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Syntaxonomy of Vegetation of Svjatoj Nos Peninsula, Lake Baikal 1. Non Forest Communities

KEYWORDS

Plant communities, Phytosociology, Braun-Blanquet approach, New syntaxa, Validation of syntaxon names, Eastern Siberia

ABSTRACT

Natural and semi-natural plant communities of Svjatoj Nos Peninsula on the East coast of Lake Baikal, Eastern Siberia, Russia, are classified and described using the methods of Braun-Blanquet phytosociology. A total of 48 associations and communities were recognized, comprising alpine tundra, subalpine forb vegetation, aquatic macrophyte vegetation, tall-herb and poor fens, mires, bogs, meadows, sand-dune and steppe vegetation. Twenty six syntaxa of ranks ranging from subassociation to class are described or validated for the first time. All communities are documented by phytosociological relevés.

INTRODUCTION

In a comprehensive programme of biological research, organized by the International Centre for Research and Conservation of Siberia, Praha, which focuses on the Zabajkal'skij National Park in Buryatia, Russia, we took part in two expeditions to Svjatoj Nos Peninsula on the East coast of Lake Baikal, in June-September 1991 and June-July 1992. Field work brought a large amount of phytosociological material, part of which has already been

summarized in a paper giving simple descriptions of vegetation types of one part of the peninsula, the isthmus (CHYTRÝ and PEŠOUT 1992). The present paper deals with syntaxonomic assessment of natural and semi-natural plant communities of the whole peninsula, thus contributing to Braun-Blanquet analysis of vegetation in Russia. In this first part, non forest communities are treated, while forest and scrub vegetation will be the subject of the second part.

STUDY AREA

Lake Baikal is one of the world's largest lakes, its surface area is 31,500 km^2, length from SW to NE 636 km and maximum width 79.5 km. It is the world's deepest lake as well, with a depth up to 1,620 m. The lake is situated in an elongated hollow bounded by mountain ranges parallel to its coasts: the Primorskij Range (1182 m), the Bajkalskij Range (2572 m), the Chamar-Daban (2370 m), the Ulan-Burgasy (1707 m), and the Barguzinskij Range (2840 m). These mountain ranges have been formed since the Tertiary period and in the whole area there is strong tectonic activity, observed up to the present time.

The study area comprises Svjatoj Nos Peninsula on the East coast of Lake Baikal. Its area is 596 km^2, length (NE-SW) 53 km, width 20 km (MOLOŽNIKOV 1974). It consists of a mountain range elongated from NE to SW composed of granitoids and metamorphic rocks of Pre-Paleozoic age (GALAZIJ et al. 1969). The elevation ranges from 455 m along Lake Baikal to 1877 m at the summit. The steep slopes of the range are dissected by numerous creek valleys. The range is connected with the mainland by a triangular isthmus consisting of sandy depositions of the Quarternary age. A large proportion of the isthmus is flooded by a several cm deep water layer. Shallow Arangatuj Lake (55 km^2) is situated in the central part of the isthmus (KOŽOV 1962). The isthmus is characterized by the occurrence of hot springs and patches of permafrost (MOLOŽNIKOV 1974). Annual oscillation of water level at Lake Baikal is about 30-35 cm with a peak in September. Long-term oscillations reach their maxima every 40-65 years and their action results in the creation of sandy coastal banks. There are more than 100 such banks in the South-west of the isthmus (GALAZIJ 1967, GALAZIJ et al. 1969). Water level oscillations strongly influenced the vegetation of the isthmus, but since the building of the Irkutsk dam on the Angara river in 1962, the water level has risen and mainly artificial oscillations are present now.

The continental climate of Eastern Siberia becomes more maritime on the Baikal coasts. Maritime features predominate in summer and autumn, and continental ones in winter, when the lake is iced over (MOLOŽNIKOV 1976). The mean annual temperature of the area under study is -1.9 °C (MOLOŽNIKOV 1974). Temperatures undergo marked seasonal fluctuations. The absolute minimum and maximum recorded were -52 °C in January, and +37 °C in July, respectively. Temperature minima are reached in January/February, maxima in July/August (IMETCHENOV and MATVEJČUK 1990). First frosts occur from early September to early October and the last from early to middle June (BUFAL and VIZENKO 1976, IMETCHENOV and MATVEJČUK 1990). The frost-free period lasts for approximately 100 days in Ust'-Barguzin town near the SE border of the peninsula (IMETCHENOV and MATVEJČUK 1990). Mean annual rainfall is under strong orographical control; according to a regional isohyet map (GALAZIJ et al. 1969), it ranges from 300-350 mm along the NW coasts of the peninsula to 500-600 mm in summit areas. Snow cover lies 6 months on the coast and 9 months on summits. Its thickness ranges from 50 cm on the isthmus to 120 cm in leeward sites on summits (MOLOŽNIKOV 1974). Due to breeze effects, fog condensation occurs on the coasts of Baikal, mainly in June and July. The fogs cool the air and the coasts are cooler than the middle elevations.

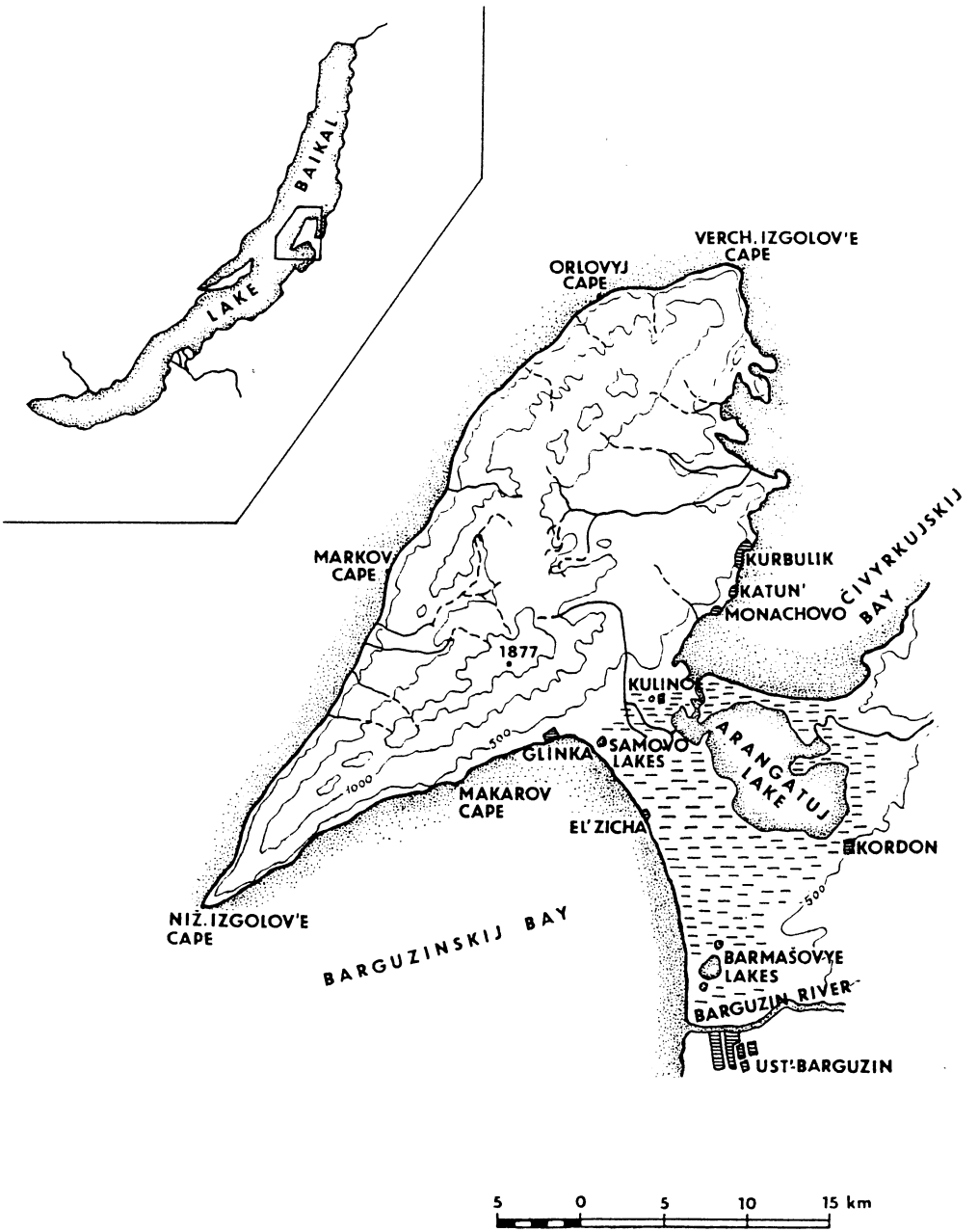

Fig. 1. Svjatoj Nos Peninsula.

Owing to these conditions, vegetation inversion occurs on the Baikal coasts. Many species, which occurred originally in the alpine tundra (golcy) and sub-tundra (podgolcy) belts have descended to the coasts, where the so-called lower sub-tundra belt is present (TJULINA 1967, 1976). However, according to our observations, this belt is not present everywhere, but the descent of particular plants is common. This belt is bounded by a light taiga forest belt, dominated by *Larix sibirica* and *Pinus sylvestris*, on the mountain slopes, reaching up to the timberline. Dark taiga forest, consisting of *Pinus sibirica* and *Abies sibirica*, does not occupy large areas in the peninsula, but occurs only at sites with increased humidity. The timberline lies at 1220-1300 m on more humid, lakeward NW slopes where the winds bring moisture-laden air and at about 1100-1150 m on drier landward SE slopes (MOLOŽNIKOV 1970). Above the timberline, extensive *Pinus pumila* scrub (podgolcy) occurs. The summits, affected by strong winds, are covered by alpine tundra (golcy). In the piedmonts, some wind-exposed steep slopes ending in the lake are occupied by primary steppe vegetation. The isthmus is covered predominantly by unforested wetlands and peatlands, but some non-flooded areas along the SW coasts are forested by light *Pinus sylvestris* taiga. The vegetation of the study area is predominantly native. However, restricted forest areas have been burned and some wetland margins are exploited as pastures or hay meadows.

The floristic characterization of the peninsula is described in BOJKOV et al. (1991) and ANENCHONOV et al. (1992). Some data on vegetation, using traditional Russian methods of classification according to dominants, are presented in MOLOŽNIKOV (1986) and BOJKOV (1990).

Other details about the environment of the study area can be found in MLÍKOVSKÝ et al. (1992).

METHODS

For the description of vegetation, the classical methods of the Braun-Blanquet approach (BRAUN-BLANQUET 1964, WESTHOFF and VAN DER MAAREL 1978) were used. Field sampling was carried out using the 7-grade scale of abundance and dominance (-,+,1,2,3,4,5).

Nomenclature of syntaxa was revised in order to follow the rules of the 2nd edition of the Code (BARKMAN et al. 1986). Descriptions of syntaxa in manuscripts deposited in the All-Union Institute of Scientific and Technical Information in Moscow are not considered effectively published in the sense of Art. 1 of the Code, although Russian phytosociologists do so (cf. MIRKIN 1986), and therefore the major part of the names published and used by them are invalid (MORAVEC, pers. comm.). In order to use validly published names in the present paper, many syntaxa recognized earlier by other authors had to be described as new. Where possible, validation of traditionally used names was preferred to formation of new names. In these cases, original forms of names were not taken from uneffectively published manuscripts, but from effectively published papers (where the names of syntaxa were usually not valid in the sense of Art. 2b due to absence of sufficient original diagnoses). Author citations of the validated syntaxa were modified according to the proposals of MORAVEC (1992).

Vascular plant names used follow "Flora Sibiri" for families that have been treated in volumes published so far (KRASNOBOROV 1988, KRASNOBOROV and MALYŠEV 1992, MALYŠEV and PEŠKOVA 1987, 1990, 1993, PEŠKOVA and MALYŠEV 1990, POLOŽIJ and MALYŠEV 1988); the others are according to MALYŠEV and PEŠKOVA (1979). Nomenclature of lichens follows SANTESSON (1984) and that of mosses largely FRAHM and FREY (1983).

SYNTAXONOMICAL SURVEY OF THE NON FOREST VEGETATION OF SVJATOJ NOS PENINSULA

Betuletea rotundifoliae MIRKIN ex CHYTRÝ, PEŠOUT et ANENCHONOV 1993
?order
Dryadion oxyodontae ŽITLUCHINA et ONIŠČENKO ex CHYTRÝ, PEŠOUT et ANENCHONOV 1993
Alectorio ochroleucae-Patrinietum sibiricae CHYTRÝ, PEŠOUT et ANENCHONOV 1993
Betuletalia rotundifoliae MIRKIN ex CHYTRÝ, PEŠOUT et ANENCHONOV 1993
Empetro-Betulion rotundifoliae ŽITLUCHINA et ONIŠČENKO ex CHYTRÝ, PEŠOUT et ANENCHONOV 1993
Rhododendro aurei-Betuletum exilis CHYTRÝ, PEŠOUT et ANENCHONOV 1993
Cladino stellaris-Betuletum exilis CHYTRÝ, PEŠOUT et ANENCHONOV 1993
Anemonastro sibiricae-Festucion ovinae CHYTRÝ, PEŠOUT et ANENCHONOV 1993
Anemonastro sibiricae-Festucetum ovinae CHYTRÝ, PEŠOUT et ANENCHONOV 1993
Aconito-Geranietea albiflori ŽITLUCHINA et ONIŠČENKO ex CHYTRÝ, PEŠOUT et ANENCHONOV 1993
Trollio-Crepidetalia sibiricae GUINOCHET per CHYTRÝ, PEŠOUT et ANENCHONOV 1993
Trollio-Crepidion sibiricae GUINOCHET per CHYTRÝ, PEŠOUT et ANENCHONOV 1993
Geranium albiflorum-Pedicularis uncinata community
Pteridium aquilinum-Bergenia crassifolia community
Lemnetea TÜXEN 1955
Lemnetalia minoris TÜXEN 1955
Lemnion minoris TÜXEN 1955
Lemnetum minoris TH. MÜLLER et GÖRS 1960
Lemnetum trisulcae SOÓ 1927
Lemno-Spirodeletum SLAVNIĆ 1956
Lemno-Utricularietalia PASSARGE 1978
Utricularion vulgaris PASSARGE 1964
Lemno-Utricularietum vulgaris SOÓ 1928
Hydrocharitetalia RÜBEL 1933
Hydrocharition RÜBEL 1933
Ceratophylletum demersi (SOÓ 1928) EGGLER 1933
Potametea KLIKA in KLIKA et NOVÁK 1941
Potametalia KOCH 1926
Nymphaeion albae OBERDORFER 1957
Polygonetum amphibii SOÓ 1927
Myriophyllo verticillati-Nymphaeetum tetragonae CHYTRÝ, PEŠOUT et ANENCHONOV 1993
Sparganium gramineum community
Potamion lucentis VOLLMAR 1947
Potametum lucentis HUECK 1931
Potametum perfoliati (KOCH 1926) PASSARGE 1964
Myriophyllo-Potametum SOÓ 1934
Potamogeton alpinus ssp. *tenuifolius* community
Potamogeton praelongus community
Potamion pusilli VOLLMAR 1947

Potametum pectinati CARSTENSEN 1955
Callitricho-Batrachietalia PASSARGE 1978
Batrachion aquatilis PASSARGE 1964
Batrachietum circinati (BENNEMA et WESTHOFF 1943) SEGAL 1965
Utricularietea intermedio-minoris PIETSCH 1965
Utricularietalia intermedio-minoris PIETSCH 1965
Sphagno-Utricularion TH. MÜLLER et GÖRS 1960
Sparganietum minimi SCHAAF 1925
Isoëto-Nanojuncetea BR.-BL. et TÜXEN 1943
Cyperetalia fusci PIETSCH 1963
Elatini-Eleocharition ovatae PIETSCH 1973
Carex bohemica community
Phragmito-Magnocaricetea KLIKA in KLIKA et NOVÁK 1941
Phragmitetalia KOCH 1926
Phragmition communis KOCH 1926
Phragmitetum communis (GAMS 1927) SCHMALE 1939
Equisetetum fluviatilis STEFFEN 1931
Bolboschoenetalia maritimi HEJNÝ in HOLUB et al. 1967
Scirpion maritimi DAHL et HADAČ 1941
Schoenoplectetum tabernaemontani RAPAICS 1927
Oenanthetalia aquaticae HEJNÝ in KOPECKÝ et HEJNÝ 1965
Oenanthion aquaticae HEJNÝ ex NEUHÄUSL 1959
Hippuridetum vulgaris PASSARGE 1955
Senecionetum congesti MIRKIN, GOGOLEVA et KONONOV per CHYTRÝ, PEŠOUT et ANENCHONOV 1993
Eleocharis mamillata community
Eleocharis mamillata-Sparganium minimum community
Ranunculus gmelinii community
Magnocaricetalia PIGNATTI 1953
Cicution virosae HEJNÝ ex SEGAL in WESTHOFF et DEN HELD 1969
Calletum palustris (VAN DER BERGHEN 1952) SEGAL et WESTHOFF in WESTHOFF et DEN HELD 1969
Caricion rostratae BALÁTOVÁ-TULÁČKOVÁ 1963
Caricetum rostratae OSVALD 1923
Comaro-Caricetum lasiocarpae BALÁTOVÁ-TULÁČKOVÁ et HÜBL 1985
Caricetum diandrae (ALMQUIST 1929) JONAS 1933
Scheuchzerio-Caricetea fuscae TÜXEN 1937
Caricetalia fuscae KOCH 1926
Sphagno warnstorfiani-Tomenthypnion DAHL 1957
Triglochino maritimi-Tomenthypnetum nitentis CHYTRÝ, PEŠOUT et ANENCHONOV 1993
*Oxycoccus palustris-Betula *exilis* community
Oxycocco-Sphagnetea BR.-BL. et TÜXEN 1943
Sphagnetalia medii KÄSTNER et FLÖSSNER 1933
Sphagnion medii KÄSTNER et FLÖSSNER 1933
Chamaedaphno-Pinetum pumilae CHYTRÝ, PEŠOUT et ANENCHONOV 1993
Chamaedaphno-Pinetum sibiricae CHYTRÝ, PEŠOUT et ANENCHONOV 1993

Calamagrostietea langsdorffii MIRKIN ex MIRKIN et al. 1992
Calamagrostietalia langsdorffii ACHTJAMOV, MIRKIN et URAZMETOV 1985 ex MIRKIN et al. 1992
Calamagrostion langsdorffii ACHTJAMOV, MIRKIN et URAZMETOV 1985
Truellum sieboldii-Calamagrostis langsdorfii community
Caricion appendiculatae ACHTJAMOV, MIRKIN et URAZMETOV 1985
Caricetum juncellae MIRKIN, GOGOLEVA et KONONOV per CHYTRÝ, PEŠOUT et ANENCHONOV 1993
Deschampsio turczaninowii-Caricetum juncellae CHYTRÝ, PEŠOUT et ANENCHONOV 1993
?class
?order
Oxytropidion lanatae CHYTRÝ, PEŠOUT et ANENCHONOV 1993
Craniospermo-Leymetum secalini CHYTRÝ, PEŠOUT et ANENCHONOV 1993
Oxytropido lanatae-Festucetum baicalensis CHYTRÝ, PEŠOUT et ANENCHONOV 1993
Stellario dichotomae-Rosetum acicularis CHYTRÝ, PEŠOUT et ANENCHONOV 1993
Cleistogenetea squarrosae MIRKIN et al. ex GOGOLEVA et al. 1987
?order
?alliance
Schizonepeta multifida-Carex pediformis community
Potentillo acaulis-Thymetum baicalensis CHYTRÝ, PEŠOUT et ANENCHONOV 1993
Saxifrago bronchialis-Phlojodicarpetum baicalensis CHYTRÝ, PEŠOUT et ANENCHONOV 1993

DESCRIPTION OF SYNTAXA

1. **Betuletea rotundifoliae** MIRKIN ex CHYTRÝ, PEŠOUT et ANENCHONOV, **cl. nov. hoc loco**
Siberian alpine tundra
Original publication: *Betuletea rotundifoliae* MIRKIN 1985 nom. inval. (art. 2b).
Nomenclatural typus: *Betuletalia rotundifoliae* MIRKIN et al. ex CHYTRÝ, PEŠOUT et ANENCHONOV 1993 (holotypus hoc loco).
Diagnostic species: *Festuca ovina* s.l., *Schulzia crinita*, *Cetraria cucullata*, *C. islandica* s.l., *Cladina rangiferina*.

? order

Dryadion oxyodontae ŽITLUCHINA et ONIŠČENKO ex CHYTRÝ, PEŠOUT et ANENCHONOV, **all. nov. hoc loco**
Wind-exposed silicolous tundra
Original publication: *Dryadion oxyodontae* ŽITLUCHINA et ONIŠČENKO in ŽITLUCHINA 1989 nom. inval. (art. 2b).
Nomenclatural typus: *Alectorio ochroleucae-Patrinietum sibiricae* CHYTRÝ, PEŠOUT et ANENCHONOV 1993 (holotypus hoc loco).
Diagnostic species: *Dryas oxyodonta*, *Minuartia arctica*, *Patrinia sibirica*, *Pedicularis oederi*.

Table 1. *Betuletea rotundifoliae* communities (1-5 *Alectorio ochroleucae-Patrinietum sibiricae*, 6-10 *Rhododendro aurei-Betuletum exilis*, 11-13 *Cladino stellaris-Betuletum exilis*, 14-19 *Anemonastro sibiricae-Festucetum ovinae*)

Relevé nr.	1	2	3	4	5	K1
Sample area (m^2)	100	100	50	100	25	
Aspect	NW	NW	SW	-	SW	
Slope (°)	5	5	5	0	5	
Cover E_2 (%)	1	5	0	0	0	
Cover E_1 (%)	50	60	10	3	5	
Cover E_0 (%)	60	70	10	20	20	
E_2 - scrub layer						
Betula nana ssp. *exilis*	+	1	.	.	.	40
Salix krylovii	.	.	.	.	.	.
Pinus pumila	.	.	.	.	.	.
Juniperus sibirica	.	.	.	.	.	.
E_1 - field layer						
Minuartia arctica	1	+	1	1	1	100
Saxifraga algisii	1	+	.	+	1	80
Selaginella rupestris	+	.	+	+	+	80
Patrinia sibirica	-	.	1	1	1	80
Poa sp.	+	1	.	+	.	60
Oxytropis alpicola	.	+	.	.	-	40
Vaccinium uliginosum	1	1	.	.	.	40
Carex aterrima	.	.	.	.	.	.
Rubus chamaemorus	.	.	.	.	.	.
Ledum palustre s.l.	.	.	.	.	.	.
Festuca ovina s.l.	.	.	.	.	.	.
Bergenia crassifolia	.	.	.	.	.	.
Anemonastrum sibiricum	1	1	.	-	.	600
Anthoxanthum alpinum	.	.	.	.	.	.
Rhododendron aureum	.	+	.	.	.	20
Empetrum subholarcticum	+	2	.	.	.	40
Aconogonon ocreatum	+	+	1	+	+	100
Rhodococcum vitis-idaea	1	1	-	.	.	60
Pedicularis oederi	-	+	.	.	.	40
Campanula rotundifolia s.l.	+	+	.	.	.	40
Rosa acicularis	.	+	.	.	.	20
Salix sphenophylla	2	2	.	.	.	40
Trisetum altaicum	.	+	.	.	.	20
Carex bigelowii ssp. *ensifolia*	.	.	.	.	.	.
Veratrum lobelianum	.	.	.	.	.	.
Vaccinium myrtillus	.	.	.	.	.	.
Diphasiastrum alpinum	.	.	.	.	.	.
Solidago dahurica	.	.	.	.	.	.
Viola altaica	.	.	.	.	.	.
E_0 - ground layer						
Cetraria nivalis	3	3	1	.	.	60
Bryoria nitidula	2	1	.	.	.	40
Dicranum elongatum	.	.	.	.	.	.

6	7	8	9	10	K2	11	12	13	K3	14	15	16	17	18	19	K4
100	100	100	25	25		100	100	100		100	30	25	100	100	100	
NW	NW	NW	W	W		NNW	-	-		-	-	N	-	S	N	
5	5	5	3	3		5	0	0		0	0	10	0	5	10	
10	10	5	10	1		80	50	70		10	0	0	0	0	0	
60	60	50	50	50		50	40	50		70	70	80	25	40	40	
90	90	90	100	90		80	25	40		60	70	70	90	35	40	
2	1	1	2	.	80	4	3	4	100	.	.	.	.	.	.	.
.	1	+	.	.	40	2	.	.	33	.	.	.	.	.	.	.
.	.	.	.	+	20	.	1	1	66	.	.	+	.	.	-	33
.	.	.	.	.	.	.	.	1	33	2	.	.	.	.	1	33
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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1	1	2	2	2	100	.	.	.	.	.	.	.	.	.	.	.
1	2	2	.	.	60	.	.	.	.	.	.	.	.	+	.	17
.	+	+	.	.	40	.	.	.	.	.	.	.	.	.	.	.
1	+	1	+	3	100	2	.	.	33	.	.	.	.	.	.	.
.	.	.	.	.	.	-	+	+	100	2	2	1	2	2	2	100
.	.	.	.	.	.	+	.	.	33	2	1	2	1	1	1	100
+	.	.	.	.	20	-	-	-	100	2	2	+	2	1	1	100
.	.	.	.	.	.	.	.	.	.	.	.	1	+	+	.	50
2	2	2	3	1	100	2	.	.	33	1	+	3	.	2	4	83
2	2	+	3	2	100	+	3	2	100	.	+	.	.	.	1	33
+	.	.	.	.	20	.	.	.	.	+	+	.	+	+	.	67
.	.	.	1	+	40	1	1	1	100	.	.	.	+	+	+	50
.	-	.	.	1	40	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	33
+	.	.	.	-	40	+	.	.	33	.	.	.	.	.	.	.
2	.	.	.	.	20	.	.	.	.	.	.	.	.	.	.	.
+	.	.	.	.	20	+	.	.	33	.	.	.	.	.	.	.
.	.	.	1	.	20	.	.	.	.	.	1	2	.	.	.	33
.	.	.	.	.	.	-	.	.	33	2	2	.	.	.	.	33
.	.	.	.	.	.	.	1	2	66	.	.	2	.	.	1	33
.	.	.	.	.	.	.	2	1	66	.	.	.	.	1	.	17
.	.	.	.	.	.	.	.	.	.	.	-	.	.	-	.	33
.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	33
.	.	.	.	.	.	.	.	.	.	.	.	.	-	.	.	17
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	2	1	.	1	80	.	.	.	.	.	.	.	.	.	.	.

Tab. 1 - cont.

Relevé nr.	1	2	3	4	5	K1
Polytrichum strictum	.	.	.	.	.	.
Aulacomnium turgidum	.	.	.	.	.	.
Sphagnum fuscum	.	.	.	.	.	.
Alectoria ochroleuca	+	1	1	+	+	100
Cladina stellaris	.	.	.	.	.	.
Cetraria islandica s.l.	+	1	.	.	.	40
Cetraria cucullata	+	2	.	.	.	40
Cladina rangiferina	.	.	.	.	.	.
Cetraria delisei	.	.	.	.	.	.
Cladina arbuscula	2	.	.	.	.	20
Cladonia amaurocraea	.	.	+	.	.	20
Polytrichum commune	.	.	.	.	.	.
Stereocaulon paschale	.	.	.	.	.	.
Haematomma ventosum	.	.	.	1	+	40
Nephroma arcticum	.	.	.	1	+	40
Cladonia furcata	.	.	.	.	.	.
Mylia anomala	.	.	.	.	.	.
Pleurozium schreberi	.	.	.	.	.	.
Polytrichum piliferum	.	.	.	.	.	.
Polytrichum juniperinum	.	.	.	.	.	.

In one relevé only:

E_2: *Betula divaricata* 10: 2;

E_1: *Pinus pumila* juv. 3: -, *Potentilla elegans* 3: -, *Silene chamarensis* 5: 1, *Salix divaricata* 9: 2, *Calamagrostis lapponica* 10: 1, *Oxycoccus microcarpus* 10: +, *Salix* sp. 10: +, *Carex canescens* 18: +;

E_0: *Pseudephebe minuscula* 4: 1, *Parmelia centrifuga* 5: +, *Umbilicaria polyrrhiza* 5: +, *Gymnocolea inflata* 6: +, *Sphagnum angustifolium* 7: +, *Dicranum spadiceum* 9: +, *Polytrichum jensenii* 9: +, *Sphagnum nemoreum* 10: 1, *Peltigera leucophlebia* 10: +, *Calypogeia sphagnicola* 10: -, *Aulacomnium palustre* 11: 2, *Dicranum* sp. 12: +, *Stereocaulon alpinum* 13: 2, *Ceratodon purpureus* 13: +, *Cladonia pleurota* 14: +, *Lecidea uliginosa* 14: +, *Cladonia pyxidata* 15: +, *Polytrichum* sp. 16: +, *Cetraria* sp. 16: -, *Cladonia fimbriata* 17: +, *Stereocaulon* sp. 18: +.

Table 2. *Lemnetea* communities (1-3 *Lemnetum trisulcae*, 4-5 *Lemnetum minoris*, 6-9 *Lemno-Spirodeletum*, 10-14 *Lemno-Utricularietum vulgaris*, 15-17 *Ceratophylletum demersi*).

Relevé nr.	1	2	3	K1	4	5	K2
Sample area (m^2)	25	25	25		25	25	
Water depth (cm)	60	200	30		30	150	
Cover (%)	80	100	100		100	100	
Lemna trisulca	4	5	5	100	1	.	50
Lemna minor	2	+	.	67	4	5	100
Spirodela polyrrhiza	.	.	.	.	.	.	.
Utricularia vulgaris	.	.	.	.	.	.	.
Ceratophyllum demersum	.	.	.	.	.	.	.
Potamogeton perfoliatus	.	.	+	33	.	.	.

6	7	8	9	10	K2	11	12	13	K3	14	15	16	17	18	19	K4
2	2	1	+	.	80	.	.	.	.	.	.	.	.	.	.	.
2	2	2	.	1	80	.	.	.	.	.	.	.	.	.	.	.
+	2	4	5	1	100	.	.	.	.	.	.	.	.	.	.	.
+	.	2	.	+	60	.	.	.	.	.	.	.	.	.	.	.
1	1	.	1	1	80	1	1	+	100	.	.	.	.	.	.	.
2	3	1	.	.	60	1	2	1	100	3	2	3	.	.	.	50
1	1	.	1	2	80	2	.	.	33	.	.	.	.	.	.	.
1	.	.	.	2	40	2	.	+	66	+	3	1	.	.	2	67
.	.	.	1	+	40	.	2	.	33	.	.	.	2	2	4	50
.	.	.	.	.	.	.	1	.	33	.	.	.	1	+	.	33
+	.	+	.	.	40	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	+	+	.	66	.	.	2	.	.	.	17
.	.	.	.	.	.	.	+	1	66	.	.	.	3	+	.	33
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	1	1	40	.	.	.	.	.	.	.	.	.	.	.
.	.	.	-	-	40	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	3	.	.	33	.	.	1	.	.	.	17
.	.	.	.	.	.	.	.	.	.	.	2	.	.	2	.	33
.	.	.	.	.	.	.	.	1	33	.	.	.	.	.	1	.

6	7	8	9	K3	10	11	12	13	14	K4	15	16	17	K5
25	25	25	25		5	5	5	5	5		100	100	100	
20	80	10	20		30	20	20	50	20		30	70	100	
100	80	100	100		100	100	100	100	100		100	100	100	
-	+	+	1	100	1	2	+	+	2	100	1	+	+	100
+	2	2	2	100	2	+	2	+	+	100	.	.	.	.
5	3	4	4	100	.	.	.	.	.	.	.	.	.	.
.	.	+	.	25	4	4	4	5	4	100	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	5	5	5	100
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Alectorio ochroleucae-Patrinietum sibiricae CHYTRÝ, PEŠOUT et ANENCHONOV, **ass. nov. hoc loco** (tab. 1, rel. 1-5)

Nomenclatural typus: tab. 1, rel. 3 (holotypus hoc loco).

A community of convex relief affected by strong winds. Soil layer is extremely shallow or completely lacking. Tall forbs or grasses do not occur in this community. There may be two groups recognized in table 1: relevés 3-5 are representatives of a more extreme, species-poor type with low cover, while relevés 1-2 originate from species-richer type with higher cover. It was recorded in summit areas of the Svjatoj Nos mountain range. Similar communities have been described from the West Sayan Mts. (ŽITLUCHINA 1989).

Betuletalia rotundifoliae MIRKIN ex CHYTRÝ, PEŠOUT et ANENCHONOV, **ord. nov. hoc loco**

Siberian alpine tundra

Original publication: *Betuletalia rotundifoliae* MIRKIN 1985 nom. inval. (art. 2b).

Syn.: *Cladonio-Schulzetalia crinitae* ŽITLUCHINA et ONIŠČENKO 1987 (art. 1).

Nomenclatural typus: *Empetro-Betulion rotundifoliae* ŽITLUCHINA et ONIŠČENKO ex CHYTRÝ, PEŠOUT et ANENCHONOV 1993 (holotypus hoc loco).

Diagnostic species: identical with those of the class.

Empetro-Betulion rotundifoliae ŽITLUCHINA et ONIŠČENKO ex CHYTRÝ, PEŠOUT et ANENCHONOV, **all. nov. hoc loco**

Dwarf-shrub tundra

Original publication: *Empetro-Betulion rotundifoliae* ŽITLUCHINA et ONIŠČENKO in ŽITLUCHINA 1989 nom. inval. (art. 2b).

Nomenclatural typus: *Rhododendro aurei-Betuletum exilis* CHYTRÝ, PEŠOUT et ANENCHONOV 1993 (holotypus hoc loco) (not *Empetro-Betuletum rotundifoliae* ŽITLUCHINA et ONIŠČENKO 1987 nom. inval. (art. 1) - see ŽITLUCHINA 1989: 76).

Diagnostic species: *Betula nana* s.l., *Empetrum subholarcticum*, *Ledum palustre* s.l., *Rhodococcum vitis-idaea*, *Rhododendron adamsii*, *R. aureum*, *Vaccinium uliginosum*, *Aulacomnium turgidum*, *Cladina stellaris*, *Pleurozium schreberi*, *Polytrichum affine*.

Rhododendro aurei-Betuletum exilis CHYTRÝ, PEŠOUT et ANENCHONOV, **ass. nov. hoc loco** (tab. 1, rel. 6-10)

Nomenclatural typus: tab. 1, rel. 8 (holotypus hoc loco).

A *Betula nana* ssp. *exilis* dominated tundra in poorly drained habitats, in shallow depressions, around springs, and at sites protected from the direct effects of extremely strong winds. Due to moist habitat conditions, the moss layer is usually well-developed, sometimes forming a thin layer of peat. It is typical of plateaus on the summit of the Svjatoj Nos mountain range above timberline. Similar vegetation was described from the alpine tundra of the West Sayan Mts. (ŽITLUCHINA 1989), and also from Mongolia, where it occurs in flood-plains of the rivers in forest belts due to vegetation inversion (MIRKIN 1985, MIRKIN et al. 1986).

Cladino stellaris-Betuletum exilis CHYTRÝ, PEŠOUT et ANENCHONOV, **ass. nov. hoc loco** (tab. 1, rel. 11-13)

Nomenclatural typus: tab. 1, rel. 11 (holotypus hoc loco).

Compared with the preceding association, this is a community of slightly drier habitats on comparatively well-drained soils. Due to comparatively poor water saturation, the performance of peat mosses is lower. *Betula nana* ssp. *exilis* reaches a higher dominance value, thus forming an almost closed dwarf scrub. Species of the field and ground layers of

krummholz stands make up an important contribution to the species composition. This community was found on the summit plateau of the Svjatoj Nos mountain range. It is very closely related to the association *Vaccinio myrtilli-Betuletum rotundifoliae* ŽITLUCHINA et ONIŠČENKO 1987 which was described from the alpine tundra of the West Sayan Mts. (ŽITLUCHINA 1989).

Anemonastro sibiricae-Festucion ovinae CHYTRÝ, PEŠOUT et ANENCHONOV, **all. nov. hoc loco**

Silicicolous short alpine grasslands

Nomenclatural typus: *Anemonastro sibiricae-Festucetum ovinae* CHYTRÝ, PEŠOUT et ANENCHONOV 1993 (holotypus hoc loco).

Diagnostic species: *Anemonastrum sibiricum*, *Anthoxanthum alpinum*, *Campanula rotundifolia* s.l., *Diphasiastrum alpinum*, *Festuca ovina* s.l., *Vaccinium myrtillus*, *Polytrichum piliferum*, *Stereocaulon alpinum*.

Floristic composition of the communities of this alliance is sometimes similar to that of *Empetro-Betulion rotundifoliae*. However, the latter represents the shrub-dominated tundra, contrary to *Anemonastro sibiricae-Festucion ovinae* which involves short grasslands.

Anemonastro sibiricae-Festucetum ovinae CHYTRÝ, PEŠOUT et ANENCHONOV, **ass. nov. hoc loco** (tab. 1, rel. 14-19)

Nomenclatural typus: tab. 1, rel. 15 (holotypus hoc loco).

Short grasslands at sites protected from the direct influence of strong winds, usually in shallow depressions with long-lasting snow cover. The soil is prone to drying out in summer. This community was recognized on a plateau in a summit area of the Svjatoj Nos mountain range. Stands of this association were also found above the alpine timberline in the valley of the Bol'šaja Čeremšana river in the Barguzinskij Range (DANIHELKA 1993). Similar types of meadows are frequently distributed in the mountains of the Northern Baikal area (TJULINA 1976, MOLOŽNIKOV 1986).

2. **Aconito-Geranietea albiflori** ŽITLUCHINA et ONIŠČENKO ex CHYTRÝ, PEŠOUT et ANENCHONOV, **cl. nov. hoc loco**

Siberian subalpine meadows and tall-forb communities

Original publication: *Aconito-Geranietea* ŽITLUCHINA et ONIŠČENKO in ŽITLUCHINA 1989 nom. inval. (art. 2b).

Nomenclatural typus: *Trollio-Crepidetalia sibiricae* GUINOCHET ex CHYTRÝ, PEŠOUT et ANENCHONOV 1993 (holotypus hoc loco).

Diagnostic species: *Aconitum paskoi* (taxon giving the name to the class), *A. rubicundum*, *Aquilegia glandulosa*, *Calamagrostis langsdorfii*, *Doronicum altaicum*, *Geranium albiflorum*, *Pedicularis uncinata*, *Poa sibirica*, *Solidago dahurica*, *Trollius asiaticus* (taxon giving the name to the order and alliance), *Veratrum lobelianum*.

Trollio-Crepidetalia sibiricae GUINOCHET per CHYTRÝ, PEŠOUT et ANENCHONOV, **ord. nov. hoc loco**

Siberian subalpine meadows and tall-forb communities

Original publication: *Trollio-Crepidetalia sibiricae* GUINOCHET 1982 nom. inval. (art. 5).

Syn.: *Aconito-Geranietalia albiflori* ŽITLUCHINA et ONIŠČENKO in ŽITLUCHINA 1989 (art. 2b).

Nomenclatural typus: *Trollio-Crepidion sibiricae* GUINOCHET per CHYTRÝ, PEŠOUT et ANENCHONOV 1993 (holotypus hoc loco).

Diagnostic species: identical with those of the class.

Trollio-Crepidion sibiricae GUINOCHET per CHYTRÝ, PEŠOUT et ANENCHONOV, **all. nov. hoc loco**

Subalpine meadows and tall-forb communities

Original publication: *Trollio-Crepidion sibiricae* GUINOCHET 1982 nom. inval. (art. 5).

Syn.: *Aconito-Geranion albiflori* ŽITLUCHINA et ONIŠČENKO 1987 (art. 1), *Rhaponticion carthamoidis* ŽITLUCHINA 1988 (art. 1).

Nomenclatural typus: *Rubo-Cardaminetum macrophyllae* GUINOCHET 1982 (holotypus hoc loco).

Diagnostic species: identical with those of the class.

Geranium albiflorum-Pedicularis uncinata community

This tall-forb community was found on the bottom of a V-shaped valley of a mountain creek in the subalpine belt. The substratum is formed of comparatively large boulders, with interspace partially filled with soil. Similar communities are rare in the study area, because valleys in the subalpine belt of the Svjatoj Nos Range are usually very narrow and do not possess bottoms suitable for the development of this vegetation. Very similar vegetation was recorded in the subalpine belt of the Bol'šaja Čeremšana river valley in the Barguzinskij Range (DANIHELKA 1993). Other communities are known from the Sayan Mts. (GUINOCHET 1982, ŽITLUCHINA 1989) and from the mountain areas of Northern Mongolia (HILBIG 1990). Species composition is documented by the following relevé:

Valley of a creek 8.5 km SSE of the Markov cape, 1150 m a.s.l., sample area 100 m^2, aspect WSW, slope 5°, cover E_1 = 80 %, E_0 = 10 %, VIII.91.

E_1: *Chamaenerion angustifolium* 2, *Equisetum pratense* 2, *Geranium albiflorum* 2, *Pedicularis uncinata* 2, *Tanacetum vulgare* 2, *Trollius kytmanovii* 2, *Aconitum rubicundum* 1, *Angelica decurrens* 1, *Calamagrostis neglecta* 1, *C. langsdorfii* 1, *Elymus transbaicalensis* 1, *Festuca ovina* s.l. 1, *Galium verum* 1, *Poa sibirica* 1, *Silene repens* 1, *Thalictrum minus* 1, *Allium splendens* +, *Anemonastrum sibiricum* +, *Anthriscus aemula* +, *Aquilegia glandulosa* +, *Artemisia tanacetifolia* +, *Bergenia crassifolia* +, *Botrychium boreale* +, *Campanula glomerata* +, *Crepis sibirica* +, *Dianthus superbus* ssp. *sajanensis* +, *Erigeron politus* +, *Hieracium* cf. *krylovii* +, *Hieracium* cf. *robustum* +, *Lilium pilosiusculum* +, *Orthilia secunda* +, *Solidago dahurica* +, *Sorbaria pallasii* +, *Spiraea media* juv. +, *Rosa acicularis* +, *Trisetum altaicum* +, *Veratrum lobelianum* +, *Atragene speciosa* -, *Dracocephalum nutans* -, *Luzula sibirica* -, *Saxifraga punctata* -, *Viola uniflora* -;

E_0: *Polytrichum piliferum* 1, *Bryum* sp. 1, *Calliergonella cuspidata* +, *Cladonia pyxidata* +.

Pteridium aquilinum-Bergenia crassifolia community

This community was found in the stony, comparatively flat bottom of a valley with an intermittent stream in the upper part of the forest belt. The habitat is moist in spring when the stream is active and dry in summer. No similar communities are mentioned in the phytosociological literature (cf. KOROTKOV et al. 1991). This community is documented in the following relevés:

Valley of a creek 3 km NW of Makarov cape, 950 m a.s.l., sample area 40 m^2, aspect SSW, slope 15°, cover E_1 = 90 %, E_0 absent, 14.VIII.91.

E_1: *Bergenia crassifolia* 3, *Pteridium aquilinum* 2, *Carex pediformis* s.l. 2, *Rosa acicularis* 2, *Solidago dahurica* 1, *Chamaenerion angustifolium* +, *Galium verum* +, *Origanum vulgare* +, *Poa sibirica* +, *Aconogonon ocreatum* +, *Rhodococcum vitis-idaea* +, *Rubus sachalinensis* juv. +, *Spiraea media* +, *Trisetum altaicum* +.

Dtto, 900 m a.s.l., sample area 20 m², aspect SSW, slope 15°, cover E_1=80 %, E_0=5 %, VIII.91.

E_1: *Pteridium aquilinum* 3, *Bergenia crassifolia* 2, *Calamagrostis epigeios* 1, *Calamagrostis langsdorfii* 1, *Carex pediformis* s.l. 1, *Crepis sibirica* 1, *Dendranthemum zawadskii* 1, *Poa sibirica* 1, *Rosa acicularis* 1, *Rubus saxatilis* 1, *Aquilegia glandulosa* +, *Betula pendula* s.l. juv. +, *Galium verum* +, *Geranium albiflorum* +, *Lathyrus humilis* +, *Maianthemum bifolium* +, *Melica nutans* +, *Origanum vulgare* +, *Rhodococcum vitis-idaea* +, *Rubus sachalinensis* juv. +, *Thalictrum minus* +, *Vicia nervata* +, *Campanula glomerata* -.

E_0: *Pleurozium schreberi* 1, *Bryum* sp. +, *Cladonia* cf. *fimbriata* +, *Dicranum polysetum* +, *Polytrichum piliferum* +.

3. *Lemnetea* TÜXEN 1955
Lemnetalia minoris TÜXEN 1955
Lemnion minoris TÜXEN 1955

Lemnetum trisulcae SOÓ 1927 (tab. 2, rel. 1-3)

A species-poor community dominated by *Lemna trisulca* which occurs in still water up to 200 cm deep, often covering large areas. This is the first report on its occurrence in Siberia (cf. KOROTKOV et al. 1991).

Lemnetum minoris TH. MÜLLER et GÖRS 1960 (tab. 2, rel. 4-5)

An extremely species-poor community, colonizing still water surfaces in habitats protected from the effects of waves and wind, e.g. loose stands of tall sedges. This association has not been reported from Siberia so far (cf. KOROTKOV et al. 1991).

Lemno-Spirodeletum SLAVNIĆ 1956 (tab. 2, rel. 6-9)

A species-poor community occurring in still water surfaces. It prefers eutrophicated and wind-protected habitats. The occurrence of this association in Siberia has not been known so far (cf. KOROTKOV et al. 1991).

Table 3. *Nymphaeion albae* communities (1-7 *Myriophyllo verticillati-Nymphaeetum tetragonae*, 8-10 *Sparganietum graminei*, 11-12 *Polygonetum amphibii*).

Relevé nr.	1	2	3	4	5	6	7	K1	8	9	10	K2	11	12	K3
Sample area (m²)	100	100	100	100	100	100	100		100	100	100		200	200	
Water depth (cm)	40	70	120	200	250	200	300		200	200	100		100	200	
Cover (%)	40	50	10	10	70	50	50		80	50	80		90	100	
Nymphaea tetragona	2	2	1	2	4	3	3	100	-	-	.	67	.	-	50
Myriophyllum verticillatum	2	2	+	.	.	+	.	57	.	.	.	.	.	.	.
Sparganium gramineum	.	+	.	.	+	1	+	57	4	3	4	100	.	+	50
Persicaria amphibia	.	.	-	.	-	+	.	43	.	.	.	.	5	5	100
Potamogeton perfoliatus	.	.	.	.	.	+	+	29	+	+	.	67	+	-	100
Lemna trisulca	.	.	.	.	.	.	.	.	+	+	+	100	+	+	100
Utricularia vulgaris	+	.	+	+	.	.	.	43	.	.	.	.	.	.	.
Carex diandra	.	.	-	+	.	.	.	29	.	.	.	.	.	.	.
Phragmites australis	.	.	.	.	.	.	.	.	.	.	+	33	.	.	.

Table 4. *Potamion lucentis* and *Potamion pusilli* communities (1-4 *Potametum lucentis*, 5-8 *Potametum perfoliati*, 9-11 *Myriophyllo-Potametum*, 12-15 *Potamogeton alpinus* ssp. *tenuifolius* comm., 16 *Potamogeton praelongus* comm., 17-18 *Potametum pectinati*).

Relevé nr.	1	2	3	4	K2	5	6	7	8	K3
Sample area (m^2)	25	25	25	25		100	100	100	100	
Water depth (cm)	90	90	90	75		100	75	200	250	
Cover (%)	14	15	19	38		50	50	25	50	
Potamogeton lucens	3	4	3	4	100	.	.	.	.	.
Persicaria amphibia	+	1	.	.	50	.	.	.	.	.
Potamogeton perfoliatus	.	.	.	1	25	3	3	2	3	100
Phragmites australis	.	.	.	.	.	+	-	-	.	75
Sparganium gramineum	.	.	.	.	.	-	.	-	.	50
Potamogeton compressus	.	.	.	.	.	.	.	.	.	.
Myriophyllum verticillatum	1	1	+	.	75	.	.	.	.	.
Potamogeton alpinus ssp. *tenuifolius*	1	-	.	.	50	.	.	.		
Callitriche palustris	1	1	.	.	50	.	.	.	.	.
Lemna minor	.	.	.	.	.	.	.	.	.	.
Potamogeton pusillus s.l.	.	.	.	.	.	.	.	.	.	.
Ceratophyllum demersum	.	.	.	.	.	.	.	.	.	.
Potamogeton praelongus	.	.	.	.	.	.	.	.	.	.
Potamogeton pectinatus s.l.	.	.	.	.	.	.	.	.	.	.
Lemna trisulca	.	.	.	.	.	1	1	1	1	100
Batrachium circinatum	2	2	+	.	75	.	.	.	.	.
Nymphaea tetragona	.	.	.	.	.	.	.	+	-	50

Lemno-Utricularietalia PASSARGE 1978
Utricularion vulgaris PASSARGE 1964

Lemno-Utricularietum vulgaris SOÓ 1928 (tab. 2, rel. 10-14)

A two-layered, floating and submerged community most frequent in still waters 20-50 cm deep, where organic matter accumulates, e.g. among the tall sedge stands. This association is new for Siberia (cf. KOROTKOV et al. 1991).

Hydrocharitetalia RÜBEL 1933
Hydrocharition RÜBEL 1933

Ceratophylletum demersi (SOÓ 1928) EGGLER 1933 (tab. 2, rel. 15-17)

A species-poor community formed of dense stands of the dominant *Ceratophyllum demersum* which occur in deep water up to 100 cm. This association has not been known from Siberia until the present (cf. KOROTKOV et al. 1991).

4. *Potametea* KLIKA in KLIKA et NOVÁK 1941
Potametalia KOCH 1926
Nymphaeion albae OBERDORFER 1957

Myriophyllo verticillati-Nymphaeetum tetragonae CHYTRÝ, PEŠOUT et ANENCHONOV, **ass. nov. hoc loco** (tab. 3, rel. 1-7)

Nomenclatural typus: tab. 3, relevé 6 (holotypus hoc loco).

9	10	11	K4	12	13	14	15	K1	16	17	18	K5
25	25	25		25	25	25	25		200	5	5	
70	100	150		20	20	30	40		70	60	60	
90	90	90		100	100	100	100		90	50	50	
3	2	+	100	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.
2	2	3	100	.	.	.	.	.	.	+	2	100
2	1	2	100	.	.	.	.	.	.	.	.	.
2	.	1	67	2	4	4	3	100	.	.	.	.
.	.	.	.	3	1	+	.	75	.	.	.	.
.	.	.	.	+	+	2	.	75	.	.	.	.
.	.	.	.	+	1	+	.	75	.	.	.	.
.	.	.	.	1	.	.	2	50	.	.	.	.
.	.	.	.	.	.	.	.	.	5	.	.	.
.	.	.	.	.	.	.	.	.	.	4	3	100
-	.	1	67	2	1	1	2	100	+	-	+	100
+	+	-	100	.	.	.	.	.	.	.	.	.
.	+	1	67	.	.	.	.	.	.	.	.	.

A community of aerohydatophytes in still water up to 300 cm deep. It is distributed in deeper parts of small lakes and shallow and wind-protected Baikal bays (Čivyrkujskij Bay). Communities with *Nymphaea tetragona* have been described in Japan (cf. MIYAWAKI 1980-1989), but the Japanese association *Brasenio schreberi-Nymphaeetum tetragonae* OKUDA in MIYAWAKI 1983 comprises *Brasenia schreberi* and other species typical of the Far East and absent in Siberia.

Sparganium gramineum community (tab. 3, rel. 8-10)

This community is found in still, deeper water. It resists relatively strong waves. It was found on large areas in Čivyrkujskij Bay at depths of about 100-200 cm.

Polygonetum amphibii SOÓ 1927 (tab. 3, rel. 11-12)

A community occurring in still, slightly eutrophic water. It colonizes the deeper parts (cca 100-200 cm) of Čivyrkujskij Bay of Lake Baikal. This is the first report on this association from the territory of Siberia (cf. KOROTKOV et al. 1991).

Potamion lucentis VOLLMAR 1947

Potametum lucentis HUECK 1931 (tab. 4, rel. 1-4)

A community dominated by *Potamogeton lucens*. It occurs in still water 30-50 cm deep. The stands in shallower waters are species-richer. This association represents a new syntaxon for Siberia (cf. KOROTKOV et al. 1991).

Potametum perfoliati (KOCH 1926) PASSARGE 1964 (tab. 4, rel. 5-8)

This community consists mostly of monocoenotic stands of *Potamogeton perfoliatus* in still waters 70-250 cm deep. Stands of this association have not been reported from Siberia so far (cf. KOROTKOV et al. 1991).

Myriophyllo-Potametum SOÓ 1934 (tab. 4, rel. 9-11)

This community is found in still water 70-100 cm deep. Compared to other communities of the alliance, it is relatively rich in species. This is the first record from Siberia (cf. KOROTKOV et al. 1991).

Potamogeton alpinus ssp. *tenuifolius* community (tab. 4, rel. 12-15)

This community inhabits mostly shallow sublittorals of lakes with sandy bottoms. It is an invasive community, which occurs particularly in disturbed sites. Similar communities have not been reported from Siberia so far (KOROTKOV et al. 1991).

Potamogeton praelongus community (tab. 4, rel. 16)

A community of still water, found in depths of 70-100 cm. The syntaxonomic status of the stands dominated by *Potamogeton praelongus* is unclear. Similar stands were documented e.g. by ČERNOHOUS et HUSÁK (1986) from Bohemia.

Potamion pusilli VOLLMAR 1947

Potametum pectinati CARSTENSEN 1955 (tab. 4, rel. 17-18)

A species-poor community, occurring in water depths of about 50 cm. It prefers slightly eutrophicated waters. This community has not been reported from Siberia so far (cf. KOROTKOV et al. 1991).

Table 5. *Callitricho-Batrachietalia* and *Utricularietea intermedio-minoris* communities (1-3 *Ranunculetum circinati*, 4-13 *Sparganietum minimi*).

Relevé nr.	1	2	3	K1	4	5	6	7	8	9	10	11	12	13	K2
Sample area (m^2)	25	25	25		100	100	100	100	100	100	100	100	100	100	
Water depth (cm)	40	50	20		120	30	30	20	60	100	30	70	90	100	
Cover (%)	50	70	50		100	100	90	100	100	100	100	80	100	100	
Batrachium circinatum	2	3	3	100	.	.	.	.	.	.	.	.	.	.	.
Myriophyllum verticillatum	2	.	+	67	.	.	.	.	.	.	.	.	.	.	.
Potamogeton lucens	1	+	.	67	.	.	.	.	.	.	.	+	.	+	20
Potamogeton perfoliatus	+	1	.	67	.	.	.	.	.	.	.	.	.	.	.
Utricularia intermedia	.	.	.	.	4	4	3	4	4	4	5	4	4	4	100
Sparganium minimum	.	.	.	.	1	2	2	1	+	+	-	2	2	2	100
Potamogeton praelongus	.	.	.	.	+	.	.	.	.	+	.	1	-	.	40
Potamogeton gramineus	.	+	.	33	1	-	2	+	.	.	+	.	1	.	60
Nymphaea tetragona	.	.	.	.	+	+	-	.	.	.	.	.	.	.	30
Lemna trisulca	.	2	.	33	.	.	.	.	.	.	.	.	.	.	.

Callitricho-Batrachietalia PASSARGE 1978
Batrachion aquatilis PASSARGE 1964

Ranunculetum circinati (BENNEMA et WESTHOFF 1943) SEGAL 1965 (tab. 5, rel. 1-3)
This community of submerged plants is found in water about 50 cm deep. This is a new syntaxon for Siberia (cf. KOROTKOV et al. 1991).

5. *Utricularietea intermedio-minoris* PIETSCH 1965
Utricularietalia intermedio-minoris PIETSCH 1965
Sphagno-Utricularion TH. MÜLLER et GÖRS 1960

Sparganietum minimi SCHAAF 1925 (tab. 5, rel. 4-13)
A community typical of small pools in inundated, loose stands of tall sedges. The floristic composition of this community is very similar to that of the stands of this association described from the western part of Central Europe by various authors (for references see TÜXEN 1972). It is not possible to solve the problem of presumed identity of communities from suboceanic parts of Europe and from continental Siberia until there is more relevé material from continental areas. Except for the relevés presented here, there is no material from boreo-continental territories (cf. KOROTKOV et al. 1991).

6. *Isoëto-Nanojuncetea* BR.-BL. et TÜXEN 1943
Cyperetalia fusci PIETSCH 1963
Elatini-Eleocharition ovatae PIETSCH 1973

Carex bohemica community (tab. 6, rel. 1-3)
A community of disturbed soils with stagnant water on fine- to coarse-grained sands dominated by *Carex bohemica*. No related community is reported from the territory of the former USSR (KOROTKOV et al. 1991) and that is why no comparison and syntaxonomic evaluation is possible for the time being.

Table 6. *Carex bohemica* comm.

Relevé nr.	1	2	3	K
Sample area (m^2)	25	25	25	
Aspect	-	-	-	
Slope (°)	0	0	0	
Cover (%)	80	80	90	
Carex bohemica	3	3	4	100
Juncus bufonius s.l.	2	2	+	100
Juncus alpino-articulatus	1	1	2	100
Ranunculus reptans	+	+	-	100
Eleocharis klingei	+	+	.	67
Callitriche palustris	.	-	.	33

Table 7. *Phragmitetalia* and *Bolboschoenetalia maritimi* communities (1-4 *Phragmitetum communis*, 5 *Equisetetum fluviatilis*, 6-8 *Schoenoplectetum tabernaemontani*).

Relevé nr.	1	2	3	4	K1	5	6	7	8	K2
Sample area (m^2)	200	200	100	100		25	100	100	100	
Water depth (cm)	230	120	5	5		30	20	30	0	
Cover (%)	90	200	100	100		80	100	100	100	
Phragmites australis	4	4	3	4	100	.	.	.	.	.
Equisetum fluviatile	.	.	.	.	.	3	.	.	.	.
Scirpus tabernaemontani	.	.	.	.	.	.	5	5	4	100
Lemna minor	.	.	+	-	50	1	1	1	.	67
Lemna trisulca	1	1	.	.	50	1	.	.	.	.
Comarum palustre	.	.	2	2	50	1	.	.	.	.
Carex diandra	.	.	2	1	50	+	.	.	.	.
Potamogeton perfoliatus	+	-	.	.	50	.	.	.	.	.
Persicaria amphibia	+	.	+	.	50	.	.	.	.	.
Menyanthes trifoliata	.	.	2	+	50	.	.	.	.	.
Epilobium palustre	.	.	+	+	50	.	.	.	.	.
Spirodela polyrrhiza	.	.	+	+	50	.	.	.	.	.
Carex sp.	.	.	.	.	.	.	+	+	.	67
Poa sp.	.	.	.	.	.	.	+	+	.	67
Persicaria lapathifolia	.	.	.	.	.	.	-	.	2	67
Pedicularis sp.	.	.	-	.	25	.	.	.	.	.
Filipendula ulmaria	.	.	.	+	25	.	.	.	.	.
Eleocharis mamillata	.	.	.	.	.	1	.	.	.	.
Utricularia vulgaris	.	.	.	.	.	1	.	.	.	.
Bidens radiata	.	.	.	.	.	.	.	.	1	33
Senecio congestus	.	.	.	.	.	.	.	.	1	33

7. *Phragmito-Magnocaricetea* KLIKA in KLIKA et NOVÁK 1941
Phragmitetalia KOCH 1926
Phragmition communis KOCH 1926

Phragmitetum communis (GAMS 1927) SCHMALE 1939 (tab. 7, rel. 1-4)

This community comprises reed stands with dominant *Phragmites australis* in still waters of various depths. Variants of deep water (up to 250 cm) are poor in species while that of sites with shallow water are richer. From Lake Baikal, occurrence of this vegetation in wetlands near the Selenga Delta is reported by SAVIČ (1967). Relevés of this association were also published from Central Yakutia (MIRKIN et al. 1985, GOGOLEVA et al. 1987).

Equisetetum fluviatilis STEFFEN 1931 (tab. 7, rel. 5)

A community of still water 5-30 cm deep, dominated by *Equisetum fluviatile*. SAVIČ (1967) presents a relevé belonging to this community from wetlands near Posol'sk (near the Selenga Delta on the South-eastern coast of Baikal). From Siberia, this association is only known from the floodplain of the middle Lena river (MIRKIN et al. 1992).

Bolboschoenetalia maritimi HEJNÝ in HOLUB et al. 1967
Scirpion maritimi DAHL et HADAČ 1941

Schoenoplectetum tabernaemontani RAPAICS 1927 (tab. 7, rel. 6-8)

A species-poor community, dominated by *Scirpus tabernaemontani*. It occurs in still alkaline water with oscillating surfaces, up to 50 cm deep. Nitrophilous species occur in this community along the paths trampled by grazing cattle. *Schoenoplectetum tabernaemontani* is a new association for Siberia (cf. KOROTKOV et al. 1991).

Oenanthetalia aquaticae HEJNÝ in KOPECKÝ et HEJNÝ 1965
Oenanthion aquaticae HEJNÝ ex NEUHÄUSL 1959

Hippuridetum vulgaris PASSARGE 1955 (tab. 8, rel. 1-6)

This community appears in muddy lake shores, significantly contributing to filling up, with *Hippuris vulgaris* as a dominant species. Water depths range from 0 to 50 cm. In Siberia, this community is known from Yakutian alases (MIRKIN et al. 1985, GOGOLEVA et al. 1987).

Senecionetum congesti MIRKIN, GOGOLEVA et KONONOV per CHYTRÝ, PEŠOUT et ANENCHONOV, **ass. nov. hoc loco** (tab. 8, rel. 7)

Original publication: *Senecionetum congesti* MIRKIN, GOGOLEVA et KONONOV 1985 nom. inval. (art. 5).

Nomenclatural typus: MIRKIN et al. 1985, pp. 388-389, tab. 18, rel. 23 (holotypus hoc loco). This community forms small patches among tall sedge and reed stands. It takes part in the filling up processes. It is characterized by dominant *Senecio congestus* and low species richness. It was first mentioned from Yakutian alases (MIRKIN et al. 1985, GOGOLEVA et al. 1987).

Eleocharis mamillata community (tab. 8, rel. 8-12)

A community of muddy shores with water depths up to 30 cm. *Eleocharis mamillata* is the dominant species. Taking into account the correct determination of species of the *Eleocharis palustris* group, it will be necessary to define the relations of this community to the association *Eleocharitetum palustris* reported from Central Yakutia (GOGOLEVA et al. 1987) and to the European association *Eleocharitetum palustris* UBRISZY 1948.

Eleocharis mamillata-Sparganium minimum community (tab. 8, rel. 13-17)

A community of non-flooded muddy shores with dead remnants of plants on the soil surface. It represents an important stage in filling up of the lake. Similar communities are not known from the territory of the former USSR (cf. KOROTKOV et al. 1991). This community shows certain relationships with the *Eleocharito palustris-Hippuridetum vulgaris* of PASSARGE (1955, see also PASSARGE 1964) from North-eastern Germany.

Ranunculus gmelinii community (tab. 8, rel. 18-20)

This heliophilous community appears in shallow pools on periodically inundated or waterlogged habitats of natural or semi-natural character. Communities with *Ranunculus gmelinii* have not been described so far (cf. KOROTKOV et al. 1991)

Table 8. *Oenanthion aquaticae* communities (1-6 *Hippuridetum vulgaris*, 7 *Senecionetum congesti*, 8-12 *Eleocharis mamillata* comm., 13-17 *Eleocharis mamillata-Sparganium minimum* comm., 18-20 *Ranunculus gmelinii* comm.).

Relevé nr.	1	2	3	4	5	6	K1
Sample area (m^2)	10	10	21	25	25	25	20
Water depth (cm)	0	0	0	0	40	10	40
Cover (%)	90	100	100	100	100	100	50
Hippuris vulgaris	3	4	4	4	3	4	100
Utricularia intermedia	2	2	2	1	2	2	100
Senecio congestus	.	.	.	.	.	.	.
Triglochin palustre	.	.	.	.	.	.	.
Epilobium palustre	.	.	.	.	.	.	.
Eleocharis mamillata	.	.	.	.	.	.	.
Sparganium minimum	.	.	.	.	.	.	.
Utricularia vulgaris	.	.	.	.	.	.	.
Carex canescens	.	.	.	.	.	.	.
Ranunculus gmelinii	+	-	1	1	1	1	100
Lemna trisulca	1	+	.	.	2	+	67
Lemna minor	.	.	.	.	.	.	.
Comarum palustre	.	.	+	-	.	.	33
Menyanthes trifoliata	.	.	.	.	.	.	.
Ranunculus reptans	.	.	.	.	.	.	.
Calla palustris	.	.	.	.	.	.	.
Myriophyllum verticillatum	1	+	.	.	.	.	33
Nymphaea tetragona	-	-	.	.	.	.	33
Equisetum fluviatile	.	.	1	+	.	.	33
Carex diandra	.	.	.	.	.	.	.
Eleocharis klingei	.	.	.	.	.	.	.
Alisma plantago-aquatica	.	.	.	.	.	.	.

In one relevé only:
Potentilla anserina 8: 2, *Ranunculus sceleratus* 8: 1, *Rumex aquaticus* ssp. *protractus* 8: 1, *Carex appendiculata* 8: +, *Persicaria lapathifolia* 7: +.

Magnocaricetalia PIGNATTI 1953
Cicution virosae HEJNÝ ex SEGAL in WESTHOFF et DEN HELD 1969

Calletum palustris (VAN DER BERGHEN 1952) SEGAL et WESTHOFF in WESTHOFF et DEN HELD 1969 (tab. 9, rel. 1-2)

A community of unstable soils on the margins of lakes at depths of 20-40 cm. This is the first report on the occurrence of this community in Siberia (cf. KOROTKOV et al. 1991).

Caricion rostratae BALÁTOVÁ-TULÁČKOVÁ 1963

Caricetum rostratae OSVALD 1923 (tab. 9, rel. 3-7)

Permanently inundated mesotrophic sedge fen with water up to 50 cm deep. Dead remnants of sedge peat accumulate on sandy ground, thus forming habitats for the succession of the two following communities which are connected with *Caricetum rostratae* in both time and space, and with frequent stands of intermediate appearance. In Siberia, this community is known from the Lower Jenisej river valley (cf. KOROTKOV et al. 1991).

7	8	9	10	11	12	K2	13	14	15	16	17	K3	18	19	20	K4
20	9	16	16	15	20		4	4	8	8	2		4	4	4	
40	0	0	20	20	30		-	-	-	-	-		10	10	20	
50	70	50	75	50	50		100	100	100	90	100		100	100	75	
.	.	.	.	.	.	.	1	1	1	.	-	80	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	3	3	4	3	3	100	4	3	3	3	3	100	.	.	.	.
.	.	.	.	.	.	.	2	2	3	2	2	100	.	.	.	.
.	.	.	.	.	.	.	+	1	1	1	1	100	.	.	.	.
.	.	.	.	.	.	.	+	1	+	1	-	100	.	.	.	.
.	.	.	+	+	1	60	+	1	1	1	1	100	5	4	4	100
.	.	.	+	+	+	60	.	.	.	.	.	.	.	.	.	.
.	1	.	+	+	1	80	.	.	.	.	.	.	+	+	+	100
.	.	.	-	.	.	20	+	+	.	.	.	40	.	.	.	.
.	.	.	.	.	.	.	+	-	.	+	+	80	.	.	.	.
.	.	1	+	+	.	60	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	+	+	+	.	.	60	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	+	+	.	.	.	40	.	.	.	.
1	.	.	.	.	.	.	.	.	.	.	.	.	+	1	.	67
.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	+	67

Comaro-Caricetum lasiocarpae BALÁTOVÁ-TULÁČKOVÁ et HÜBL 1985 (tab. 9, rel. 8-16)

Tall-sedge fen with dominant *Carex lasiocarpa*, slighly more mesotrophic than *Caricetum rostratae*. Similar stands have undoubtedly wider distribution throughout Siberia (cf. KOROTKOV et al. 1991), but their syntaxonomic evaluation needs further study and more extensive comparison of Siberian and European relevé material. From the Baikal area, vegetation belonging to this association was sampled by SAVIČ (1967) in mires near Posol'sk. Some relevés included here in this association are very close to *Caricetum chordorrhizae* PAUL et LUTZ 1941.

Caricetum diandrae (ALMQUIST 1929) JONAS 1933 (tab. 9, rel. 17-24)

Mesotrophic tall-sedge fen with dominant *Carex diandra*, forming the last stage of succession within *Caricion rostratae*. This community has not been recognized in Siberia so far (KOROTKOV et al. 1991), although e.g. SAVIČ (1967) published relevé material belonging to this association.

Table 9. *Magnocaricetalia communities* (1-2 *Calletum palustris*, 3-7 *Caricetum rostratae*, 8-16 *Comaro-Caricetum lasiocarpae*, 17-24 *Caricetum diandrae*).

Relevé nr.	1	2	K1	3	4	5	6	7	K2
Sample area (m^2)	25	25		100	100	100	16	25	
Water depth (cm)	30	5		0	5	20	20	10	
Cover E_1 (%)	100	100		70	60	80	100	70	
Cover E_0 (%)	0	0		50	30	0	20	5	
Calla palustris	5	5	100	.	.	.	.	.	.
Carex lasiocarpa	+	+	100	+	.	1	.	.	40
Carex diandra	+	1	100	.	.	.	.	.	.
Carex rostrata	+	+	100	3	1	5	4	1	100
Comarum palustre	.	+	50	1	2	1	+	+	100
Utricularia intermedia	.	.	.	2	2	3	3	4	100
Menyanthes trifoliata	.	.	.	+	3	.	1	3	80
Eriophorum gracile	.	.	.	2	.	1	.	.	40
Naumburgia thyrsiflora	.	-	50	.	.	.	.	.	.
Carex limosa	.	.	.	.	.	.	.	.	.
Carex juncella	.	.	.	+	.	.	.	.	20
Salix myrtilloides	.	.	.	+	.	.	.	.	20
Equisetum fluviatile	.	.	.	.	.	1	.	.	20
Epilobium palustre	.	.	.	.	.	.	.	1	20
Carex chordorrhiza	.	.	.	1	.	2	.	.	40
Calamagrostis langsdorfii	.	.	.	.	2	+	.	.	40
Calamagrostis neglecta	.	.	.	.	1	.	.	.	20
Lemna minor	.	.	.	.	.	.	+	1	40
Carex canescens	.	.	.	.	+	.	.	.	20
Glyceria spiculosa	.	.	.	.	.	.	.	.	.
Persicaria amphibia	.	.	.	.	.	.	.	.	.
Carex litophila	.	.	.	.	.	.	.	.	.
Pedicularis karoi	.	.	.	.	-	.	.	.	20
Rumex aquaticus ssp. *protractus*	.	.	.	.	+	.	.	.	20
Stachys aspera	.	.	.	.	.	.	.	.	.
Iris laevigata	.	.	.	.	.	.	.	.	.
Eriophorum russeolum	.	.	.	.	.	.	.	.	.
E_0 - ground layer									
Drepanocladus aduncus	.	.	.	.	.	.	+	+	40
Calliergon giganteum	.	.	.	.	.	.	.	.	.
Drepanocladus exannulatus	.	.	.	.	.	.	.	.	.
Meesia triquetra	.	.	.	.	.	.	.	.	.
Rhizomnium magnifolium	.	.	.	.	.	.	.	.	.
Drepanocladus vernicosus	.	.	.	.	.	.	.	.	.
Sphagnum teres	.	.	.	.	1	.	.	.	20
Calliergon richardsonii	.	.	.	.	.	.	3	1	40

In one relevé only:
Utricularia vulgaris 1: +, *Carex pseudocyperus* 1: -, *Scutellaria galericulata* 7: +, *Spirodela polyrrhiza* 10: 1, *Peucedanum salinum* 13: -, *Oxycoccus microcarpus* 15: +, *Truellum sieboldii* 15: -, *Spiraea salicifolia* 23: +.

8	9	10	11	12	13	14	15	16	K3	17	18	19	20	21	22	23	24	K4
100	100	100	35	100	50	25	25	25		100	100	100	100	100	100	100	25	
10	0	1	10	0	5	0	10	10		10	30	20	0	10	5	60	0	
90	90	70	70	70	60	90	90	55		100	100	100	90	90	90	100	80	
10	10	50	50	60	30	30	30	0		10	0	0	5	5	5	0	20	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	1	2	1	2	2	3	3	2	100	.	1	+	.	+	.	1	1	63
1	1	.	.	.	.	.	.	.	22	1	2	2	2	2	2	2	2	100
+	.	2	+	2	1	3	3	3	89	+	1	+	1	+	+	1	+	100
-	1	1	+	+	2	1	1	1	100	.	+	+	1	4	1	2	1	88
4	3	1	2	1	2	1	1	1	100	4	.	.	2	1	2	.	.	50
4	4	+	1	+	.	.	.	.	56	4	3	3	4	.	4	3	2	88
.	.	2	+	1	2	+	+	.	67	.	1	2	1	+	+	.	+	75
.	.	.	-	.	+	.	+	.	33	+	1	+	.	-	1	+	+	88
-	.	+	.	.	+	.	+	.	44	.	+	1	.	+	+	+	1	75
.	.	+	+	.	+	.	+	.	44	.	-	.	.	.	-	.	.	25
.	.	1	.	.	1	.	1	.	33	.	.	.	.	.	.	-	+	25
.	.	-	+	+	.	.	-	.	44	.	.	.	.	.	.	.	2	13
.	+	.	.	.	.	.	.	.	11	.	+	-	.	1	+	.	.	50
.	.	1	3	3	.	.	.	.	33	.	.	.	.	.	.	.	.	.
.	.	+	.	.	.	.	.	+	22	.	.	.	.	.	.	1	.	13
.	.	.	+	.	.	+	.	.	22	.	.	.	.	.	.	2	+	25
+	.	.	.	.	.	.	.	.	11	+	.	.	.	1	.	.	.	25
.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	-	+	.	38
.	.	.	2	.	.	1	1	.	33	.	.	.	.	.	.	+	.	13
.	.	.	.	.	.	.	.	.	.	.	+	+	.	+	-	.	.	50
.	.	.	.	.	.	.	.	.	.	.	+	+	.	+	.	.	.	38
.	.	.	-	.	.	.	.	.	11	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	13
.	-	.	.	.	.	.	.	.	11	.	.	.	.	1	.	.	.	13
.	.	.	.	.	.	+	+	.	22	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	.	+	2	.	1	.	1	.	56	2	+	.	.	2	.	.	.	38
1	.	.	.	.	.	.	1	.	22	.	2	2	.	.	1	3	.	50
.	.	.	.	.	.	.	.	.	.	1	.	.	.	+	.	.	.	25
1	.	.	.	.	.	.	.	.	11	.	.	+	.	.	.	.	.	13
.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	2	.	25
.	.	.	.	.	.	.	.	.	.	.	+	1	.	.	.	.	.	25
.	.	.	.	.	.	.	+	.	11	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Table 10. *Sphagno warnstorfiani-Tomenthypnion* communities (1-13 *Triglochino maritimi-Tomenthypnetum nitentis*, 14-20 *Oxycoccus palustris-Betula* **exilis* comm.).

Relevé nr.	1	2	3	4	5	6
Sample area (m^2)	100	100	100	100	100	100
Water depth (cm)	0	0	0	0	0	0
Cover E_2 (%)	5	5	5	0	0	0
Cover E_1 (%)	80	80	80	50	80	80
Cover E_0 (%)	90	90	80	100	70	70
E_2 - scrub layer						
Betula fruticosa	1	1	1	.	.	.
E_1 - field layer						
Menyanthes trifoliata	1	2	2	.	2	1
Carex diandra	+	1	+	.	+	-
Eriophorum gracile	+	-	.	.	.	-
Epilobium palustre	+	+	+	.	+	+
Comarum palustre	1	+	+	-	.	-
Triglochin maritima	1	+	1	.	+	1
Andromeda polifolia	+	+	+	.	+	+
Carex rostrata	+	+	-	.	.	.
Drosera anglica	1	1	+	.	+	+
Utricularia intermedia	1	+	-	.	.	.
Pedicularis karoi	+	-	.	.	-	.
Peucedanum salinum	+	+	-	.	+	.
Equisetum fluviatile	+	+	+	.	.	.
Pyrola rotundifolia	.	.	.	.	.	.
Cardamine pratensis	.	.	.	.	.	.
Baeothryon alpinum	.	.	.	.	.	.
Betula pendula s.l.	.	.	.	.	.	.
Carex limosa	.	1	1	2	1	1
Betula nana ssp. *exilis*	1	1	1	.	+	1
Oxycoccus palustris	.	1	1	+	1	.
Oxycoccus microcarpus	1	.	.	1	.	+
Drosera rotundifola	+	+	+	1	+	+
Carex dioica	.	.	.	.	1	1
Calamagrostis neglecta	.	.	.	.	.	.
Dactylorhiza incarnata	1	+	+	.	.	.
Dactylorhiza cruenta	+	-	-	.	.	.
Chamaedaphne calyculata	.	.	+	-	.	.
Scheuchzeria palustris	.	.	.	.	+	.
Carex lasiocarpa	.	.	.	.	.	.
Glyceria spiculosa	.	.	.	.	.	.
Saxifraga hirculus	.	.	.	.	.	.
Poa sp.	.	.	.	.	.	.
Carex canescens	.	-	.	1	.	.
Eriophorum russeolum	.	.	.	2	.	.
Herminium monorchis	.	.	.	.	+	+
Spiranthes amoena	.	.	.	.	+	+

7	8	9	10	11	12	13	K1	14	15	16	17	18	19	20	K2
100	100	100	100	100	50	100		100	100	100	100	100	100	50	
0	0	0	0	15	10	30		0	0	0	0	0	0	0	
5	0	0	5	0	0	0		0	0	0	0	0	0	0	
50	70	80	80	80	80	80		80	80	80	80	80	70	60	
100	90	90	70	80	70	70		90	100	100	100	100	90	100	
.	.	.	1	.	.	.	31	.	.	.	.	.	.	.	.
.	2	2	3	2	2	2	85	+	.	.	.	+	.	.	29
.	+	1	2	2	2	2	85	.	.	.	.	.	2	+	29
.	+	.	+	+	.	+	54	.	.	.	.	.	+	.	14
.	.	.	+	-	+	.	62	.	+	.	.	.	.	.	14
+	1	-	.	1	+	2	85	-	.	.	.	-	.	.	29
1	.	+	.	1	+	+	77	.	.	.	.	.	+	.	14
+	+	1	+	.	+	1	85	.	.	.	.	.	.	.	.
.	1	.	.	1	1	1	54	.	.	.	.	.	.	+	14
.	.	.	.	.	.	.	38	.	.	.	.	.	.	.	.
.	.	.	.	+	+	.	38	.	.	.	.	.	.	.	.
.	-	.	.	-	.	.	38	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	31	.	.	.	.	.	.	.	.
1	.	.	.	.	.	.	31	.	.	.	.	.	.	.	.
+	.	.	.	.	.	.	8	1	1	+	1	1	+	+	100
.	.	.	.	.	.	.	.	+	+	.	+	.	+	.	57
.	.	.	.	.	.	.	.	1	1	+	+	.	-	.	71
.	.	.	.	.	.	.	.	1	+	.	+	+	.	.	57
+	1	+	2	1	2	2	92	1	1	1	1	1	.	.	71
2	2	2	.	.	2	.	69	+	1	2	+	1	3	2	100
1	2	2	1	1	1	1	85	.	1	+	2	2	.	2	71
1	+	+	1	+	1	.	69	2	+	2	+	.	1	1	86
.	.	+	2	.	.	.	62	+	+	+	+	+	.	.	71
.	+	+	1	+	2	.	54	.	1	1	+	.	2	.	57
.	+	.	+	2	.	+	31	.	.	.	.	.	1	+	29
.	.	.	.	.	.	.	23	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	23	.	.	.	.	.	.	.	.
1	.	.	.	.	.	.	23	.	.	.	.	.	.	.	.
.	.	.	.	+	+	.	23	.	.	.	.	.	.	.	.
+	.	.	+	.	+	.	23	.	.	.	.	.	.	.	.
.	2	+	.	.	.	.	15	.	.	.	.	.	.	2	14
.	.	.	+	.	.	.	8	.	.	.	.	.	+	-	29
.	.	.	.	.	.	.	.	+	.	.	-	.	1	.	43
.	.	.	.	.	.	.	15	.	.	.	.	.	.	.	.
.	.	.	.	.	1	.	15	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	15	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	15	.	.	.	.	.	.	.	.

Tab. 10 - cont.

Relevé nr.	1	2	3	4	5	6
Hammarbya paludosa	.	.	.	.	.	.
Cicuta virosa	.	.	.	.	.	.
Naumburgia thyrsiflora	.	.	.	.	.	.
Corallorhiza trifida	.	.	.	.	.	.
Moehringia lateriflora	.	.	.	.	.	.
E_0 - ground layer						
Tomenthypnum nitens	1	4	2	4	4	3
Sphagnum teres	3	.	3	.	.	1
Aulacomnium palustre	1	2	.	+	1	2
Sphagnum fallax	3	.	1	2	.	1
Drepanocladus vernicosus	.	.	1	.	.	+
Paludella squarrosa	+	.	1	.	.	.
Sphagnum warnstorfii	.	.	.	.	+	.
Meesia triquetra	.	.	2	.	1	.
Sphagnum rubellum	.	.	.	.	.	.
Calliergon giganteum	.	+	.	.	.	.
Drepanocladus exannulatus	.	.	.	.	+	.
Helodium blandowii	.	.	.	.	.	.
Sphagnum magellanicum	.	.	.	.	.	.

In one relevé only:
E_2: *Betula pendula* s.l. 7: 1;
E_1: *Carex juncella* 1: +, *Drosera* x *obovata* 1: +, *Ledum palustre* 7: 2, *Pinus sylvestris* juv. 7: 1, *Equisetum arvense* 7: +, *Rubus chamaemorus* 7: +, *Salix myrtilloides* 7: +, *Pedicularis labradorica* 8: -, *Galium uliginosum* 10: -, *Salix rosmarinifolia* 13 : +, *Dactylorhiza incarnata* 19 : -;
E_0: *Calliergon cordifolium* 9: 1, *Calliergon stramineum* 11: 1.

8. *Scheuchzerio-Caricetea fuscae* TÜXEN 1937
Caricetalia fuscae KOCH 1926
Sphagno warnstorfiani-Tomenthypnion DAHL 1957

Triglochino maritimi-Tomenthypnetum nitentis CHYTRÝ, PEŠOUT et ANENCHONOV, **ass. nov. hoc loco** (tab. 10, rel. 1-13)

Nomenclatural typus: tab. 10, rel. 12 (holotypus hoc loco).

Sedge-moss mire following the preceding community in the succession towards filling up, and often forming floating rafts or spongy peat. The peat layer reaches a thickness of several dozen centimeters. This vegetation has probably not been reported in Siberia (cf. KOROTKOV et al. 1991).

*Oxycoccus palustris-Betula *exilis* community (tab. 10, rel. 14-20)

This sedge-moss community forms the most advanced successional stage within *Scheuchzerio-Caricetea fuscae* in the area under study. Comparing it to the preceding community, some shrubs (such as *Betula nana* ssp. *exilis*) and peatmosses appear. This community was only found at one site near the Kordon settlement.

7	8	9	10	11	12	13	K1	14	15	16	17	18	19	20	K2
.	-	.	.	.	.	.	8	.	.	.	.	.	.	-	14
.	.	.	.	+	+	.	15	.	.	.	.	.	.	.	.
.	.	.	.	+	.	+	15	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	29
.	.	.	.	.	.	.	.	.	.	.	.	.	-	+	29
4	2	2	4	.	3	1	92	4	4	4	2	3	4	3	100
+	1	.	.	2	2	3	62	2	.	2	3	3	2	3	86
3	1	.	+	.	.	.	62	1	.	2	.	3	1	.	57
2	4	4	.	2	2	1	77	1	3	.	3	1	1	.	71
.	.	.	.	+	2	3	38	.	.	.	.	.	.	.	.
.	.	.	+	1	.	.	31	.	.	.	.	.	.	.	.
.	1	+	.	+	.	.	31	.	.	.	.	.	.	.	.
.	.	.	.	.	2	.	23	.	.	.	.	.	.	.	.
.	.	.	1	.	.	.	8	.	2	.	2	.	.	.	29
.	.	.	.	2	.	.	15	.	.	.	.	.	.	.	.
.	.	.	.	.	1	.	15	.	.	.	.	.	.	.	.
.	.	.	+	.	+	.	15	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	1	.	+	.	.	.	29

9. *Oxycocco-Sphagnetea* BR.-BL. et TÜXEN 1943
Sphagnetalia medii KÄSTNER et FLÖSNER 1933
Sphagnion medii KÄSTNER et FLÖSNER 1933

Chamaedaphno-Pinetum pumilae CHYTRÝ, PEŠOUT et ANENCHONOV, **ass. nov. hoc loco** (tab. 11, rel. 1-9)

Nomenclatural typus: tab. 11, rel. 6 (holotypus hoc loco).

An open bog characterized by hummock-and-hollow pattern, with peatmosses more or less tolerant to water deficit (*Sphagnum magellanicum* and *S. rubellum*) forming the hummocks, and *S.* sect. *Cuspidata* forming the hollows. Occurrence of dwarf shrubs, dwarf trees and *Pinus pumila* is a typical feature of this community. Several bog communities are described from Western Siberia (cf. KOROTKOV et al. 1991), but the syntaxonomic relations of this vegetation in Siberia remain under question.

Chamaedaphno-Pinetum sibiricae CHYTRÝ, PEŠOUT et ANENCHONOV, **ass. nov. hoc loco** (tab. 11, rel. 10-19)

Nomenclatural typus: tab. 11, rel. 14 (holotypus hoc loco).

A forested bog, the floristic composition of which resembles the preceding community. These two communities are connected both in space and time. The relations of this association to Western Siberian forested bogs studied by KUSTOVA (ms., see KOROTKOV et al. 1991) remain under question.

Table 11. *Sphagnion medii* communities (1-9 *Chamaedaphno-Pinetum pumilae*, 10-19 *Chamaedaphno-Pinetum sibiricae*).

Relevé nr.	1	2	3	4	5	6
Sample area (m^2)	100	100	100	100	100	400
Cover E_3 (%)	0	0	0	0	0	0
Cover E_2 (%)	5	10	5	0	20	30
Cover E_1 (%)	80	90	90	80	80	60
Cover E_0 (%)	100	100	100	100	100	100
E_3 - tree layer						
Pinus sibirica	.	.	.	.	.	.
Betula pendula s.l.	.	.	.	.	.	.
Larix sibirica	.	.	.	.	.	.
E_2 - scrub layer						
Betula pendula s.l.	.	.	.	.	.	1
Pinus sibirica	1	1	1	.	2	.
Betula pubescens s.l.	+	1	+	.	+	.
Pinus pumila	.	.	.	.	.	2
Betula fruticosa	+	+	+	.	.	.
Duschekia fruticosa	.	.	.	.	.	.
Larix sibirica	.	.	.	.	.	.
Pinus sylvestris	.	.	.	.	.	.
Salix caprea	.	.	.	.	.	.
E_1 - field layer						
Oxycoccus microcarpus	2	2	2	2	2	1
Drosera rotundifolia	1	1	1	1	+	+
Eriophorum russeolum	.	.	.	.	.	+
Rhodococcum vitis-idaea	.	.	.	.	.	.
Carex globularis	.	.	.	.	.	.
Equisetum fluviatile	.	.	.	.	.	.
Calamagrostis langsdorfii	.	.	.	.	.	.
Rosa acicularis	.	.	.	.	.	.
Salix myrtilloides	.	.	.	.	.	.
Equisetum sylvaticum	.	.	.	.	.	.
Menyanthes trifoliata	.	.	.	.	.	.
Carex limosa	.	.	.	.	.	.
Comarum palustre	.	.	.	.	.	.
Calamagrostis neglecta	.	.	.	.	.	.
Chamaedaphne calyculata	1	1	1	2	1	3
Ledum palustre	2	2	2	.	2	2
Rubus chamaemorus	2	2	2	+	2	1
Vaccinium uliginosum	1	1	1	+	1	.
Oxycoccus palustris	.	.	.	+	.	.
Betula nana ssp. *exilis*	1	2	2	1	1	.
Smilacina trifolia	1	+	.	-	+	.
Glyceria spiculosa	.	.	.	.	.	.
Carex canescens	1	+	-	.	+	.
Betula sp. juv.	.	.	.	.	.	+

7	8	9	K1	10	11	12	13	14	15	16	17	18	19	K2
400	400	25		200	400	200	200	200	400	200	200	100	100	
0	0	0		40	20	50	50	60	30	10	70	15	50	
20	30	10		40	20	40	40	30	40	15	20	20	30	
60	70	70		70	70	90	80	90	70	70	70	70	80	
100	100	100		40	60	80	90	90	80	100	90	100	100	
.	.	.	.	+	1	1	3	3	2	2	2	2	3	100
.	.	.	.	2	1	2	1	2	2	.	1	2	2	90
.	.	.	.	1	2	3	1	.	.	.	3	.	.	50
1	2	2	44	2	2	.	1	2	2	2	2	2	2	90
.	.	.	44	+	+	.	2	.	1	2	.	1	2	70
.	.	.	44	1	.	.	2	2	1	.	.	.	.	40
2	2	1	44	1	+	.	.	.	.	.	.	.	.	20
.	.	.	33	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	+	.	1	.	.	.	.	+	.	.	30
.	.	.	.	+	1	.	.	.	.	.	.	.	.	20
.	.	.	.	+	1	.	.	.	.	.	.	.	.	20
.	.	.	.	.	.	1	.	.	.	.	+	.	.	20
+	1	1	100	.	.	.	.	+	+	.	.	1	+	40
.	+	.	78	.	.	.	.	.	.	.	.	.	.	.
+	.	1	33	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	+	1	1	+	.	+	+	+	1	.	80
.	.	.	.	.	1	2	1	.	.	1	2	1	+	70
.	.	.	.	+	.	.	+	1	+	.	.	.	.	40
.	.	.	.	1	.	1	.	.	.	.	.	.	+	30
.	.	.	.	+	+	+	.	.	.	.	.	.	.	30
.	.	.	.	+	+	.	1	.	.	.	.	.	.	30
.	.	.	.	.	1	1	.	.	.	.	-	.	.	30
.	.	.	.	.	.	.	+	+	2	.	.	.	.	30
.	.	.	.	.	.	.	+	+	1	.	.	.	.	30
.	.	.	.	.	.	.	+	+	+	.	.	.	.	30
.	.	.	.	.	.	.	.	+	1	.	1	.	.	30
3	2	3	100	1	1	.	1	1	1	2	1	1	2	90
2	3	.	78	3	4	3	3	3	2	3	3	3	2	100
+	2	+	100	.	+	.	1	2	.	2	.	1	2	60
.	.	.	56	+	1	.	1	.	2	+	1	2	1	80
1	.	1	33	+	+	.	+	1	1	1	+	+	.	80
+	.	.	67	.	.	.	.	+	.	2	.	.	+	30
.	.	.	44	+	+	.	1	2	.	.	+	.	.	50
.	.	1	11	+	-	.	2	2	2	.	.	.	.	50
.	.	.	44	.	.	.	.	.	.	.	+	.	.	10
.	+	.	22	.	.	.	.	.	.	.	.	.	.	.

Tab. 11 - cont.

Relevé nr.	1	2	3	4	5	6
Carex caespitosa	.	.	.	.	.	.
Chamaerion angustifolium	.	.	.	.	.	.
Drosera rotundifolia	.	.	.	.	.	.
Eriophorum gracile	.	.	.	.	.	.
Carex capitata	.	.	.	.	.	.
Epilobium palustre	.	.	.	.	.	.
E_0 - ground layer						
Cladonia sulphurina	.	.	+	.	.	+
Sphagnum teres	1	1	.	.	.	.
Aulacomnium palustre	.	.	.	.	.	.
Helodium blandowii	.	.	.	.	.	.
Pleurozium schreberi	.	.	.	.	.	.
Sphagnum magellanicum	3	3	4	4	4	4
Sphagnum rubellum	1	1	2	1	.	1
Sphagnum fallax et *flexuosum*	2	2	.	1	2	.
Cladina stellaris	.	.	+	.	.	+
Cladina arbuscula	.	+	.	.	.	+
Polytrichum strictum	.	-	-	.	.	.
Icmadophila ericetorum	.	.	.	.	.	.
Polytrichum commune	.	.	.	.	.	.
Sphagnum wulfianum	.	.	.	.	.	.
Tomenthypnum nitens	.	.	.	.	.	.

In one relevé only:

E_3: *Betula pubescens* s.l. 10: 2, *Pinus sylvestris* 12: 1, *Abies sibirica* 12: +, *Populus tremula* 14: +;

E_2: *Ribes nigrum* 10: 1, *Salix hastata* 10: 1, *Rubus sachalinensis* 17: 1, *Spiraea salicifolia* 17: +;

E_1: *Betula divaricata* 7: +, *Ledum palustre* s.l. 9: 2, *Carex dioica* 10: +, *Equisetum arvense* 10: +, *Lathyrus pratensis* 10: +, *Spiraea salicifolia* 10: +, *Vicia cracca* 10: +, *Pyrola asarifolia* 10: -, *Equisetum variegatum* 11: +, *Carex paralella* ssp. *redowskiana* 11: +, *Bistorta major* 11: +, *Linnaea borealis* 12: +, *Trientalis europaea* 12: +, *Lathyrus pilosus* 12: -, *Carex lasiocarpa* 15: +, *Galium uliginosum* 15: +, *Naumburgia thyrsiflora* 15: +, *Peucedanum salinum* 15: +, *Pyrola rotundifolia* 15: +, *Aconitum baicalense* 15: -, *Caltha* sp. 15: -, *Dactylorhiza meyeri* 15: -, *Stachys aspera* 15: -, *Lycopodium annotinum* 17: 1, *Pinus sibirica* juv. 17: +;

E_0: *Cetraria islandica* 6: +, *Calliergon stramineum* 10: 1, *Sphagnum nemoreum* 11: 2, *Cladina rangiferina* 11: 1, *Peltigera malacea* 11: +, *Paludella squarrosa* 12: 2, *Polytrichum juniperinum* 12: 1, *Rhizomnium magniferum* 15: +, *Sphagnum russowii* 16: 3.

10. *Calamagrostietea langsdorffii* MIRKIN per MIRKIN et al. 1992

Glycophyllous meadows of Eastern Siberia and Far East

Original publication: *Calamagrostetea langsdorffii* MIRKIN in ACHTJAMOV, MIRKIN et URAZMETOV 1985 nom. inval. (Art. 5).

Calamagrostietalia langsdorffii ACHTJAMOV, MIRKIN et URAZMETOV 1985 per MIRKIN et al. 1992

Wet-mesic meadows

Original publication: *Calamagrostetalia langsdorffii* ACHTJAMOV, MIRKIN et URAZMETOV 1985 nom. inval. (art. 5).

7	8	9	K1	10	11	12	13	14	15	16	17	18	19	K2
.	.	.	.	1	.	+	.	.	.	.	.	.	.	20
.	.	.	.	-	.	+	.	.	.	.	.	.	.	20
.	.	.	.	.	+	.	.	.	+	.	.	.	.	20
.	.	.	.	.	.	.	+	.	+	.	.	.	.	20
.	.	.	.	.	.	.	+	.	.	.	1	.	.	20
.	.	.	.	.	.	.	.	-	.	.	+	.	.	20
+	-	.	44	.	.	.	.	.	.	.	.	.	.	.
.	1	.	33	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	2	+	.	.	.	+	+	.	.	.	40
.	.	.	.	+	.	+	.	.	1	.	.	.	.	30
.	.	.	.	.	2	.	.	.	.	.	2	.	1	30
3	3	4	100	+	.	.	2	.	2	2	4	3		60
1	1	2	89	.	.	1	2	2	3	2	2	2	1	80
2	2	+	78	2	1	.	4	3	.	3	2	1	3	80
+	1	.	44	+	+	.	.	.	.	+	.	1	+	50
.	+	.	33	.	.	.	.	.	.	.	.	.	+	10
.	-	.	33	.	.	.	.	.	.	.	-	.	.	10
-	-	.	22	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	2	.	.	.	.	2	.	.	20
.	.	.	.	.	.	2	.	.	.	.	2	.	.	20
.	.	.	.	.	.	.	.	.	2	.	.	.	+	20

Calamagrostion langsdorffii ACHTJAMOV, MIRKIN et URAZMETOV 1985
Floodplain meadows

Truellum sieboldii-Calamagrostis langsdorfii community (tab. 12, rel. 1-4)
A community of clay soils in coastal habitats of shallow lakes. It is formed of tall grass stands dominated by *Calamagrostis langsdorfii*. It was only found at one site near the Kordon settlement; probably no similar stands are known (cf. KOROTKOV et al. 1991).

Caricion appendiculatae ACHTJAMOV, MIRKIN et URAZMETOV 1985
Communities of tussock sedges on waterlogged habitats
Syn.: *Caricion juncellae* KONONOV in MIRKIN et al. 1992 (syntax. syn.).

Caricetum juncellae MIRKIN, GOGOLEVA et KONONOV per CHYTRÝ, PEŠOUT et ANENCHONOV, **ass. nov. hoc loco** (tab. 12, rel. 5-17)
Original publication: *Caricetum juncellae* MIRKIN, GOGOLEVA et KONONOV 1985 nom. inval. (art. 5).
Nomenclatural typus: MIRKIN et al. 1985, pp. 380-381, tab. 15, rel. 17 (holotypus hoc loco).
A community of tussocky sedges of waterlogged habitats on sandy soils. Relevés presented here belong to the subassociation **Caricetum juncellae calamagrostietosum neglectae** MIRKIN, GOGOLEVA et KONONOV per CHYTRÝ, PEŠOUT et ANENCHONOV **subass. nov. hoc loco**

Table 12. *Calamagrostietea langsdorffii* communities (1-4 *Truellum sieboldii-Calamagrostis langsdorfii* comm., 5-17 *Caricetum juncellae calamagrostietosum neglectae*, 18-23 *Deschampsio turczaninowii-Caricetum juncellae*).

Relevé nr.	1	2	3	4	K1	5	6	7
Sample area (m^2)	10	10	21	25		100	100	100
Water depth (cm)	0	0	0	0		20	5	0
Cover E_1 (%)	90	100	100	100		80	80	80
Cover E_0 (%)	0	20	20	0		5	10	10
E_1 - field layer								
Calamagrostis langsdorfii	4	5	5	5	100	+	1	2
Truellum sieboldii	1	1	+	+	100	.	.	.
Stachys aspera	1	.	1	+	75	.	.	.
Rorippa palustris	+	+	+	.	75	.	.	.
Calamagrostis neglecta	.	.	.	.	.	1	+	2
Carex appendiculata	.	.	.	.	.	2	1	.
Spiraea salicifolia	.	.	.	.	.	+	2	1
Deschampsia turczaninowii	.	.	.	.	.	.	.	.
Equisetum arvense ssp. *boreale*	.	.	.	.	.	.	.	.
Carex juncella	.	.	.	.	.	3	4	3
Comarum palustre	+	+	+	.	75	1	1	+
Rumex aquaticus ssp. *protractus*	1	+	+	+	100	.	.	.
Epilobium palustre	+	.	.	.	25	.	.	.
Carex rostrata	.	.	.	.	.	1	.	-
Naumburgia thyrsiflora	.	.	.	.	.	.	.	.
Galium trifidum	.	+	+	.	50	.	.	.
Salix myrtilloides	.	.	.	.	.	.	.	+
Cicuta virosa	.	.	.	.	.	.	.	.
Triglochin palustre	.	.	.	.	.	.	.	.
Menyanthes trifoliata	+	.	.	.	25	.	.	.
Persicaria hydropiper	+	.	.	.	25	.	.	.
Iris laevigata	.	+	.	+	50	.	.	.
Lathyrus pilosus	.	.	-	.	25	.	.	.
Carex chordorrhiza	.	.	.	.	.	+	.	.
Utricularia intermedia	.	.	.	.	.	+	.	.
Carex canescens	.	.	.	.	.	.	.	1
Euphrasia stricta	.	.	.	.	.	.	.	+
Salix rosmarinifolia	.	.	.	.	.	.	.	.
Scolochloa festucacea	.	.	.	.	.	.	.	.
Senecio congestus	.	.	.	.	.	.	.	.
Carex sajanensis	.	.	.	.	.	.	.	.
E_0 - ground layer								
Amblystegium kochii	.	2	2	.	50	.	.	.
Leptobryum pyriforme	.	2	2	.	50	.	.	.
Drepanocladus aduncus	.	.	.	.	.	1	2	1
Calliergon giganteum	.	.	.	.	.	.	+	.

In one relevé only:

E_1: *Bidens cernua* 1: +, *Spirodela polyrrhiza* 1: +, *Galium uliginosum* 2: +, *Lactuca sibirica* 3: +, *Bidens radiata* 4: +, *Equisetum fluviatile* 8: -, *Salix pseudopentandra* 9: 1, *Betula pendula* s.l. juv. 10: 1, *Potentilla norvegica* 10: +, *Eriophorum gracile* 11: +, *Carex diandra* 11: 1, *Vaccinium uliginosum* 13: +, *Agrostis* sp. 15 :+, *Rumex*

8	9	10	11	12	13	14	15	16	17	K2	18	19	20	21	22	23	K3
100	100	50	25	25	100	100	100	25	100		100	100	100	100	100	100	
10	5	0	5	0	30	30	30	50	?		3	15	0	0	10	80	
90	90	90	100	90	100	100	90	80	50		50	50	25	15	50	95	
5	0	0	20	20	5	5	0	0	15		1	0	0	0	0	1	
.	.	.	+	.	.	.	.	.	.	31	.	1	.	.	.	1	33
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+	+	3	1	2	5	4	2	4	3	100	.	.	.	.	.	.	.
.	1	.	2	1	.	.	.	.	2	46	.	.	.	.	.	1	17
2	.	1	.	.	.	.	.	.	.	38	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	1	1	2	2	2	+	100
.	.	.	.	.	.	.	.	.	.	.	1	+	-	.	1	+	83
4	5	3	4	4	+	2	4	1	1	100	3	3	2	2	3	3	100
2	.	1	2	1	.	.	+	.	.	62	.	.	.	.	.	1	17
+	+	1	.	.	.	+	.	.	.	31	.	.	.	.	.	.	.
:	.	.	.	+	+	1	.	.	1	31	.	.	.	.	.	.	.
+	+	.	.	.	.	.	.	.	.	31	.	.	.	.	.	.	.
.	.	+	+	+	.	.	.	+	.	31	.	.	.	.	.	.	.
.	.	.	.	.	.	+	.	.	.	8	.	.	.	.	.	.	.
+	.	.	.	1	.	.	.	.	.	23	.	.	.	.	.	.	.
.	.	+	+	.	.	+	.	.	.	23	.	.	.	.	.	.	.
.	.	.	.	.	1	+	.	.	+	23	.	.	.	.	.	.	.
+	.	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.	.
.	.	.	.	.	.	.	+	.	.	8	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	17
1	.	.	.	.	.	.	.	.	.	15	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	+	.	15	.	.	.	.	.	.	.
.	.	.	+	.	.	.	.	.	.	15	.	.	.	.	.	.	.
.	.	.	.	+	.	.	.	.	.	15	.	.	.	.	.	.	.
1	.	.	.	.	.	.	.	-	.	15	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	1	2	15	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	+	-	15	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	33
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1	.	.	.	.	1	1	.	.	2	54	.	.	.	.	.	.	.
.	.	.	2	.	.	.	.	.	.	15	.	.	.	.	.	.	.

acetosella 15: +, *Senecio congestus* 16: +, *Lemna minor* 16: 1, *Glyceria spiculosa* 16: 2; *Allium maximowiczii* 23: 1, *Carex schmidtii* 23: 1, *Potentilla anserina* 23: 1, *Juncus filiformis* 23: +, *Primula nutans* 23: -;

E_0: *Aulacomnium palustre* 7: 1, *Leptodictyum riparium* 11: +, *Ceratodon purpureus* 12: 2, *Polytrichum commune* 15: 1.

(original publication *Caricetum juncellae calamagrostietosum neglectae* MIRKIN, GOGOLEVA et KONONOV 1985 nom. inval. (art. 4a); nomenclatural typus: MIRKIN et al. 1985, pp. 380-381, tab. 15, rel. 10 - holotypus hoc loco). This subassociation is confined to periodically dry habitats (MIRKIN et al. 1985). Vegetation belonging to the association *Caricetum juncellae* is widely distributed throughout Eastern Siberia, e.g. in alases of Central Yakutia (MIRKIN et al. 1985, GOGOLEVA et al. 1987), middle Lena floodplain (MIRKIN et al. 1992) and Barguzinskij Range (DANIHELKA 1993). Vegetation belonging with certainty to this association is also known from wetlands near Posol'sk on the SE Baikal coasts (SAVIČ 1967); similar stands are known from the Cipa river valley in NE Buryatia (ANENCHONOV and OSIPOV 1991). Similar stands dominated by *Carex appendiculata* have been described from the Far East (e.g. ACHTJAMOV et al. 1985).

Oxytropidion lanatae

Table 13. ~~*Scrophularion incisae*~~ communities (1-6 *Craniospermo-Leymetum secalini*, 7-9 *Oxytropido lanatae-Festucetum baicalensis*, 10-12 *Stellario dichotomae-Rosetum acicularis*).

Relevé nr.	1	2	3	4	5	6	K1	7	8	9	K2	10	11	12	K3
Sample area (m^2)	25	30	30	45	45	30		25	25	25		25	25	25	
Aspect	-	SW	SW	SW	SW	SW		-	-	-		-	-	NE	
Slope (°)	0	5	5	5	5	5		0	0	0		0	0	5	
Cover E_1 (%)	5	15	20	15	5	15		15	15	15		30	70	70	
Cover E_0 (%)	0	0	0	0	0	0		0	0	0		10	5	0	
E_1 - field layer															
Isatis oblongata	-	+	1	+	+	+	100	.	.	.	.	.	.	.	.
Craniospermum subvillosum	+	+	.	-	.	.	50	.	.	.	.	.	.	.	.
Oxytropis lanata	.	.	.	.	.	.	.	2	+	1	100	+	.	.	33
Papaver ledebourianum	.	.	.	.	.	.	.	+	+	+	100	.	.	.	.
Carex korshinskyi	.	.	.	.	.	.	.	.	+	2	67	.	.	.	.
Rosa acicularis	.	.	.	.	.	.	.	-	+	.	67	2	4	4	100
Phlojodicarpus baicalensis	.	.	.	.	.	.	.	.	.	.	.	.	+	+	67
Stellaria dichotoma	.	.	.	.	.	.	.	.	.	.	.	.	+	+	67
Scrophularia incisa	.	-	-	-	-	-	83	+	+	+	100	.	.	.	.
Calamagrostis epigeios	.	.	.	.	.	.	.	1	1	+	100	2	.	1	67
Festuca rubra ssp. *baicalensis*	.	.	.	.	.	.	.	2	1	1	100	+	+	1	100
Aconogonon ocreatum	+	+	+	+	+	.	83	1	1	+	100	1	1	1	100
Leymus secalinus	2	2	2	2	+	2	100	.	.	.	.	.	2	+	67
Silene repens	.	.	.	.	.	.	.	-	.	.	33	-	1	.	67
Carex sabulosa	.	.	.	-	.	.	17	.	.	.	.	.	.	+	33
Corispermum ulopterum	.	.	.	.	.	.	.	-	.	.	33	.	-	.	33
E_0 - ground layer															
Cladina rangiferina	.	.	.	.	.	.	.	-	.	.	33	2	.	.	33

In one relevé only:

E_1: *Artemisia commutata* 10: 2, *Bromopsis sibirica* 11: +, *Pinus sibirica* juv. 11: -, *Cotoneaster melanocarpa* juv. 12: +, *Galium verum* 12: +, *Aconogonon sericeum* 12: +;

E_0: *Ceratodon purpureus* 10: 2, *Cetraria cucullata* 10: +, *Cladina arbuscula* 11: 1.

Deschampsio turczaninowii-Caricetum juncellae CHYTRÝ, PEŠOUT et ANENCHONOV, **ass. nov. hoc loco** (tab. 12, rel. 18-23)

Nomenclatural typus: tab. 12, rel. 22 (holotypus hoc loco).

This endemic community of Baikal coasts, typically inhabits stony shores affected by surf. In such conditions, the cover of vegetation is low which promotes the performance of S-strategic grass *Deschampsia turczaninowii*. Similar communities have not as yet been described from Siberia (cf. KOROTKOV et al. 1991).

11. ?class
?order
Sand vegetation in East Siberian-Mongolian steppe territory

Oxytropidion lanatae CHYTRÝ, PEŠOUT et ANENCHONOV, **all. nov. hoc loco**

Sand vegetation

Nomenclatural typus: *Oxytropido lanatae-Festucetum baicalensis* CHYTRÝ, PEŠOUT et ANENCHONOV 1993 (holotypus hoc loco).

Diagnostic species: *Festuca rubra* ssp. *baicalensis*, *Leymus secalinus*, *Oxytropis lanata*, *Aconogonon ocreatum*, *Scrophularia incisa*.

Craniospermo-Leymetum secalini CHYTRÝ, PEŠOUT et ANENCHONOV, **ass. nov. hoc loco** (tab. 13, rel. 1-6)

Nomenclatural typus: tab. 13, rel. 2 (holotypus hoc loco).

A species-poor community of sand in the surf zone of Baikal. Its stands form a narrow strip along the shoreline in the epilittoral zone, where the highest waves reach when the water in Lake Baikal rises. It was recorded only on the shore of the Barguzinskij Bay. This community is endemic for Baikal shores and no similar vegetation has been described so far (cf. MOLOŽNIKOV 1986, KOROTKOV et al. 1991).

Oxytropido lanatae-Festucetum baicalensis CHYTRÝ, PEŠOUT et ANENCHONOV, **ass. nov. hoc loco** (tab. 13, rel. 7-9)

Nomenclatural typus: tab. 13, rel. 9 (holotypus hoc loco).

Primary vegetation of unconsolidated sand dunes. Total cover is low and the dominants are mostly grasses and sedges with creeping rhizomes. Ground layer is absent. The community was found in the NW part of the Barguzinskij Bay coast in habitats where the influence of strong winds from the lake impedes the establishment of a forest. Similar communities are not mentioned in the phytosociological literature (cf. KOROTKOV et al. 1991) and they are probably not very frequent in Eastern Siberia (cf. MOLOŽNIKOV 1986).

Stellario dichotomae-Rosetum acicularis CHYTRÝ, PEŠOUT et ANENCHONOV, **ass. nov. hoc loco** (tab. 13, rel. 10-12)

Nomenclatural typus: tab. 13, rel. 12 (holotypus hoc loco).

A dwarf scrub community dominated by clonal shrub *Rosa acicularis*. It occurs on relatively stabilized sand dunes and gradually replaces the previous community in the course of succession. In the area under study, it was found at the same sites as *Oxytropido lanatae-Festucetum baicalensis*. The position of this association within the alliance *Oxytropidion lanatae* is provisional because neither sand grasslands nor scrub vegetation have been phytosociologically studied in Siberia (cf. KOROTKOV et al. 1991).

Table 14. *Cleistogenetea squarrosae* communities (1-3 *Schizonepeta multifida-Carex pediformis* comm., 4-12 *Potentillo acaulis-Thymetum baicalensis*, 13-16 *Saxifrago bronchialis-Phlojodicarpetum baicalensis*).

Relevé nr.	1	2	3	K1
Sample area (m^2)	100	100	100	
Aspect	W	W	-	
Slope (°)	10	5	0	
Cover E_1 (%)	90	90	100	
Cover E_0 (%)	5	0	0	
E_1 - field layer				
Vicia nervata	2	1	2	100
Achillea asiatica	+	2	1	100
Trifolium lupinaster	+	+	1	100
Avenula hookeri ssp. *schelliana*	+	+	+	100
Bupleurum scorzonerifolium	1	+	.	67
Delphinium grandiflorum	1	.	1	67
Aster serpentimontanus	+	.	1	67
Schizonepeta multifida	.	2	+	67
Lychnis sibirica	.	-	+	67
Potentilla acaulis	.	.	.	.
Orostachys spinosa	.	.	.	.
Koeleria cristata	+	.	.	33
Agropyron cristatum	.	.	.	.
Dracocephalum nutans	.	.	.	.
Papaver nudicaule	+	.	.	33
Alyssum obovatum	.	.	.	.
Scorzonera radiata	.	.	.	.
Calamagrostis epigeios	.	.	.	.
Orobanche coerulescens	.	.	.	.
Chenopodium aristatum	.	.	.	.
Chenopodium album	.	.	.	.
Stellaria dichotoma	.	.	.	.
Phlojodicarpus baicalensis	.	.	.	.
Carex pediformis cf. ssp. *reventa*	.	.	.	.
Selaginella rupestris	.	.	.	.
Saxifraga bronchialis	.	.	.	.
Youngia tenuifolia	.	.	.	.
Woodsia ilvensis	.	.	.	.
Calamagrostis korotkyi	.	.	.	.
Aconogonon ocreatum	.	.	.	.
Silene cf. *chamarensis*	.	.	.	.
Borodinia baicalensis	.	.	.	.
Artemisia commutata s.l.	1	1	2	100
Galium verum	2	1	1	100
Carex korshinskyi	2	.	2	67
Veronica incana	+	.	1	67
Pulsatilla flavescens	2	.	1	67
Carex pediformis	+	2	2	100
Artemisia frigida	.	+	.	33
Festuca ovina s.l.	1	+	1	100
Heteropappus altaicus	2	1	.	67
Artemisia dracunculus	+	.	2	67

4	5	6	7	8	9	10	11	12	K2	13	14	15	16	K3
15	25	25	50	25	25	25	25	15		100	25	25	25	
S	S	SSE	W	SSW	SE	SE	SSE	-		SW	SSW	S	S	
20	15	40	30	40	40	60	40	0		35	30	25	3	
70	70	70	60	50	60	70	60	15		60	50	10	10	
0	5	0	0	0	0	0	0			15	20		25	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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+	2	1	2	1	1	1	.	+	89	1	.	.	.	25
2	+	+	.	+	+	+	-	+	89	1	.	.	.	25
1	+	+	1	+	2	+	.	.	78	.	.	.	.	.
1	.	+	+	1	1	+	2	+	89	.	.	.	.	.
.	+	+	1	+	+	+	.	.	67	-	.	.	.	25
.	.	.	+	+	+	+	+	+	67	.	.	.	.	.
.	.	2	+	1.	2	2	.	.	56	.	.	.	.	.
+	.	.	+	.	+	.	.	.	33	.	.	.	.	.
.	+	1	.	.	.	.	+	.	33	.	.	.	.	.
.	+	.	.	+	.	+	.	.	33	.	.	.	.	.
.	.	.	+	+	.	.	1	.	33	.	.	.	.	.
.	.	.	.	+	.	.	1	-	33	.	.	.	.	.
.	.	.	.	.	+	.	+	+	33	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	2	2	1	1	100
.	.	.	.	.	.	.	.	.	.	2	+	+	1	100
.	.	.	.	.	.	.	.	.	.	1	+	1	1	100
.	.	.	.	.	.	.	.	.	.	+	-	+	+	100
.	.	.	.	.	.	+	.	.	11	1	+	.	1	75
.	.	.	.	.	.	.	.	.	.	+	.	+	+	75
.	.	.	.	.	.	.	.	.	.	.	2	+	1	75
.	.	.	.	.	.	.	.	.	.	.	+	1	1	75
.	.	.	.	.	.	.	.	.	.	.	+	.	1	50
.	.	.	.	.	.	.	.	.	.	.	.	+	-	50
1	2	2	1	3	+	2	1	-	100	1	.	.	.	25
1	1	.	+	+	1	2	1	+	89	.	.	.	.	.
+	1	1	2	+	2	+	+	+	100	.	.	.	.	.
+	+	+	+	.	+	1	+	+	89	.	.	.	.	.
2	+	-	+	.	+	+	.	.	67	-	.	.	.	25
+	.	.	1	+	+	1	.	.	56	.	.	.	.	.
+	.	.	.	1	1	1	.	.	44	.	.	.	.	.
1	.	.	+	.	.	.	.	.	22	.	.	.	.	.
.	1	+	.	.	.	.	.	.	22	.	.	.	.	.
.	.	.	.	.	.	.	3	1	22	.	.	.	.	.

Tab. 14 - cont.

Relevé nr.	1	2	3	K1
Thymus baicalensis s.l.	.	.	1	33
Pulsatilla turczaninovii	.	.	.	.
Rosa acicularis	.	.	.	.
Dianthus versicolor	1	+	1	100
Poa stepposa	1	+	.	67
Allium splendens	+	.	.	33
Silene repens	.	+	.	33
Astragalus fruticosus	.	-	.	33
Cerastium arvense	.	.	1	33
Poa sp.	.	.	+	33
Artemisia sericea	.	.	.	.
Androsace lactiflora	.	.	.	.
Camelina microcarpa	.	.	.	.
Spiraea media juv.	.	.	.	.
Linaria acutiloba	.	.	.	.
Sisymbrium heteromallum	.	.	.	.
E_0 - ground layer				
Parmelia taractica	.	.	.	.
Cetraria nivalis	.	.	.	.

In one relevé only:

E_1: *Aconogonon angustifolium* 1: +, *Achyrophorus maculatus* 1: -, *Artemisia tanacetifolia* 2: 2, *Plantago media* 2: 2, *Astragalus inopinatus* 2: 1, *Phlomis tuberosa* 2: 1, *Bromopsis inermis* 2: +, *Polygala hybrida* 2: +, *Agrostis trinii* 3: 2, *Bupleurum triradiatum* 3: 1, *Galatella dahurica* 3: 1, *Geranium coeruleum* 3: 1, *Potentilla bifurca* 3: 1, *Potentilla* sp. 3: 1, *Myosotis* sp. 3: +, *Plantago major* 3: +, *Taraxacum ceratophorum* 3: +, *Hieracium umbellatum* 4: -, *Sedum maximum* s.l. 5: -, *Polygonatum odoratum* 6: -, *Festuca ovina* s.l. 7: +, *Turritis glabra* 7: -, *Euphorbia* cf. *esula* 8: -, *Hieracium* cf. *robustum* 9: +, *Erysimum hieraciifolium* 11: +, *Sedum aizoon* 11: +, *Artemisia vulgaris* 12: 1, *Artemisia dracunculus* 12: +, *Artemisia lagocephala* 14: +, *Cotoneaster uniflorus* 14: +, *Rhodococcum vitis-idaea* 15: 1, *Saxifraga algisii* 15: 1, *Patrinia sibirica* 16: +;

E_0: *Polytrichum piliferum* 5: 1, *Cladina rangiferina* 14: 2, *Cladina arbuscula* 16: +, *Parmelia centrifuga* 16: +, *Stereocaulon paschale* 16: +.

12. *Cleistogenetea squarrosae* MIRKIN et al. ex GOGOLEVA et al. 1987

East Siberian and Mongolian steppes

Original publication: *Cleistogenetea squarrosae* MIRKIN et al. 1986 nom. inval. (Art. 2b).

Syn.: *Potentillo-Artemisietea* GUINOCHET 1982 p.p. (Art. 2b).

Note: From Siberia, various authors described various syntaxa of the rank of association to order within this class (e.g. GUINOCHET 1982, KONONOV et al. 1985, MIRKIN et al. 1985, 1992, ŽITLUCHINA 1986, GOGOLEVA et al. 1987). On the basis of this fragmentary and scattered material it seems impossible to assess the syntaxonomic structure of this very varied class. That is why communities of association rank are not placed to alliances and orders in this paper.

4	5	6	7	8	9	10	11	12	K2	13	14	15	16	K3
2	3	3	3	3	+	1	1	+	100	+	2	.	1	75
.	.	.	+	.	1	-	.	.	33	2	+	1	1	100
.	+	.	+	.	+	+	.	.	44	+	1	.	.	50
1	1	1	+	.	.	+	.	-	67	-	-	.	+	75
2	+	+	.	+	+	1	+	.	78	+	1	.	.	50
+	.	+	+	-	+	+	.	.	67	.	1	.	+	50
.	.	.	+	.	.	.	+	.	22	1	.	.	.	25
.	.	.	-	-	.	.	+	.	33	.	.	.	.	.
.	.	.	.	.	.	.	+	.	11	.	.	.	.	.
.	.	.	.	.	.	.	.	1	11	.	.	.	-	25
.	+	.	.	.	.	.	.	.	11	1	.	.	.	25
.	.	.	+	.	.	+	.	.	22	.	.	.	.	.
.	.	.	-	.	.	.	+	.	22	.	.	.	.	.
.	.	.	.	.	+	.	.	.	11	1	.	.	.	25
.	.	.	.	.	.	+	+	.	22	.	.	.	.	.
.	.	.	.	.	.	-	1	.	22	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	2	2	.	.	50
.	.	.	.	.	.	.	.	.	.	.	1	.	+	50

Schizonepeta multifida-Carex pediformis community (tab. 14, rel. 1-3)

This secondary dry grassland develops on deforested sunny slopes under the influence of grazing. The soil is several cm deep overlaying crystallinic bedrock. The stands are closed and species-rich. This community was found only on Kovrižka hill. In its physiognomy, species composition and ecology, this community resembles the so-called meadow steppes of Russian botanists (cf. PEŠKOVA 1972).

Potentillo acaulis-Thymetum baicalensis CHYTRÝ, PEŠOUT et ANENCHONOV **ass nov. hoc loco** (tab. 14, rel. 4-12)

Nomenclatural typus: tab. 14, rel. 5 (holotypus hoc loco).

This mountain steppe community inhabits steep rocky slopes above Baikal shores. The soil is very shallow, erosion-prone, with prevailing coarsely grained sand and gravel from the weathering of crystallinic rocks. Its habitats are primarily without forest, probably due to exposure to strong winds from Baikal, and these stands may spread on sites deforested due to the effect of grazing. Many stands are grazed by goats. This community was found on the western shore of Čivyrkujskij Bay. So-called mountain steppes are often mentioned in Eastern Siberia (PEŠKOVA 1972, 1985). This community is documented from Uškan'e islands by IVANOVA (1969). Similar vegetation is described in GUINOCHET (1982) from the surroundings of Irkutsk, and in ŽITLUCHINA (1986) from the West Sayan Mts.

Saxifrago bronchialis-Phlojodicarpetum baicalensis CHYTRÝ, PEŠOUT et ANENCHONOV, **ass. nov. hoc loco** (tab. 14, rel. 13-16)

Nomenclatural typus: tab. 14, rel. 15 (holotypus hoc loco).

A community of non-forest patches on dry and sunny, rocky slopes in the forest belt near the alpine timberline and in the subalpine belt. Many species typical of siliceous rocks in higher altitudes are present in this community while a great many true steppe species are lacking. This association is a subalpine vicariant of the preceding one but, due to conspicuous differences in species composition, it is doubtful whether it belongs to the class *Cleistogenetea squarrosae*. However, similar communities are not phytosociologically described in Siberia (cf. KOROTKOV et al. 1991) and further comparisons are necessary.

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Appendix - Localities of relevés

Table 1

1.-2. Plateau in the summit of the mountain range 5.5 km NW of Glinka settlement, 1740-1770 m, VIII.91
3. Summit of the mountain range 4.8 km N of Makarov's cape, 1620 m, VIII.91
4.-15. Plateau in the summit of the mountain range 5.5 km NW of Glinka settlement, 1740-1770 m, VIII.91
16. Grasslands among krummholz stands 9 km SSE of Markov's cape, 1450 m, VIII.91
17.-19. Plateau in the summit of the mountain range 5.5 km NW of Glinka settlement, 1740-1770 m, VIII.91

Table 2

1. Barmašovye Lakes, 455 m, VII.91
2. Arangatuj Lake near Kordon settlement, 455 m, VII.91
3. Barmašovye Lakes, 455 m, VII.91
4. Arangatuj Lake near Kordon settlement, 455 m, VII.91
5. Čivyrkujskij Bay near Kulinoe settlement, 455 m, VII.91
6-9. Arangatuj Lake near Kordon settlement, 455 m, VII.91
10-12. Barmašovye Lakes, 455 m, VII.91
13-14. Arangatuj Lake near Kordon settlement, 455 m, VII.91
15-17. Barmašovye Lakes, 455 m, VII.91

Table 3

1-3. Samovye Lakes VI.91
4-12. Čivirkujskij Bay near Glinka settlement VII.91

Table 4
1-4. Barmašovye Lakes, 455 m, VII.91
5-7. Samovye Lakes, 455 m, VI.91
8. Pools in mires near El'zicha settlement, 455 m, VII.91
9-12. Čivyrkujskij Bay near Kulinoe settlement, 455 m, VII.91
13-14. Samovye Lakes, 455 m, VI.91
15. Pools in mires near El'zicha settlement, 455 m, VII.91
16. A lake near Kulinoe settlement, 455 m, VII.91
17-18. Barmašovye Lakes, 455 m, VII.91

Table 5
1-7. Samovye Lakes, 455 m, VI.91
8-13. Pools in mires near El'zicha settlement, 455 m, VI.91

Table 6
1-3. Margins of mires between El'zicha settlement and Barmašovye Lakes, 460 m, VI.91

Table 7
1-4. Čivyrkujskij Bay near Kulinoe settlement, 455 m, VII.91
5. Barmašovye Lakes, 455 m, VII.91
6-8. Mires between Kulinoe settlement and Kovrižka hill, 455 m, VII.91

Table 8
1-3. Mires near Kulinoe settlement, 455 m, VII.91
4-6. Mires near El'zicha settlement, 455 m, VII.91
7. Mires near Kulinoe settlement, 455 m, VIII.91
8. Coast of Barmašovye Lakes, 455 m, VIII.91
9-10. Coast of Barmašovye Lakes, 455 m, VII.91
11-12. Mires near El'zicha settlement, 455 m, VII.91
13-15. Coast of Samovye Lakes, 455 m, VI.91
16-17. Margins of mires near El'zicha settlement, 455 m, VII.91
18-20. Around Kordon settlement, 455 m, VII.91

Table 9
1-2. Samovye Lakes, 455 m, VI.91
3. Mires near El'zicha settlement, 455 m, VIII.91
4. Mires near Kordon settlement, 455 m, VIII.91
5. Mires near El'zicha settlement, 455 m, VIII.91
6-7. Mires 1.5 km N of Katun', 455 m, VIII.91
8. Mires near Kordon settlement, 455 m, VIII.91
9. Čivyrkujskij Bay near Kulinoe settlement, 455 m, VII.91
10-13. Mires near El'zicha settlement, 455 m, VIII.91
14-15. Mires between Barmašovye Lakes and Barguzinskij Bay coast, 455 m, VIII.91
16-19. Mires near El'zicha settlement, 455 m, VIII.91
20. Barmašovye Lakes, 455 m, VII.91
21. Čivyrkujskij Bay near Kulinoe settlement, 455 m, VII.91
22. Mires near El'zicha settlement, 455 m, VII.91
23. Mires near Kordon settlement, 455 m, VIII.91
24. Mires near Kulinoe settlement, 455 m, VIII.91

Table 10
1-3. Between Kordon settlement and Arangatuj Lake, 455 m, VII.91
4-7. Mires around Kulinoe settlement, 455 m, VII.91
8-12. Mires around Kordon settlement, 455 m, VIII.91
13. Near Kulinoe settlement, 455 m, VII.91

21. Čivyrkujskij Bay near Kulinoe settlement, 455 m, VII.91
22. Mires near El'zicha settlement, 455 m, VII.91
23. Mires near Kordon settlement, 455 m, VIII.91
24. Mires near Kulinoe settlement, 455 m, VIII.91

Table 10

1-3. Between Kordon settlement and Arangatuj Lake, 455 m, VII.91
4-7. Mires around Kulinoe settlement, 455 m, VII.91
8-12. Mires around Kordon settlement, 455 m, VIII.91
13. Near Kulinoe settlement, 455 m, VII.91
14-20. Between Kordon settlement and Arangatuj lake, 455 m, VII.-VIII.91

Table 11

1-4. Bogs around Kordon settlement, 460 m, VII.91
5-8. Bogs around Kulinoe settlement, 460 m, VII.91
9-11. Bogs around Kulinoe settlement, 460 m, VIII.91
12-19. Bogs around Kordon settlement, 460 m, VIII.91

Table 12

1-4. Arangatuj Lake coast near Kordon settlement, 455 m, VIII.91
5-7. Mires around Kulinoe settlement 455 m, VIII.91
8-10. Mires near El'zicha settlement 455 m, VIII.91
11-12. Mires near Barmašovye Lakes 455 m, VIII.91
13-17. Mires between Kulinoe settlement and Kovrižka and Golaja hills, 455 m, VIII.91
18-23. Baikal coast near Orlovskij cape, 455 m, VI.92

Table 13

1-6. Barguzinskij Bay coast 6-10 km SE of Glinka settlement, 460 m, VIII.91
7-12. Barguzinskij Bay coast 6-8 km SE of Glinka settlement, 460 m, VIII.91

Table 14

1-4. Kovriška hill 1.5 km ENE of Kulinoe settlement, 470 m, VIII.91
5-6. Slopes of Golaja hill 3 km NNE of Kulinoe settlement, 480 m, VIII.91
7-8. Rocky slopes above Čivyrkujskij Bay coast near the W margin of the village of Monachovo, 470 m, VIII.91
9. Rocky slopes above Čivyrkujskij Bay coast 1 km NE of the village of Monachovo, 500 m, VIII.91
10. Rocky slopes above Čivyrkujskij Bay coast near the N margin of the village of Katun', 490 m, VIII.91
11-12. Rocky slopes above Čivyrkujskij Bay coast near the W margin of the village of Monachovo, 470 m, VIII.91
13. Rocky enclaves in pine forest 2.7 km NW of Glinka settlement, 1150 m, VIII.91
14. Rocky slopes 3.5 km NNW of Makarov's Cape, 1300 m, VIII.91
15. Rocky slopes 4 km NW of Glinka settlement, 1400 m, VIII.91
16. Rocky slopes 3 km NW of Makarov's Cape, 900 m, VIII.91