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BRYOPHYTE VEGETATION OF BASHKIRIA, SOUTH URALS. IV. ON THE BRYOPHYTE COMMUNITIES IN BELAYA RIVER VALLEY, BASHKORTOSTAN

РАСТИТЕЛЬНОСТЬ МОХООБРАЗНЫХ БАШКИРИИ, ЮЖНЫЙ УРАЛ. IV. К БРИОСООБЩЕСТВАМ ДОЛИНЫ РЕКИ БЕЛАЯ

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Abstract

In the upstream of Belaya River (Republic of Bashkortostan, South Ural region), the observing and classification of epiphytic, epixylic, and epilithic bryophyte communities were performed following the Brown-Blanquet approach. The revealed communities are presented by nine associations and one rangless community belonging to 4 classes, 5 orders and 6 alliances. The relevés and localities of associations *Anomodontetum longifolii* Waldheim 1944, *Anomodontetum rugelii* Peciar 1965, *Homomallietum incurvati* Philippi 1965 and *Pseudoleskeelletum catenulatae* Ježek & Vondráček 1962 are reported to the republic for the first time.

Резюме

В верховьях р. Белая (Республика Башкортостан, Южно-Уральский регион) проведены обследование и классификация эпифитных, эпиксильных и эпилитных сообществ мохообразных в соответствии с подходом Браун-Бланке. Выявленные бриоценозы представлены 9 ассоциациями и 1 безранговым сообществом, относящимися к 4 классам, 5 порядкам, 6 союзам. Описания и местонахождения ассоциаций *Anomodontetum longifolii* Waldheim 1944, *Anomodontetum rugelii* Peciar 1965, *Homomallietum incurvati* Philippi 1965 и *Pseudoleskeelletum catenulatae* Ježek & Vondráček 1962 приводятся для республики впервые.

KEYWORDS: bryophytes, bryophyte communities, syntaxonomy, the Southern Urals.

Introduction

This article follows up on the research and floristic classification of the bryophyte communities in the Republic of Bashkortostan (Southern Urals region), which were started in the 1990s. Currently, the work on the preparation of the Prodromus of vegetation of the Russian Federation (Plugatar' *et al.,* 2020) is being undertaken. We intend to include in this project the data on the classification of the bryophyte communities based on the Brown-Blanquet approach within the hierarchy of the main syntaxonomical categories applied for the Classification of Vegetation of Europe. Currently, there emerged a need to systematize the data on the bryophyte communities in the different Russian regions to clarify their syntaxonomical position.

The purpose of this work is to classify the epiphytic, epixylic, and epilithic bryophyte communities described in the upstream of Belaya River.

Material and Methods

The study was carried out in the upstream of Belaya River in Beloretskiy, Burzyanskiy, Meleuzovskiy and Kugarchinskiy districts of the Republic of Bashkortostan. According to natural zoning of Bashkortostan, the study area is situated within two districts comprising the light coniferous forests of the central part of the Southern Urals and the broad-leaved forests of the western slope of the Southern Urals (Muldashev, 2010). The terrain is mountainous with ridges heavily dissected by river valleys. The mountain forests are mainly dominated by *Tilia cordata* Mill., *Acer platanoides* L., *Pinus sylvestris* L., *Ulmus laevis* Pall., *Betula pendula* Roth and *Populus tremula* L. The floodplain forests with *Prunus padus* L. and *Alnus incana* (L.) Moench usually occupy relatively small areas because Belaya River within this part of the stream is characterized by narrow valleys and steep banks.

An average elevation of the study area is of about 220–500 m above sea level. The geological structure is composed of a variety of Riphean and Paleozoic rocks. The rock outcrops are mainly presented by limestones. The climate is moderately warm and humid. The mean annual temperature ranges from +1.0 to +2.5°C, while the sum of effective temperatures during the growing period ranges from 2100 to 2400°C. The mean annual precipitation is 500–650 mm (Yaparov, 2005).

About 180 geobotanical relevés were carried out in 1993 and 2022. The most typical sites of the bryophytic

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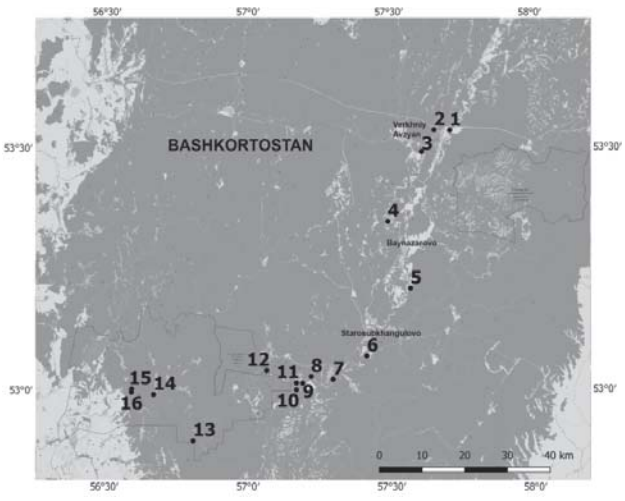
Fig. 1. Collecting localities:



1 – Beloretskiy District. 2 km north-east of Kaga Village. The left bank of the Belaya River (53.538630°N, 57.712581°E), 420 m alt., 25.VI.1993.

2 – Beloretskiy District. 2 km from Kaga Village downstream of the Belaya River. The slope of the mountain near the right bank of the river (53.53961°N, 57.65641°E), 500 m alt., 26.VI.1993.

3 – Beloretskiy District. 3 km from Bel'sky Village downstream of the Belaya River. The slope of the mountain near the right bank of the river (53.494913°N, 57.612138°E), 450 m alt., 26.VI.1993.

4 – Burzyanskiy District. 3 km from Muradymovo Village upstream of the Belaya River. The slope of the mountain near the right bank of the river (53.351145°N, 57.491589°E), 360 m alt., 26.VI.1993.

5 – Burzyanskiy District. 2 km from Staromunasipovo Village downstream of the Belaya River. The slope of the mountain near the left bank of the river (53.212277°N, 57.569587°E), 360 m alt., 26.VI.1993.

6 – Burzyanskiy District. 5 km from Starosubkhangulovo (Burzyan) Village downstream of the Belaya River. The slope of the mountain near the left bank of the river (53.073163°N, 57.415392°E), 340 m alt., 1.VII.1993.

7 – Burzyanskiy District. 4 km from Mindigulovo Village downstream of the Belaya River. The right bank of the river (53.025199°N, 57.296872°E), 340 m alt., 3.VII.1993.

8 – Burzyanskiy District. 12 km from Mindigulovo Village downstream of the Belaya River. The slope of the mountain near the right bank of the river (53.03093°N, 57.22001°E), 310 m alt, 9.VII.2022.

9 – Burzyanskiy District. 8 km from Akbulatovo Village upstream of the Belaya River. The slope of the mountain near the right bank of the river (53.017363°N, 57.190560°E), 300 m alt., 10.VII.2022.

10 – Burzyanskiy District. 5.5 km from Akbulatovo Village upstream of the Belaya River. The left bank of the river (53.00378°N, 57.16862°E), 300 m alt., 10.VII.2022.

11 – Burzyanskiy District. 4 km from Akbulatovo Village upstream of the Belaya River. The right bank of the river (53.01802°N, 57.16846°E)., 300 m alt., 10.VII.2022.

12 – Burzyanskiy District. "Shul'gan-Tash" State Nature reserve. Near the Kapova Cave (53.043831°N, 57.065126°E), 300 m alt., 05.VII.1993.

13 – Kugarchinskiy District. 2 km from the former Akbuta Village downstream of the Belaya River. The slope of the mountain near the left bank of the river (52.89831°N, 56.80821°E), 300 m alt., 7.VII.1993.

14 – Meleuzovskiy District. 5 km from the Sakaska Tract downstream of the Belaya River. The slope of the mountain near the right bank of the river (52.993730°N, 56.669969°E), 300 m alt., 7.VII.1993.

15 – Meleuzovskiy District. 7 km from the Syrtlanovo Village upstream of the Belaya River. The slope of the mountain near the right bank of the river (53.005029°N, 56.593580°E), 340 m alt., 9.VII.1993.

16 – Kugarchinskiy District. 7 km from the Syrtlanovo Village upstream of the Belaya River. The forest on the left bank of the river (52.998108°N, 56.592507°E), 280 m alt., 9.VII.1993.

cover on the tree trunks, decaying wood and stony substrates (rock outcrops, cliffs and boulders) were selected. The particular attention was paid to the ecological homogeneity of the sample plots, i.e. moisture, illumination, exposition, *etc.* The area of sample plots ranges from 1 to 16 dm^2. The abundance of species was evaluated according to the Braun-Blanquet abundance scale: r – extremely rare, cover is negligible; + – cover is not more than 1 %; 1 – 1–5 %; 2 – 5–25 %; 3 – 25–50 %; 4 – 50–75 %; 5 – 75–100 %. In the synoptic tables, the constancy of species was displayed in a categorical form: I (0–20 %); II (20–40 %); III (40–60 %); IV (60–80 %); V (80–100 %).

During the field work only preliminary abundance of species was evaluated, the real abundance was defined in the laboratory after determination of species with microscope. The names of syntaxa follow the International Code of Phytosociological Nomenclature (Theurillat *et al.,* 2021). The nomenclature of bryophytes is after Hodgetts *et al.* (2020). The system of high syntaxa is mainly after Mucina *et al.* (2016). The specimens are deposited at the Herbarium of Institute of Biology of Ufa Federal Research Centre of the Russian Academy of Sciences (UFA).

In the text the following abbreviations are used: T – trunk of tree, B – base of tree, PT – *Populus tremula*, PP – *Prunus padus*, R – rotten wood, TC – *Tilia cordata*, UL – *Ulmus laevis*, LM – limestone, ass. – association, subass. – subassociation, d.s. – diagnostic species.

The geobotanical relevés were made in 16 localities (Fig. 1).

Synopsis of Syntaxa

Totally, eight associations and one rangless community belonging to 4 classes, 5 orders and 6 alliances were recorded in the study area (Table 1). Tables of associations are also in the supplementary materials, SM (https://kmkjournals.com/upload/PDF/Arctoa/32/Arctoa_32_001_009_SM.pdf) and they are also included in the electronic version of the article. The syntaxomical position of the revealed communities is as follow.

Class ***Frullanio dilatatae-Leucodontetea sciuroidis*** Mohan 1978
Order ***Orthotrichetalia*** Hadač in Klika & Hadač 1944
Alliance ***Ulotion crispae*** Barkman 1958
Ass. ***Pylaisietum polyanthae*** Felföldy 1941
Alliance ***Syntrichion laevipilae*** Ochsner 1928
Ass. ***Pylaisiello polyanthae-Leskeelletum nervosae*** Baisheva et al. 1994
Order ***Dicranetalia scoparii*** Barkman 1958
Alliance ***Dicrano scoparii-Hypnion filiformis*** Barkman 1958
Ass. ***Ptilidio pulcherrimi-Hypnetum pallescentis*** Barkman ex Willmanns 1962
subass. ***P.p.-H.p.*** *typicum*
subass. ***P.p.-H.p.*** *callicladietosum haldaniani* Baisheva 1995
Ass. ***Platygyrietum repentis*** Le Blanc ex Marstaller 1986
Class ***Cladonio digitatae-Lepidozietea reptantis*** Ježek & Vondráček 1962
Order ***Brachythecietalia rutabulo-salebrosi*** Marstaller 1987
Alliance ***Bryo capillaris-Brachythecion rutabuli*** Lecointe 1975
Ass. ***Brachythecio salebrosi-Amblystegietum serpentis*** Baisheva et al. 1994
subass. ***B.s.-A.s.*** *typicum*
subass. ***B.s.-A.s.*** *plagiomnietosum cuspidati* Baisheva 1995
Class ***Neckeretea complanatae*** Marstaller 1986
Order ***Neckeretalia complanatae*** Ježek & Vondráček 1962
Alliance ***Neckerion complanatae*** Šmarda & Hadač ex Klika 1948
Suballiance ***Brachyhecio populei-Homalienion trichomanoidis*** Marstaller 1992
Ass. ***Anomodontetum longifolii*** Waldheim 1944
Ass. ***Anomodontetum rugelii*** Peciar 1965
Anomodon viticulosus – community
Suballiance ***Pseudoleskeello nervosae-Homomalienion incurvati*** Marstaller 1992
Ass. ***Homomallietum incurvati*** Philippi 1965
Class ***Schistidietea apocarpi*** Ježek & Vondráček 1962 (syn. ***Grimmietea anodontis*** Hadač & Vondráček in Ježek & Vondráček 1962)
Order ***Schistidietalia apocarpi*** Ježek & Vondráček 1962
Alliance ***Grimmion tergestinae*** Šmarda 1947 (Syn. ***Schistidion apocarpi*** Ježek & Vondráček 1962)
Ass. ***Pseudoleskeelletum catenulatae*** Ježek & Vondráček 1962

Syntaxa description

Association ***Pylaisietum polyanthae*** Felföldy 1941 (Table 1 in SM, columns 1–5)

Diagnostic species: *Pylaisia polyantha.*

The epiphytic communities of ass. ***Pylaisietum polyanthae*** were described in the broad-leaved and mixed forests on the bark of *Populus tremula, Tilia cordata, Ulmus laevis* and *Prunus padus.* The communities usually grow on trunks at the height up to 200 cm above the ground, rarely – on tree bases or on bark of dead trees. The average cover is 92 %, the species number in relevé varies from 3 to 7, accounting for on average 4.4.

Floristic composition of these communities is characterized by sporadic presence of *Radula complanata, Lewinskya speciosa, Leucodon sciuroides,* and *Pseudoamblystegium subtile*; it is quite similar to the communities of ass. ***Pylaisietum polyanthae*** described in the other parts of Bashkortostan (Baisheva *et al*., 1994; Baisheva, 2000). Hübschmann (1986) classified this association within xero-mesophytic alliance ***Tortulion laevipilae*** (=***Syntrichion laevipilae***) Ochsner 1928, while Marstaller (1993) placed it within the alliance ***Ulotion crispae*** Barkman 1958, which unites oceanic epiphytic bryophyte communities occurring on bark of living trees (Mucina *et al.*, 2016). According to Marstaller (1993), the communities of ass. ***Pylaisietum polyanthae*** growing in the forests are close to ***Ulotion crispae***, whereas those existing in secondary anthropogenic landscapes have similarity with ***Tortulion laevipilae***. A few years later, Marstaller (2006) noted, that syntaxonomical position of ass. ***Pylaisietum polyanthae*** is not completely clear, because some bryophyte communities of the alliances ***Ulotion crispae*** and ***Syntrichion laevipilae*** may be poorly differentiated due to human impact, especially bark eutrophication in many regions of Central Europe. The communities of ass. ***Pylaisietum polyanthae*** with quite high (Marstaller, 2007; Alataş *et al*., 2019) and low (Pisarenko, 1999; Schlüsslmayr, 2001; Gapon, 2006; Springer, 2010) presence of ***Ulotion crispae*** diagnostic block were reported from different regions.

In the Ural's communities of this association, the diagnostic species of the order ***Orthotrichetalia*** (*Leucodon sciuroides*, *Lewinskya speciosa, L. affinis)* are relatively well represented, whereas the diagnostic groups of alliances ***Ulotion crispae*** (*Ulota drummondii, Metzgeria furcata, Lewinskya acuminata, etc.*) and ***Syntrichion laevipilae*** (*Orthotrichum philiberti, Syntrichia papillosa*, *etc.*, with the exception of *Nyholmiella obtusifolia*) are absent or very rare.

Association ***Pylaisiello polyanthae-Leskeelletum nervosae*** Baisheva et al. 1994 (Table 1 in SM, columns 6–15)

Diagnostic species: *Pylaisia polyantha, Pseudoleskeella nervosa.*

In the study area, these epiphytic communities characterized by dominance of *Pseudoleskeella nervosa* and high presence of *Pylaisia polyantha* are quite common in the different forest types; they are more widespread than mesophytic ass. ***Pylaisietum polyanthae***. They were mainly found on the bases of trees with slightly damaged bark and on tree trunks at the height up to 110 cm above the ground, rarely on recently died trees with bark rem-

nants. The host phorophytes usually are *Tilia cordata, Populus tremula* and *Ulmus laevis.* The average cover is 99%, the species number in relevé varies from 3 to 8, accounting for on average 5.3.

The floristic composition of the association may include both the obligate epiphytes (*Lewinskya speciosa, L. affinis,* etc.) and the species which are more typical for the rotten wood (*Brachythecium salebrosum, Haplocladium microphyllum, Plagiomnium cuspidatum*).

This association has been earlier recorded in broad-leaved maple-lime-oak forests near Nugush Village which is not far from the study area (Baisheva *et al.,* 1994) and in the western part of the republic within the zone of plain broadleaved forests (Baisheva, 2000). Marstaller (2006) considered this association as a synonym of ass. ***Pylaisietum polyanthae*** Felföldy 1941, but this decision is very doubtful, because Ural's communities of ass. ***Pylaisiello-Leskeelletum*** are mainly characterized by high abundance of *Pseudoleskeella nervosa* whereas *Pylaisia polyantha* may have low projective cover. Also, these communities could be easily recognized physiognomically in the field and prefer xero-mesophytic habitats, in contrast to ass. ***Pylaisietum polyanthae*** which could be found in a wide range of environmental conditions in the Southern Urals and has its ecological optimum in the mesophytic aspen forests where *Pylaisia polyantha* often forms the wide stripes on the tree trunks at the height up to 2 m above the ground.

Association ***Platygyrietum repentis*** Le Blanc ex Marstaller 1986 (Table 2 in SM)

Diagnostic species: *Platygyrium repens.*

The communities of this association are quite rare in the study area and may be found on the rotten wood, the bases and trunks of old trees of *Tilia cordata* and *Betula pendula* as well as on the bark of recently died trees. The sample plots were described on the height from 0 to 2 m above the ground. The average cover is 96 %, the species number in relevé varies from 2 to 7, accounting for on average 5.2.

The floristic composition of the communities in the study area is quite similar with ones previously described in the northeastern part of the Bashkortostan (Baisheva, 1995). It is characterized by dominance of *Platygyrium repens* and relatively high constancy of *Pylaisia polyantha, Jochenia pallescens, Pseudoleskeella nervosa* and *Brachythecium salebrosum*. In comparison with this association described in the Central Europe (Marstaller, 2005), *Dicranoweisia cirrata, Dicranum viride* and some other species are absent in our communities.

Association ***Ptilidio pulcherrimi-Hypnetum pallescentis*** Barkman ex Willmanns 1962:

subass. ***P.p.-H.p.*** typicum (Table 3 in SM, columns 1–5)

Diagnostic species: *Ptilidium pulcherrimim, Jochenia pallescens.*

subass. ***P.p.-H.p.*** *callicladietosum haldaniani* Baisheva 1995 (Table 3 in SM, columns 6–14)

Diagnostic species: *Ptilidium pulcherrimim, Jochenia pallescens, Callicladium haldaneanum.*

In the study area, the communities of this association are common and grow mostly on decaying wood and bases of trees of *Betula pendula*, rarely on *Tilia cordata*. The average cover is 98 %, the species number in relevé varies from 3 to 11, accounting for on average 6.8.

The communities of subass. *P.p.-H.p. callicladietosum haldaniani* grow more frequently on bases of living trees than on decaying wood and are characterized by the dominance or co-dominance of *Callicladium haldaneanum*.

The differences between communities of this association in the study area and those revealed in the mountain coniferous forests of the central, elevated part of the Southern Urals (Baisheva *et al.*, 1994) are reflected in the absence or much lower constancy of boreal species, i.e. *Dicranum fuscescens, Blepharostoma trichophyllum, Lophoziopsis longidens, etc*. and in the presence of *Pseudoleskeella nervosa* and *Haplocladium microphyllum.*

Diagnostic species of this association are also included in the diagnostic block of the order ***Dicranetalia scoparii*** Barkman 1958 and alliance ***Dicrano scoparii-Hypnion filiformis*** Barkman 1958. This order was traditionally considered within the class ***Cladonio digitatae-Lepidozietea reptantis*** (Hübschmann, 1986; Marstaller, 1993, 2006), but in the recent review of European plant communities (Mucina *et al.,* 2016) it was placed into the class ***Frullanio dilatatae-Leucodontetea sciuroidis***. In the study area, the floristic composition of ass. ***Ptilidio pulcherrimi-Hypnetum pallescentis*** includes both epixylic species of the class ***Cladonio digitatae-Lepidozietea reptantis*** and its high syntaxa (*Lophocolea heterophylla, Cladonia coniocraea*, etc.) and the epiphytic species of the class ***Frullanio dilatatae-Leucodontetea sciuroidis*** (*Pylaisia polyantha* and *Radula complanata*), but all these groups are represented quite sparsely. It is difficult to say, whether Southern Ural's communities of the order ***Dicranetalia*** are fully compliant with the class ***Frullanio dilatatae-Leucodontetea sciuroidis***; it needs further studies.

Association ***Brachythecio salebrosi-Amblystegietum serpentis*** Baisheva et al. 1994

subass. ***B.s.-A.s.*** typicum (Table 4 in SM, columns 1–8).

Diagnostic species: *Amblystegium serpens, Brachythecium salebrosum.*

subass. ***B.s.-A.s.*** *plagiomnietosum cuspidati* Baisheva et al. 1995 (Table 4 in SM, columns 9–13)

Diagnostic species: *Amblystegium serpens, Brachythecium salebrosum, Plagiomnium cuspidatum*.

In the study area, this association is represented by two subassociations. The communities of subass. ***B.s.-A.s.*** typicum were described on rotten wood and the bases

of trunks of *Tilia cordata* and *Populus tremula.* The average cover is 99 %, the species number in relevé varies from 3 to 7, accounting for on average 5.4.

The communities of subass. ***B.s.-A.s.*** *plagiomnietosum cuspidati* were found only on the decaying wood. The mean cover is 98 %, the species number in relevé varies from 6 to 13, accounting for on average 8.2.

The differences between floristic composition of subassociations mainly include better representation of epiphytic diagnostic species of the class ***Frullanio-Leucodontetea*** (*Radula complanata, Pylaisia polyantha, Lewinskya speciosa*) in the subass. typicum, whereas in the communities of the subass. ***B.s.-A.s.*** *plagiomnietosum cuspidati* epixylic diagnostic species of the class ***Cladonio–Lepidosietea*** (*Lophocolea heterophylla* and *L. minor*) are usually present (Table 4 in SM).

The communities of this association were firstly described on rotten wood of the initial stages of decomposition in the floodplain alder forests of the Bashkir Cis-Urals (Baisheva *et al.,* 1994). The characteristic features of these communities were the high constancy of *Leskea polycarpa,* which is the typical for floodplain forests, and the epiphytic species *Pylaisia polyantha.* Earlier, this association was placed within the alliance ***Leskeion polycarpae*** Barkman 1958 of the class ***Frullanio dilatatae-Leucodontetea sciuroidis***. The subass. ***B.s.-A.s.*** *plagiomnietosum cuspidati* described later (Baisheva, 1995) united epixylic communities with high constancy or even co-domination of *Plagiomnium cuspidatum* and low presence of *Leskea polycarpa*. The communities of this association from the other parts of the republic are also characterized by low constancy of *Leskea polycarpa.* The comparative table with data from different parts of the republic is provided to clarify syntaxonomical position of this association within high syntaxa (Table 5 in SM).

Marstaller (2006) considered this association as problematic and proposed to place it within the alliance ***Bryo capillaris-Brachythecion rutabuli*** Marstaller 1987. It seems to be a correct decision, since *Brachythecium salebrosum* and *Amblystegium serpens* are diagnostic species for the order ***Brachythecietalia rutabulo-salebrosi*** and the alliance ***Bryo-Brachythecion***. Probably, the communities with a high participation of *Leskea polycarpa* are typical only for the floodplain forests and represent one of the variants of this association widespread in Bashkortostan.

Ass. ***Anomodontetum rugelii*** Peciar 1965 (Table 6 in SM, columns 1–11)

Diagnostic species: *Anomodon rugelii*.

In the study area, the communities of this association are rare, being described only on the left and right banks of river in one locality (7 km from the Syrtlanovo Village upstream of the Belaya River). The communities were found in moist and shaded habitats in the floodplain lime-alder forests and on the mountain lime-oak-maple forest growing on the slope along the river. The substrate is limestone outcrops and bases of *Ulmus laevis* trunks. The mean cover is 98 %, the species number in relevé varies from 3 to 8, accounting for on average 5.3.

Dominant species is *Anomodon rugelii*, also *Sciuro-hypnum populeum, Rhynchostegium murale, Plagiomnium cuspidatum, Tortella tortuosa, Lophocolea minor, Taxyphyllum wissgrillii* and some other species may have significant abundancy in the communities.

In Europe, *Anomodon rugelii* was assessed as rare and local species with category Near Threatened (Hodgetts *et al*., 2019). In Central Europe, the typical habitats of this species are rocks and bases of trunks of old broad-leaved trees (*Acer pseudoplatanus* and *Fraxinus excelsior*) in semi-shaded habitats [Springer, 2009, 2010]. This moss species is threatened by climate change-induced drought and modern forestry practices across its European range (Sabovljevic *et al*., 2019), and the communities of this association are vulnerable and need in protection.

Ass. ***Anomodontetum longifolii*** Waldheim 1944 (Table 6 in SM, columns 12–20)

Diagnostic species: *Anomodon longifolius*.

The communities of this association were described in shaded habitats on the limestone outcrops and the bases of *Tilia cordata* and *Ulmus laevis* trunks in the broad-leaved forests. The mean cover is 93 %, the species number in relevé varies from 4 to 10, accounting for on average 6.9.

Dominant species *Anomodon longifolius* usually grows together with *Sciuro-hypnum populeum, Tortella tortuosa, Homomallium incurvatum, Radula complanata* and some other species.

In Central Europe, these communities are rare and recommended for protection (Lauer, 2002; Schubert, 2009; Müller & Volker, 2008), eastwards they seem to be more frequent. Unlike the communities of this association from Germany and Ukraine, where they grow on bark and protruding roots of *Fraxinus excelsior, Quercus robur, Acer platanoides, Acer campestre, Acer pseudoplatanus,* rarely on stones (Gapon, 2006, 2014; Springer, 2010), in the Southern Urals communities *Porella platyphylla* was not found, while *Tortella tortuosa, Homomallium incurvatum, Sciuro-hypnum populeum* were present relatively often.

Anomodon viticulosus – community (Table 7 in SM)

These communities dominated by *Anomodon viticulosus* were found in habitats with different moisture conditions on limestone rock outcrops and boulders within broad-leaved and lime-pine forests. The mean cover is 92 %, the species number in relevé varies from 4 to 13, accounting for on average 6.5.

The related species are *Tortella tortuosa, Hypnum cupressiforme, Brachythecium capillaceum, Didymodon fallax* and some other. *Anomodon viticulosus* is the diagnostic species of the association ***Anomodonto viticulosi-Leucodontetum sciuroidis*** Wiśn. 1930 (syn. ***Neckero-Ano-***

modontetum viticulosi Szafran 1955), which is quite widespread in some regions of Central and South Europe (Lauer, 2002; Puglisi & Privitera, 2012) and Turkey (Alataş, 2018). Our communities are distinguished from this association by low presence of *Leucodon sciuroides* and absence of such species as *Neckera complanata, Homalia trichoimanoides, Porella platyphylla*, *Zygodon rupestris*, *etc.* To clarify the syntaxonomical position of these communities, the additional data should be collected.

Association ***Homomallietum incurvati*** Philippi 1965 (Table 8 in SM)

Diagnostic species: *Homomallium incurvatum.*

The communities of this association were found on limestones in the habitats with different light and moisture conditions in floodplain shady forests with *Ulmus laevis, Prunus padus, Tilia cordata*, in semi-open pine mountain forests and open steep slopes. The average cover is 90 %, the species number in relevé varies from 3 to 9, accounting for on average 6.

The diagnostic species is *Homomallium incurvatum*, the relatively high constancy have *Tortella tortuosa, Flexitrichum flexicaule, Campyliadelphus chrysophyllus* and *Hypnum cupressiforme.*

This association is common in warm and dry deciduous forests of Germany, where the communities form small patches of moss cover on limestone outcrops and roots of trees lying on soil (Marstaller, 1988, 1991, 2003, 2004, 2005, 2008, 2017; Shubert, 2009; Lauer, 2002) and often presented by two subassociations, i.e. ***H.i.*** typicum and ***H.i.*** *brachythecietosum populei*, which differs by the presence in the habitats with more high humidity. The diagnostic species of the class ***Neckeretea complanatae*** and its high syntaxa have a good presence in the Central European communities of this association, while the communities from the Southern Urals are distinguished by the better presence of diagnostic species of the class ***Ctenidietea mollusci*** and its high syntaxa (*Flexitrichum flexicaule, Campyliadelphus chrysophyllus, Encalypta streptocarpa, Encalypta rhaptocarpa*) and poorer floristic composition, i.e. absence of *Homalothecium sericeum, Porella platyphylla, Ctenidium molluscum, Schistdium robustum*, *etc.* (Table 9 in SM).

Association ***Pseudoleskeelletum catenulatae*** Ježek & Vondráček 1962 (Table 10 in SM)

Diagnostic species: *Pseudoleskeella catenulata.*

These xero-mesophytic communities were described on open and well illuminated limestone outcrops mainly on the mountain slopes of southern, south-eastern, south-western, rarely of western exposition. Some relevés were made on boulders within semi-open pine and birch-lime-pine forests. The average cover is 90 %, the species number in relevé varies from 3 to 8, accounting for on average 5.6.

The dominant species is *Pseudoleskeella catenulata*, also the high constancy have *Syntrichia ruralis, Tortella tortuosa, Flexitrichum flexicaule, Pseudoleskeella nervosa, Hypnum cupressiforme*.

In the South and Central Europe, ***Pseudoleskeelletum catenulatae*** unites bryophyte communities growing on open, well-illuminated to lightly shaded limestone outcrops in the middle mountain belt (Guerra, 1985; Nörr, 1970; Marstaller, 1980). The habitats and floristic composition of the association from the Southern Urals are quite similar (Table 11 in SM), the main differences are the absence of *Syntrichia montana* and *Homalothecium sericeum,* which are rare in Bashkortostan. This association was included into the alliance ***Grimmion tergestinae*** Šmarda ex Klika 1948 of the class ***Grimmietea anodontis*** Hadač & Vondráček in Ježek & Vondráček 1962, but diagnostic block of these high syntaxa are presented rather weakly in Central Europe (Hübschmann, 1986) and in the Southern Urals.

DISCUSSION

In comparison with Central European bryophyte vegetation, the communities of the study area, as well as in the other regions of Bashkortostan, are characterized by poor floristic composition and weak representation of diagnostic species of high syntaxa (Table 1, page 7), complicating floristic classification of communities. Also, there are special ecological preferences of some species, which in Western and Central Europe are mainly epiphytes, and in the continental climate of the Southern Ural grow mainly on limestones (e.g., *Hypnum cupressiforme*).

In the study area some rare and endangered in Europe (Hodgetts *et al.*, 2019) and Bashkortostan (Martynenko, 2021) species were revealed, i.e. *Haplocladium microphyllum* and *Anomodon rugelii*, which prefer sheltered microhabitats in the old-growth forests. Probably, the survival of these species in the Belaya River valley is caused by the management history of Southern Ural forests, where the mountain broad-leaved forests along the river valleys were less affected by industrial logging due to the lack of roads. In such regions only selective winter logging was carried out. For bryophytes, winter logging is less harmful than the summer one, because the ground layer and the bases of tree trunks are protected by snow cover (Baisheva *et al*., 2013).

The list of bryophyte communities of the study area is not yet completed, and further research is needed in this area.

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Table 1. Syntaxa of bryophyte vegetation in the Belaya River valley

Number of syntaxa	1	2	5	3	4	6	7	8	9	10	11	12
Number of relevés	5	10	10	5	9	8	5	11	9	8	8	22
D.s. of associations, subassociations and a community												
Pylaisia polyantha	**V**	**V**	III	III	II	III	.	.	.	.	.	.
Pseudoleskeella nervosa	.	**V**	IV	I	II	II	I	I	I	II	II	II
Platygyrium repens	.	II	**V**	III	II	I	.	.	.	.	.	.
Jochenia pallescens	I	I	III	**IV**	**V**	II	II	.	.	.	.	.
Ptilidium pulcherrimum	I	.	I	**V**	**IV**	I	.	.	.	.	.	.
Callicladium haldaneanum	.	.	.	.	**V**	.	.	.	.	.	.	.
Brachythecium salebrosum	I	II	II	II	II	**IV**	**V**	.	I	.	.	.
Amblystegium serpens	.	II	I	I	I	**V**	**V**	I	II	.	.	.
Plagiomnium cuspidatum	I	II	I	II	.	I	**V**	II	I	I	.	I
Anomodon rugelii	.	.	.	.	.	.	.	**V**	I	.	.	.
Anomodon longifolius	.	I	.	.	.	.	.	III	**V**	.	.	I
Anomodon viticulosus	.	.	.	.	.	.	.	I	II	**V**	.	I
Homomallium incurvatum	.	.	.	.	.	.	.	I	III	.	**V**	I
Pseudoleskeella catenulata	.	.	.	.	.	.	.	.	II	II	.	**V**
D.s. of ***Frullanio–Leucodontetea*** and ***Orthotrichetalia***												
Radula complanata	II	II	.	.	II	III	.	II	II	.	I	I
Lewinskya speciosa	II	II	III	.	.	I	.	.	.	.	.	.
Nyholmiella obtusifolia	I	I	.	.	.	.	.	.	.	I	.	.
Lewinskya affinis	I	I	.	.	.	.	.	.	.	.	.	.
Leucodon sciuroides	.	I	I	.	.	.	.	.	.	II	.	I
Frullania dilatata	.	.	.	.	.	.	.	.	.	I	.	.
D.s. of ***Dicranetalia scoparii*** and ***Dicrano–Hypnion***												
Dicranum montanum	.	.	I	I	III	.	.	.	.	.	.	.
Dicranum scoparium	.	.	.	II	I	.	.	.	.	.	.	.
D.s. of ***Cladonio–Lepidozietea*** *and* ***Lophocoleetalia heterophyllae***												
Lophocolea minor	.	I	.	.	I	I	II	IV	II	.	I	.
Lophocolea heterophylla	.	.	.	.	II	.	III	.	.	.	.	.
Cladonia coniocraea	.	.	I	I	II	.	.	.	.	.	.	.
Dicranum flagellare	.	.	.	I	I	.	.	.	.	.	.	.
Dicranum fuscescens	.	.	.	.	I	.	.	.	.	I	.	.
D.s. of ***Brachythecietalia rutabulo–salebrosi***												
Brachytheciastrum velutinum	.	.	.	.	.	I	I	.	.	.	.	.
Sciuro-hypnum reflexum	.	.	.	.	.	I	.	.	.	.	.	.
Sciuro-hypnum curtum	.	.	.	.	.	.	II	.	.	.	.	.
Brachythecium capillaceum	.	.	.	.	.	.	.	.	I	II	.	I
Ptychostomum moravicum	.	.	.	.	.	.	.	.	.	.	.	I
Sciuro-hypnum starkei	.	.	.	.	.	.	.	I	.	.	.	.
D.s. of ***Schistidietea apocarpi, Schistidietalia apocarpi*** and ***Grimmion tergestinae***												
Schistidium apocarpum s.l.	.	.	.	.	.	.	.	.	II	.	II	II
Didymodon rigidulus	.	.	.	.	.	.	.	I	I	.	.	I
Schistidium submuticum	.	.	.	.	.	.	.	.	.	I	I	I
Schistidium lancifolium	.	.	.	.	.	.	.	.	.	I	.	.
Schistidium crassipilum	.	.	.	.	.	.	.	.	.	.	.	I
D.s. of ***Neckeretea complanatae, Neckeretalia complanatae*** and ***Neckerion complanatae***												
Pseudoamblystegium subtile	II	I	.	.	.	.	.	.	I	.	.	.
Sciuro-hypnum populeum	.	.	.	.	.	.	.	IV	II	.	I	I
Homalothecium sericeum	.	.	.	.	.	.	.	.	II	II	.	I
Rhynchostegium murale	.	.	.	.	.	.	.	II	II	.	I	.
Neckera pennata	.	.	.	.	.	.	.	.	.	I	.	.
Porella platyphylla	.	.	.	.	.	.	.	.	.	I	.	.
D.s. of ***Ctenidietea mollusci, Ctenidietalia mollusci, Ctenidion mollusci*** and ***Distichion capillacei***												
Flexitrichum flexicaule	.	.	.	.	.	.	.	.	.	II	IV	II
Tortella tortuosa	.	.	.	.	.	.	.	I	III	III	IV	IV
Encalypta rhaptocarpa	.	.	.	.	.	.	.	.	.	.	I	I
Encalypta streptocarpa	.	.	.	.	.	.	.	.	II	.	III	I
Campyliadelphus chrysophyllus	.	.	.	.	.	.	.	.		I	III	I
Tortella fragilis	.	.	.	.	.	.	.	I	I		II	I
Distichium capillaceum	.	.	.	.	.	.	.	.	.	II	I	.

Other species:												
Haplocladium microphyllum	I	III	I	II	I	II	III	.	.	.	.	.
Sanionia uncinata	I	.	I	II	II	II	III	.	.	.	.	.
Leskea polycarpa	.	I	.	.	.	.	.	.	.	.	.	.
Eurhynchiastrum pulchellum	I	.	.	.	.	.	.	.	.	.	.	.
Oxyrrhynchium hians	.	.	I	.	.	.	.	.	.	.	.	.
Hypogymnia physodes	.	.	I	.	.	.	.	.	.	.	.	.
Entodon schleicheri	.	.	I	.	.	.	.	.	.	.	.	.
Parmelia sulcata	.	.	I	.	.	.	.	.	.	.	.	.
Pohlia nutans	.	.	.	I	II	.	I	.	.	.	.	.
Pleurozium schreberi	.	.	.	II	I	.	I	.	.	.	II	.
Oncophorus elongatus	.	.	.	I	II	.	I	.	.	.	.	.
Campylophyllopsis sommerfeltii	I	.	.	.	.	II	V	.	.	.	.	.
Cynodontium strumiferum	.	.	.	.	I	.	.	.	.	.	.	.
Ceratodon purpureus	.	.	.	.	.	I	.	.	.	.	.	.
Ptychostomum capillare	.	.	.	.	.	.	I	I	II	.	I	I
Syntrichia ruralis	.	.	.	.	.	.	.	.	II	III	II	IV
Brachythecium albicans	.	.	.	.	.	.	.	I	II	.	.	I
Plagiomnium rostratum	.	.	.	.	.	.	.	II	.	.	.	.
Taxiphyllum wissgrillii	.	.	.	.	.	.	.	II	I	.	.	.
Leptogium tenuissimum	.	.	.	.	.	.	.	.	I	.	.	.
Hypnum cupressiforme	.	.	.	.	.	.	.	.	.	III	III	II
Orthotrichum cupulatum	.	.	.	.	.	.	.	.	.	II	.	I
Didymodon fallax	.	.	.	.	.	.	.	.	.	II	.	I
Serpoleskea confervoides	.	.	.	.	.	.	.	.	.	I	.	I
Abietinella abietina	.	.	.	.	.	.	.	.	.	II	.	I
Plagiochila porelloides	.	.	.	.	.	.	.	.	.	I	.	.
Pseudoleskeella tectorum	.	.	.	.	.	.	.	.	.	I	.	.
Paraleucobryum longifolium	.	.	.	.	.	.	.	.	.	I	.	.
Barbilophozia barbata	.	.	.	.	.	.	.	.	.	I	.	.
Ptychostomum elegans	.	.	.	.	.	.	.	.	.	I	.	I
Orthotrichum anomalum	.	.	.	.	.	.	.	.	.	.	.	I
Encalypta sp.	.	.	.	.	.	.	.	.	.	I	.	I
Schistidium sp.	.	.	.	.	.	.	.	.	.	.	.	I
Bryum sp.	.	.	.	.	.	.	.	.	II	I	.	I
Cladonia ramulosa	.	.	.	.	.	.	.	.	.	.	.	I
Ptychostomum imbricatulum	.	.	.	.	.	.	.	.	.	.	.	I
Rhytidium rugosum	.	.	.	.	.	.	.	.	.	.	.	I
Didymodon ferrugineus	.	.	.	.	.	.	.	.	.	I	.	.

Syntaxa:
1 – Ass. ***Pylaisietum polyanthae*** Felföldy 1941
2 – Ass. ***Pylaisiello polyanthae-Leskeelletum nervosae*** Baisheva et al. 1994
3 – Ass. ***Platygyrietum repentis*** Le Blanc ex Marstaller 1986
4 – Ass. ***Ptilidio pulcherrimi-Hypnetum pallescentis*** Barkman ex Willmanns 1962: subass. ***P.p.-H.p. typicum;***
5 – Ass. ***Ptilidio pulcherrimi-Hypnetum pallescentis*** Barkman ex Willmanns 1962: subass. ***P.p.-H.p. callicladietosum haldaniani*** Baisheva 1995
6 – Ass. ***Brachythecio salebrosi-Amblystegietum serpentis*** Baisheva et al. 1994: subass. ***B.s.-A.s. typicum;***
7 – Ass. ***Brachythecio salebrosi-Amblystegietum serpentis*** Baisheva et al. 1994: subass. ***B.s.-A.s. plagiomnietosum cuspidati*** Baisheva 1995
8 – Ass. ***Anomodontetum rugelii*** Peciar 1965
9 – Ass. ***Anomodontetum longifolii*** Waldheim 1944
10 – ***Anomodon viticulosus*** – community
11 – Ass. ***Homomallietum incurvati*** Philippi 1965
12 – Ass. ***Pseudoleskeelletum catenulatae*** Ježek & Vondráček 1962

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Supplementary materials for

Elvira Z. Baisheva

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Table 1. Associations ***Pylaisietum polyanthae*** Felföldy 1941 (1–5) and ***Pylaisiello polyanthae–Leskeetum nervosae*** Baisheva et al. 1994 (6–15)

Number of relevé	1	2	3	4	5	**CONSTANCY**	6	7	8	9	10	11	12	13	14	15	**CONSTANCY**
Field number of relevé	337	281	274	281a	335a		310	333	394	314	279	402	403	316	340	278	
Length of the plot, cm	15	10	10	10	15		15	15	10	20	10	10	15	15	15	10	
With of the plot, cm	15	10	10	10	15		10	15	10	10	10	10	15	15	15	10	
Cover (%)	80	100	90	100	90		90	100	100	100	100	100	100	100	100	100	
Exposition	N		E	NE	E		NW	NW	N	S		N			N		
Heigh above the ground, cm	100		200	120	90		110	70	40	40		20			40		
Base of tree (B)/Trunk (T)	T	B	T	T	T		T	T	T	TC	B	T			T	B	
Substrate	PT	PT	PP	PT	TC		TC	PT	UL	TC	PT	TC	R	R	TC	PT	
Number of species	3	7	5	3	4		6	5	3	7	8	5	5	6	5	3	
D.s. of associations																	
Pylaisia polyantha	2	3	5	3	3	**V**	3	3	4	1	1	r	2	2	4	.	**V**
Pseudoleskeella nervosa	.	.	.	.	.		2	4	3	3	3	3	4	4	1	4	**V**
D.s. of ***Frullanio dilatatae–Leucodontetea sciuroidis, Orthotrichetalia, Syntrichion laevipilae*** and ***Leskeion polycarpae***																	
Radula complanata	.	+	.	2	.	**II**	.	2	.	.	2	3	.	.	2	.	**II**
Lewinskya speciosa	1	.	2	.	.	**II**	+	2	.	.	.	.	1	.	.	.	**II**
Nyholmiella obtusifolia	4	.	.	.	.	**I**	2	.	.	.	.	.	.	.	.	.	**I**
Leucodon sciuroides	.	.	.	2	.		.	.	.	.	.	.	3	.	.	.	**I**
Lewinskya affinis	.	.	.	.	1	**I**	.	.	2	.	.	.	.	.	.	.	**I**
Leskea polycarpa	.	.	.	.	.		.	.	.	3	.	.	.	.	.	.	**I**
D.s. of ***Dicranetalia scoparii*** and ***Dicrano-Hypnion***																	
Jochenia pallescens	.	.	r	.	.	**I**	.	+	.	+	.	.	.	.	.	.	**I**
Ptilidium pulcherrimum	.	.	1	.	.	**I**	.	.	.	.	.	.	.	.	.	.	
D.s. of ***Cladonio digitatae-Lepidozietea reptantis, Cladonio–Lepidozietalia*** **and** ***Brachythecietalia***																	
Brachythecium salebrosum	.	r	.	.	.	**I**	.	.	.	.	3	.	.	2	.	r	**II**
Amblystegium serpens	.	.	.	.	.		.	.	.	.	.	+	.	r	r	.	**II**
Lophocolea minor	.	.	.	.	.		.	.	.	.	+	+	.	.	.	.	**I**

Number of relevé	1	2	3	4	5		6	7	8	9	10	11	12	13	14	15	
D.s. of ***Neckeretalia complanatae*** and ***Neckerion complanatae***																	
Pseudoamblystegium subtile	.	3	.	.	2	**II**	.	.	.	.	+	.	.	.	.	.	**I**
Plagiomnium cuspidatum	.	.	.	.	+	**I**	.	.	.	2	1	.	.	.	.	2	**II**
Other species:																	
Haplocladium microphyllum	.	2	.	.	.	**I**	+	.	.	2	3	.	.	+	3	.	**III**
Platygyrium repens	.		.	.	.		2	.	.	+	.	.	.	1	.	.	**II**
Eurhynchium pulchellum	.	1	.	.	.	**I**	.	.	.	.	.	.	.	.	.	.	
Campylophyllopsis sommerfeltii	.	r	.	.	.	**I**	.	.	.	.	.	.	.	.	.	.	
Sanionia uncinata	.		+	.	.	**I**	.	.	.	.	.	.	.	.	.	.	
Anomodon longifolius	.	.	.	.	.		.	.	.	.	.	.	1	.	.	.	**I**

Localities of relevés (ordinal No. of relevé in the table indicated in bold – No. of locality mentioned in the captures under Figure 1):

1, 5, 6, 7, 9, 13 – 6; **2, 4, 10, 15** – 5; **3** – 3; **7** – 14; **8** – 15; **11, 12** – 16; **14** – 7.

Table 2. Association ***Platygyrietum repentis*** Le Blanc ex Marstaller 1986

Number of relevé	1	2	3	4	5	6	7	8	9	10	**CONSTANCY**
Field number of relevé	318	358	306	359	357	304	342	280	311	308	
Length of the plot, cm	15	15	15	15	15	10	20	15	10	15	
With of the plot, cm	15	15	15	15	15	10	15	15	10	15	
Cover (%)	80	90	100	100	90	100	100	100	100	100	
Exposition			N	N	N						
Heigh above the ground, cm	100	120	50	30	170	200	60		140		
Base of tree (B)/Trunk (T)			T	T		T	T	B	T		
Substrate	R	R	TC	TC	T	BP	TC	BP	TC	R	
Number of species	7	4	7	4	2	5	4	5	7	7	
D.s. of association											
Platygyrium repens	4	3	4	4	5	3	3	4	4	3	**V**
D.s. of ***Frullanio dilatatae–Leucodontetea sciuroidis*** and ***Orthotrichetalia***											
Lewinskya speciosa	2	2	r	.	.	.	.	.	2	r	**III**
Pylaisia polyantha	2	.	+	.	.	.	2	.	2	2	**III**
Leucodon sciuroides	.	2	.	.	.	.	2	.	.	.	**I**
D.s. of **Dicranetalia** and ***Dicrano-Hypnion***											
Jochenia pallescens	1	.	+	+	.	2	.	.	+	3	**III**
Ptilidium pulcherrimum	.	.	.	.	.	.	.	3	.	.	**I**
Dicranum montanum	.	.	.	.	.	3	.	1	.	.	**I**
D.s. of ***Cladonio digitatae-Lepidozietea reptantis*** and ***Brachythecietalia***											
Brachythecium salebrosum	.	.	2	3	.	.	.	.	.	+	**II**
Cladonia coniocraea	.	.	.	.	.	2	.	.	2	.	**I**
Amblystegium serpens	.	.	.	.	.	.	.	+	.	.	**I**
Other species:											
Pseudoleskeella nervosa	+	.	2	2	2	.	2	.	1	+	**IV**
Plagiomnium cuspidatum	.	.	2	.	.	.	.	.	.	.	**I**

Number of relevé	1	2	3	4	5	6	7	8	9	10	
Haplocladium microphyllum	.	.	.	.	.	.	.	.	1	+	**I**
Sanionia uncinata	1	.	.	.	.	.	.	.	.	.	**I**
Entodon schleicheri	+	.	.	.	.	.	.	.	.	.	**I**
Parmelia sulcata	.	2	.	.	.	.	.	.	.	.	**I**
Oxyrrhynchium hians	.	.	.	.	.	.	.	+	.	.	**I**
Hypogymnia physodes	.	.	.	.	.	2	.	.	.	.	**I**

Localities of relevés (ordinal No. of relevé in the table indicated in bold – No. of locality mentioned in the captures under Figure 1):

1, 3, 6, 9, 10 – 6; **2, 4, 5** – 13; **7** – 7; **8** – 5.

Table 3. Association ***Ptilidio pulcherrimi–Hypnetum pallescentis*** Barkman ex Willmanns 1962:

subass. ***P.p.-H.p. typicum*** (Table 3, 1–5); subass. ***P.p.-H.p. callicladietosum haldanianii*** Baisheva 1995 (Table 3, 6–14)

Number of relevé	1	2	3	4	5	**CONSTANCY**	6	7	8	9	10	11	12	13	14	**CONSTANCY**
Field number of relevé	285	265	319	261	301		305	337a	360	294	269	292	297	307	309	
Length of the plot, cm	15	20	15	10	15		20	15	15	15	15	15	10	10	10	
With of the plot, cm	15	10	15	10	10		20	15	15	15	15	15	10	10	10	
Cover (%)	100	90	100	100	100		80	100	100	100	100	100	100	100	100	
Exposition							E	N	N					N		
Heigh above the ground, cm									30					100	40	
Base of tree (B)/Trunk (T)							B	B	T	B						
Substrate	R	R	R	R	R		TC	BP	BP	BP	R	R	R	R	R	
Number of species	7	6	10	5	6		8	3	4	5	6	11	7	8	8	
D.s. of association and subassociation																
Ptilidium pulcherrimum	1	2	2	4	4	**V**	1	.	3	2	2	1	1	3	3	**IV**
Jochenia pallescens	4	1	3	2	.	**IV**	1	1	2	3	.	2	1	2	3	**V**
Callicladium haldanianum	.	.	.	.	.		1	5	4	2	4	1	2	1	2	**V**
D.s. of ***Frullanio dilatatae–Leucodontetea sciuroidis*** and ***Orthotrichetalia***																
Pylaisia polyantha	+	.	2	2	.	**III**	.	.	2	.	.	.	.	.	+	**II**
Radula complanata	.	.	.	.	.		2	.	.	.	.	.	.	+	.	**II**
D.s. of ***Dicranetalia scoparii*** and ***Dicrano scoparii–Hypnion filiformis***																
Dicranum scoparium	.	2	.	.	+	**II**	.	.	.	.	.	2	.	.	.	**I**
Dicranum montanum	.	.	.	.	2	**I**	.	.	.	3	2	2	2	.	.	**III**
D.s. of ***Cladonio digitatae–Lepidozietea reptantis, Cladonio–Lepidozietalia*** and ***Brachythecietalia***																
Brachythecium salebrosum	2	.	2	.	.	**II**	3	.	.	.	.	.	.	1	1	**II**
Amblystegium serpens	.	.	r	.	.	**I**	.	.	.	.	.	.	.	1	.	**I**
Dicranum flagellare	.	3	.	.	.	**I**	.	.	.	.	.	.	3	.	.	**I**
Cladonia coniocraea	.	.	.	.	2	**I**	.	.	.	.	2	.	3	.	.	**II**
Lophocolea heterophylla	.	.	.	.	.		.	.	.	+	2	+	.	.	.	**II**

Number of relevé	1	2	3	4	5		6	7	8	9	10	11	12	13	14	
Dicranum fuscescens	.	.	.	.	.		2	.	.	.	.	.	.	.	.	**I**
Lophocolea minor	.	.	.	.	.		.	.	.	.	.	+	.	.	.	**I**
Other species:																
Pseudoleskeella nervosa	.	.	+	.	.	**I**	+	.	.	.	.	.	.	1	2	**II**
Platygyrium repens	.	.	2	2	+	**III**	.	.	.	.	.	.	.	2	2	**II**
Plagiomnium cuspidatum	2	.	+	.	.	**II**	.	.	.	.	.	.	.	.	.	
Haplocladium microphyllum	2	.	1	.	.	**II**	.	.	.	.	.	.	.	.	r	**I**
Pohlia nutans	.	1	.	.	.	**I**	.	.	.	.	.	+	1	.	.	**II**
Sanionia uncinata	2	.	+	.	.	**II**	.	.	.	.	1	2	.	.	.	**II**
Pleurozium schreberi	.	2	.	.	+	**II**	.	.	.	.	.	2	.	.	.	**I**
Oncophorus elongatus	.	.	.	2	.	**I**	1	.	.	.	.	2	.	.	.	**II**
Cynodontium strumiferum	.	.	.	.	.		.	2	.	.	.	.	.	.	.	**I**

Localities of relevés (ordinal No. of relevé in the table indicated in bold – No. of locality mentioned in the captures under Figure 1):

1, 5, 9, 11, 12 – 5; **2** – 2; **3, 6, 7, 13, 14** – 6; **4** – 1; **8** – 13, **10** – 3.

Table 4. Association ***Brachythecio salebrosi–Amblystegietum serpentis*** Baisheva et al. 1994:

subass. ***B.s.–A.s***. *typicum* (1–8); subass. ***B.s.–A.s. plagiomnietosum cuspidati*** Baisheva et al. 1995 (9–13)

Number of relevé	1	2	3	4	5	6	7	8	**CONSTANCY**	9	10	11	12	13	**CONSTANCY**
Field number of relevé	336	355	295	296	290	288	315	356		317	332	282	291	284	
Length of the plot, cm	15	15	10	10	10	15	10	15		15	10	15	10	15	
With of the plot, cm	15	15	10	10	10	15	10	15		15	10	15	10	15	
Cover (%)	100	100	100	100	100	100	100	90		90	100	100	100	100	
Exposition		N	W	W		N	S	E							
Base of tree (B)/Trunk (T)		B	B	B		B	B	B							
Substrate	R	TC	TC	TC	R	PT	TC	TC		R	R	R	R	R	
Number of species	4	3	7	7	6	3	6	7		7	6	8	7	13	
D.s. of association and subassociation															
Brachythecium salebrosum	.	.	1	1	3	2	2	1	**IV**	2	2	3	2	3	**V**
Amblystegium serpens	5	5	3	4	2	4	4	1	**V**	4	2	3	4	2	**V**
Plagiomnium cuspidatum	.	.	.	.	.	.	+	.	**I**	1	2	1	2	2	**V**
D.s. of ***Frullanio dilatatae–Leucodontetea sciuroidis*** and ***Orthotrichetalia***															
Radula complanata	.	.	4	2	+	2	.	.	**III**	.	.	.	.	.	
Pylaisia polyantha	.	2	1	.	.	.	+	2	**III**	.	.	.	.	.	
Lewinskya speciosa	.	.	+	.	.	.	.	.	**I**	.	.	.	.	.	
D.s. of ***Dicranetalia scoparii*** and ***Dicrano–Hypnion***															
Jochenia pallescens	.	2	2	1	.	.	.	.	**II**	1	.	.	.	r	**II**
Ptilidium pulcherrimum	.	.	.	.	.	.	2	.	**I**	.	.	.	.	.	
D.s. of ***Cladonio digitatae-Lepidozietea reptantis, Cladonio–Lepidozietalia*** and ***Brachythecietalia***															
Lophocolea heterophylla	.	.	.	.	.	.	.	.		.	.	2	r	+	**III**
Lophocolea minor	.	.	.	.	+	.	.	.	**I**	.	.	+	.	2	**II**
Sciuro-hypnum curtum	.	.	.	.	.	.	.	.		1	2	.	.	.	**II**

Number of relevé	1	2	3	4	5	6	7	8		9	10	11	12	13	
Brachytheciastrum velutinum	1	.	.	.	.	.	.	.	**I**	.	.	.	.	+	**I**
Sciuro-hypnum reflexum	.	.	.	2	.	.	.	.	**I**	.	.	.	.	.	
Other species:															
Campylophyllopsis sommerfeltii	2	.	.	.	.	.	.	4	**II**	+	3	1	2	2	**V**
Haplocladium microphylum	+	.	.	.	r	.	.	+	**II**	.	.	2	1	2	**III**
Sanionia uncinata	.	.	.	r	.	.	.	1	**II**	.	.	2	+	+	**III**
Pseudoleskeella nervosa	.	.	.	+	2	.	2	.	**II**	r	.	.	.	.	**I**
Platygyrium repens	.	.	r	.	.	.	.	.	**I**	.	.	.	.	.	
Ceratodon purpureus	.	.	.	.	.	.	.	r	**I**	.	.	.	.	.	
Ptychostomum capillare	.	.	.	.	.	.	.	.		.	2	.	.	.	**I**
Pohlia nutans	.	.	.	.	.	.	.	.		.	.	.	.	r	**I**
Pleurozium schreberi	.	.	.	.	.	.	.	.		.	.	.	.	+	**I**
Oncophorus elongatus	.	.	.	.	.	.	.	.		.	.	.	.	+	**I**

Localities of relevés (ordinal No. of relevé in the table indicated in bold – No. of locality mentioned in the captures under Figure 1):

1, 7, 9, 10 – 6; **2, 8** – 13; **3, 4, 5, 6, 11, 12, 13** – 5.

Table 5. Comparison of communities of ass. ***Brachythecio salebrosi–Amblystegietum serpentis*** described in the different regions of the Republic of Bashkortostan

Number of syntaxa	1	2	3	4	5	6
Number of relevés	8	5	14	15	25	18
D. s. of association and subassociation						
Brachythecium salebrosum	IV	V	IV	V	V	IV
Amblystegium serpens	V	V	V	V	IV	III
Plagiomnium cuspidatum	I	V	II	V		V
D.s. of ***Frullanio–Leucodontetea*** and ***Orthotrichetalia***						
Pylaisia polyantha	III	.	III	.	.	.
Radula complanata	III	.	I	.	.	.
Lewinskya speciosa	I	.	.	.	.	.
Nyholmiella obtusifolia	.	.	I	.	.	.
D.s. of ***Leskeion polycarpae***						
Leskea polycarpa			IV	I	I	I
D.s. of ***Dicranetalia*** and ***Dicrano-Hypnion***						
Jochenia pallescens	II	II	I	III	.	.
Ptilidium pulcherrimum	I	.	.	.	.	.
Callicladium haldanianum	.	.	.	II	.	.
Dicranum montanum	.	.	.	I	I	.
D.s. of ***Cladonio -Lepidozietea*** and ***Lophocoleetalia***						
Lophocolea minor	I	II	.	II	I	I
Lophocolea heterophylla	.	III	I	II	.	I
D.s. of ***Brachythecietalia*** and ***Bryo-Brachythecion***						
Brachytheciastrum velutinum	I	I	I	I	I	.
Sciuro-hypnum reflexum	I	.	.	IV	II	II
Sciuro-hypnum curtum	.	II	I	I	.	.
Sciuro-hypnum starkei	.	.	I	I	.	.
Brachythecium rutabulum	.	.	.	I	.	.

Number of syntaxa	1	2	3	4	5	6
			Other species:			
Sanionia uncinata	II	III	II	III	I	I
Haplocladium microphyllum	II	III	.	.	.	.
Pseudoleskeella nervosa	II	I	.	I	.	.
Campylophyllopsis sommerfeltii	II	V	I	II	I	.
Ceratodon purpureus	I	.	III	I	.	I
Platygyrium repens	I	.	I	.	.	.
Ptychostomum capillare	.	I	.	.	.	I
Pohlia nutans	.	I	I	I	I	.
Pleurozium schreberi	.	I	I	I	I	.
Oncophorus elongatus	.	I	.	.	.	.
Oxyrrhynchium hians	.	.	.	I	I	.
Ptychostomum imbricatulum	.	.	.	.	I	I
Brachythecium albicans	.	.	.	I	.	.
Amblystegium varium	.	.	.	I	.	.
Climacium dendroides	.	.	.	I	.	.
Leptodictyum riparium	.	.	.	I	.	.
Plagiothecium denticulatum	.	.	I	.	.	I
Rhytidiadelphus triquetrus	.	.	I	.	I	.
Plagiothecium sp.	.	.	I	.	.	.

Syntaxa: 1 – subass. ***B.s.-A.s. typicum*** from the Belaya River valley;
2 – subass. ***B.s.-A.s. plagiomnietosum cuspidati*** from the Belaya River valley;
3 – subass. ***B.s.-A.s. typicum*** from the different regions of the Bashkir Cis-Urals (Baisheva et al., 1994);
4 – subass. ***B.s.-A.s. plagiomnietosum cuspidati*** from north-eastern part of the Bashkortostan (Baisheva, 1995);
5 – subass. ***B.s.-A.s. typicum*** from the western part of the Bashkortostan (Baisheva, 2000);
6 – subass. ***B.s.-A.s. plagiomnietosum cuspidati*** from the western part of the Bashkortostan (Baisheva, 2000).

Table 6. Associations ***Anomodontetum rugelii*** Peciar 1965 (1–11) and ***Anomodontetum longifolii*** Waldh. 1944 (12–20)

Number of relevé	1	2	3	4	5	6	7	8	9	10	11	**CONSTANCY**	12	13	14	15	16	17	18	19	20	**CONSTANCY**
Field number of relevé	379	384	381	398	391	378	383	400	382	390	387		365	399	388	392	395	401	61	380	364	
Length of the plot, cm	30	15	15	30	20	40	15	20	15	15	15		15	15	10	20	40	10	20	15	20	
Width of the plot, cm	15	15	15	15	20	20	15	20	15	15	15		15	15	10	20	40	10	20	15	20	
Cover (%)	100	100	100	100	90	100	100	100	100	90	100		100	100	100	80	80	100	100	100	80	
Exposition	SE	N	SE	SE	SE	SE	SE	SE	SE	SE	SE		S	S	SE	SE	SE	N	S	SE	S	
Substrate	LM	UL	LM	LM	LM	LM	LM	LM	LM	LM	LM		LM	LM	LM	LM	LM	TC	LM	UL	LM	
Number of species	5	5	4	8	7	6	3	4	4	4	8		10	9	6	7	9	4	4	5	8	
D.s. of associations																						
Anomodon rugelii	4	4	3	3	4	4	4	5	4	4	3	**V**		.	.	.	.	.	.	+	.	**I**
Anomodon longifolius	2	+	2	.	2	.	.	.	.	.	2	**III**	3	2	4	3	3	4	5	5	3	**V**
D.s. of ***Neckeretea complanatae***, ***Neckeretalia complanatae*** and ***Neckerion complanatae***																						
Sciuro-hypnum populeum	.	.	+	.	+	.	2	1	3	1	+	**IV**	3	2	1	.	.	.	.	.	.	**II**
Rhynchostegium murale	.	.	.	2	.	.	.	.	.	2	2	**II**	.	1	+	.	.	.	.	.	.	**II**
Plagiomnium cuspidatum	.	.	.	r	.	.	2	2	.	.	.	**II**	.	.	.	.	.	.	2	.	.	**I**
Anomodon viticulosus	.	.	.	.	+	.	.	.	.	.	.	**I**	.	.	.	1	2	.	.	.	.	**II**
Homalothecium sericeum	.	.	.	.	.	.	.	.	.	.	.		.	.	.	+	+	.	.	.	.	**II**
D.s. of ***Ctenidietea mollusci*** and ***Ctenidietalia mollusci***																						
Tortella tortuosa	.	.	.	2	2	.	.	.	.	.	.	**I**	2	2	.	3	2	.	.	.	+	**III**
Encalypta streptocarpa	.	.	.	.	.	.	.	.	.	.	.		.	.	.	2	1	.	.	.	1	**II**
Tortella fragilis	.	.	.	.	.	.	.	.	.	.	+	**I**	.	+	.	.	.	.	.	.	2	**I**

Number of relevé	1	2	3	4	5	6	7	8	9	10	11		12	13	14	15	16	17	18	19	20	
D.s. of ***Cladonio digitatae–Lepidozietea reptantis, Cladonio-Lepidozietalia*** **and** ***Brachythecietalia***																						
Lophocolea minor	+	r	.	2	.	+	.	1	+	.	2	**IV**	.	+	.	.	.	3	.	.	.	**II**
Amblystegium serpens	.	3	.	.	.	.	.	.	.	.	.	**I**	.	.	.	.	.	2	.	+	.	**II**
Brachythecium salebrosum	.	.	.	.	.	.	.	.	.	.	.		.	.	.	.	.	.	.	+	.	**I**
Sciuro-hypnum starkei	.	r	.	.	.	2	.	.	.	.	.	**I**	.	.	.	.	.	.	.	.	.	
Brachytecium capillaceum	.	.	.	.	.	.	.	.	.	.	.		.	.	.	.	.	.	2	.	.	**I**
Other species:																						
Radula complanata	+	.	.	.	+	.	.	.	.	2	3	**II**	.	.	3	.	+	2	.	.	.	**II**
Plagiomnium rostratum	2	.	.	2	.	+	.	.	.	.	.	**II**	.	.	.	.	.	.	.	.	.	
Taxyphyllum wissgrillii	.	.	2	.	.	2	.	.	1	.	.	**II**	.	.	.	.	.	.	.	1	.	**I**
Pseudoleskeella nervosa	.	.	.	+	.	.	.	.	.	.	.	**I**	.	3	.	.	.	.	.	.	.	**I**
Homomallium incurvatum	.	.	.	+	+	.	.	.	.	.	.	**I**	+	+	2	.	+	.	.	.	+	**III**
Brachythecium albicans	.	.	.	.	.	+	.	.	.	.	.	**I**	2	.	.	.	.	.	.	.	2	**II**
Ptychostomum capillare	.	.	.	.	.	.	.	.	.	.	r	**I**	.	.	r	.	r	.	.	.	.	**II**
Pseudoleskeella catenulata	.	.	.	.	.	.	.	.	.	.	.		2	.	.	.	.	.	.	.	3	**II**
Syntrichia ruralis	.	.	.	.	.	.	.	.	.	.	.		+	.	.	r	.	.	1	.	.	**II**
Schistidium apocarpum s.l.	.	.	.	.	.	.	.	.	.	.	.		1	.	.	.	.	.	.	.	+	**II**
Bryum sp.	.	.	.	.	.	.	.	.	.	.	.		1	.	.	2	.	.	.	.	.	**II**

Number of relevé	1	2	3	4	5	6	7	8	9	10	11		12	13	14	15	16	17	18	19	20	
Didymodon rigidulus	.	.	.	.	.	.	.	.	.	.	.		.	.	.	.	+	.	.	.	.	**I**
Leptogium tenuissimum	.	.	.	.	.	.	.	.	.	.	.		r	.	.	.	.	.	.	.	.	**I**
Serpoleskea subtilis	.	.	.	.	.	.	.	.	.	.	.		.	r	.	.	.	.	.	.	.	**I**

Localities of relevés (ordinal No. of relevé in the table indicated in bold – No. of locality mentioned in the captures under Figure 1):

1, 2, 3, 5, 6, 7, 9, 10, 11 14, 15, 16, 19 – 15; **4, 8, 13, 17** – 16; **12, 20** – 14; **18** – 8

Table 7. ***Anomodon viticulosus*** **-** community

Number of relevé	1	2	3	4	5	6	7	8	9	**CONSTANCY**
Field number of relevé	2	1	11	17	4	18	277a	276a	7	
Length of the plot, cm	30	30	40	40	40	40	20	15	40	
Width of the plot, cm	30	30	40	40	40	40	20	15	40	
Cover (%)	100	100	85	100	80	90	100	100	70	
Exposition	SW	SW	W	NE	SW	NE	NW	NW	W	
Substrate	LM	LM	LM	LM	LM	LM	LM	LM	LM	
Number of species	6	4	4	5	4	8	13	10	5	
D. s. of community										
Anomodon viticulosus	4	4	4	4	3	4	3	2	3	**V**
D.s. of ***Neckeretea complanatae***, ***Neckeretalia complanatae*** and ***Neckerion complanatae***										
Homalothecium sericeum	.	.	.	.	.	.	2	r	.	**II**
Plagiomnium cuspidatum	.	2	.	.	.	.	.	.	.	**I**
Neckera pennata	.	.	.	.	.	.	.	2	.	**I**
Porella platyphylla	.	.	.	.	.	.	2	.	.	**I**
D.s. of ***Ctenidietea mollusci***, ***Ctenidietalia mollusci***, ***Ctenidion mollusci*** and ***Distichion capillacei***										
Tortella tortuosa	.	.	.	.	.	.	1	.	.	**III**
Distichium capillaceum	.	.	.	.	.	.	r	2	.	**II**
Flexitrichum flexicaule	.	.	.	1	.	+	.	.	.	**II**
Campyliadelphus chrysophyllus	.	.	.	.	.	r	.	.	.	**I**
D.s. of ***Schistidietea apocarpi, Schistidietalia apocarpi*** and ***Grimmion tergestinae***										
Schistidium submuticum	.	.	.	.	.	2	.	.	.	**I**
Schistidium lancifolium	.	.	.	.	.	.	.	+	.	**I**
D.s. of ***Frullanio–Leucodontetea*** and ***Orthotrichetalia***										
Leucodon sciuroides	.	.	.	.	.	.	2	2	.	**II**
Frullania dilatata	.	.	.	.	.	.	.	r	.	**I**

Number of relevé	1	2	3	4	5	6	7	8	9	
Nyholmiella obtusifolia	r	.	.	.	.	.	.	.	.	**I**
Other species:										
Syntrichia ruralis	1	.	1	.	1	.	1	.	1	**III**
Hypnum cupressiforme	.	.	.	2	.	2	2	3	.	**III**
Pseudoleskeella nervosa	r	1	.	.	.	.	.	.	2	**II**
Pseudoleskeella catenulata	.	.	2	.	+	.	.	.	.	**II**
Brachytecium capillaceum	3	2	r	.	.	.	.	.	.	**II**
Abietinella abietina	.	.	.	.	.	+	+	+	.	**II**
Didymodon fallax	.	.	.	.	.	1	.	.	.	**II**
Orthotrichum cupulatum	.	.	.	.	3	.	.	.	2	**II**
Serpoleskea confervoides	1	.	.	.	.	.	.	.	.	**I**
Plagiochila porelloides	.	.	.	.	.	.	+	.	.	**I**
Dicranum fuscescens	.	.	.	.	.	.	.	+	.	**I**
Pseudoleskeella tectorum	.	.	.	.	.	r	.	.	.	**I**
Paraleucobryum longifolium	.	.	.	.	.	.	+	.	.	**I**
Barbilophozia barbata	.	.	.	.	.	.	1	.	.	**I**
Ptychostomum elegans	.	.	.	.	.	.	+	.	.	**I**
Bryum sp.	.	.	.	2	.	.	.	.	.	**I**
Didymodon ferrugineus	.	.	.	2	.	.	.	.	.	**I**
Encalypta sp.	.	.	.	.	.	.	.	.	+	**I**

Localities of relevés (ordinal No. of relevé in the table indicated in bold – No. of locality mentioned in the captures under Figure 1):

1, 2, 3, 5, 9 – 8; **4, 6** – 10; **7, 8** – 4.

Table 8. Association ***Homomallietum incurvati*** Philippi 1965

Number of relevé	1	2	3	4	5	6	7	8	**CONSTANCY**
Field number of relevé	300	298	299	302	324	320	389	323	
Length of the plot, cm	15	15	15	20	15	15	15	15	
Width of the plot, cm	10	15	10	15	15	15	15	15	
Cover (%)	90	90	100	80	80	90	90	100	
Exposition	N	N	N	N	S	S	S	S	
Substrate	LM	LM	LM	LM	LM	LM	LM	LM	
Number of species	9	3	6	8	8	3	5	6	
D.s. of association									
Homomallium incurvatum	3	3	3	4	3	2	3	2	**V**
D. s. of ***Neckerion complanatae***									
Sciuro-hypnum populeum	.	.	.	.	.	.	+	.	**I**
Rhynchostegium murale	.	.	.	.	.	.	3	.	**I**
D. s. of ***Ctenidietalia mollusci***, ***Ctenidion mollusci*** and ***Distichion capillacei***									
Tortella tortuosa	2	.	.	2	2	.	1	2	**IV**
Flexitrichum flexicaule	2	4	.	2	2	.	.	2	**IV**
Campyliadelphus chrysophyllus	+	1	2	2	.	.	.	.	**III**
Encalypta streptocarpa	r	.	+	.	.	.	.	.	**II**
Encalypta rhaptocarpa	.	.	.	.	+	.	.	.	**I**
Tortella fragilis	2	.	r	.	.	3	.	.	**II**
Distichium capillaceum	2	.	.	.	.	.	.	.	**I**
D.s. of ***Schistidietea apocarpi, Schistidietalia apocarpi*** and ***Grimmion tergestinae***									
Schistidium apocarpum s.l.	2	.	.	+	.	.	.	.	**II**
Schistidium submuticum	.	.	2	.	.	.	.	.	**I**
Other species:									
Hypnum cupressiforme	.	.	3	.	2	3	.	2	**III**

Number of relevé	1	2	3	4	5	6	7	8	
Pleurozium schreberi	+	.	.	+	.	.	.	.	**II**
Pseudoleskeella nervosa	.	.	.	2	1	.	.	2	**II**
Syntrichia ruralis	.	.	.	.	2	.	.	2	**II**
Radula complanata	.	.	.	.	.	.	3	.	**I**
Lophocolea minor	.	.	.	+	.	.	.	.	**I**
Ptychostomum capillare	.	.	.	.	+	.	.	.	**I**

Localities of relevés (ordinal No. of relevé in the table indicated in bold – No. of locality mentioned in the captures under Figure 1):

1, 2, 3, 4 – 5; **5, 6, 8** – 6; **7** – 16.

Table 9. Comparison of communities of ass. ***Homomallietum incurvati*** Philippi 1965 described in the Republic of Bashkortostan and Germany

Number of syntaxa	1	2	3	4	5	6	7	8	9	10
Number of relevés	8	13	20	23	13	16	27	8	82	11
D.s. of association										
Homomallium incurvatum	V	V	V	V	V	V	V	V	V	V
D. s. of ***Neckeretea complanatae, Neckeretalia complanatae*** and ***Neckerion complanatae***										
Sciuro-hypnum populeum	I	.	.	I	I	V	II	II	III	V
Rhynchostegium murale	I	I	.	II	I	.	II	II	III	I
Homalothecium sericeum	.	III	II	II	I	II	II	II	III	.
Porella platyphylla	.	.	III	.	.	II	I	.	I	.
Metzgeria furcata	.	.	.	.	.	.	I	.	.	I
Anomodon viticulosus	.	.	.	.	.	.	.	II	I	.
Plagiomnium cuspidatum	.	.	.	.	.	.	.	.	I	.
Homalia trichomanoides	.	.	.	.	.	.	.	.	.	II
D. s. of ***Ctenidietea mollusci, Ctenidietalia mollusci, Ctenidion mollusci*** and ***Distichion capillacei***										
Tortella tortuosa	IV	I	I	II	I	I	I	.	I	.
Flexitrichum flexicaule	IV	.	.	.	.	.	.	.	.	.
Campyliadelphus chrysophyllus	III	.	II	.	.	.	.	.	.	.
Encalypta streptocarpa	II	.	.	.	.	.	.	I	I	.
Tortella fragilis	II	.	.	.	.	.	.	.	.	.
Encalypta rhaptocarpa	I	.	.	.	.	.	.	.	.	.
Distichium capillaceum	I	.	.	.	.	.	.	.	.	.
Ctenidium molluscum	.	III	I	II	I	.	I	.	I	.
Campylophyllum halleri	.	.	.	I	.	.	.	.	.	.
D.s. of ***Schistidietea apocarpi, Schistidietalia apocarpi*** and ***Grimmion tergestinae***										
Schistidium apocarpum s.l.	II	V	V	.	.	II	.	.	.	II
Schistidium submuticum	I	.	.	.	.	.	.	.	.	.

Number of syntaxa	1	2	3	4	5	6	7	8	9	10
Schistidium crassipilum	.	.	.	V	V	I	IV	V	V	I
Schistidium robustum	.	.	.	II	I	.	.	.	.	.
Didymodon rigidulus	.	.	.	.	.	.	.	.	I	.
Tortula muralis	.	.	.	.	I	.	.	I	I	.
Other species:										
Hypnum cupressiforme	III	III	III	III	IV	IV	III	IV	III	II
Syntrichia ruralis	II	.	.	.	.	.	.	.	.	.
Pleurozium schreberi	II	.	.	.	.	.	.	.	.	.
Pseudoleskeella nervosa	II	.	.		.	.	.	.	.	.
Radula complanata	I	.	.	.	.	.	.	.	I	.
Lophocolea minor	I	.	.	.	.	.	.	.	.	I
Ptychostomum capillare	I	.	.	.	.	.	.	II	.	II
Ptychostomum moravicum	.	.	II	II	II	I	I	.	III	.
Brachythecium rutabulum	.	I	.	I	I	I	I	III	I	II
Homalothecium lutescens	.	.	I	I	I	.	I	.	I	.
Orthotrichum anomalum	.	.	.	I	.	I	.	.	I	.
Plasteurhynchium striatulum	.	I	I	.	.	.	.	.	.	.
Serpoleskea confervoides	.	I	.	.	.	.	.	.	I	I
Brachytheciastrum velutinum	.	.	I	.	I	III	.	.	.	.
Bryoerythrophyllum recurvirostrum	.	.	I	.	.	I	I	I	I	I
Campylophyllopsis calcarea	.	.	I	.	I	.	I	.	I	.
Brachythecium glareosum	.	.	.	.	I	.	.	.	I	.
Oxyrrhynchium hians	.	.	.	.	I	.	.	I	.	.
Lepraria sp.	.	.	.	.	.	I	.	.	III	.
Amblystegium serpens	.	.	.	.	.	I	I	.	I	.
Frullania dilatata	.	.	.	.	.	.	I	.	I	.

Number of syntaxa	1	2	3	4	5	6	7	8	9	10
Isothecium alopecuroides	.	.	.	.	.	.	.	.	I	II

Low constancy species: *Brachythecium tommasinii* (2–I); *Cladonia pyxidata* (3–I); *Didymodon fallax* (5 – I); *Didymodon sinuosus* (9 – I); *Didymodon vinealis* (9 – I); *Eurhynchium crassinervium* (9 – I); *Exsertotheca crispa* (9 – I); *Grimmia pulvinata* (9 – I); *Hygrohypnum luridum* (10-I); *Leptogium lichenoides* (2–I); *Leskea polycarpa* (9 – I); *Leucodon sciuroides* (9 – I); *Physcia dubia* (6-I); *Pterigynandrum filiforme* (7-I); *Syntrichia calcicola* (9 – I); *Tortella bambergeri* (9 – I); *Tortula subulata* (9 – I); *Zygodon viridissimus* (9 – I).

Syntaxa:
1 – communities of ass. ***Homomallietum incurvati*** Philippi 1965 from the Belaya River valley;
2 – ass. ***Homomallietum incurvati*** Philippi 1965 (var. ***typica*** + var. ***Ctenidium molluscum***) from nature reserve "Ibengarten bei Dermbach in der Rhön" (Thuringia, Germany) (Marstaller, 1988)
3 – ass. ***Homomallietum incurvati*** Philippi 1965 (var. ***typica*** + var. ***Tortella tortuosa***) from nature reserves "Großer Hörseiberg and Huhrodt" and "Kleiner Hörselberg" near Eisenach (Thuringia, Germany) (Marstaller, 1991)
4 – subass. ***H.i. typicum*** + subass. ***H.i. brachythecietosum populei*** from nature reserve „Mertelstal und Heldrastein" near Schnellmannshausen (Thuringia, Germany) (Marstaller, 2004)
5 – subass. ***H.i. typicum*** + subass. ***H.i. brachythecietosum populei*** from nature reserve "Ziegenried" near Plaue (Thuringia, Germany) (Marstaller, 2003)
6 – subass. ***H.i. typicum*** + subass. ***H.i. brachythecietosum populei*** from Teufelsberg Mt. near Weissendorf (Thuringia, Germany) (Marstaller, 2005)
7 – subass. ***H.i. typicum*** + subass. ***H.i. brachythecietosum populei*** from Bleicheroder Mt. (Thuringia, Germany) (Marstaller, 2008)
8 – subass. ***H.i. typicum*** + subass. ***H.i. brachythecietosum populei*** from in the vicinity of Zscheiplitz near Freyburg /Unstrut (Saxony-Anhalt, Germany) (Marstaller, 2017).
9 – communities of ass. ***Homomallietum incurvati*** Philippi 1965 from Saxony-Anhalt, Germany (Schubert, 2009).
10 – subass. ***H.i. typicum*** + subass. ***H.i. brachythecietosum populei*** from Pfalz, Germany (Lauer, 2002).

Table 10. Association ***Pseudoleskeelletum catenulatae*** Ježek & Vondráček 1962

Number of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	**CONSTANCY**
Field number of relevé	25	8	6	3	12	14	15	13	339	338	329	330	373	371	372	22	363	367	368	29	35	28	
Length of the plot, cm	20	15	30	30	20	15	30	30	20	15	15	15	20	20	20	15	20	20	20	15	20	20	
Width of the plot, cm	15	15	30	30	20	15	30	30	20	15	15	15	20	20	20	15	15	20	20	15	20	20	
Cover (%)	90	100	100	100	80	90	90	70	100	100	100	100	90	100	100	100	90	100	100	60	70	60	
Exposition	NE	W	W	SW	W	SE	SE	SE	S	S	S	S	S	S	S	W	S	S	S	NE	NE	NE	
Substrate	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	
Number of species	7	5	7	3	3	5	6	7	8	8	4	8	5	7	8	6	5	7	5	3	3	4	
D.s. of association																							
Pseudoleskeella catenulata	3	4	3	4	2	4	3	3	3	2	5	3	2	3	3	4	4	4	2	4	3	3	**V**
D.s. of ***Schistidietea apocarpi, Schistidietalia apocarpi*** and ***Grimmion tergestinae***																							
Schistidium apocarpum s.l.	.	.	.	.	.	.	.	.	1	2	+	1	.	.	.	.	+	.	+	.	.	.	**II**
Didymodon rigidulus	1	.	2	.	.	.	.	1	.	+	.	.	.	.	.	.	.	.	.	.	.	.	**I**
Schistidium submuticum	.	.	.	.	.	1	.	.	.	.	.	.	.	r	.	.	.	.	.	.	.	.	**I**
Schistidium crassipilum	1																			+	.	1	**I**
D.s. of ***Neckeretalia complanatae*** and ***Neckerion complanatae***																							
Sciuro-hypnum populeum	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	**I**
D.s. of ***Ctenidietea mollusci***, ***Ctenidietalia mollusci***, ***Ctenidion mollusci*** and ***Distichion capillacei***																							
Tortella tortuosa	2	.	.2	.	.	.2	3	2	.	2	2	.	+	.	.	r	2	2	3	2	2	2	**IV**
Flexitrichum flexicaule	.	.	.	.	.	.	.	.	+	2	.	3	.	2	2	r	.	.	.	.	.	.	**II**
Encalypta rhaptocarpa		.	.	.	.	.	.	.	1	+	.	.	.	.	.	.	.	.	.	.	.	.	**I**
Campyliadelphus chrysophyllus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	**I**
Tortella fragilis	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	**I**

Number of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Encalypta streptocarpa	2	.	.	.	.	.	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**I**
D.s. of ***Frullanio–Leucodontetea*** and ***Orthotrichetalia***																							
Leucodon sciuroides	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	**I**
Radula complanata	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	**I**
Other species																							
Syntrichia ruralis		.	+	2	4	1	+	1	2	1	+	1	.	.	2	.	2	2	2	.	2	1	**IV**
Hypnum cupressiforme	.	.	.	.	.	2	.	r	.	.	.	2	.	.	3	.	.	2	3	.	.	.	**II**
Pseudoleskeella nervosa	.	2	.	.	.	.	.	.	1	3	.	2	2	.	.	.	.	.	.	.	.	.	**II**
Brachytecium capillaceum	.	3	2	2	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	**I**
Orthotrichum cupulatum		r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**I**
Orthotrichum anomalum	.	.	.	.	2	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	**I**
Anomodon longifolius	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**I**
Didymodon fallax	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	**I**
Serpoleskea confervoides	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**I**
Homomallium incurvatum	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**I**
Brachythecium albicans	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	**I**
Encalypta sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	.	.	**I**
Schistidium sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	.	.	.	**I**
Abietinella abietina	.	.	.	.	.	.	2	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	**I**
Ptychostomum capillare	.	.	.	.	.	.	.	.	.	.	.	r	.	.	r	.	.	.	.	.	.	.	**I**
Bryum sp.	.	.	.	.	.	.	.	+	.	.	.	.	.	2	.	.	.	2	.	.	.	.	**I**
Cladonia ramulosa	.	.	.	.	.	.	.	.	.	.	.	.	.	+	r	.	.	.	.	.	.	.	**I**
Ptychostomum imbricatulum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	**I**
Ptychostomum moravicum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	**I**

Number of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Rhytidium rugosum	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**I**
Ptychostomum elegans	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**I**

Localities of relevés (ordinal No. of relevé in the table indicated in bold – No. of locality mentioned in the captures under Figure 1):

1, 16, 20, 21, 22 – 11; **2, 3, 4, 5 –** 8; **6, 7, 8** – 9; **9, 10 –**7; **11, 12** – 6; **13, 14, 15** – 14; **16–**10; **17, 18, 19** – 14.

Table 11. Comparison of communities of ass. ***Pseudoleskeelletum catenulatae*** Ježek & Vondráček 1962 described in the Republic of Bashkortostan, Spain and Germany

Number of syntaxa	1	2	3	4	5
Number of relevés	22	6	11	7	10
D.s. of association					
Pseudoleskeella catenulata	V	V	V	V	V
D.s. of ***Schistidietea apocarpi, Schistidietalia apocarpi*** and ***Grimmion tergestinae***					
Schistidium apocarpum s.l.	II	III	II	V	II
Didymodon rigidulus	I	I	I	IV	II
Schistidium submuticum	I	.	.	.	.
Schistidium crassipilum	I	.	.	.	.
D.s. of ***Ctenidietea mollusci***, ***Ctenidietalia mollusci***, ***Ctenidion mollusci*** and ***Distichion capillacei***					
Tortella tortuosa	IV	I	IV	IV	V
Flexitrichum flexicaule	II	.	II	II	IV
Encalypta rhaptocarpa	I	.	.	.	.
Encalypta streptocarpa	I	I	II	III	III
Campyliadelphus chrysophyllus	I	.	.	.	.
Tortella fragilis	I	.	.	.	.
Distichium capillaceum	.	I	.	.	.
D.s. of ***Frullanio–Leucodontetea*** and ***Orthotrichetalia***					
Leucodon sciuroides	I	I	.	III	.
Radula complanata	I	.	.	.	.
Other species					
Syntrichia ruralis	IV	.	I	.	.
Hypnum cupressiforme	II	.	I	III	.
Pseudoleskeella nervosa	II	.	.	.	.
Orthotrichum cupulatum	I	III	.	I	.

Orthotrichum anomalum	I	III	I	III	I
Abietinella abietina	I	.	I	.	.
Ptychostomum capillare	I	.	I	V	.
Cladonia ramulosa	I	.	.	II	V
Ptychostomum imbricatulum	I	.	.	.	III
Ptychostomum moravicum	I	.	I	.	.
Homalothecium sericeum	.	IV	III	III	II
Tortula muralis	.	I	I	V	I
Grimmia pulvinata	.	I	I	I	IV
Bryum argenteum	.	.	II	V	.
Leptogium sinuatum	.	.	III		.
Bryoerythrophyllum recurvirostrum	.	.	I	II	I
Syntrichia montana	.	.	.	IV	I
Pseudocrossidium revolutum	.	.	.	.	V
Buckia vausheri	.	.	.	.	IV
Physcia muscigena	.	.	.	.	II

Low constancy species: *Anomodon longifolius* (1-I);*Anomodon viticulosus* (1-I); *Brachythecium albicans* (1-I); *Brachytecium capillaceum* (1–I); *Brachythecium salebrosum* (2–I); *Bryum sp.* (1, 5 – I); *Camptothecium lutescens (*3–I); *Cladonia furcata* (5-I); *Cladonia sp. moravicum* (3-I); *Dermatocarpon miniatum* (4-I); *Deschampsia flexuosa moravicum* (3-I); *Didymodon fallax* (1-I); *Diploschistes bryophilus* (5-I); *Encalypta sp.* (1-I); *Encalypta vulgaris* (5-I); *Homomallium incurvatum* (1-I); *Lecanora sp.* (3-I); *Ptychostomum elegans* (1–I); *Rhytidium rugosum* (1-I); *Schistidium sp.* (1-I); *Sciuro-hypnum populeum* (1-I); *Serpoleskea confervoides* (1-I); *Sesleria varia* (3-I); *Streblotrichum convolutum* (5-I); *Syntrichia calcicola* (3–I); *Thymus sp.* (3-I); *Toninia coeruleonigricans* (5-I).

Syntaxa:

1 – ass. ***Pseudoleskeelletum catenulatae*** from the Belaya River valley; 2 - ass. ***Pseudoleskeelletum catenulatae*** from the Sierras Béticas Nts. (Southern Spain) (Guerra, 1985); 3 - ass. ***Pseudoleskeelletum catenulatae*** from Rübeland limestone area (Germany) (Nörr, 1970); 4 - Bryum-subass of ass. ***Pseudoleskeelletum catenulatae*** from Thuringia, Germany) (Marstaller, 1980). Currently, this syntaxa is recognized as subass. ***P.c. pseudocrossidietosum revoluti*** Marstaller 1987 (Marstaller, 2006); 5 - ***Barbula revoluta*** - subass. of ass. ***Pseudoleskeelletum catenulatae*** from Thuringia, Germany) (Marstaller, 1980). Now this syntaxa is considered as variant (Marstaller, 2006).