

BRYOPHYTE COMMUNITIES OF SALAIR FORESTS (SOUTH SIBERIA)

СООБЩЕСТВА МОХООБРАЗНЫХ В ЛЕСАХ САЛАИРА (ЮЖНАЯ СИБИРЬ)

OLGA Y. PISARENKO¹

ОЛЬГА Ю. ПИСАРЕНКО¹

Abstract

Bryophyte communities were studied in tall-herb fir-aspen forests ("chernevaia taiga") and birch-pine grass forests of Salair ridge. Characteristics of recognized 8 associations and 4 subassociations are given. Two associations and two subassociations are described as new, others are known from Central Europe and South Urals. In the Central Europe system of high syntaxa (Marsteller, 1993) the associations belong to 3 classes, 5 orders and 5 alliances. Forests of Salair differ on composition of bryophyte communities inhabited them. Phytocenological characteristics of each syntaxon are given along with ecological one.

Резюме

В крупнотравных пихтово-осиновых (черневых) и в травяных березово-сосновых лесах Салаирского кряжа изучены сообщества мохообразных. Представлена характеристика выявленных 8 ассоциаций и 4 субассоциаций. Две ассоциации и 2 субассоциации описаны как новые, остальные известны из Европы и Южного Урала. В системе высших синтаксонов Центральной Европы выявленные сообщества отнесены к 3 классам, 5 порядкам и 5 союзам. Леса Салаира различаются по составу обитающих в них сообществ мохообразных. Фитоценологическая характеристика каждого синтаксона приводится наряду с экологической.

INTRODUCTION

In Russia, research of bryophyte vegetation using the Braun-Blanquet approach was initiated by Baisheva in the territory of Bashkiria (Baisheva & al. 1994, Baisheva, 1995). This article presents research using the same approach in the area of the Salair ridge.

STUDY AREA

Salair ridge is the northwest termination of Altai-Sayan mountain system. It is a low only slightly incised peneplain (Vdovin, 1988). The ridge surface is covered by thick layer of loam. The elevation of the ridge ranges from 400 to 450 meters above sea-level. The area of ridge is about 22 500 sq. km., with an approximate length of 300 km. The climate is continental. Average annual temperature ranges from -2.1°C up to +2.3°C. Annual precipitation is about 800 mm on western gentle slope of the ridge and about 400 mm on the eastern ones (Lashchinsky & Sedelnikov, 1991). The investigations of bryophyte vegetation were carried out in the two most widespread types of Salair forests: tall-

herbaceous fir-aspen forests (so-called "chernevaia taiga") and mesophytic birch-pine forests.

Chernevaia taiga occupies the most part of the Salair territory, almost completely covering the sloping watersheds (Poliakov, 1934). The canopy is open. The *Populus tremula* L. groups are alternated with *Abies sibirica* Ledeb. groups and with tall herb meadows (Ioschenko, Lashchinsky, 1994). The shrub layer is sparse, consisting mainly of *Sorbus sibirica* Hedl., *Padus avium* Mill., *Salix caprea* L., *Caragana arborescens* Lam.. The herb layer in the *Populus tremula* groups and in the tall herb meadows is closed and complex. Its average height is 1-1.5 m, but individual sprouts may reach 3,5-4 m. In the top sublayer, dominant species include: *Aconitum septentrionale* Koelle, *Crepis sibirica* L., *Cirsium heterophyllum* (L.) Hill, *Saussurea latifolia* Ledeb. Under the tall herb canopy, in the second herb sub-layer, dominant species include: *Stellaria bungeana* Fenzl, *Myosotis krylovii* Serg., *Adoxa moschatellina* L., *Erythronium sibiricum* (Fisch. et C.A.Mey.) Kryl., *Anemon-*

¹ – Central Siberian Botanical Garden, Zolotodolinskaya 101, Novosibirsk 630090 Russia – Россия 630090 Новосибирск, Золото долинская 101, Центральный сибирский ботанический сад

oides altaica (C. A. Mey.) Holub, *A. caerulea* (DC.) Holub, *Corydalis bracteata* (Steph.) Pers. (Lashchinsky & Sedelnikov, 1991). Small-sized bushes (*Ribes atropurpureum* C. A. Mey., *Rubus idaeus* L., *Lonicera xylosteum* L.) do not exceed the average height of the herb layer. Litter is absent, and moss cover on the soil is poorly developed. In the *Abies sibirica* groups, tall herb species do not form a dense cover. The species of the second herb sublayer are most abundant. Also found in this group are *Circaea alpina* L., *Oxalis acetosella* L., *Paris quadrifolia* L., *Calamagrostis obtusata* Trin. (Lashchinsky & al., 1991). Thickness of litter is 1-2 cm. Cover of the moss can reach 20-30 %.

Mesophytic birch-pine forests occur on the eastern side of ridge. The canopy is formed by *Pinus sylvestris* L. and *Betula pendula* Roth, sometimes with *Larix sibirica* Ledeb. The shrub layer is well developed, and consists mainly of *Caragana arborescens* Lam. with lesser amounts of *Spiraea media* Franz Schmidt and *Rosa majalis* Herrm. The herb layer is rich, with 60-80% cover. *Carex macroura* Meinsh., *Brachypodium pinnatum* (L.) Beauv., *Calamagrostis arundinacea* (L.) Roth dominate. The communities, located on the upper portions eastern ridgeside, are distinguished by a more diverse shrub layer (*Salix caprea* L., *Viburnum opulus* L.). In the herb layer of these communities both taiga species and tall-herb species are constantly present. Sometimes in the herb layer *Vaccinium myrtillus* L. sub-dominates (Ermakov & al., 1991). Moss cover is 40-60% and consists of a few species.

MATERIALS AND METHODS

The material was collected in 1993-1994. 20 areas of tall-herb fir-aspen forests and 20 areas of mesophytic birch-pine grass forests were investigated (primarily in the vicinity of the stationary plots known as "Kotorovo" and "Mirnyi," near the villages of the same names). 380 geobotanical relevés of homogeneous plots of bryophyte cover on soil, tree trunks and decaying wood were carried out. In each case ecological conditions of plots were described and samples of bryophyte cover were collected in herbarium. Nomenclature of mosses is after Ignatov & Afonina (1992), of hepatics – Konstantinova & al. (1992). The names of syntaxa follow the Code of Phytosociological Nomenclature (Barkman & al., 1986). The abundance of species was evaluated according to the

Braun-Blanquet cover abundance scale: + – cover not more than 1%, 1 – 1-5%, 2a – 6-12%, 2b – 13-25%, 3 – 26-50%, 4 – 51-75%, 5 – 76-100%. All of the relevés were arranged using the tabular sorting method of the Braun-Blanquet approach. Syntaxonomical position of segregated phytocoenons was defined according to the system of the highest syntaxons, offered by R. Marstaller (1993) for bryophyte vegetation of Central Europe. In this system our relevés are referred to 3 classes, 5 orders, 5 unions and 8 associations.

The abbreviations of substrata used in the tables are as follow: As – *Abies sibirica*, Bp – *Betula pendula* Roth, Ls – *Larix sibirica* Ledeb., Ps – *Pinus sylvestris* L., Pt – *Populus tremula*, Ts – *Tilia sibirica* Fisch. ex Bayer, Ss – *Sorbus sibirica* Hedl., R – rotten wood, L – litter. The numbers of nomenclature type-relevés are marked with "!".

THE LIST OF SYNTAXA OF THE BRYOPHYTE VEGETATION OF SALAIR FORESTS

- Class CLADONIO-LEPIDOZIETEA REPTANTIS
Jez. et Vondr. 1962 em. Marst.1993
- Ord. DIPLOPHYLLLETALIA ALBICANSIS Phil.1963
All. *Dicranellion heteromallae* (Phil.1956)
Phil.1963
Suball. *Pogonatenion urnigeri* (v.Krus.1945)
Phil.1956 em. Marst.1984
Ass. *Dicranello heteromallae-Atrichetum flaviseti* ass.nov.
- Ord. BRACHYTHECIATALIA RUTABULO-SALEBROSI Marst. 1987
All. *Bryo-Brachythecion* Lec.1975 em. Marst.1987
Ass. *Brachythecietum salebroso-reflexi* ass. nov.
subass. *typicum* subass. nov.
subass. *plagiomnietosum cuspidati*
subass. nov.
subass. *brachythecietosum reflexi*
(Baisheva et al.1994) subass. et stat. nov.
- Ord. DICRANETALIA SCOPARII Barkm. 1958
All. *Dicrano scoparii-Hypnion filiformis*
Barkm. 1958
Ass. *Orthodicrano montani-Hypnetum filiformis* Wins. 1930
Ass. *Ptilidio pulcherrimi-Hypnetum pallenscentis* Barkm. ex Wilm.1962
subass. *callicladietosum haldaniani* Baisheva 1995

Table 1. *Brachythecietum salebroso-reflexi* ass. nov. *typicum* subass.nov.

Number of releve	01 02 03 04 05 06 07 08 09 10 11! 12 13 14 15 16 17 18 19	C
Substratum	Pt Pt Pt Pt Pt Pt Pt Pt Pt Pt Pt Pt Pt Pt Pt R R R R	O
Width of the plot, cm	10 20 10 10 10 10 40 10 20 15 20 20 20 20 10 20 10 10 20	N
Length of the plot, cm	10 20 10 40 10 10 60 10 30 15 20 60 20 20 50 20 20 10 20	S
Cover, %	100 100 100 90 100 100 90 100 70 100 100 80 100 100 90 100 100 100 100	T
Number of species in releve	5 4 2 5 4 5 4 3 2 6 4 4 4 5 4 6 5 7 5	
Diagnostic species of subassociation, association, alliance and order		
<i>Brachythecium reflexum</i>	4 5 4 4 4 3 3 3 2a 2b 1 2b 2a 2b 2b 2a 1 +	V
<i>Brachythecium salebrosum</i>	1 2a 2a 2b 3 2b 3 4 3 4 4 4 5 5 4 4 4 4	V
Diagnostic species of <i>Bryo-Brachythecion</i> = diagnostic species of <i>Brachythecietalia rutabulo-salebrosi</i>		
<i>Amblystegium serpens</i>	+ + . + . + + . 1 + . + + + +	IV
<i>Campylium hispidulum</i>	+ + . + + + . . . + + . + . + . 1 +	IV
Diagnostic species of <i>Cladonio-Lepidozietea reptantis</i>		
<i>Lophocolea heterophylla</i>	. . . . . . . . . . . . . . . + + . .	I
Other species		
<i>Plagiomnium cuspidatum</i>	. . . . + . . . . . . . . . . + + + + +	II
<i>Sanionia uncinata</i>	. . . . . . . . . . . . . + . . . . + .	I
<i>Leskeella nervosa</i>	1 + 1 . . . + .	I
<i>Radula complanata</i>	. + . + . . + . . . 1 . +	II
<i>Platydictya subtilis</i>	. . . . + . . . . . . . + . . . . . .	I

Low constancy species: *Leskea polycarpa* (6 — +), *Amblystegium varium* (7 — +).

Class FRULLANIO DILATATAE–
LEUCODONTETEA SCIUROIDIS
Mochan1978 em. Marst.1985

Ord. ORTHOTRICHETALIA Had. in Kl. et
Had. 1944

All. *Ulotion crispae* Barkm. 1958

Ass. *Pylaisietum polyanthae* Felf. 1941

Ass. *Orthotrichetum speciosi* (Jaggi 1934)
Barkm. 1958

Ass. *Pylaisiello to polyanthae–Leskeelletum
nervosae* Baisheva et al.1994

Class HYLOCOMIETEA SPLENDENTIS
Gillet ex Marst. 1993

Ord. HYLOCOMIETALIA SPLENDENTIS
Gillet ex Marst. 1993

All. *Pleurozium schreberi* Wisn. 1930

Ass. *Pleurozietum schreberi* Wisn.1930

DESCRIPTION OF THE SYNTAXA

The descriptions of associations are given in sequence, reflecting their distributions in Salair forests: epiphytic and epixylic communities, from the most usual to more rare; communities inhabit litter and deadfall; communities formed on patches of soil cover disturbance.

Ass. **Brachythecietum salebroso-reflexi** ass.
nov. Table 1-3

Type-releve of association is 11 (Table 1).

Diagnostic species: *Brachythecium reflexum*, *B. salebrosum* (codom).

The association unites epiphytic and epixylic communities with predominance of *Brachythecium reflexum* and *B. salebrosum*. *Plagiomnium cuspidatum* is frequently present. The association is the most widespread in Salair chernevaia taiga. The communities inhabit tree bases up to a height of 0.6 m and on the deadfalls.

The segregation of this association is disputable. The association is formed by species of wide ecological amplitude, widespread in the boreal zone. In all probability, the association is also widely distributed. Our materials consist of about 100 releves, carried out in Salair chernevaia taiga. Although in the literature, associations with similar floristic composition are known, we failed to classify our materials to any of already described syntaxa. The arguments of our taxonomical decision are given below. The decision can be considered as an invitation for discussion about these communities with invoking of additional materials.

Described communities are poor on floristic composition. Therefore diagnostic species of higher syntaxa were used to recognize phytocoenons. Well presented diagnostic species combination of the alliance *Bryo-Brachythecion* (= order *Brachythecietalia rutabulo-salebrosi*) – *Brachythecium reflexum*, *B. salebrosum*, *B. starkei*, *B. velutinum*, *Amblystegium serpens*, *Campylium hispidulum* – permits to classify the phytocoenon in this order and alliance. From diagnostic species of class *Cladonio-Lepidozi-*

Table 2. *Brachythecietum salebroso-reflexi* ass. nov. *plagiomnietosum cuspidati* subass.nov.

Number of releve	01 02 03! 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20	C
Substratum	R R R R R R R R R As Ts R Ts Ts R Ts Ts Ss Pt Pt	O
Width of the plot, cm	10 20 10 10 10 20 10 10 10 10 40 20 20 30 40 40 40 10 40 20	N
Length of the plot, cm	30 200 30 30 30 50 20 100 20 10 50 100 80 50 80 60 50 40 80 50	S
Cover, %	100 100 100 80 100 100 100 90 100 70 90 100 80 100 100 70 90 100 100 90	T
Number of species in releve	8 8 4 6 6 5 7 9 7 4 5 8 3 7 6 7 8 5 4 12	
Diagnostic species of subassociation(*), association, alliance and order		
<i>*Plagiomnium cuspidatum</i>	2b 3 2a 2a 3 2a 2b 2a 2a 3 3 3 4 4 3 3 4 5 3	V
<i>Brachythecium reflexum</i>	3 + 3 3 1 2b 2a 3 2b 2b 2b 3 3 2a 2b 1 1 1 1 .	V
<i>Brachythecium salebrosum</i>	3 3 3 2a 3 2b 2a + + . 1 1	III
Diagnostic species of <i>Bryo-Brachythecion</i> = diagnostic species of <i>Brachythecietalia rutabulo-salebrosi</i>		
<i>Amblystegium serpens</i>	+ + . + + 1 2a . + +	II
<i>Campylium hispidulum</i>	+ + 1 1	I
<i>Brachythecium starkei</i>	. . . . . 1 1	I
Diagnostic species of <i>Cladonio-Lepidozietea reptantis</i>		
<i>Lophocolea heterophylla</i>	. 1 + +	I
<i>Plagiothecium denticulatum</i>	. . . . . . + 1 2a + . 1	II
Other species		
<i>Lophocolea minor</i>	. . 1 + . . + + + + . + . + + . . +	III
<i>Sanionia uncinata</i>	+ + . 1 . . . 1 . . + 1 . + + 1 1 + . 1	IV
<i>Callicladium haldanianum</i>	. . . . . 1 . 1 . + . 2b . . . +	II
<i>Leskeella nervosa</i>	+ 1 +	I
<i>Radula complanata</i>	. . . . . . . . . . . + . + . . . + +	I

Low constancy species: *Ceratodon purpureus* (2 – +), *Leptobryum pyriforme* (2 – 2a), *Brachythecium velutinum* (18 – +), *B. oedipodium* (6 – 2a; 18 – 1), *Rhytidiadelphus subpinnatus* (12 – +), *Rhizomnium pseudopunctatum* (12 – +), *Mnium stellare* (20 – 1), *Orthotrichum speciosum* (20 – +), *Dicranum polysetum* (15 – +), *Plagiomnium confertidens* (1 – +), *P. drummondii* (5 – +), *P. medium* (20 – 1), *P. rostratum* (20 – 1), *Hypnum pallescens* (11 – +), *Pohlia nutans* (9 – +), *Platydictya subtilis* (20 – +), *Pylaiiella polyantha* (17 – 1; 20 – +), *Oncophorus wahlenbergii* (16 – +; 17 – 1), *Orthodicranum montanum* (15 – +).

etea reptantis, allocated on European material, only *Lophocolea heterophylla* and *Plagiothecium denticulatum* are presented. Marstaller takes *Cladonio-Lepidozietea reptantis* as synonym of the class *Lepidozio-Lophocoletea* v. Hübschm. ex Mohan 1978. From diagnostic species of this class in our syntaxons *Ptilidium pulcherrimum*, *Hypnum pallescens*, *Tetraphis pellucida*, *Dicranum fuscescens*, *Plagiothecium laetum* are present. It is another point in favor of classification of our association in *Cladonio-Lepidozietea reptantis*.

The high constancy of *Plagiomnium cuspidatum* is called our attention. Marstaller gives this species together with *Brachythecium populeum*, *Homalia trichomanoides*, *Anomodon viticulosus*, *Oxystegus tenuirostre* as diagnostic for order *Neckeretalia complanatae* Jez. et Vondr. 1962 (class *Neckeretea complanatae* Marst. 1986). In Salair, this combination of species is found on rock outcrops. In our association the presence of *Plagiomnium cuspidatum* is not supported by other diagnostic species of the class and the order. In Salair (and in general in Siberia) *Plagiomnium cuspidatum* is one of most common species, which

occurs on trunks of trees, deadfalls, litter, soil, on stones.

In literature the associations with similar species composition are described. They are *Brachythecio salebrosi-Amblystegietum juratzkani* (Sjog. ex Marst. 1987) Marst. 1989 and *Brachythecio salebrosi-Drepanocladetum uncinati* Marst. 1989 – epiphytic associations, described on European material; *Brachythecio salebrosi-Amblystegietum serpentis* Baisheva et al. 1994 – epixylic association, described in Bashkiria. The first of them is distinguished on *Amblystegium serpens* domination (Marstaller, 1988 a, 1988 b, 1992), the second – on *Sanionia uncinata* domination (Marstaller, 1992). In our communities both *A. serpens* and *S. uncinata* are present in insignificant abundance. *Brachythecium reflexum*, the most constant and abundant species in our communities, in the associations, mentioned above, is represented occasionally. Besides both these associations are characterized by the absence of *Plagiomnium cuspidatum*. In central Europe *P. cuspidatum* is (as it was shown above) more typical for epilithic communities. The association *Brachythecio salebrosi-Amblystegietum serpentis* is related to association *Brachythecio*

Table 3. *Brachythecietum salebroso-reflexi* ass. nov. *brachythecietosum reflexi* (Baisheva et al. 1994) subass. et stat. nov.

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	C	
Number of releve	As	As	As	Bp	As	As	Ts	Bp	As	As	As	As	Pt	Pt	Pt	R	As	R	O	
Substratum	5	15	10	20	10	10	20	30	10	10	20	20	10	20	10	5	10	10	N	
Width of the plot, cm	20	30	10	30	40	30	60	40	30	10	30	30	20	20	10	50	30	200	S	
Length of the plot, cm	100	90	100	100	100	100	90	90	80	80	80	100	100	100	80	100	80	100	T	
Cover, %	1	2	4	3	5	3	8	7	3	4	5	7	2	4	5	7	6	10		
Number of species in releve	Diagnostic species of subassociation(*), association, alliance and order																			
<i>*Brachythecium reflexum</i>	5	5	5	5	5	5	4	4	4	4	4	4	5	5	4	5	4	4	V	
<i>Brachythecium salebrosum</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I
Diagnostic species of <i>Bryo-Brachythecion</i> = diagnostic species of <i>Brachythecietalia rutabulo-salebrosi</i>																				
<i>Amblystegium serpens</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II
<i>Campyllum hispidulum</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I
Diagnostic species of <i>Cladonio-Lepidozietea reptantis</i>																				
<i>Lophocolea heterophylla</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I
<i>Plagiothecium denticulatum</i>	.	.	.	1	+	+	.	1	.	2a	1	+	.	.	.	.	.	1	III
Other species																				
<i>Plagiomnium cuspidatum</i>	.	.	1	.	1	.	.	.	1	.	.	1	.	.	+	+	+	+	III	
<i>Lophocolea minor</i>	.	.	+	+	+	.	1	.	.	+	+	+	.	.	.	.	.	.	III
<i>Sanionia uncinata</i>	.	.	1	.	.	+	.	2a	2a	.	.	1	.	.	.	1	.	+	II	
<i>Dicranum fuscescens</i>	.	.	.	.	1	.	.	+	.	.	+	1	.	.	.	.	.	.	II
<i>Leskeella nervosa</i>	.	.	.	.	.	.	.	.	.	.	.	.	1	+	1	.	.	.	I
<i>Hypnum pallescens</i>	.	1	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	+	I
<i>Callicladium haldanianum</i>	1	I

Low constancy species: *Rhizomnium pseudopunctatum* (7 - +), *Amblystegium varium* (11 - +), *Lophozia ventricosa* (8 - +), *Eurhynchium hians* (8 - +), *Ptilidium pulcherrimum* (7 - +; 12 - +), *Pylaisiella polyantha* (7 - +; 8 - +), *Radula complanata* (15 - +), *Orthodicranum montanum* (17 - +).

salebrosi- Amblystegietum juratzkani. It is distinguished on *Amblystegium serpens* domination against background *Brachythecium salebrosum* and *Leskea polycarpa* (the latter on Salair dated to rock outcrops), in absence of *Brachythecium reflexum*. All this prevents the classifying of our phytocoenon as one of the associations mentioned above.

Three subassociations belong to the composition of *Brachythecietum salebroso-reflexi*: *B. s.-r. typicum* subass. nov.; *B. s.-r. plagiomnietosum cuspidati* subass. nov.; *B. s.-r. brachythecietosum reflexi* (Baisheva et al., 1994) subass. et stat. nov. All three subassociations have identical floristic basis. They are distinguished by species proportion according to some differences in ecological conditions of typical sites.

Subass. *Brachythecietum salebroso-reflexi typicum* subass. nov. Table 1

Type-releve – 11.

Diagnostic species: *Brachythecium reflexum*, *B. salebrosum* (codom).

Amblystegium serpens, *Campyllum hispidulum*, *Plagiomnium cuspidatum* (last usually vegetative) are constantly present, but their abundance is limited. The average cover is about 100%, and the average number of species in releve

is 5. The communities of this subassociation can be always found on bases of *Populus tremula* trunks in Salair tall-herb fir-aspen forests, in the conditions of average light exposure and high moisture. Occasionally they occur on bases of *Betula pendula* and *Sorbus sibirica* trunks. Besides, these communities occur on deadfalls at initial stages of wood destruction. Their sizes depend on the diameter of the tree trunk and varies from 10 x 10 cm on thin trunks, up to bands of 30 cm in width or more, partially encircling the base of large trees generally up to a height of 100-120 cm above the ground.

Subass. *Brachythecietum salebroso-reflexi plagiomnietosum cuspidati* subass. nov. Table 2
Type-releve – 3.

Diagnostic species: *Plagiomnium cuspidatum*.

Except for the increase of the role of *Plagiomnium cuspidatum*, the subassociation is characterized by the occasional presence of a large set of species inhabiting rotten wood. The cover frequently reaches 100%, and the average number of species in releve is 6. These communities are widespread on old deadfalls with decaying moist wood. They replace the subassociation described above at the following stage of wood destruction. Sometimes the subassociation oc-

Table 4. *Pylaisietum polyanthae* Felf. 1941

Number of releve	1	2	3	4	5	6	7	8	9	10	C
Length of the plot, cm	20	30	20	20	10	10	20	20	20	20	O
Width of the plot, cm	50	40	60	20	20	20	40	30	20	20	N
Cover, %	70	80	90	80	80	90	90	100	80	90	S
Height above the ground, cm	30	150	40	35	30	60	40	40	100	70	T
Substratum	Ts	Pt	Pt	Pt	Ss	Pt	Pt	Pt	Pt	Pt	
Number of species in releve	2	5	3	2	3	3	1	2	6	4	
	Diagnostic species of association										
<i>Pylaisiella polyantha</i>	3	3	5	4	4	5	5	5	3	4	V
	Diagnostic species of <i>Orthotrichetalia</i>										
<i>Orthotrichum speciosum</i>	1	1	+	.	.	+	.	+	+	.	IV
	Diagnostic species of <i>Frullania dilatatae-Leucodontetea sciuroidis</i>										
<i>Radula complanata</i>	.	+	.	.	+	+	.	.	.	+	III
	Other species										
<i>Orthotrichum obtusifolium</i>	.	+	.	.	.	.	.	.	+	.	II
<i>Brachythecium salebrosum</i>	.	1	1	.	.	.	.	.	.	.	II
<i>Platygyrium repens</i>	.	.	.	.	.	.	.	1	+	.	II
<i>Amblystegium serpens</i>	.	.	.	+	.	.	.	.	+	.	II

Low constancy species: *Leskeella nervosa* (9 – +), *Hypnum pallescens* (10 – +), *Callicladium haldanianum* (5 – +).

curs on the base of tree trunks (*Populus tremula*, *Sorbus sibirica*, *Tilia sibirica*). It probably reflects the process of decomposition of tree bark outside of dead layers.

On the general floristic composition, this subassociation is similar to *Brachythecio salebrosi-Amblystegietum serpentis plagiomnietosum cuspidati* Baisheva 1995. But the *Brachythecio salebrosi-Amblystegietum serpentis* is characterized by domination of *Amblystegium serpens* and high constancy of *Leskea polycarpa*. It is the low participation of the first, and the absence of the latter that prevent the classification of our phytocoenon as a subassociation of *Brachythecio salebrosi-Amblystegietum serpentis*. Nonetheless, it is obvious that these two subassociations are related syntaxa. For elucidation of their connection and syntaxonomical positions, further investigations are required.

Subass. *Brachythecietum salebroso-reflexi brachythecietosum reflexi* (Baisheva et al. 1994) subass. et stat. nov. Table 3

Diagnostic species: *Brachythecium reflexum* (dom.).

The constancy and abundance of other species are reduced. The communities usually are formed by 4-5 species. They have a small size, their area is 100-400 sq. cm. The average cover is 80-90%. The communities are developed on the bases of *Abies sibirica* trunks, sometimes – on *Populus tremula* trunks. On *Populus tremula* the communities of *brachythecietosum reflexi* either occupy the position above two early de-

scribed subassociations, or grow on the bases of trunks, but then – in rather drier conditions. Probably, *B. s-r. brachythecietosum reflexi* is indifferent to light exposure and more xerophytic in comparison with two other subassociations.

Communities such as these, were described in broad-leaved and mixed forests of South Urals as association *Brachythecietum reflexi* Baisheva et. al. 1994. They are also widespread on *Abies sibirica* trunks, and occur also on *Picea obovata*, *Tilia cordata*, *Betula pendula*. But it was problematic to classify two above-mentioned phytocoenons within *Brachythecietum reflexi* Baisheva et. al. 1994. because of uncertain syntaxonomical position of the association (Baisheva et. al., 1994), poor floristic composition, and the most xerophytic sites of inhabitation. Therefore the alternative syntaxonomical decision is proposed. I propose to change the status of the *Brachythecietum reflexi* Baisheva et. al. 1994 and consider it as subassociation *Brachythecietum salebroso-reflexi brachythecietosum reflexi*.

Ass. ***Pylaisietum polyanthae*** Gams 1927.

Table 4

Diagnostic species: *Pylaisiella polyantha* (dom.).

The association unites epiphytic bryophyte communities, the basis of which is formed by *Pylaisiella polyantha*. Its cover usually is 70-100%. In Europe, in such communities *Leucodon sciuroides*, *Ulota crispa* and also *Frullania dilatata*, *Leskea polycarpa*, *Hypnum cupres-*

Table 5. *Orthotrichetum speciosi* Barkm. 1958

Number of releve	1	2	3	4	5	6	7	8	9	10	C
Length of the plot, cm	10	10	10	10	10	10	15	15	10	10	O
Width of the plot, cm	10	10	10	15	15	15	20	10	10	10	N
Cover, %	80	80	90	90	80	90	60	90	90	90	S
Height above the ground, cm	120	150	300	250	250	180	200	170	170	200	T
Substratum	Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt	Pt	
Number of species in releve	4	3	2	2	2	2	2	3	3	1	
	Diagnostic species of association										
<i>Orthotrichum speciosum</i>	4	4	5	5	3	5	3	5	4	5	V
	Diagnostic species of <i>Orthotrichetalia</i>										
<i>Pylaisiella polyantha</i>	+	+	.	.	.	.	.	+	+	.	III
	Diagnostic species of <i>Frullania dilatatae-Leucodontetea sciuroidis</i>										
<i>Radula complanata</i>	+	+	.	.	.	.	.	.	+	.	II
	Other species										
<i>Orthotrichum obtusifolium</i>	+	.	+	1	2a	1	+	1	.	.	IV

siforme occur (Hübschmann, 1986). The first and the second of these species are absent in Salair bryoflora; the other grow on exposed rock only. In Salair only *Orthotrichum speciosum*, *Leskeella nervosa*, *Amblystegium serpens*, *Brachythecium salebrosum*, *Radula complanata* sometimes occur in *Pylaisietum polyanthae* in little abundance.

The communities of *Pylaisietum polyanthae* are similarly poor in species composition, and are widespread in the xerophytic and mesophytic forests of the South Urals (Baisheva et al., 1994). On Salair the communities with *Pylaisiella polyantha* domination are the most characteristic for chernevaia taiga. They constantly occur on *Populus tremula*, covering trunks by half-rings of width 10-30 cm with interval 10-15 cm at height from 30 up to 100-120 cm. Such distribution, probably, is caused by the character of *Pylaisiella polyantha* growing – sprouts are directed upwards and in ac-

cordance with growth, move upward, while the oldest bottom part of grouping dies and comes off the trunk. The communities are situated on trunks higher than *Brachythecium salebrosum-reflexi*, which grow on bases of trunks. The communities of these two associations do not overlap on the trunk. Except for *Populus tremula*, the communities occur on *Betula pendula*, *Sorbus sibirica*, *Tilia sibirica*. In the mesophytic birch-pine grass forests similar communities are represented very poorly, their size does not exceed 10x20 cm. They occur rarely and live only on *Populus tremula*.

Ass. **Orthotrichetum speciosi** (Jaggli 1934) Barkm. 1958

Table 5

Diagnostic species: *Orthotrichum speciosum*.

On Salair the communities grow mainly on *Populus tremula* trunks in chernevaia taiga. The communities grow by patches 15-20 cm in diameter, mainly on southern (south-western, south-eastern) parts of a trunk. They occupy the sites

Table 6. *Pylaisiella polyanthae* - *Leskeelletum nervosae* Baisheva et al. 1994

Number of releve	1	2	3	4	5	6	7	C
Substratum	Pt	Pt	Pt	Pt	Pt	Pt	Pt	O
Width of the plot, cm	10	10	10	20	10	10	10	N
Length of the plot, cm	10	15	20	20	10	10	20	S
Cover, %	70	60	40	70	40	40	70	T
Number of species in releve	2	3	4	5	5	4	5	
	Diagnostic species of association							
<i>Leskeella nervosa</i>	4	3	2b	2b	2a	2a	1	V
	Diagnostic species of <i>Orthotrichetalia</i>							
<i>Pylaisiella polyantha</i>	+	+	+	+	+	+	+	V
<i>Orthotrichum speciosum</i>	.	.	+	.	+	.	.	I
	Diagnostic species of <i>Brachythecietalia rutabulo-salebrosi</i>							
<i>Brachythecium reflexum</i>	.	.	.	2b	1	1	1	III
<i>Brachythecium salebrosum</i>	.	1	.	+	.	.	2a	III
<i>Lophocolea heterophylla</i>	.	.	.	.	+	+	.	II
Low constancy species: <i>Amblystegium serpens</i> (7 – 2b), <i>Platydictya subtilis</i> (4 – 2a), <i>Orthotrichum obtusifolium</i> (3 – +).								

Table 7. *Orthodicrano montani-Hypnetum filiformis* Wins. 1930

Number of releve	01	02	03	04	05	06	07	08	09	10	11	12	13	14	C
Substratum	Bp	Bp	As	Bp	As	Bp	As	As	As	Bp	Bp	As	R	As	O
Width of the plot, cm	20	20	10	40	20	20	20	10	10	20	30	10	10	20	N
Length of the plot, cm	20	40	40	40	40	40	40	30	40	40	30	10	40	20	S
Cover, %	100	60	90	100	90	80	70	100	80	80	60	80	90	100	T
Number of species in releve	8	5	7	7	5	4	7	7	6	7	5	5	6	7	
Diagnostic species of association and alliance															
<i>Orthodicranum montanum</i>	1	2a	2a	1	4	4	1	1	2b	2a	2b	2a	2b	3	V
Diagnostic species of <i>Dicranetalia scoparii</i> = diagnostic species of <i>Dicrano scoparii-Hypnion filiformis</i>															
<i>Ptilidium pulcherrimum</i>	.	.	.	.	.	2b	+	+	+	1	3	3	3	+	IV
Diagnostic species of <i>Bryo-Brachythecion</i> = diagnostic species of <i>Brachythecietalia rutabulo-salebrosi</i>															
<i>Brachythecium reflexum</i>	2a	.	2a	2b	.	1	2a	3	2a	2a	1	1	.	1	IV
<i>Brachythecium salebrosum</i>	.	1	.	.	.	.	.	+	.	.	.	1	1	.	II
<i>Brachythecium starkei</i>	.	.	+	.	1	.	.	.	.	.	.	.	.	.	I
Diagnostic species of <i>Cladonio-Lepidozietea reptantis</i>															
<i>Plagiothecium denticulatum</i>	2a	2a	2b	1	+	1	3	+	+	2a	.	.	.	.	IV
<i>Lophozia ventricosa</i>	1	.	.	1	.	.	.	.	.	.	+	.	.	.	II
Other species															
<i>Plagiomnium cuspidatum</i>	.	.	1	.	1	.	2a	2a	1	.	.	.	1	.	III
<i>Sanionia uncinata</i>	.	.	1	2b	+	.	+	+	.	3	.	2a	1	+	IV
<i>Lophocolea minor</i>	+	.	+	.	.	.	+	.	2a	+	.	.	.	+	III
<i>Tetraphis pellucida</i>	+	.	.	.	.	.	.	.	.	+	.	.	.	+	II

Low constancy species: *Callicladium haldanianum* (11 - 2b; 13 - +), *Dicranum fuscescens* (1 - +; 14 - 3); *Lepidozia reptans* (1 - 2a), *Orthotrichum speciosum* (2 - +), *Plagiomnium drummondii* (4 - 2a), *Platygyrium repens* (2 - 1), *Pohlia nutans* (4 - +).

higher than *Pylaisietum polyanthae* communities at height from 1.5 up to 5 meters, in conditions of the best light exposure and less moisture. It is reflected by change of species ratio: the role of *Orthotrichum speciosum* and *O. obtusifolium* grows, the cover of *Pylaisiella polyantha* is sharply reduced. *Orthotrichetum speciosi* as well as *Pylaisietum polyanthae* in Salair differ from European ones (Hübschmann, 1986) by extremely poor floristic composition. As well as in previous association, *Leucodon sciuroides*, *Ulota crispa*, *Frullania dilatata*, *Leskea polycarpa*, *Hypnum cupressiforme*, *Tortula papillosa* characteristic for European association and a number of European species of *Orthotrichum* are absent. However, similar ecological conditions and characteristic appearance, supporting by *Orthotrichum speciosum* domination, allow to classify described communities as *Orthotrichetum speciosi*.

Ass. **Pylaisiello to polyanthae-Leskeelletum nervosae** Baisheva et al.1994. Table 6

Diagnostic species: *Leskeella nervosa*, *Pylaisiella polyantha*.

The type of association is described by Baisheva in broad-leaved forests of South Urals. These communities are widespread there on trunks of *Tilia cordata*, *Acer platanoides*, *Quercus robur*

and grow at height of 0.5-1 m above the ground (Baisheva & al., 1994). In Salair the communities with predominance of *Leskeella nervosa* have been found rarely. They occur in tall-herb fir-aspen forests, on trunks of *Populus tremula* at 0.3-0.6 m above the ground. They usually occupy the small area - 10 x 10(20) cm. The cover is 40-70%. Average number of species in releve is 4. In Salair the communities differ from South Urals ones by presence (with high constancy and abundance) of diagnostic species of the order *Brachythecietalia rutabulo-salebrosi* Marst. 1987. It is connected with the fact that *Brachythecietum salebroso-reflexi* and the communities with domination of *Leskeella nervosa* are placed close to each other: the first grows on the bases of *Populus tremula* trunks, the latter occupy sites above them on the trunk. Taking into account that *Leskeella nervosa* occurs mainly on stones further to East, it seems possible to classify our communities as variant *Brachythecium* in association *Pylaisiello to polyanthae-Leskeelletum nervosae*.

Ass. **Orthodicrano montani-Hypnetum filiformis** Wins. 1930 Table 7

Diagnostic species: *Orthodicranum montanum*.

The association was described in Europe. It unites epiphytic communities with the predominance of *Orthodicranum montanum*. Salair com-

Table 8. *Ptilidio pulcherrimi-Hypnetum pallescentis* Barkm. ex Wilm. 1962
1-11 typicum, 12-20 subass. *callicladietosum haldanianae* Baisheva 1995

Number of releve	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	C
Substratum	Bp	Bp	Bp	Bp	Ls	Ls	Ls	As	Ls	Bp	Bp	Ls	Ps	Bp	Bp	Bp	Bp	Bp	Bp	Ls	O
Width of the plot, cm	15	10	20	5	10	20	10	10	20	10	10	5	10	20	10	30	20	10	20	10	N
Length of the plot, cm	20	20	30	10	15	20	15	20	20	15	30	15	10	40	40	30	40	50	60	40	S
Cover, %	100	80	90	80	100	80	80	80	80	100	100	80	30	90	100	100	100	80	90	90	T
Number of species in releve	5	4	5	4	4	5	5	3	5	4	5	3	4	6	9	5	8	3	6	5	
Diagnostic species of association and subassociation (*)																					
<i>*Callicladium haldanianum</i>	.	.	.	.	1	.	.	.	+	.	+	2a	2a	3	4	4	4	3	3	3	III
<i>Hypnum pallescens</i>	5	4	4	3	3	3	2b	2a	2a	2a	1	3	2a	2a	+	.	1	1	.	.	IV
Diagnostic species of <i>Dicrano scoparii-Hypnion filiformis</i>																					
<i>Ptilidium pulcherrimum</i>	+	+	+	2b	3	1	4	4	4	4	4	2b	1	.	2a	2b	2a	2a	2a	3	V
<i>Orthodicranum montanum</i>	.	.	1	.	.	+	.	.	.	.	1	.	.	.	.	+	.	.	.	.	I
Diagnostic species of <i>Cladonio-Lepidozietea reptantis</i>																					
<i>Lophocolea heterophylla</i>	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	+	.	I
<i>Plagiothecium denticulatum</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	I
Other species																					
<i>Dicranum fuscescens</i>	.	.	1	.	.	2b	+	.	+	.	.	.	.	.	.	1	+	.	1	+	II
<i>Orthodicranum flagellare</i>	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	+	.	.	1	+	II
<i>Pleurozium schreberi</i>	+	.	.	.	.	1	.	.	1	.	1	.	.	.	1	.	.	.	.	.	I
<i>Ptilium crista-castrensis</i>	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	+	.	.	.	.	I
<i>Sanionia uncinata</i>	+	+	+	.	.	.	.	.	+	.	.	.	.	2a	.	.	+	.	.	.	II
<i>Pohlia nutans</i>	.	.	.	+	+	.	.	.	.	.	+	.	.	.	.	.	.	.	1	.	II

Low constancy species: *Amblystegium serpens* (1 - +; 2 - +), *Brachythecium oedipodium* (14 - 1), *Lepidozia reptans* (20 - 1), *Lophocolea minor* (7 - +), *Oncophorus wahlenbergii* (14 - +), *Plagiomnium cuspidatum* (15 - +), *Rhytidadelphus triquetrus* (15 - 1).

munities differ from European ones (Marstaller, 1986a, 1988ab, 1989, 1990, 1992, 1994) by the poorer floristic composition. *Orthodicranum montanum* and *Ptilidium pulcherrimum* are the only representative diagnostic species of alliance *Dicrano scoparii-Hypnion filiformis*. Besides, *Hypnum cupressiforme* is usually present in this association in Europe. The latter species, however is a rare, epilithic species in Salair. Another feature, distinguishing our communities from European ones, is the presence of *Brachythecium reflexum*, *B. salebrosum* (species of the order *Brachythecietalia rutabulo-salebrosi*) and *Plagiomnium cuspidatum*. But three enumerated species are the most widespread in Salair chernevaia taiga, and in this case, obviously, they have no syntaxonomical significance.

In Salair, these communities are frequently found in *Abies sibirica* groups of tall-herb fir-spen forests. Microclimatic conditions above the soil in the *Abies sibirica* groups differ from those in *Populus tremula* groups by less light exposure and humidity of air (Lashchinsky & Sedelnikov, 1991). Here communities grow on *Abies sibirica* and *Betula pendula* trunks, covering their bases up to height 10-30 cm. The cover is about 80%. Average number of species in releve is 6.

Association ***Ptilidio pulcherrimi-Hypnetum pallescentis*** Barkm.ex Wilm.1962. Table 8.

Diagnostic species: *Hypnum pallescens*, *Ptilidium pulcherrimum*.

Orthodicranum montanum, *O. flagellare*, *Dicranum fuscescens* are usually present in small abundance. The cover is usually 80-100%, the average number of species in releve is 5. The communities in Salair are practically identical to ones described in Central Europe and South Urals (Philippi, 1956; Hübschmann, 1986; Marstaller, 1986a, 1988b; Baisheva & al., 1994). This is the most widespread epiphytic association of Salair mesophytic birch-pine grass forests. The communities are found on *Betula pendula*, *Sorbus sibirica*, *Larix sibirica*, *Abies sibirica*, *Pinus sylvestris* trunks. The extent of communities' development depends on properties of tree bark. On *Betula pendula* they can occupy the large areas, covering the base of a trunk on perimeter up to height 30-40 cm. On inclined trees the communities grow on upper surfaces up to height 1-1.5 m above the ground. The communities inhabiting *Pinus sylvestris* and *Abies sibirica* are weakly developed. They grow on lower part of trunks, forming separate groups by the area about 100 sq. cm. Their species composition is extremely poor, sometimes

Table 11. *Dicranello heteromallae-Atrichetum flavisetii* ass. nov.

Number of releve	01	02	03	04	05	06	07	08	09!	10	11	12	13	14	15	16	C
Length of the plot, cm	30	30	20	30	80	40	30	30	60	60	30	30	30	60	50	20	O
Width of the plot, cm	40	40	20	50	100	50	50	40	60	100	40	100	40	60	50	40	N
Cover, %	60	80	40	100	90	100	30	100	100	100	100	100	100	100	100	100	S
Number of species in releve	13	9	6	11	9	9	7	7	6	5	5	4	4	4	6	3	T
Diagnostic species of association and alliance (*)																	
<i>Atrichum flavisetum</i>	3	3	2a	3	3	5	2a	4	4	5	3	4	4	4	4	4	V
* <i>Dicranella heteromalla</i>	.	.	.	2a	3	1	2a	2b	3	2b	1	3	2a	2a	1	2a	V
Diagnostic species of <i>Bryo-Brachythecion</i> = Diagnostic species of <i>Brachythecietalia rutabulo-salebrosi</i>																	
<i>Brachythecium salebrosum</i>	1	1	1	.	1	1	.	1	1	1	2a	.	2a	1	.	.	IV
<i>Brachythecium oedipodium</i>	.	.	.	+	.	+	+	.	.	.	.	1	.	.	1	.	II
<i>Brachythecium reflexum</i>	.	+	1	1	+	+	.	.	.	.	.	.	.	.	.	.	II
<i>Campylium hispidulum</i>	+	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	I
Other species																	
<i>Plagiomnium cuspidatum</i>	1	1	2a	2b	+	+	1	1	1	1	3	1	1	.	.	.	V
<i>Ceratodon purpureus</i>	.	1	.	.	2a	.	+	.	+	+	1	.	.	1	1	.	III
<i>Pohlia nutans</i>	+	+	.	+	1	+	.	+	.	.	.	.	.	.	.	1	III
<i>Lophocolea minor</i>	+	+	+	+	+	.	.	+	.	.	.	.	.	.	+	.	III
<i>Plagiothecium denticulatum</i>	+	1	1	1	.	.	+	.	.	.	.	.	.	.	.	.	II
<i>Sanionia uncinata</i>	.	.	.	+	1	.	.	.	.	.	.	.	.	.	.	.	I
<i>Marchantia polymorpha</i>	1	.	.	.	.	.	.	1	.	.	.	.	.	.	1	.	I
<i>Funaria hygrometrica</i>	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	I

Low constancy species: *Amblystegium serpens* (1 - +), *Bryum capillare* (1 - +), *Ditrichum cylindricum* (1 - 1), *Fissidens bryoides* (1 - +), *Plagiomnium medium* (4 - 1), *Pogonatum urnigerum* (9 - 2a), *Polytrichum commune* (6 - 1), *Schistostega pennata* (4 - +).

tion. It is due to less variety of occasionally occurred species. The place of *Dicranum scoparium* in our communities is occupied by *Dicranum polysetum*. Besides, in these communities *Brachythecium salebrosum*, one of the most widespread in Salair, is present. Synonym of *Pleurozietum schreberi* Wisn. 1930 is *Pleurozietum crista-castrensis* Solometch 1994 (Baisheva & al. 1994) described in Urals nemoral spruce and fir forests.

Bryophyte communities with participation of *Rhytidiadelphus triquertus*, *Pleurozium schreberi*, *Ptilium crista-castrensis* and *Hylocomium splendens* take place in Salair chernevaia taiga on deadfalls and stumps. But here, these species are present literally by accounting number of sprouts. The basis of the communities are formed by species of *Brachythecietalia rutabulo-salebrosi*. Some participation of *Hylocomietalia splendentis* species here obviously is due to the territorial affinity of tall-herb fir-aspen forests and mesophytic birch-pine grass forests in Salair. Therefore such communities were considered as the representatives of *Brachythecietum salebrosi-reflexi*.

Soil bryophyte carpet in Salair tall-herb fir-aspen forests is developed poorly and non-uniformly. There are small bryophyte groupings on the soil in tall-herb forest meadows. Their area is

not more than several square meter. Their cover varies from 5-20% in *Populus tremula* groups and meadows to 60-80 (100)% in *Abies sibirica* groups. The basis is formed by species of families *Brachytheciaceae* and *Mniaceae*. *Brachythecium salebrosum*, *B. starkei*, *Eurhynchium hians*, *Plagiomnium medium*, *Rhodobryum roseum* are the most constant. However, the abundance of these species is small. In combination with very small cover of groupings as a whole, it prevents from sure identifying of phytocoenon. Probably, in this case we deal with communities, which are in extreme conditions and consequently are underdeveloped. Therefore only the table of releves is given (Table 10).

Ass. **Dicranello heteromallae-Atrichetum flaviseti** ass.nov. Table 11

Type-releve 9.

Diagnostic species: *Atrichum flavisetum*, *Dicranella heteromalla* (codom.).

The association unites the communities which are formed on bare soil under upturned roots of fallen trees. The roots of *Abies sibirica* are not deep in soil. Strong winds, which are common in Salair, wrench off large trees with roots. Roots of the fallen tree dig up the ground, and described communities are formed thereon. The size of these communities is determined by the abundance of the ground held by the roots of

Table 12. Syntaxa of bryophyte vegetation of Salair forests

	1	2	3	4	5	6	7	8	9	10	11
Number of syntaxa	1	2	3	4	5	6	7	8	9	10	11
Number of releves in syntaxa	10	10	7	18	19	20	16	14	11	9	24
Mean cover, %	85	84	56	93	96	93	88	84	88	84	77
Total number of species	10	4	9	21	12	32	22	18	13	17	10
Mean number of species in releve	3	2	4	5	5	6	7	6	5	5	4
Diagnostic species of association and subassociation											
<i>Pylaisiella polyantha</i> // oOrth	V ⁴	III ⁺	V ⁺	I		I					
<i>Orthotrichum speciosum</i> // oOrth	IV ⁺	V ⁴	I			I		I			
<i>Leskeella nervosa</i>	I		V ^{2b}	I	I	I					
<i>Brachythecium reflexum</i> // aBrach			III ¹	V ⁴	V ^{2b}	V ^{2b}	II	IV ^{2a}			
<i>Brachythecium salebrosum</i> // aBrach	II		III ¹	I	V ⁴	III ^{2b}	IV ¹	II			IV ¹
<i>Plagiomnium cuspidatum</i>				III ¹	II	V ³	V	III ¹		I	
<i>Atrichum flavisetum</i>							V ⁴				
<i>Dicranella heteromalla</i> // aDicr							V ^{2a}				
<i>Orthodicranum montanum</i> // aHypn				I		I		V ^{2b}	II	I	
<i>Hypnum pallescens</i>	I			I		I			V ³	III ^{2b}	
<i>Callidadium haldanianum</i>	I			I		II		I	II	V ³	
<i>Ptilium crista-castrensis</i> // aPleur									I	II	V ^{2a}
<i>Hylocomium splendens</i> // aPleur											II
Diagnostic species of <i>Frullanio dilatatae</i> - <i>Leucodontetea sciuroidis</i>											
<i>Radula complanata</i>		III ⁺	II		I	II	I				
Diagnostic species of <i>Cladonio-Lepidozietea reptantis</i>											
<i>Plagiothecium denticulatum</i>				III ¹		II	II	IV ¹	I	II	
<i>Lophocolea heterophylla</i>			II	I	I	I			I	II	
<i>Lophocolea minor</i>				III ⁺		III ⁺	III ⁺	III ⁺	I		
<i>Lophozia ventricosa</i>				I				II			
Diagnostic species of <i>Bryo-Brachythecion</i>											
<i>Amblystegium serpens</i>	II		I	II	IV ⁺	II	I		I		
<i>Campylium hispidulum</i>				I	IV ⁺	I	I				
<i>Brachythecium starkei</i>						I		I			I
<i>Brachythecium oedipodium</i>						I	II			I	I
Diagnostic species of <i>Dicrano scoparii</i> - <i>Hypnion filiformis</i>											
<i>Ptilidium pulcherrimum</i>				I				IV ^{2a}	V ^{2b}	V ^{2a}	
Diagnostic species of <i>Hylocomietea splendentis</i> and <i>Pleurozium schreberi</i>											
<i>Pleurozium schreberi</i>									II	I	V ³
<i>Rhytidiadelphus triquetrus</i>										I	I
Other species											
<i>Orthotrichum obtusifolium</i>	II	IV ¹	I								
<i>Platygyrium repens</i>	II							I			
<i>Sani onia uncinata</i>				II	I	IV	I	IV ¹	II	II	
<i>Dicranum fuscescens</i>				II				I	II	II	
<i>Orthodicranum flagellare</i>									I	IV ⁺	
<i>Pohlia nutans</i>							I	III	I	II	II
<i>Ceratodon purpureus</i>							I	III			
<i>Platydictya subtilis</i>			I		I	I					
<i>Plagiomnium medium</i>							I	I			I
<i>Dicranum polysetum</i>							I				II
<i>Tetraphis pelucida</i>									II		

Explanation of numbers and abbreviations:

1. *Py-laisietum polyanthae* Felf. 1941; 2. *Orthotrichetum speciosi* (Jaggi 1934) Barkm. 1958; 3. *Py-laisielletum polyanthae* – *Leskeelletum nervosae* Baisheva et al.1994; 4. *Brachythecietum salebroso-reflexi* ass. nov. subass. *brachythecietosum reflexi* (Baisheva et al.1994) subass. et stat. nov.; 5. *Brachythecietum salebroso-reflexi* ass. nov. subass. *typicum* subass. nov.; 6. *Brachythecietum salebroso-reflexi* ass. nov. subass. *plagiomnietosum cuspidati* subass. nov.; 7. *Dicranello heteromallae-Atrichetum flaviseti* ass.nov.; 8. *Orthodicrano montani-Hypnetum filiformis* Wins. 1930; 9. *Ptilidio pulcherrimi-Hypnetum pallescentis* Barkm. ex Wilm.1962; 10. *Ptilidio pulcherrimi-Hypnetum pallescentis* Barkm. ex Wilm.1962 subass. *callidietosum haldaniani* Baisheva 1995; 11. *Pleurozietum schreberi* Wisn.1930.

//oOrth – diagnostic species [d.s.] of *Orthotrichetalia* (class *Frullanio dilatatae-Leucodontetea sciuroidis*), //aBrach – d.s. of *Bryo-Brachythecion* (class *Cladonio-Lepidozietea reptantis*), //aHypn – d.s. of *Dicrano scoparii-Hypnion filiformis* (class *Cladonio-Lepidozietea reptantis*), //aDicr – d.s. of *Dicranellion heteromallae* (class *Cladonio-Lepidozietea reptantis*), //aPleur – d.s. of *Pleurozion schreberi* (class *Hylocomietea splendentis*).

Low constancy species:

Amblystegium varium (4 – I, 5 – I), *Brachythecium velutinum* (6 – I), *Bryum capillare* (7 – I), *Ditrichum cylindricum* (7 – I), *Eurhynchium hians* (4 – I), *Fissidens bryoides* (7 – I), *Funaria hygrometrica* (7 – I), *Lepidozia reptans* (8 – I, 10 – I), *Leptobryum pyriforme* (6 – I), *Leskea polycarpa* (5 – I), *Marchantia polymorpha* (7 – I), *Mnium stellare* (6 – I), *Oncophorus wahlenbergii* (6 – I, 10 – I), *Plagiomnium confertidens* (6 – I), *Plagiomnium drummondii* (6 – I, 8 – I), *P. rostratum* (6 – I), *Pogonatum urnigerum* (7 – I), *Polytrichum commune* (7 – I), *Rhytidiadelphus subpinnatus* (6 – I), *Rhizomnium pseudopunctatum* (4 – I, 6 – I), *Rhodobryum roseum* (11 – I), *Schistostega pennata* (7 – I).

laying tree and the time of existence of these ecotopes. It can reach more than 0.5 sq. m. The average cover of the communities living for a long time is about 100%. The number of species, forming such community, is not constant. From 3 up to 14 species were found. The basis of the communities are formed by *Atrichum flavisetum* and *Dicranella heteromalla*. *Plagiomnium cuspidatum* is constantly present but in little abundance. Sometimes there occur species usually growing on patches of soil cover disturbance. They are *Ceratodon purpureus*, *Funaria hygrometrica*, *Pogonatum urnigerum*, *Ditrichum cylindricum* and some others.

In Europe alliance *Dicranellion heteromallae* (relating to order *Diplophylletalia albicantis*) is described within the class *Cladonio-Lepidozietea reptantis*. It unites bryophyte communities formed on bare ground and patches of soil cover disturbance (Hübschmann, 1986; Marstaller, 1988ab, 1990, 1992, 1994). Suballiance *Pogonatenion urnigeri* of this alliance includes associations like ours on appearance and ecology. Their basis is formed by species of genus *Ditrichum*, *Dicranella*, and family *Polytrichaceae*. From diagnostic species of higher syntaxa only *Dicranella heteromalla* is present in our communities. However, appearance, taxonomic and ecological features allow to classify *Dicranello heteromallae-Atrichetum flaviseti* among

suballiance *Pogonatenion urnigeri* of alliance *Dicranellion heteromallae* of the order *Diplophylletalia albicantis*. In our case the species combination of the order *Brachythecietalia rutabulo-salebrosi* of alliance *Bryo-Brachythecion* is due to the forest phytocenosis where communities of the association occur. It is not a sufficient reason for its classification into *Brachythecietalia rutabulo-salebrosi*, which unites epiphytic and epixylic communities.

CONCLUSIONS

The most typical bryophyte communities were described in the Salair forests. They are referred to 8 associations. Among them 2 associations are described as new. Other are known throughout the Europe and South Urals. In the European system of high syntaxa (Marstaller, 1993) the associations belong to 3 classes, 5 orders and 5 alliances.

Tall-herb fir-aspen forests and mesophytic birch-pine grass forests of Salair are differ on composition of characteristic bryophyte communities. *Pleurozietum schreberi* and *Ptilidio pulcherrimi-Hypnetum pallescentis* occur in mesophytic birch-pine grass forests, where the first constantly occur on litter and on dead-falls, the latter – on the bases of tree trunks. The other associations in Salair inhabit tall-herb fir-aspen forests. Thus, the communities *Brachythecietum salebroso-reflexi* are common on dead-

falls and bases of tree trunks. *Pylaisietum polyanthae* and *Pylaisiello to polyanthae-Leskeelletum nervosae* occur on *Populus tremula* trunks at height about 1 m above the ground, *Orthorichetum speciosi* takes place higher than they. *Orthodicrano montani-Hypnetum filiformis* frequently occur on the bases of *Abies sibirica* trunks. The communities *Dicranello heteromallae-Atrichetum flaviseti* are developed on bare ground on the roots of fallen trees.

ACKNOWLEDGEMENTS

I am grateful to N.Lashchinsky, G.Taran and to M. Ignatov for remarks and comments, to I.Polskih and to T. Dunklin for correction the English of the manuscript. The research was supported by Grant № 98-04-49637 from the RFFI.

LOCALIZATION OF RELEVES

Table 1: 1-3, 6, 8-11, 24, 16-19 – Novosibirsk Prov., Toguchin Distr., nr. Kotorovo, watershed of Draznie Tajli River and Bolshie Tajli River, tall-herb aspen forest; 4, 7 – Novosibirsk Prov., Maslianino Distr., Draznie Tajli River, valley slope in mid-stream, tall-herb aspen forest; 12 – Altaiskiy Territory, Zarinsk Distr., 7 km SE from Udinsk, tall-herb fir-linden forest; 13, 15 – Novosibirsk Prov., Toguchin Distr., Elizavetka River, valley slope, tall-herb aspen forest.

Table 2: 1, 3, 4 – 7, 9 – Novosibirsk Prov., Toguchin Distr., watershed of Draznie Tajli River and Bolshie Tajli River, tall-herb aspen forest; 2 – Novosibirsk Prov., Toguchin Distr., nr. Kotorovo, tall-herb fir forest; 8, 10, 20 – Novosibirsk Prov., Toguchin Distr., valley of Elizavetka River, tall-herb fir forest in ravine; 11, 13, 14, 16, 17 – Altaiskiy Territory, Zarinsk Distr., 7 km SE from Udinsk, tall-herb fir-linden forest; 12, 15, 18 – Novosibirsk Prov., Toguchin Distr., mid-stream Bolshie Tajli River, valley slope, tall-herb fir forest.

Table 3: 1, 3, 6, 10, 18 – Novosibirsk Prov., Toguchin Distr., Elizavetka River, valley slope, tall-herb fir forest; 2, 8, 11, 12 – Novosibirsk Prov., Toguchin Distr., upper course of Bolshie Tajli River, valley slope, tall-herb fir forest in ravine; 4 – Novosibirsk Prov., Toguchin Distr., mid-stream Bolshie Tajli River, valley slope, tall-herb fir forest; 5, 9, 13-16 – Novosibirsk Prov., Toguchin Distr., nr. Kotorovo, tall-herb fir forest; 7 – Altaiskiy Territory, Zarinsk Distr., 7 km SE from Udinsk, tall-herb fir-linden forest; 17 – Novosibirsk Prov., Maslianino Distr., mid-stream Draznie Tajli River, valley slope, tall-herb fir forest.

Table 4: 1, 4 – Altaiskiy Territory, Zarinsk Distr., 7 km SE from Udinsk, tall-herb fir-linden forest; 2, 3 – Novosibirsk Prov., Maslianino Distr.; 5-10 – Novosibirsk Prov., Toguchin Distr., nr. Kotorovo, watershed of Draznie Tajli River and Bolshie Tajli

River, tall-herb aspen forest.

Table 5: 1-10 – Novosibirsk Prov., Toguchin Distr., nr. Kotorovo, watershed of Draznie Tajli River and Bolshie Tajli River, tall-herb aspen forest.

Table 6: 1-10 – Novosibirsk Prov., Toguchin Distr., nr. Kotorovo, watershed of Draznie Tajli River and Bolshie Tajli River, tall-herb aspen forest.

Table 7: 1, 9, 10 – Novosibirsk Prov., Toguchin Distr., upper course of Draznie Tajli River, valley slope, tall-herb fir forest; 2 – Altaiskiy Territory, Zarinsk Distr., 7 km SE from Udinsk, tall-herb fir-linden forest; 3-4, 14 – Novosibirsk Prov., Toguchin Distr., upper course of Bolshie Tajli River, valley slope, tall-herb fir forest; 6, 11, 13 – Novosibirsk Prov., Toguchin Distr., mid-stream Bolshie Tajli River, valley slope, tall-herb fir forest; 7, 12 – Novosibirsk Prov., Toguchin Distr., nr. Kotorovo, tall-herb fir forest.

Table 8: 1, 12, 14 – Novosibirsk Prov., Toguchin Distr., nr. Mokrushino, mesophytic pine forest; 2, 4-9 – Novosibirsk Prov., Toguchin Distr., nr. Mokrushino, mesophytic larch-pine forest; 3, 11, 15, 17, 18, 19 – Novosibirsk Prov., Toguchin Distr., upper course of Kolirak River, valley slope, mesophytic pine forest; 10, 13, 20 – Novosibirsk Prov., Toguchin Distr., nr. Mirnij, mesophytic pine forest.

Table 9: 1-3, 9, 11, 18, – Novosibirsk Prov., Toguchin Distr., nr. Mokrushino, mesophytic pine forest; 4-8, 13, 21-23 – Novosibirsk Prov., Toguchin Distr., nr. Mirnij, mesophytic pine forest; 10, 15, 17, 24 – Novosibirsk Prov., Toguchin Distr., upper course of Kolirak River, valley slope, mesophytic pine forest; 12, 14, 16, 19, 20 – Novosibirsk Prov., Toguchin Distr., nr. Konevo, mesophytic larch-pine forest.

Table 10: 1, 4, 5, 7 – Novosibirsk Prov., Maslianino Distr., mid-stream Draznie Tajli River, valley slope, tall-herb fir forest; 2, 6, 9, 11, 13 – Novosibirsk Prov., Toguchin Distr., upper course of Bolshie Tajli River, valley slope, tall-herb fir forest; 3, 8 – Novosibirsk Prov., Maslianino Distr., mid-stream Draznie Tajli River, valley slope, tall-herb aspen forest; 10, 20 – Novosibirsk Prov., Toguchin Distr., Elizavetka River, valley slope, tall-herb fir forest; 12, 17-19, 21, 22 – Novosibirsk Prov., Toguchin Distr., nr. Kotorovo, tall-herb fir forest; 14-16, 23-25 – Novosibirsk Prov., Toguchin Distr., Elizavetka River, valley slope, tall-herb forest meadow.

Table 11: 1-3, 7, 8 – Novosibirsk Prov., Toguchin Distr., valley of Elizavetka River, tall-herb fir forest in ravine; 4 – Novosibirsk Prov., Maslianino Distr., mid-stream Draznie Tajli River, valley slope, tall-herb fir forest; 5, 6, 9-11, 14 – Novosibirsk Prov., Toguchin Distr., nr. Kotorovo, tall-herb fir forest; 12, 15, 16 – Novosibirsk Prov., Toguchin Distr., upper course of Bolshie Tajli River, valley slope, tall-herb fir forest in ravine; 13 – Novosibirsk Prov., Toguchin Distr., mid-stream Bolshie Tajli River, valley slope, tall-herb fir forest.

LITERATURE CITED

- BAISHEVA, E. Z. 1995. Bryophyte vegetation of Bashkiria (South Urals). II. Epiphytic and epixylic communities of North-Eastern Baskiria. – *Arctoa* **4**: 55-63.
- BAISHEVA, E. Z., A. I. SOLOMETCH & E. A. IGNATOVA 1994. Bryophyte vegetation of Bashkiria, South Urals. I. Epiphytic and epixylic communities. – *Arctoa* **3**: 139-152.
- BARKMAN, J. J., J. MORAVEC & S. RAUSCHERT 1986. Code of phytosociological nomenclature. – *Vegetatio* **67**: 145-195.
- [ERMAKOV, N. B., A. Y. KOROLYUK & N. N. LASHCHINSKY] ЕРМАКОВ, Н. Б., А. Ю. КОРОЛЮК, Н. Н. ЛАЩИНСКИЙ 1991. Флористическая классификация мезофильных травяных лесов Южной Сибири. – [Floristic classification of mezophytic grass forests of South Siberia] *Новосибирск [Novosibirsk]*: 96.
- HÜBSCHMANN, A. von 1986. Prodrum der Moosgesellschaften Zentraleuropas. – *Bryoph. Bibl.* **32**: 1-313.
- IGNATOV, M. C. & O. M. AFONINA (eds.) 1992. Check-list of mosses of the former USSR. – *Arctoa* **1**(1-2): 1-85.
- [IOSCHENKO, E. N. & N. N. LASHCHINSKY] ИОЩЕНКО, Е. Н., Н. Н. ЛАЩИНСКИЙ 1994. Пространственно-возрастная структура древостоя как функция биологии древесных пород. – [Spatial-age structure as a function of tree species biology] *Успехи экологической морфологии растений и ее влияние на смежные науки [Uspekhi ekologicheskoi morfologii rastenij i ee vliyanie na smezhnye nauki] М. [Moscow]*: 63-64.
- [KONSTANTINOVA, N. A., A. D. POTEKIN & R. N. SCHLJAKOV] КОНСТАНТИНОВА, Н. А., А. Д. ПОТЕМКИН, Р. Н. ШЛЯКОВ 1992. Список печеночников и антоцеротовых территории бывшего СССР. – [Check-list of the Hepaticae and Anthocerotae of the former USSR] *Arctoa* **1**(1-2): 87-127.
- [LASHCHINSKY, N. N., I. D. MANATKOV & N. N. LASHCHINSKY] ЛАЩИНСКИЙ, Н. Н., И. Д. МАХАТКОВ, Н. Н. ЛАЩИНСКИЙ 1991. Влияние травяного слоя на возобновление древесных пород в черневых лесах Салаира. – [The influence of grass layer on renewal of tree species in Salair chernevaia tajga] *Лесоведение [Lesovedenie]* **1**: 66-69.
- [LASHCHINSKY, N. N. & V. P. SEDELNIKOV (ed.)] ЛАЩИНСКИЙ, Н. Н., В. П. СЕДЕЛЬНИКОВ 1991. Экология сообществ черневых лесов Салаира. – [Ecology of chernevaia taiga communities on Salair] *Новосибирск, Наука [Novosibirsk, Nauka]*: 73.
- MARSTALLER, R. 1986a. Die Moosgesellschaften der Verbände Dicrano-Hypnion filiformis Barkman 1958 und Antitrichion curtispindulæ v. Krusensterna 1945. – *Gleditschia* **14**(1): 197-225.
- MARSTALLER, R. 1986b. Die Moosgesellschaften der Basaltblöcke und Basaltblockhalden am Bayer bei Dermbach in der Rhön. – *Gleditschia* **14**(1): 227-254.
- MARSTALLER, R. 1988a. Bryosoziologische Studien im Naturschutzgebiet bei Ebersdorf. – *Ber. Bayer. Bot. Ges.* **59**: 27-50.
- MARSTALLER, R. 1988b. Bryosoziologische Untersuchungen in den Naturschutzgebieten "Löschleite" und "Wurzelbergfarmde". – *Arch. Nat. schutz Landsch. forsch., Berlin*, **28**(1): 43-59.
- MARSTALLER, R. 1989. Bryosoziologische Studien im Naturschutzgebiet Bleiberg bei Saalburg. – *Herzogia* **8**: 1-51.
- MARSTALLER, R. 1990. Die Bryophytenvegetation des Naturschutzgebietes Buchenberg bei Weida, Kreis Gera. – *Gleditschia* **1**: 169-183.
- MARSTALLER, R. 1992. Bryosoziologische Untersuchungen im Zittauer Gebirge. – *Abh. Ber. Naturkundemus* **66**(4): 1-41.
- MARSTALLER, R. 1993. Synsystematische Übersicht über die Moosgesellschaften Zentraleuropas. – *Herzogia* **9**: 519-541.
- MARSTALLER, R. 1994. Bemerkenswerte Moosgesellschaften im Kreidesandsteingebiet des nördlichen Harzvorlandes. – *Herzogia* **10**: 167-189.
- PHILIPPI, G. 1956. Einige Moosgesellschaften des Südschwarzwaldes und der angrenzenden Rheinebene. – *Beitr. nat. Forsch Südwestdetschl.* **15**: 91-124.
- [POLIAKOV, P. P.] ПОЛЯКОВ, П. П. 1934. Ботанико-географические очерки Кузнецкой котловины, Салаира и западной предсалаирской полосы. – [Botanical-geographic article of Kuzneck hollow, Salair and Salair neighbourhood] *Материалы Кузнецко-Барнаульской почвенной экспедиции 1931 г. [Materialy Kuznetsko-Barnaulskoj pochvennoj ekspedicii 1931 g.] Л., Изд-во АН СССР [Leningrad, Izd. Akad. Nauk SSSR]*: 64.
- [VDOVIN, V. V.] ВДОВИН, В.В. 1988. Кузнецко-Салаирская провинция. – [Kuzneck-Salair Province] *Рельеф Алтае-Саянской горной области [In: Relief Altae-Sayanskij gornoj oblasti] Новосибирск, Наука [Novosibirsk, Nauka]*: 40-70.