Arctoa (2004) **13**: *33-40*

RARE SPECIES AND PRELIMINARY LIST OF MOSSES OF THE KABARDINO-BALKARIA (CAUCASUS)

РЕДКИЕ ВИДЫ И ПРЕДВАРИТЕЛЬНЫЙ СПИСОК МХОВ КАБАРДИНО-БАЛКАРИИ (КАВКАЗ)

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Abstract

A new interesting findings of mosses in the Kabardino-Balkaria (Caucasus) are discussed, including *Andreaea heinemanii, Brachythecium geheebii, Cirriphyllum crassinervium, Dicranum tauricum, Entodon challengeri, Eurhynchium striatum, Fabronia ciliaris, Oreas martiana, Mielichhoferia himalayana, Plasteurhynchium striatulum, Rhodobryum ontariense, Rhynchostegiella tenella, R. teneriffae, Rhynchostegium rotundifolium, Sciurohypnum flotovianum, Serpoleskea confervoides, Stereodon fertilis, Syntrichia sinensis, Tortula atrovirens*. Additionally a preliminary list of 326 species, known in the republic is given, annotated with the altitudinal distribution and substrate.

Резюме

Приводятся новые интересные находки мхов в Кабардино-Балкарии, в т. ч. *Andreaea heinemanii,Brachythecium geheebii,Cirriphyllum crassinervium,Dicranum tauricum,Entodon challengeri, Eurhynchium striatum, Fabronia ciliaris, Oreas martiana, Mielichhoferia himalayana, Plasteurhynchium striatulum, Rhodobryum ontariense, Rhynchostegiella tenella, R. teneriffae, Rhynchostegium rotundifolium, Sciurohypnum flotovianum, Serpoleskea confervoides, Stereodon fertilis, Syntrichia sinensis, Tortula atrovirens*. Также дан предварительный список 326 видов, известных из республики, с указанием их высотного распространения, приуроченности к горным поясам, а также характерного для них субстрата.

INTRODUCTION

Kabardino-Balkaria Republic is situated in the northern part of Central Caucasus. Its territory, ca. 12500 km^2, is very diverse in climatic conditions. In general this is one of the relatively dry regions of Caucasus, strongly sheltered from the SW (the main direction of winds in this area) by the Great Caucasian Range with several peaks above 5000 m elev. However, the abundance of deep gorges and canyons with wet shaded cliffs results in well representation of mesophytic and hygromesophytic elements as well. The lowland part of Kabardino-Balkaria, 170-400 m elev., is covered mostly by steppe vegetation which is strongly modified by antropogenic influence. Lower mountain belt, ca. 400-1700 m, has a variety of broad-leaved forests, dominated mostly by *Fagus* and *Quercus*. Above ca. 1700 m elev. forests are composed mostly by *Betula* and *Pinus sylvestris*, and at less extend by *Populus tremula*. Treeline is at ca. 2300-2700 m, and alpine vegetation reaching 3200-3400 m, while above permanent snow and glaciers cover most of land surface. The highest point of the republic, as well as the Russia as a whole, is the Elbrus Peak, 5642 m, but the area around it is covered by glaciers, and the highest collecting point was on the Elbrus slope at 3850 m (volcanic rock outcrops well inside the glaciated area).

The peculiar character of Kabardino-Balkaria is the numerous and extensive forestless areas

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at middle elevations (mainly of south-facing slopes) covered by xerophytic shrubby or grassy vegetation. Its specific flora and vegetation allow to segregate a specific mountain xerophytic belt (Shhagapsoev & Volkovich, 2002).

The moss flora of the republic was studied by Bush (1927), who reported 74 species (specimens in LE). In 1980s Portenier collected ca. 300 specimens in the valley of Cherek Bezengijskij Creek. This collection (in MHA) was identified by Ignatova, but remained unpublished (though these data provide the basis for some records in the check-list of mosses of the former USSR, Ignatov & Afonina, 1992). In 1998-2004 Kharzinov undertook the expanded moss collecting in the republic (2500 specimens in KBNG, many duplicates in MHA). In 2004 field work has been conducted by him with Ignatova and Ignatov. As a result of study of new collections and partial revision of old collections, Kharzinov compiled the conspectus of moss flora of Kabardino-Balkaria; it includes 326 species and is going to be published elsewhere, while here we report some more interesting and phytogeographycally revealing species, as well as the perliminary list of species with brief information on their altitudinal range and substrates. Three rare species of *Orthotrichum*: *O. callistomum* Fischer-Ooster ex B.S.G., *O. vladikavkanum,* and *O. sordidum* are descussed and illustrated in a separate paper in this volume (Akatova & al., 2004).

INTERESTING RECORDS

Xeric species

Several species found in Kabardino-Balkarian Republic are very xeric, and more characteristic for Central Asia, being very rare in Caucasus as a whole. Two of them, *Tortula atrovirens* and *Syntrichia sinensis* were found on S-facing slopes in the valley of Cherek Bezengijskij Creek near Bezengi, one of the most xeric region, the only area in the republic where are known also *Tortula acaulon, Weissia controversa, W. brachycarpa, Aloina rigida*. The third species, *Fabronia ciliaris*, was found in another valley, in its more xeric part.

Tortula atrovirens (Sm.) Lindb. (= *Tortula* convoluta (Brid.) Pyl.) – (1) Chereksky District, Kabardino-Balkarian State Nature Reserve, Khumashki, on rocks, 1500 m, coll. Kharzinov, 6.VII.1994 (KBNG, MHA); (2) Cherek Bezengijsky canyon close to Bezengi, northern depression, 1600 m, under an overhang of cliff, shady, dry, coll. Portenier 6.IV.1987; (3) Left slope to Cherek Bezengijsky canyon close to Bezengi, 1500 м, at base of rocks of slope with xerophytic vegetation, coll. Portenier 12.VII.1988 (MHA).

Syntrichia sinensis (C. Muell.) Broth. – Cherek Bezengijskij canyon close to Bezengi, northern depression, 1600 m, rather wet nishe in cliff, coll. Portenier 18.VII.1987 (MHA). We found it in 2004 on xeric rocks on open S-facing slope in the same valley, upstream from Bezengi, in several places 2-10 km from Bezengi, up to Dumala Creek mouth [43° 10' N – 43° 14' E], usually in small amount, at 1600-1650 m elev. (KBNG, MHA).

Fabronia ciliaris (Brid.) Brid. – Baksan River near Bylym, 43° 28' N – 43° 13' E, 1000 m alt., in deep narrow crevices of rock outcrops (with *Ceterach officinarum* Willd. and *Grimmia tergestina* Tomm. ex B. S. G.), Ignatov, Ignatova & Kharzinov 30.VII.2004 (KBNG, MHA).

Submediterranean species

There are a number of species with overall Mediterranean and Submediterranean distribution, which are quite widespread in the Caucasus along the Black Sea coast, but at the same time they are absent or quite rare in the Central Caucasus.

Some of them are still not found in the Kabardino-Balkaria: *Palamocladium euchloron* (Bruch ex C. Muell.) Wijk et Marg., *Oxyrrhynchium pumilum* (Wils.) Loeske, *Isothecium myosuroides* Brid., *Leptodon smithii* (Hedw.) Web. et Mohr. This is surprising, considering how common are *Palamocladium* and *Leptodon* in Western Caucasus.

Several species that are extremely common in Black Sea coastal area are very rare in Kabardino-Balkaria: *Neckera crispa* Hedw. was found only two times, *Neckera complanata* (Hedw.) Hueb. – once, *Thamnobryum alopecuroides* (Hedw.) Gangulee – just in one valley in the lower course of Cherek Bezengijskij Creek, in several places within the distance of few kilometer along the valley bottom. Further studies will probably add more localities of these species, but it is very likely

that they will remain rare for the republic as a whole.

Contrary to these, species of *Anomodon, Leucodon* and *Homalothecium* are quite common in Kabardino-Balkaria, in wide range of elevations, many of them exceed tree-line, occurring on cliffs in subalpine zone.

The following more rare species of the Submediterranean group were found in Kabardino-Balkaria, usually in small quantities in single or limited number of places:

Dicranum tauricum Sapegin – Baksan Distr., Adyl-Su River valley, 1900 m elev., in rather disturbed tourist place, on fresh logs and stumps, common in about 100 m along trail in one place in *Pinus* forest, coll. Ignatov, Ignatova & Kharzinov, 29.VII.2004 (KBNG, MHA).

Brachythecium geheebii Milde – (1) Nalchik, city park, on rocks, near Nalchik River, 520 m elev., on exposed rocks, coll. Kharzinov 24.IV.2002 (KBNG); (2) Nalchik city surroundings, Kenzhensky Forest, ca. 500 m elev., on rocks at tree base, coll. Kharzinov 22.VII.2002 (KBNG); (3) Baksan Distr., Tyzyl Canyon, 950 m elev., in forest, at fallen decaying tree twigs, coll. Kharzinov 29.III.2002 (KBNG).

Cirriphyllum crassinervium (Tayl.) Loeske et Fleisch. – Between Karasu and Babugent (ca. 43° 18' N – 43° 26' E, 850 m elev.), in bottom of ravine, on calcareous rocks; coll. Ignatov, Ignatova & Kharzinov, 3.VIII.2004 (KBNG, MHA).

Eurhynchium striatum (Hedw.) B.S.G. – (1) Nalchik, city park, 520 m elev., on soil under shrubs, coll. Kharzinov 24.IV.2002 (KBNG); (2) Urvan Distr., Chernorechensky Forest, 360 m elev., on tree bases, coll. Kharzinov 5.VII.2002 (KBNG).

Plasteurhynchium striatulum (Spruce) Fleisch. – Cherek Distr., Skalisty Range, right bank of Karasu River near Karasu village, 1000 m elev., broad-leaved forest on N-facing slope, on soil, with*Timmia bavarica* and *Plagiomnium undulatuem,* coll. Portenier 17.X.1988 (MHA).

Rhynchostegiella tenella (Dicks.) Limpr. – Baksan Distr., Baksanenok, in small woodland, 360 m elev., on exserted roots of trees, coll. Kharzinov, 30.VI.2002 (KBNG, MHA).

Rhynchostegiella teneriffae (Mont.) Dirkse et Boumann – Between Karasu and Babugent (ca. 43° 18' N – 43° 26' E, 850 m alt.), on wet rocks at the bottom of ravine, beside a small rather permanent stream; coll. Ignatov, Ignatova & Kharzinov, 3.VIII.2004 (KBNG, MHA).

Rhynchostegium rotundifolium (Brid.) B.S.G. – Urvan Distr., Urvanskie Dachi, 540 m elev., on rocks along creek bank, in shade of trees, coll. Kharzinov 26.VII.2002 (KBNG, MHA).

Sciurohypnum flotovianum (Sendtn.) Ignatov et Huttunen (= *Eurhynchium flotovianum* (Sendtn.) Kartt., *Cirriphyllum velutinoides* (Bruch) Loeske et Fleisch.). – Surrounding of Nalchik City, Kizilovka, on rocks in deciduous forest, 550 m elev., coll. Kharzinov 7.VI.2002 (KBNG, MHA).

Stereodon fertilis (Sendtn.) Lindb. (= *Hypnum fertile* Sendtn.) – Between Kara-Su and Babugent (ca. 43° 18' N – 43° 26' E, 850 m elev.), in bottom of ravine, on wet rotten logs; coll. Ignatov, Ignatova & Kharzinov, 3.VIII.2004 (KBNG, MHA).

Miscelaneous interesting species

Entodon challengeri (= *E. compressus* (Hedw.) C.Muell. – Prokhladny Distr., Priblizhnoe, 330 m elev., in forest, on exserted roots of trees and soil nearby, 26.V.2002, leg. Kharzinov (KBNG, MHA).

This species is widespread in Asia westwards to Altai, and also in Eastern North America, exbiting thus typical arcto-tertiary disjunction. In Europe it was known by a single collection in Central European Russia, Vologda Province in 1742 by Pallas (voucher specimen in H and LE), but it was never collected or recorded since that time. Our search in 2000 in Vologda Province gave no results (Ignatov & Ignatova, 2004), so this species was considered as extinct from the flora of Europe. Also *E. compressus* was reported from Caucasus by Duell (1985) in his catalogue of European mosses for Caucasus. We however failed to find any reference for that, so the present finding can be considered as the first for Caucasus, and the only known existing locality of this species in Europe.

Andreaea heinemannii Hampe et C. Muell. – Elbrus Distr., on E-facing slope of Elbrus Peak, 43° 17' N – 42° 28' E, 3300 m elev., voulcanic rock outcrops among alpine meadow,

surrounded by glacier spurs from the main Elbrus glacier, coll. Ignatov, Ignatova & Kharzinov 28.VII.2004 (MHA, KBNG).

This species has wide distribution in the world (Murray, 1987), but in most regions is quite rare. In the Caucasus it was known up to now by the single collection, the type specimen of *A. planinervis* Lindb. (from Georgia), which was synonymized with *A. heinemannii* by Murray (1987).

Oreas martiana (Hoppe et Hornsch.) Brid. – Cherkessky District, left cliffy slope to Cherek Bezengijsky Creek Valley, near Mizhirgi Creek mouth, 2800 m, on vertical soil slide among alpine meadow, coll. Portenier 9.VIII.1987 (MHA).

This species is known from many parts of the Holarctic, but similarly to the previous one is a very rare almost throughout its range. In Russia it was reported from Chukotka (two localities, cf. Afonina, 2004) and in Eastern Sayan Mts. in South Siberia (Bardunov, 1974). In 2004 tree of authors (ZK,MI, EI) visited this area, but few-hour search brought no results.

Mielichhoferia himalayana Mitt. (= *M. caucasica* Schimp. ex Broth.) – Cherkessky District, left cliffy slope to Cherek Bezengijsky River Valley, in wet cliff crevice, 2800 m, 12.VII.1987, coll. Portenier (MHA).

Until now this species was known from the Caucasus by a single collection of Ruprecht from the Dagestan Republic (in cave near Karata, at 1800 m alt.). Schimper suggested that this is a new species (label in herbarium, S), and Brotherus (1892) described it as *M. caucasica*. Savicz-Ljubitskaya & Smirnova (1970) synonymized this species with *M. hymalayana*, and also they reported this species from Uzbekistan in Middle Asia. Our new collection perfectly agrees with descri ption and illustrations given by Savicz-Ljubitskaya & Smirnova (1970).

Rhodobryum ontariense (Kindb.) Kindb. – Leskensky Distr., Khaznidin River canyon, on rocks in forest, 1400 m, coll. Kharzinov, 26.VII.1999 (KBGN); Leskensky Distr., Tashly-Tala, rocks in forest, 1100 m, coll. Kharzinov, 30.VII.2003 (KBGN); between Kara-Su and Babugent (ca. 43° 18' N – 43° 26' E, 850 m elev.), in bottom of ravine, on calcareous rocks; coll. Ignatov, Ignatova & Kharzinov, 3.VIII.2004 (KBNG, MHA).

This species got a wide recognition about thirty to twenty years ago, and since that time it was found as more frequent comparatively with *R. roseum* in some, especially more southern areas (cf. Ochyra & Szmajda, 1983; Iwatsuki & Koponen, 1972). In Russia it is more or less common in South Siberia and South Urals (Ignatov & Ignatova, 2003-2004). At least locally in Central Caucasus *R. ontariense* is also not a rare species.

Serpoleskea confervoides (Brid.) Loeske (*Platydictya confervoides* (Brid.) Crum; *Amblystegiella confervoides* (Brid.) Loeske).

Between Karasu and Babugent (ca. 43° 18' N – 43° 26' E, 850 m alt.), in relatively dry *Fagus* forest on steep slope, on low exserted (up to 10 cm high above ground) limestone rocks, as well as on beech roots; coll. Ignatov, Ignatova & Kharzinov, 3.VIII.2004 (KBNG, MHA).

This species is small, somewhat difficult to separate from widespread *Serpoleskea subtilis*, as well as from slender ecostate phenotypes of *Amblystegium serpens*. Thus, due to these confusions, it was reported much wider than its real distribution is. In fact, in Russia it is a very rare moss, growing typically in small quantity. In this place, however, we found it on many rocks and roots in appropriate environments in beech forest with almost no herbaceous plants.

PRELIMINARY LIST OF MOSSES OF KABARDINO-BALKARIA

In the following list moss nomenclature follows mostly Ignatov & Ignatova (2003-2004), or, for species not included in that "Flora...", according to Ignatov & Afonina (1992). Each species is characterized by the altitudinal range (in meter), by occurrence in mountain belts and by characteristic substrate preference.

Mountain belts are abbreviated as follow:

С – steppe belt (below 400 m)
НЛ – low forest belt (ca. up to 1700 m)
ВЛ – upper forest belt
ГК – mountain xeric belt (at 700-2000 m)
СА – subalpine belt
А – alpine belt
СН – subnival belt (above 3400 m)

Substrates are abbreviated as follow:

R – rocks
T – trunks
W – wood (rotten)
S – soil
H – humus (including other substrates rich in organic material).

SPHAGNACEAE			
Sphagnum capillifolium	1100-2700	НЛ, ВЛ, А	S, H
centrale	2100-2350	ВЛ, СА	S, H
girgensohnii	2100	ВЛ	H
palustre	2300-2800	СА, А	H
quinquefarium	2700	А	H
russowii	1900	ВЛ	S
squarrosum	2700	А	H
subsecundum	2100-2500	ВЛ, А	H
teres	2100	ВЛ	H
warnstorfii	2300-2800	СА, А	H
ANDREAEACEAE			
Andreaea heinemanii	3300	СН	R
rupestris	1750-3300	ВЛ, СА, СН	R
POLYTRICHACEAE			
Atrichum angustatum	580	НЛ	S
flavisetum	750-1900	НЛ, ВЛ	S
undulatum	500-2100	С, НЛ, ВЛ	S
Oligotrichum hercinicum	2000	ВЛ	R
Pogonatum aloides	2300	СА	S
urnigerum	1300-2200	ВЛ	S
Polytrichastrum alpinum	2000-3850	ВЛ, СА, А, СН	S
formosum	540-1850	НЛ, ВЛ	S
longisetum	2400	СА	S
sexangulare	3360-3450	СН	S
Polytrichum commune	1700-2500	ВЛ, СА, А	S
juniperinum	1750-3800	ВЛ, СА, А, СН	S
piliferum	1750-3850	ВЛ, СА, А, СН	S, R
strictum	1800-2200	ВЛ	S, H
swartzii	2350	СА	H
FUNARIACEAE			
Funaria hygrometrica	350-2100	С, НЛ, ВЛ	S, R
ENCALYPTACEAE			
Encalypta alpina	2400	СА	S
ciliata	1800-2100	ВЛ	S
rhaptocarpa	1600-2900	ГК, ВЛ, А	S, R
streptocarpa	580-1400	НЛ, ВЛ	S, R
vulgaris	1000-1650	НЛ, ВЛ	R
TIMMIACEAE			
Timmia bavarica	1000-2000	НЛ, ВЛ	S, R
DICRANACEAE			
Amphidium lapponicum	1650-3250	ВЛ, СА, А, СН	R
mougeotii	580-2500	НЛ, ВЛ, СА, А	R
Campylopus fragilis	1650	ВЛ	S
schimperi	1750-2500	ВЛ, СА	S, H
Cynodontium fallax	1800-2200	ВЛ	R
polycarpon	2200	ВЛ	R
strumiferum	1200-2000	ГК, ВЛ	R
Dichodontium pellucidum	1900	ВЛ	S
Dicranella schreberiana	1800	ВЛ	R
subulata	1600	ВЛ	S
varia	900-1600	НЛ, ВЛ	S
Dicranodontium denudatum	2400	СА	H
Dicranoweisia crispula	1700-3500	ВЛ, СН	S, R
Dicranum bergeri	1100	НЛ	S
bonjeanii	2500	СА	H
dispersum	1900-2405	ВЛ, СА	S
elongatum	1900-2200	ВЛ	S, R
fulvum	850	НЛ	T, W
fuscescens	2150-2405	ВЛ, СА	S, R
montanum	1300-2300	ВЛ, СА	T, W
muehlenbeckii	1000-1600	НЛ, ВЛ	S, R
scoparium	2000-2400	ВЛ, СА	S,R,W
spadiceum Zett.	1600-2800	ВЛ, А	S, R
spadiceum var. *subscabrifolium*	2200	ВЛ	R
tauricum	1900	ВЛ	W
Kiaeria starkei	3300	СН	S
Oncophorus virens	1000-2200	НЛ, ВЛ	S, R
Oreas martiana	2700	А	S
Paraleucobryum enerve	2200-3300	ВЛ, СА,СН	S, R
longifolium	1900-2000	ВЛ	R
FISSIDENTACEAE			
Fissidens adianthoides	620-1600	НЛ, ВЛ	H
bryoides	520-1750	НЛ, ВЛ	S, R
dubius	1600-2405	ВЛ, СА	R
exilis	1000	НЛ	S
gracilifolius	850-1000	НЛ	R
taxifolius	520-1100	НЛ	S, R
DITRICHACEAE			
Ceratodon purpureus	1800-3850	ВЛ, СА, А, СН	S, R
Distichium capillaceum	1400-3300	ВЛ, СА, А	S, R
inclinatum	1600	ВЛ	R
Ditrichum flexicaule	1760-2800	ВЛ, СА, А	S, R
Saelania glaucescens	2200	ВЛ	R
POTTIACEAE			
Aloina rigida	1500	ГК	S
Barbula convoluta	1800	ВЛ	S
crocea	1000	НЛ	S
unguiculata	520-1800	НЛ, ВЛ	S, R
Bryoerythrophyllum ferruginascens	2200	ВЛ	S
recurvirostrum	850-2500	НЛ, ВЛ, СА	S
Didymodon cordatus	1500	ВЛ	S
ferrufineus	1650	ВЛ	S, R
rigidulus	520-2800	НЛ, ВЛ, А	R
vinealis	520-2800	НЛ, А	S, R
Eucladium verticillatum	650-980	НЛ	R
Gymnostomum aeruginosum	520-2200	НЛ, ВЛ	R
calcareum	650-2300	НЛ, СА	R
Hymenostylium recurvirostrum	1650-2000	ВЛ	R
Oxystegus tenuirostris	850-2200	НЛ, ВЛ	S, W
Pterygoneurum ovatum	1100	НК	S
Syntrichia norvegica	1300	ВЛ,	R
ruralis	320-2300	С, НЛ, ВЛ, СА	S, R
sinensis	1600-1650	ВЛ	S, R
Tortella fragilis	1600-2900	ВЛ, СА, А	S, R
tortuosa	660-3850	НЛ, ВЛ, ГК, СА, А, СН	S, R
Tortula acaulon	1650-1900	ВЛ, ГК	S
atrovirens	1400-1600	ВЛ, ГК	S
eurhyphylla	2200-3800	ВЛ, СН	S
lingulata	520	НЛ	S
mucronifolia	1500-2800	ВЛ, ГК, А	S
muralis	520-1750	НЛ, ВЛ	R
subulata	1100-1900	НЛ, ВЛ	S, R
Trichostomum brachydontium	850-2000	НЛ, ВЛ	S, R
crispulum	1000	НЛ	R
Weissia brachycarpa	1650-2200	ВЛ, ГК	S, R
controversa	1300-1600	ВЛ	S
fallax	1450-1800	ВЛ	S, R

GRIMMIACEAE			
Coscinodon cribrosus	2200-3800	ВЛ	CH R
Grimmia alpestris	1800-3800	ВЛ, CH	R
anodon	1700-3800	ВЛ, CH	R
donniana	3800	CH	R
elatior	530-2100	НЛ, ВЛ	R
funalis	1600-2000	ВЛ	R
hartmanii	1950	ВЛ	R
incurva	3300	CH	R
laevigata	800-1800	НЛ, ВЛ, ГК	R
longirostris	1900-2500	ВЛ, CA, A	R
muehlenbeckii	2200	ВЛ	R
ovalis	520-2300	НЛ, ВЛ, CA	R
poecilostoma	1650-1900	ВЛ	R
pulvinata	520	НЛ	R
reflexidens	1000-3330	НЛ, ВЛ, ГК, CH	R
tergestina	1000	ГК	R
Racomitrium canescens	500-3850	C, НЛ, ВЛ, CA, A, CH	S, R
lanuginosum	1800-1900	ВЛ	R
sudeticum	520	НЛ	R
Schistidium agassizii	1500	ВЛ	R
apocarpum	1280-2400	ВЛ, CA	S, R
dupretii	1800	ВЛ	R
elegantulum	850-1000	НЛ	R
papillosum	1800-2200	ВЛ	R
pruinosum	1700	ВЛ	S
flaccidum	1850-3800	ВЛ, CH	R
rivulare	1750	ВЛ	R
trichodon	1300-2300	ВЛ, CA	R
SELIGERIACEAE			
Blindia acuta	1600-2500	ВЛ, CA	S,
Seligeria pusilla	850-1000	НЛ	R
ORTHOTRICHACEAE			
Orthotrichum affine	500	НЛ	T
alpestre	1850-2000	ВЛ	R
anomalum	520-2200	НЛ, ВЛ	ГК, R
callistomum	1650	ВЛ	T
diaphanum	510-2200	НЛ, ВЛ	R, T
obtusifolium	520-1700	НЛ, ВЛ	T
pallens	520-2000	НЛ, ВЛ	T
pumilum	520-800	НЛ	T
rupestre	1600-2200	ВЛ	R
sordidum	1650	ВЛ	T
speciosum	320-2000	C, НЛ, ВЛ	R,T,W
striatum	1650-2000	ВЛ	T
vladikavkanum	380-1600	C, ВЛ	T
Ulota crispa	520-1500	НЛ, ВЛ	T, W
curvifolia	1100	НЛ	R
SPLACHNACEAE			
Tayloria acuminata	2000	ВЛ	S
serrata	1700-2200	ВЛ	S, T
splachnoides	2000	ВЛ	S
MEESIACEAE			
Amblyodon dealbatus	1650-1950	ВЛ	R
Leptobryum pyriforme	580-2000	НЛ, ВЛ	S, H
Paludella squarrosa	2700	A	H
BRYACEAE			
Anomobryum julaceum	1650-2200	ВЛ	S, R
Bryum algovicum	520-2200	НЛ, ВЛ	S, R
amblyodon	1700	ВЛ	S
argenteum	330-3850	C, НЛ, ВЛ, ГК, CA, A, CH	S, R
caespiticium	1850-2300	ВЛ, CA	S, R, H
capillare	320-2000	C, НЛ, ВЛ	T,W,R
creberrimum	380-1200	C, НЛ	S, T
cryophilum	2400	CA	S
funckii	330-520	C, НЛ	S, R
kunzei	2300	CA	S, R
laevifilum	540-2000	НЛ, ВЛ	T,W,R
pallens	1000-2300	НЛ, ВЛ, CA	S, R
pseudotriquetrum	980-2900	НЛ, ВЛ, CA, A	S, H
schleicheri	2200-2900	ВЛ, CA, A	S,R
turbinatum	1900-2600	ВЛ, A	R
uliginosum	980-1600	НЛ, ВЛ	S
Mielichhoferia			
himalayana	2800	A	R
Rhodobryum ontariense	580-1400	НЛ, ВЛ	R
roseum	580-2300	НЛ, ВЛ, CA	S,R,W
MNIACEAE			
Mnium ambiguum	1600-2700	ВЛ, CA, A	S
heterophyllum	520-1750	НЛ, ВЛ	S, R
marginatum	520-2900	НЛ, ВЛ, CA, A	S, W
spinosum	1000-2400	НЛ, ВЛ, CA	S, R
spinulosum	540-1050	НЛ	S
stellare	510-2250	НЛ, ВЛ	S, T
thomsonii	1000-2100	НЛ, ВЛ	S
Plagiomnium affine	530-1650	НЛ, ВЛ	S
cuspidatum	320-2700	C, НЛ, ВЛ, ГК, CA, A	S,R,T, W, H
ellipticum	570-2800	НЛ, ВЛ, CA, A	S, R
medium	520-2200	НЛ, ВЛ	S, R
rostratum	530-1900	НЛ, ВЛ	S, R
undulatum	380-2100	НЛ, ВЛ	S, H, R, W
Pohlia andalusica	3400	CH	R
andrewsii	2400	A	R
cruda	1700-3800	ВЛ, CA, A, C H	S,R, T,W
elongata	1800-2400	ВЛ, CA	S, R
filum	1650-2800	ВЛ, A	S
longicollis	1800-2400	ВЛ, CA	S, R
minor	3300	CH	S, R
nutans	1700-2300	ВЛ, CA	S, R, T
obtusifolia	3300	CH	S
proligera	1700-2300	ВЛ	S
wahlenbergii	1000-2900	НЛ, ВЛ, A	S
Pseudobryum cinclidioides	580	НЛ	H
Rhizomnium			
pseudopunctatum	520-2150	НЛ, ВЛ	S, R
punctatum	530-1900	НЛ, ВЛ	S,T,W
Trachycystis ussuriense	850-1600	НЛ, ВЛ	S, R
AULACOMNIACEAE			
Aulacomnium palustre	1300-2750	ВЛ, CA, A	H
BARTRAMIACEAE			
Bartramia ithyphylla	1800-3300	ВЛ, CA, A, CH	S, R
pomiformis	1700-2700	ВЛ, CA, A	S, R
Philonotis caespitosa	2200	ВЛ	S
fontana	2200-2250	ВЛ	H, S
seriata	1900-2550	ВЛ, CA	S, R
tomentella	2500	A	S
Plagiopus oederiana	1000-2400	НЛ, ВЛ,	S, R
HEDWIGIACEAE			
Hedwigia ciliata	560-2500	НЛ,ВЛ,ПК, CA,A	S,R
FONTINALIACEAE			
Fontinalis antipyretica	650-1300	НЛ, ВЛ	R, A

FABRONIACEAE			
Fabronia ciliaris	1000	НЛ, ГК	R
PLAGIOTHECIACEAE			
Herzogiella seligeri	850-1900	НЛ, ВЛ	W
Isopterygiopsis pulchella	1650-2000	ВЛ	S, R
Myurella julacea	2200	ВЛ	S
Plagiothecium cavifolium	1000-1800	НЛ, ВЛ	S, R
denticulatum	1100-2100	НЛ, ВЛ	S,R,T,W
laetum	1900-2200	ВЛ	S, T
nemorale	380-750	С, НЛ	S,R,T,W
PTERIGYNANDRACEAE			
Pterigynandrum filiforme	540-2400	НЛ, ВЛ, СА	R, T
LEUCODONTACEAE			
Leucodon immersus	520-1900	НЛ, ВЛ	R,T,W
sciuroides	380-2300	С,НЛ,ВЛ,ГК	S,R,T,W
CALLIERGONACEAE			
Calliergon cordifolium	2300	ВЛ	H
richardsonii	2700-2900	А	H
Warnstorfia exannulata	950-2500	НЛ, СА	S, H
fluitans	1600-1650	ВЛ	H
ENTODONTACEAE			
Entodon compressus	330	С	S, T
concinnus	950-2650	НЛ, ВЛ, ГК, СА, А	S,R,T
schleicheri	330-1900	С, НЛ, ВЛ	S, R, T
Platygyrium repens	520-530	НЛ	T
HYPNACEAE			
Hypnum cupressiforme	520-2300	НЛ,ВЛ,СА	S,R,T,W
Taxiphyllum wissgrillii	850-1700	НЛ, ВЛ	R
PSEUDOLESKEACEAE			
Lescuraea saxicola	1900-2300	ВЛ	R
Ptychodium plicatum	2000-2400	ВЛ, СА	R
ANOMODONTACEAE			
Anomodon attenuatus	360-1800	С,НЛ,ВЛ	S,R,T,W
longifolius	500-650	С, НЛ	S, R, T
rugelii	520-1350	НЛ, ВЛ	S, R, T
viticulosus	320-1900	С,НЛ,ВЛ	S,R,T,W
NECKERACEAE			
Homalia trichomanoides	540-2000	НЛ, ВЛ	R, T
Neckera complanata	1800-2000	ВЛ	R, W
crispa	980-2400	НЛ, ВЛ, СА	R
Thamnobryum alopecurum	850-950	НЛ	R
CLIMACIACEAE			
Climacium dendroides	580-2700	НЛ,ВЛ,СА,А	S,R,W,H
HYLOCOMIACEAE			
Ctenidium molluscum	580-1500	НЛ, ВЛ	S, R
Hylocomiastrum pyrenaicum	750-2400	НЛ, СА	R
Hylocomium splendens	1000-2600	НЛ, ВЛ, СА	S, R
Pleurozium schreberi	1700-2400	ВЛ, СА	S, R
Rhytidiastrum squarrosus	2000	ВЛ	S
subpinnatum	2150	ВЛ	S
Rhytidiadelphus triquetrus	580-2800	НЛ, ВЛ, ГК, СА, А	S,H,R, T, W
LEMBOPHYLLACEAE			
Isothecium alopecuroides	750-2018	НЛ, ВЛ	R, T
BRACHYTHECIACEAE			
Brachytheciastrum collinum	1000-3350	НЛ, ВЛ, ГК	R, S
velutinum	500-3250	С, НЛ, ВЛ, А	S, T, R
Brachythecium campestre	540-1500	НЛ, ВЛ	S,R,W
cirrosum	1700-2300	ВЛ	S, R
geheebii	500-950	НЛ	S,R,W
glareosum	1650-2000	ВЛ	S,R,T,W
mildeanum	540-1700	НЛ, ВЛ	S, R, H
rivulare	330-2000	С,НЛ,ВЛ	S,R,W,H
rotaeanum	1650	ВЛ	S, R
rutabulum	360-2150	С, НЛ, ВЛ	S,R,T,W
salebrosum	360-2000	С, НЛ, ВЛ	S,R,T,W
Cirriphyllum crassinervium	850	НЛ	R
piliferum	1800-2000	ВЛ	S, T
Eurhynchiastrum pulchellum	1700-2300	ВЛ	S, R, T
Eurhynchium angustirete	520-2300	НЛ, ВЛ	S, R
striatum	360-520	С, НЛ	S, T
Homalothecium lutescens	360-2100	С, НЛ, ВЛ	S, R, T
philippeanum	1000-1850	НЛ, ВЛ, ГК	R
sericeum	850-2000	НЛ, ВЛ, ГК	R
Oxyrrhycnhium hians	350-1800	С,НЛ,ВЛ	S,R,T,W
Plasteurhynchium striatulum	1000	НЛ	S
Platyhypnidium riparioides	520-1400	НЛ, ВЛ	S, R
Pseudoscleropodium purum	2100	ВЛ	S
Rhynchostegiella tenella	360	С	T
tenereffae	850	НЛ	R
Rhynchostegium murale	520-1700	НЛ, ВЛ	R
rotundifolium	540	НЛ	R
Sciurohypnum flotovianum	550-1000	НЛ	R
populeum	330-2000	С,НЛ,ВЛ	S,R,T,W
starkei	2100-2300	ВЛ	H, W
SCORPIDIACEAE			
Hamatocaulis vernicosus	1800-2700	ВЛ, СА, А	R, H
Hygrohypnella duriuscula	1300	ВЛ	R, A
Limprichtia cossonii	2250-2500	ВЛ, СА	H
revolvens	2300-2400	СА	S, H
Sanionia uncinata	1300-3400	ВЛ, СА, А, СН	S,R,W
Scorpidium scorpioides	2100	ВЛ	HS
PYLAISIACEAE			
Callicladium haldanianum	1750	ВЛ	R
Calliergonella cuspidata	580-2900	НЛ, ВЛ, СА, А	S, R, H
lindbergii	1600-2300	ВЛ, СА	S, R
Homomallium incurvatum	520-2300	НЛ, ВЛ	R
Ptilium crista-castrensis	1900-2600	ВЛ, СА, А	H,R,W
Pylaisia polyantha	330-2000	С, НЛ, ВЛ	T, W
Stereodon fertilis	850	НЛ	W
revolutus	1900-2500	ВЛ, СА	S, R
procerrimus	2300-2800	СА, А	R
vaucheri	550-2400	НЛ, ВЛ, СА	S, R
RHYTIDIACEAE			
Rhytidium rugosum	1050-2750	НЛ,ВЛ,ГК,СА,А	S, R
PSEUDOLESKEELLACEAE			
Pseudoleskeella catenulata	850	НЛ	R
nervosa	360-2300	НЛ, ВЛ	R,T,W
tectorum	800-1900	НЛ, ВЛ, ГК	T, R
LESKEACEAE			
Leskea polycarpa	520-2100	НЛ, ВЛ	R, T

THUIDIACEAE			
Abietinella abietina	330-2650	С,НЛ,ВЛ,ПК,СА	S,R,T
Helodium blandowii	650	НЛ	S
Thuidium delicatulum	530-1900	НЛ, ВЛ	S,R,T,W
philibertii	580-2650	НЛ, ВЛ, СА, А	S,R,W
recognitum	520-1400	НЛ, ВЛ	S, R
AMBLYSTEGIACEAE			
Amblystegium serpens	320-1800	С, НЛ, ВЛ	S,R,T,W
var. *juratzkanum*	520-1100	НЛ	S,R,T,W
Campyliadelphus chrysophyllus	350-2000	С, НЛ, ВЛ	S, W
Campylidium sommerfeltii	540-800	НЛ	T, W
Campylium protensum	530-2300	НЛ, ВЛ, СА	R,T,H
Cratoneuron filicinum	420-2700	С, НЛ, ВЛ, А	S,R,H
C filicinum var. *fallax*	1900	ВЛ	R
Drepanocladus aduncus	330-1900	С, НЛ, ВЛ	S,R,H
polygamus	1200-2200	НЛ, ВЛ	R, H
Hygroamblystegium humile	360-540	С, НЛ	R, W
varium	360-1800	С, НЛ, ВЛ	S, T
Hygrohypnum luridum	750-1800	НЛ, ВЛ	R, A
Leptodictyum riparium	360-870	С, НЛ	S,T,W
Palustriella commutata	650-3000	НЛ, ВЛ, А	R, A
decipiens	1700	ВЛ	R
Serpoleskea confervoides	520-850	НЛ	R, T
subtilis	850-1800	НЛ, ВЛ	T, W
Tomentypnum nitens	330	С	H

ACKNOWLEDGEMENTS

We are very grateful to the administration and staffs of Kabardino-Balkarian State Reserve for the help in field work. The studies of Ignatov and Ignatova were partly supported by the grant 04-04-48774 of Russian Foundation for Basic Reseraches, of Portenier – by the grant 02-04-49778.

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