i>				
<i>Carex echinata</i>	-	-	III	I
<i>Carex canescens</i>	II	-	-	II
<i>Epilobium palustre</i>	-	-	-	II
<i>Calliargon stramineum?</i>	-	I	-	-
<i>Sphagnum warnstorffii</i>	II	I	I	I
<i>Parnassia palustris</i>	III	-	II	-
<i>Rhizomnium pseudopunctatum</i>	I	-	-	I
D.sp. <i>Scheuchzerietalia palustris, Caricion lasiocarpae, Caricetum rostratae</i>				
<i>Carex limosa</i>	-	-	I	V
<i>Carex rostrata</i>	-	-	-	V
D.sp. <i>Scheuchzerio-Caricetea fuscae</i>				
<i>Carex nigra</i>	V	V	V	V
<i>Aulacomnium palustre</i>	IV	IV	III	III
<i>Bryum pseudotriquetrum</i>	III	III	II	I
<i>Eriophorum polystachyon</i>	I	-	I	III
<i>Sphagnum subsecundum</i>	I	-	II	I
<i>Warnstorffia exannulata</i>	I	-	I	II
<i>Fissidens adianthoides</i>	I	-	-	-
<i>Polytrichum commune</i>	-	I	-	-

Table 5.1. (continued)

	1	2	3	4
Other frequent species				
<i>Nardus stricta</i>	II	V	V	IV
<i>Primula auriculata</i>	I	IV	IV	III
<i>Cirsium simplex</i>	II	V	V	III
<i>Anthoxanthum odoratum</i>	-	V	V	II
<i>Briza marcowiczii</i>	I	V	IV	-
<i>Alchemilla vulgaris</i>	II	IV	II	I
<i>Luzula multiflora</i>	IV	V	IV	-
<i>Deschampsia caespitosa</i>	III	IV	II	II
<i>Pedicularis nordmanniana</i>	III	V	IV	II
<i>Euphrasia ossica</i>	II	IV	V	I

Syntaxa:

1 - *Caro caucasici-Caricetum nigrae salicetosum kazbekensis*; 2 - *C.c.-C.n. typicum*; 3 - *Swertio ibericae-Caricetum nigrae*; 4 - *Caricetum rostratae*.

As a rule, alpine fens have a thin peat layer (0.5-1m). We studied peat composition, succession dynamics and humus radiocarbon age of a fen near a small lake on Mt. Malaya Khatipara (PAVLOVA & ONIPCHENKO 1992). Radiocarbon age of the peat was estimated at 2480 and 1110 years for depth of 45-50 and 25-30 cm respectively. The calendar age should be considerably older due to addition of "young" carbon by the roots of modern plants. The botanical composition of the peat suggests that graminoids (especially *Carex nigra*) played the main role in peat formation from the beginning, with moss *Aulacomnium palustre* becoming a dominant more recently.

Alpine fens accumulate a significant soil (peat) seed bank (about 10 000 seeds per sq. m (SEMENOVA & ONIPCHENKO 1994). The most abundant species with permanent seed banks (about 1000 seed/m²) are: *Cerastium cerastioides*, *Luzula multiflora*, *Sagina saginoides*, *Alchemilla vulgaris* *aggr.*, *Cardamine uliginosa*.

In spite of hydromorphic conditions, alpine fens are relatively productive communities. Due to permanent water availability, rate of organic matter decomposition in fen soils is the highest among the communities of the alpine zone (LEINSOO *et al.* 1991).

Two associations can be distinguished according to the floristic and ecological features.

5.1.1. *Caro caucasici-Caricetum nigrae*

Floristic features

This association comprises the fens of the alpine zone. Common species of cold snowbeds (*Carum caasicum*, *Polygonum viviparum*, *Cerastium cerastioides*, *Sibbaldia procumbens*) form the diagnostic core of the association. *Carex nigra*, *Aulacomnium palustre* and *Nardus stricta* are the usual dominants. *Primula auriculata*, *Cirsium simplex*, *Deschampsia caespitosa* and *Pedicularis nordmanniana* play an important role in plant cover.

The association is similar to *Primulo auriculatae - Caricetum dacicae* AKATOV 1989 and to *Deschampsio-Caricetum dacicae* AKATOV 1989, which were described for the western Caucasus (AKATOV 1989). A distinctive floristic property of our association is that the role of snowbed species (*Cerastium cerastioides*, *Polygonum viviparum*, *Sibbaldia procumbens* etc.) as well as bryophytes (*Aulacomnium palustre*, *Brium pseudotriquetrum*) is much greater. These species are essentially absent in the associations described by AKATOV (1989).

The total number of species for 18 releves was 119, including 76 vascular plants, 41 bryophytes and 2 lichens. Average species richness per releve was 24, including 18 vascular plants and 6 bryophytes, so the species composition varies considerably among the communities. The role of bryophytes is important in terms of both species number and plant cover. Mean bryophyte cover is approximately the same as vascular plant cover (about 55%). The role of lichens is negligible.

Two subassociations can be separated on the basis of floristic differences, namely ***C.c.-C.n. typicum*** (typus, or nomenclature type, of the association - No. 128/90) and ***C.c.-C.n. salicetosum kazbekensis*** (typus, or nomenclature type, No. 33/89) (Table 5.2.). The role of grassland and snowbed species is higher in the typical subassociation.

Ecological features

The communities occupy flat (0-7°) areas near lakes and streams with poor drainage. Peat soils are typically saturated with water throughout the whole vegetative season. However, cold and oxygen-rich water often percolates through the soil horizontally, which prevents the upper part of the soil from

gleization. Due to their position at the bottoms of U-shaped mountain valleys, fens have a significant snowbank accumulation. Snow usually melts by the second half of June. The underground water table lies at about 3-10 cm. Although boulders cover only a small area within the communities (0-10%), the peat layer often contains some large stones.

The fens of the association can be found mainly within the alpine zone (elevation range 2350-2900 m, mean 2660 m).

5.1.2. *Swertia ibericae*-*Caricetum nigrae*

Floristic features

The association includes subalpine fens. The diagnostic set combines some typical species of moist soils (*Potentilla erecta*, *Swertia iberica*, *Dactylorhiza urvilleana*, *Campylium stellatum*, *Pinguicula vulgaris* etc.), as well as some species of *Mulgedio-Aconitetea* (*Veratrum album*, *Geranium sylvaticum*) class. Frequency of alpine grassland species (*Nardus stricta*, *Anthoxanthum odoratum*, *Luzula multiflora*) is high.

We registered 59 vascular plant species and 28 bryophytes in 10 relevés. Mean numbers of species per relevé were 21 and 5 correspondingly. There were no lichens found in the communities. In comparison with the previous association, vascular plant cover is better developed (50-90%, mean 70%), but moss cover is less dense (0-50%, mean 26%).

Typus, or nomenclature type, is relevé No. 71/93.

Ecological features

The fens of the association are typical of the subalpine zone within the elevation range of 1900-2600 m (mean 2340 m). They develop on slopes of varying exposure and steepness (from 0 to 30°). A permanently abundant, but stagnant, water supply is a necessary condition for the community development. They occupy local areas on alluvial fans near streams, on slopes with springs, as well as on flat floodplains at the bottom of U-shaped valleys. The underground water table can be found at 5-15 cm depth.

Table 5.2.
Caro caucasici-Caricetum nigrae

Releve No.	0	0	0	0	0	1	1	0	1	0	0	0	0	1	1	0	0	0
	19	46	34	25	33	70	02	46	42	21	1	18	7	27	28	3	6	58
Year	88	94	91	91	89	94	94	93	90	83	89	83	88	90	90	86	88	93
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Altitude (* 10)	65	85	90	40	70	75	70	75	75	65	70	70	60	60	60	80	40	35
Steepness	3	0	0	0	0	7	0	3	0	5	3	0	0	0	0	0	3	0
Exposition	n	-	-	-	-	ne	-	e	-	n	ne	-	-	-	-	n	-	
Vascular plant cover	25	60	35	30	35	60	40	70	90	60	50	70	30	80	70	25	50	80
Bryophyte cover	90	15	90	40	60	60	80	40	10	50	60	50	90	40	60	70	70	10
Lichen cover	+	+	0	0	0	0	0	0	0	+	0	0	+	0	+	0	0	0
Stone cover	0	0	0	0	0	1	0	3	0	5	5	0	10	0	0	0	0	0
Lichen species number	1	1	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0
Bryophyte species number	11	11	2	5	3	7	3	4	2	5	6	7	5	8	5	3	8	5
Vascular plant species number	17	14	12	11	13	13	19	22	19	26	21	19	22	22	25	16	21	20
D.sp. <i>C.c.-C.n. salicetosum kazbebensis</i>																		
<i>Salix kazbekensis</i>	1	+	2	1	2	3	2						1					
<i>Ligularia sibirica</i>				r	+		+											
<i>Saxifraga hirculus</i>	1				+													
D.sp. <i>C.c.-C.n. typicum</i>																		
<i>Agrostis vinealis</i>									1	+	1	1	1	1	+	+	1	1
<i>Phleum alpinum</i>		+				+			+	1	1	2	+	r	+	+	1	+
<i>Taraxacum stevevii</i>								+		+	+	+	+	+	+			1
<i>Epilobium anagalidifolium</i>														+	r			+
D.sp. <i>Caro caucasici-Caricetum nigrae</i>																		
<i>Carum caasicum</i>		2	+		+		+	1	1	1	1	1	1	1	1	1	2	1
<i>Polygonum viviparum</i>	1	2	1	+	+	1	+		+		1	+			1	1		
<i>Cerastium cerastioides</i>	1		+				+		+		+	1	+	+	r	1	+	+
<i>Sibaldia procumbens</i>		+						1	+		1	1	+		r	1		
D.sp. <i>Caricetalia fuscae, Caricion fuscae</i>																		
<i>Carex echinata</i>																		
<i>Carex canescens</i>				r	+													
<i>Epilobium palustre</i>																		
<i>Calliargon stramineum?</i>																		+
<i>Sphagnum warnstorffii</i>					1		1							2	2			
<i>Parnassia palustris</i>					r	+	+											
<i>Rhizomnium pseudopunctatum</i>							+											
D.sp. <i>Scheuchzerio-Caricetea fuscae</i>																		
<i>Carex nigra</i>	3	4	2	1	2	3	3		1		2	2	2	2	2	2	2	1
<i>Aulacomnium palustre</i>	3	1	5	+			4	3			3		4	2	3	4	2	2
<i>Bryum pseudotriquetrum</i>	1	1				+		+	1		1						+	+
<i>Eriophorum polystachyon</i>					2													
<i>Sphagnum subsecundum</i>					1													
<i>Warnstorfia exannulata</i>	+																	
<i>Fissidens adianthoides</i>						+												
Other species																		
<i>Alchemilla vulgaris</i>	1						1		1	+	2	1	+	1			1	1
<i>Anthoxanthum odoratum</i>								+	+	1	1			1	1	1	1	1
<i>Briza marcowiczii</i>						+		2	+	1	1	+	1	1	1		1	
<i>Campanula tridentata</i>								1		+			+					

Table 5.2. (continued)

Releve No.	0	0	0	0	0	1	1	0	1	0	0	0	1	1	0	0	0	
Year	88	94	91	91	89	94	94	93	90	83	89	83	88	90	90	86	88	93
<i>Campylium stellatum</i>	1													+				+
<i>Cardamine uliginosa</i>	1	1		+			+				+	1		r	+			
<i>Carex oreophila</i>		1						+										+
<i>Carex sempervirens</i>								+	2		+							1
<i>Cetraria islandica</i>	+	+								+					+			
<i>Cirsium simplex</i>						+	+	3	4	2	2	1	1	3	2		3	3
<i>Climacium dendroides</i>						+					1	2		+				
<i>Deschampsia caespitosa</i>	+	+	r			+				1	1	2		r	+		2	1
<i>Eriophorum vaginatum</i>			r	+			+											+
<i>Euphrasia ossica</i>	+				+			+	+	+	+			+	+		+	+
<i>Festuca ovina</i>				+	+	+				+								+
<i>Gentiana biebersteinii</i>					+					+								+
<i>Gentiana pyrenaica</i>			r					+	+	+		+	+	+	+	+	+	+
<i>Geranium gymnocaulon</i>								+	+					r				
<i>Luzula multiflora</i>	+	1	+			+	+	1	+	+	1	2	1	+	1	+	1	+
<i>Nardus stricta</i>			+			+		1	+	1	2	2	1	1	2	+	1	2
<i>Onchophorus virens</i>	2					+	3	+		2								
<i>Dactylorhiza urvilleana</i>															+	+		+
<i>Pedicularis nordmanniana</i>	+		r			+		1	+	1	1	+	1	+	+		1	
<i>Philonotis fontana</i>	1	1				4			1	2	1	1	+		+			
<i>Plagiomnium ellipticum</i>	1	+									1							
<i>Primula auriculata</i>						1		1		2	1	1	+	2	+		2	
<i>Ranunculus oreophilus</i>							+	+										1
<i>Sanionia uncinata</i>	1	+		3		+				1	2	1						
<i>Sphagnum capillifolium</i>			1		2											2	3	
<i>Swertia iberica</i>	+				+	+												
<i>Trifolium spadiceum</i>						+							1			2	1	

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

Barbilophozia lycopodioides (21/83:1, 18/83), *Betula litwinowii* (25/91:r), *Bryum caespiticium* (21/83:1), *Bryum cyclophyllum* (58/93), *Caltha polypetala* (19/88), *Carex atrata* (142/90:1, 21/83), *Carex pyrenaica* (127/90, 128/90), *Carum meifolium* (46/93), *Catabrosella variegata* (142/90), *Cephalozia* sp. (58/93), *Cerastium purpurascens* (46/94, 6/88), *Cirsium ciliatum* (102/94), *Coeloglossum viride* (128/90:r), *Cratoneuron commutatum?* (19/88), *Cratoneuron filicinum* (127/90), *Crepis glabra* (58/93), *Deschampsia flexuosa* (128/90), *Desmatodon latifolius* (46/94, 46/93), *Drepanocladus fluitans?* (21/83:1), *Drepanocladus intermedius?* (25/91), *Empetrum nigrum* (7/88:1), *Festuca brunnescens* (46/93), *Gagea fistulosa* (46/93), *Gentiana septemfida* (21/83), *Geum rivale* (102/94:2), *Hedysarum caucasicum* (46/93, 21/83), *Hieracium macrolepis* (7/88), *Hyalopoa pontica* (19/88), *Juncus triglumis* (25/91:1), *Leontodon hispidus* (21/83), *Leptodictyum riparium?* (127/90, 128/90), *Lescurea saxicola* (18/83), *Ligusticum caucasicum* (19/88), *Lophozia* sp. (46/94), *Matricaria caucasicum* (58/93), *Meesia uliginosa* (19/88:1, 33/89:2), *Minuartia imbricata* (21/83:1), *Palustriella commutata* (170/94:1), *Pedicularis condensata* (46/93, 127/90), *Pellia endiviifolia* (127/90, 6/88), *Poa alpina* (170/94, 21/83), *Pohlia nutans* (127/90), *Pohlia wahlenbergii* (46/94:1), *Polygonum bistorta* (46/94, 33/89), *Polytrichastrum alpinum* (46/94, 3/86), *Polytrichum commune* (7/88:1, 6/88), *Polytrichum juniperinum* (46/94), *Polytrichum longisetum* (128/90:1), *Potentilla crantzii* (142/90, 1/89:1), *Potentilla gelida* (102/94), *Primula algida* (46/94), *Primula ruprechtii* (19/88), *Pterigynandrum filiforme* (18/83), *Ranunculus brachylobus* (7/88), *Rhizomnium punctatum* (19/88), *Rhododendron caucasicum* (7/88, 6/88:1), *Rhytidium rugosum* (18/83), *Scapania* sp. (7/88, 6/88), *Sedum tenellum* (1/89), *Sphagnum russowii?* (6/88:2), *Stereocaulon alpinum* (7/88), *Vaccinium vitis-idaea* (102/94), *Valeriana alpestris* (33/89), *Veratrum album* (128/90:r, 58/93), *Veronica gentianoides* (19/88).

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

19/88 - 17.07, 9, Gidam; 46/94 - 11.07, 15, Kyshkadzher; 34/91 - 17.08, 25, Nazlalykol; 25/91 - 16.08, 25, Nazlalykol; 33/89 - 19.08, 25, Kyshkadzher (N.Lubeznova); 170/94 - 06.09, 15, Oriuchat; 102/94 - 21.07, 25, Goralykol; 46/93 - 12.08, 8, M.Khatipara; 142/90 - 17.08, 9, Khadzhibey; 21/83 - 24.08, 15, M.Khatipara; 1/89 - 04.08, 100, M. Khatipara; 18/83 - 24.08, 16, M.Khatipara; 7/88 - 31.07, 15, Ullu-Murudzhu; 127/90 - 16.08, 16, Bol.Khatipara; 128/90 - 16.08, 8, Bol.Khatipara; 3/86 - 09.08, 25, M.Khatipara; 6/88 - 31.07, 25, Ullu-Murudzhu; 58/93 - 16.08, 16, Baduk.

5.2. *Scheuchzerietalia palustris*

Communities of this order are not well represented in the reserve, because of existing relief features and the low concentration of nutrients in water. We treat several communities with significant role of *Carex rostrata* and *C. limosa* as part of the European association *Caricetum rostratae* OSVALD 1923 em DIERSSEN 1982 (*Caricion lasiocarpae*).

Floristic features

Floristic composition of the communities resembles the previous association. The presence of *Carex rostrata* and *C. limosa* is the main diagnostic feature. The role of grassland species is low.

We registered 35 vascular plant species and 16 bryophytes in 6 relevés of the association. As in the previous association, there are no lichens in the communities. Mean floristic richness per relevé is 17 species (including 4 bryophytes). This value is significantly lower than in other fens. Overall, the bryophyte cover (5-100%, mean 68%) is better developed than the vascular plant cover (20-75%, mean 47%).

AKATOV (1989) described a new association *Primulo auriculatae-Caricetum rostratea* for the Caucasian Reserve (the Western Caucasus). Their composition is very similar to our communities within *Caricetum rostratae*.

Ecological features

These communities develop within the subalpine zone (2150-2450 m a.s.l., mean 2200 m). They occupy flat or very gentle (up to 5°) slopes with water saturated soils. The water table lies near the soil surface. Open water areas may be present within the communities. Poor drainage causes peat formation. Stones are completely absent from the surface.

The communities are widespread in the Western Caucasus (AKATOV 1991).

Table 5.3.

Swertio ibericae-Caricetum nigrae, Caricetum rostratae

Releve No.	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0
	42	92	13	67	71	04	22	52	50	39	10	12	19	20	43	23
Year	95	94	93	94	93	94	95	91	93	91	88	93	93	93	95	95
Altitude (* 10)	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2
	20	52	45	40	45	40	20	90	60	30	15	45	18	15	20	20
Steepness	5	2	0	20	15	30	2	1	5	5	0	0	0	0	5	0
Exposition	nw	nw	-	se	s	e	sw	nw	se	w	-	-	-	-	e	-
Vascular plant cover	80	70	55	60	80	50	60	90	70	70	40	20	30	45	70	75
Bryophyte cover	40	10	15	30	40	30	20	0	20	50	80	80	90	99	5	50
Stone cover	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0
Lichen spec.number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bryophyte spec. number	5	12	4	3	7	5	6	0	6	4	3	4	4	3	6	3
Vasc.pl.spec. number	13	16	16	27	29	23	17	25	25	18	15	14	13	16	12	9
D.sp. Swertio ibericae-Caricetum nigrae																
<i>Potentilla erecta</i>	+	+	1	1	2	+	2	2	1	2	2	+	+	1		
<i>Swertia iberica</i>	2	+	2	2	1	1	+	+	+	+	1	1	+	+		
<i>Crepis glabra</i>		+		+	2	+		+	+	2	1		1	1		
<i>Campylium stellatum</i>	+		+	2	+	+				1						
<i>Dactylorhiza urvilleana</i>	+		1	1	+	+	1		+							
<i>Pinguicula vulgaris</i>	+			+	+					+						
<i>Veratrum album</i>				+	+		+	r	+							
<i>Geranium sylvaticum</i>			+					+		1						
<i>Eleocharis quinqueflora</i>				+	+					+						
<i>Scapania irrigua</i>		+				+	2									
D.sp. Caricetalia fuscae, Caricion fuscae																
<i>Carex echinata</i>		+					+	+		+	2	+				
<i>Carex canescens</i>														1		2
<i>Epilobium palustre</i>															+	+
<i>Sphagnum wamstorffii</i>					1									3		
<i>Parnassia palustris</i>		+			+		+									
<i>Rhizomnium pseudopunctatum</i>																+
D.sp. Scheuchzenetalia palustris, Caricion lasiocarpae, Caricetum rostratae																
<i>Carex limosa</i>		+								+	+	+	1	+		+
<i>Carex rostrata</i>											2	1	2	2	2	3
D.sp. Scheuchzerio-Caricetea fuscae																
<i>Carex nigra</i>	4	2	1	2	2	3	2		1	1	1	1	1	1	3	2
<i>Aulacomnium palustre</i>			1	1		2		1	1	+	+	3	1			
<i>Bryum pseudotriquetrum</i>	+	+								1						+
<i>Eriophorum polystachyon</i>							+				1	1	2			
<i>Sphagnum subsecundum</i>	2						2	1								2
<i>Wamstorfia exannulata</i>	+	+													1	3
Other species																
<i>Alchemilla vulgaris</i>		+			+			+								+
<i>Anthoxanthum odoratum</i>			+	+	+	1	+	+	2	+	+			+	+	
<i>Briza marcowiczii</i>			1	+	+	+	+			+	+					
<i>Carex sempervirens</i>					2	1	+									
<i>Carex umbrosa</i>						+			1				+			

Table 5.3. (continued)

Releve No.	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	
Year	42	92	13	67	71	04	22	52	50	39	10	12	19	20	43	23
Year	95	94	93	94	93	94	95	91	93	91	88	93	93	93	95	95
<i>Carum caucasicum</i>				+	1				+							
<i>Cirsium simplex</i>	+	2	3	2	2	1	2	3	2	2		1	+	2		
<i>Deschampsia caespitosa</i>		+		+				+							+	+
<i>Eriophorum vaginatum</i>									2		1	1		+		
<i>Euphrasia ossica</i>		+	r	+	+	+	+	+	+	+				+		
<i>Gentiana pyrenaica</i>				1	+	+			+	+	+	+	+	1		
<i>Gentiana septemfida</i>							+	+	+							
<i>Helictotrichon versicolor</i>				+	r					r						
<i>Hypnum lindbergii</i>	2				+	2										
<i>Ligularia sibirica</i>									+	+					1	
<i>Luzula multiflora</i>		+	+	+	+		1	r	+							
<i>Nardus stricta</i>	1	2	2	1	2	1	1	1	2	2	2	1	1	1		
<i>Pedicularis condensata</i>				+	r	+										
<i>Pedicularis nordmanniana</i>		+	1	+	+	+			+	+	1	+				
<i>Primula auriculata</i>	2	+	2	2	1	1			1	1	2	+			1	
<i>Ranunculus oreophilus</i>		+	+	+	+									1		
<i>Ranunculus subtilis</i>						1		1								+
<i>Sphagnum capillifolium</i>										3	4	2		3		
<i>Sphagnum platyphyllum?</i>	1									2		2	3			
<i>Taraxacum stevevii</i>			+									+		+		
<i>Trifolium spadiceum</i>	1						+	+		1						

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

Acer trautvetteri (42/95), *Agrostis vinealis* (192/94, 52/91:1), *Astrantia maxima* (22/95), *Barbilophozia barbata* (39/91), *Betula litwinowii* (10/88, 12/93), *Blindia acuta* (204/94), *Blysmus compressus* (50/93), *Brachythecium rivulare* (192/94, 43/95), *Bryum pallens* (71/93), *Cardamine uliginosa* (43/95, 23/95), *Carex pallescens* (204/94, 52/91), *Centaurea salicifolia* (52/91), *Cephaloziella* sp. (192/94), *Chiloscyphus pallescens* (192/94), *Climacium dendroides* (22/95:2, 50/93:1), *Cratoneuron filicinum* (43/95), *Daphne glomerata* (67/94), *Dicranum bonjeanii* (71/93, 50/93), *Festuca brunnescens* (20/93), *Festuca gigantea* (43/95), *Festuca ovina* (71/93:1), *Filipendula ulmaria* (52:91), *Gentiana biebersteinii* (52/91:r), *Geranium renardii* (71/93:r), *Juncus alpigenus* (204/94), *Juncus articulatus* (50/93), *Juncus effusus* (52/91), *Lophozia* sp. (67/94:1), *Molinia caerulea* (204/94:2, 52/91:r), *Palustriella commutata* (67/94:1), *Pellia* sp. (43/95), *Philonotis fontana* (192/94), *Plagiomnium ellipticum* (22/95, 23/95:1), *Polytrichum formosum* (19/93), *Potentilla crantzii* (10/88), *Ranunculus caucasicus* (67/94), *Rhinanthus minor* (71/93, 52/91:1), *Rhizomnium punctatum* (192/94), *Rhododendron caucasicum* (204/94, 50/93), *Rhynchocorys elephas* (43/95), *Rhytidadelphus triquetrus* (22/95), *Salix pantosericea* (43/95), *Scapania* sp. (71/93, 50/93:1), *Selaginella selaginoides* (71/93, 204/94), *Sphagnum centrale* (13/93:1, 10/88:2), *Sphagnum girgensohnii* (192/94:1, 20/93:1), *Sphagnum quinquefarium?* (12/93:2, 19/93:3), *Sphagnum squarrosum* (192/94:1, 13/93:1), *Stellaria anagalloides* (23/95), *Stellaria persica* (23/95), *Thalictrum minus* (52/91), *Trollius ranunculinus* (67/94, 71/93), *Vicia cracca* (22/95:1, 52/91), *Vicia sepium* (43/95), *Viola canina* (52/91).

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

42/95 - 07.07, 25, Buul'gen; 192/94 - 10.09, 25, Kichi-Murudzhu; 13/93 - 08.07, 25, Ullu-Murudzhu (L.Rasran); 67/94 - 16.07, 15, Bol.Khatipara; 71/93 - 17.08, 16, Baduk; 204/94 - 11.09, 25, Klukhor; 22/95 - 04.07, 25, Alibek; 52/91 - 31.08, 25, Dombay-Ulgen; 50/93 - 10.08, 10, M.Khatipara; 39/91 - 18.08, 25, Ullu-Murudzhu; 10/88 - 31.07, 25, Ullu-Murudzhu; 12/93 - 08.07, 25, Ullu-Murudzhu (S.Sukhov); 19/93 - 08.07, 25, Ullu-Murudzhu (D.Sukhova); 20/93 - 08.07, 25, Ullu-Murudzhu (E.Kuraeva); 43/95 - 07.07, 25, Buul'gen; 23/95 - 04.07, 25, Alibek.