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LIVERWORTS OF THE RUSSIAN ARCTIC: AN ANNOTATED CHECK-LIST AND BIBLIOGRAPHY

ПЕЧЕНОЧНИКИ РОССИЙСКОЙ АРКТИКИ: СПИСОК ВИДОВ И БИБЛИОГРАФИЯ

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Abstract

On the basis of verified records, the Russian Arctic liverwort flora is comprised of 205 species representing 67 genera and 26 families. Each taxon is treated with respect to distribution and frequency within 15 phytogeographic subdivisions. A historical review, annotations, a comprehensive list of synonyms, and a bibliography are included.

Резюме

На основании анализа литературных данных и ревизии доступных гербарных образцов составлен список печеночников Российской Арктики с указанием частоты встречаемости видов в каждом из 15 фитогеографических регионов, на которые подразделяется рассматриваемая территория. Список насчитывает 205 видов из 67 родов и 26 семейств. Приведены также история изучения, комментарии по отдельным видам, список синонимов и библиография.

INTRODUCTION

The study of liverworts in the Russian Arctic was begun in the middle of XIX century. Important early contributions were made by S. O. Lindberg & H. Arnell (1889), and H. Arnell (1913, 1917), who provided detailed descriptions of many taxa and described several new to science. Most subsequent publications dealt with regional hepatic floras, with the exception of the valuable treatment on the liverworts of northern Russia, "Liverworts and Hornworts of the North of the USSR", which was published by R. N. Schljakov (1976, 1979-1981) in five parts. This treatment includes a discussion of taxonomy and the general distribution of northern liverworts. Subsequently, numerous reports on liverworts in various arctic regions were published, and many of these are summarized in the recent Checklist of Hepaticae and Anthocerotae of the Territory of the Former USSR by N. A. Konstantinova & al. (1992). However, this list contains only general information and a limited number of annotations. Furthermore, it includes a number of doubtful records that could not be verified at that time.

The present checklist represents a compilation of all available literature on Russian Arctic hepatics, and incorporates the results of a revision of some specimens that were the basis for doubtful records. We have studied a number specimens from various collections from the Polar Urals (det. by L.A. Zinovjeva), from Franz-Josef Land and the Taimyr Peninsula (det. by A. L. Zhukova), from Chukotka (det. by J. Duda), O.Ekstam's collections from Novaya Zemlya (det. by S. Arnell), and H. Arnell's collections from Siberia. Unfortunately, our search for voucher specimens was not always successful because many of them are scattered in various herbaria and some were not available for study. A serious obstacle to the production of this checklist is that very few specimens were collected by

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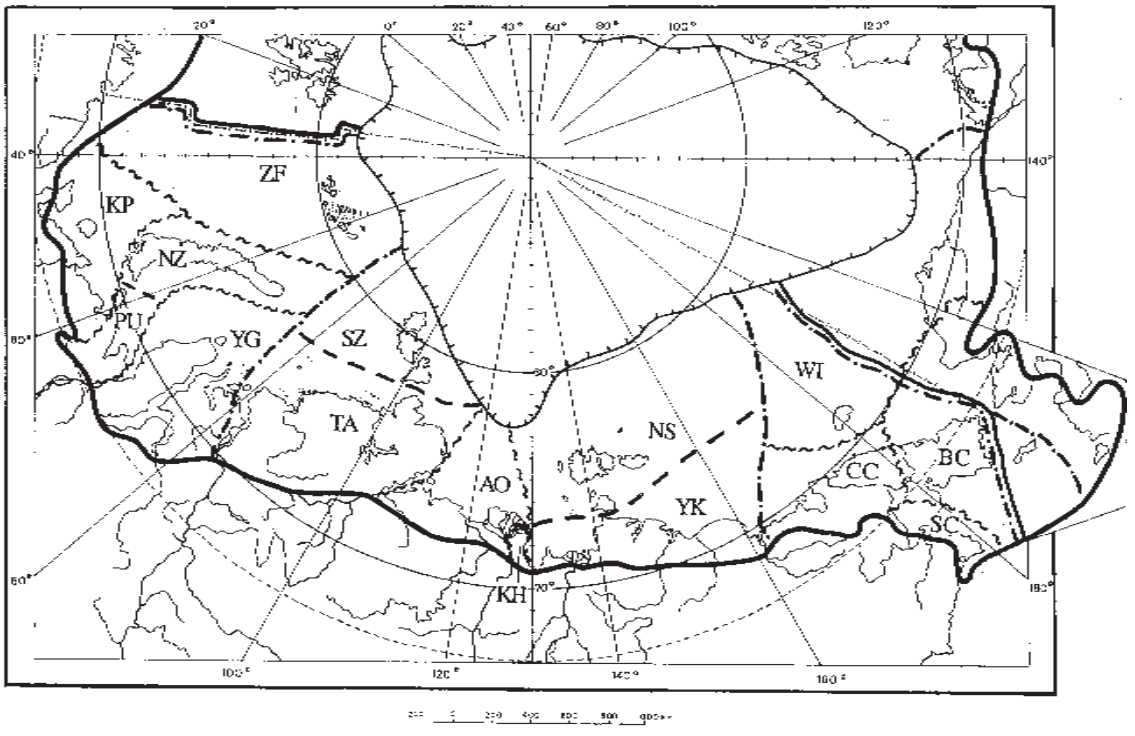

Fig. 1. Phytogeographic subdivision of the Russian Arctic (according to Yurtsev & al., 1978)
Рис. 1. Фитогеографическое подразделение Российской Арктики (согласно Юрцеву и др., 1978).

Земля Франца Иосифа	ZF	Franz Josef Land
Канино-Печерский регион	KP	Kanin-Pechora Region
Полярный Урал	PU	Polar Ural
Новая Земля	NZ	Novaya Zemlya
Ямало-Гыданский регион	YG	Yamal-Gydan Region
Таймыр	TA	Taimyr
Северная Земля	SZ	Severnaya Zemlya
Анабаро-Оленекский регион	AO	Anabar-Olenek Region
Хараулахский регион	KH	Kharaulakh Region
Яно-Колымский регион	YK	Yana-Kolyma Region
Новосибирские острова	NS	Novosibirskiye Islands
Континентальная Чукотка	CC	Continental Chukotka
Остров Врангеля	WI	Wrangel Island
Южная Чукотка	SC	South Chukotka
Берингийская Чукотка	BC	Beringian Chukotka

professional hepaticologists and determined while alive, that is, with oil bodies present. Therefore, our knowledge of Russian Arctic liverworts is based mainly on dried materials collected by geobotanists, "mossologists", lichenologists, and others. Studies of dried material may lead to misinterpretations and misjudgments of the taxonomy of certain groups. Unfortunately, we had no possibility to study the majority of the collections that were the basis for the more valuable contributions at the turn of the century (i.e., specimens reported by Lindberg & Arnell, 1889; and Arnell, 1917). The necessity for revision of these collections in the light of new knowledge of liverwort taxonomy is evident; however, we consider the present study a starting point and hope that it will pro-

vide a stimulus for further studies of arctic liverworts.

The delimitation of the Russian Arctic and its subdivision into 15 phytogeographic regions accepted herein (Fig. 1) is that of B. A. Yurtsev & al. (1978). In some instances, it was difficult to determine if a locality is situated within the Arctic as delimited (for example, some localities in the Polar Urals, Lower Lena, and Archangelsk Region), and we made an arbitrary decision to include species from such localities in the present checklist. The frequency of each taxon in each region is assessed according to the following scale: r = rare (recorded from 1-5 localities); s = sporadic (6-10 localities); and c = common (>10 localities). Also taken into consideration are the abundance of each species, biological and ecological peculiarities, and whether the taxon could be easily overlooked. These data on frequency are preliminary and reflect the present knowledge of Arctic hepatics, since the degree of investigation of different sectors of the Arctic varies enormously. For example, many regions have been explored by nonprofessional hepaticologists only, and such collectors rarely do a thorough job of collecting the microhabitats. However, frequency data give a general idea of the distribution of individual species, and allow us to concentrate future investigations on the search for rare species. Varieties are included in the list. Forms usually are not listed but notes on the distribution of some forms are given in the comments.

In addition to the frequency abbreviations, the following symbols are included in the checklist: "!" indicates confirmation of the presence of a taxon in a region; "?" suggests that occurrence in a region is doubtful.

In this checklist we used the same generic concepts as in Konstantinova & al. (1992). Some exceptions are related to validation of names (see Konstantinova & Vasiljev, 1993; Konstantinova & Chernjadieva, 1995) and corrections of some printing errors. The authors have the differnt opinions on the volume of genera and the current usage of "microgenera" is the decision of the first author.

Regional History of Exploration of Hepatics in the Russian Arctic

Franz-Josef Land Archipelago (ZF). A review of the bryological exploration of this archipelago, as well as an analysis of the liverwort flora were published by Zhukova (1973a). She studied all the available collections and produced a list of 33 species and 15 infraspecific taxa. A review of this material has resulted in the exclusion of some species (e. g., *Sphenolobopsis pearsonii, Gymnomitrion obtusum* etc.), and the addition of others (e. g., *Lophozia rubrigemma, Scapania zemliae*, and *S. ligulifolia*), so that 35 species are now known. This low number presumably reflects the High Arctic position of the archipelago, as well as insufficient investigation of the flora.

Kanin-Pechora Region (KP). Northeastern Europe is one of the most poorly studied areas of the Russian Arctic. The first data (32 species) for this area were published by R. Pohle (1915) in his treatment on bryophytes of the Russian North. Apart from this list, only two papers dealing with liverworts of northern Arkhangelsk Region have been published; one by Zhukova & al. (1981), and the other by Konstantinova (1990). In the former, 21 species of liverworts collected in the course of investigation of bog vegetation were listed, while the latter is based on revision of 29 specimens collected by F. Ruprecht in 1841, and documents the occurrence of 30 species. In total, 54 liverworts are known presently from this large and diverse territory, a number that clearly does not reflect the true diversity of hepatics in this region.

Polar Ural (PU). The first data on liverworts of this region (4 species) were published by Pohle (1915), and in 1931, Z. N. Smirnova (1931) recorded 32 additional species. A more comprehensive list of the liverworts of this territory was presented by Zinovjeva (1973), who listed 130 species for the Polar and Northern Urals, including 90 species for the area referred to herein as the Arctic. During our study, a number of specimens determined by Zinovjeva were reexamined and some species are excluded (see annotations and list of excluded taxa). More

recently, some additions to the flora of this region were made by I. D. Kildjuschevsky (1975), and I. Novotny & L. Klimes (1991) recorded the recently described species, *Protolophozia debiliformis*, as well as 13 associated liverworts. Two of these, *Marsupella sphacelata* and *Scapania undulata* f. *aequatiformis*, are new for the Russian Arctic. Most recently, 64 species from the Sob' River Basin, including 27 species new to the Polar Urals, were reported by Konstantinova & Chernjadieva (1995). At present, 110 species of hepatics are documented from the Polar Urals, but this number surely does not reflect the true richness of the liverwort flora of this area.

NOVAYA ZEMLYA (NZ). A fairly detailed account of the history of early studies of bryophytes of the Russian North, including liverworts of Novaya Zemlya and Waygach Island, was given by H. Arnell (1917). On the basis of a compilation of published data and identification of a number of collections, he cited 32 species for this area. Examination of O. Ekstam's collection by S. Arnell (1947) enlarged this list with 19 additional taxa, some of which were revised in the course of our study. In spite of relatively high number of species (61 species and 3 varieties) known at present from this region, the liverwort flora of these High Arctic islands surely is more rich.

YAMAL-GYDAN REGION (YG). The first reports from this Region provide mostly fragmentary data on about 30 species (see Arnell, 1917; Ladyzhenskaja, 1971; Andrejeva, 1981), and some common hepatics were mentioned in several geobotanical papers. However, in 1973 to 1983 and in 1988, 1990, 1992 the group of Polar Expedition headed by Olga Rebristaya has collected about 15 000 of liverwort specimens. This collection was identified in part by Zhukova (see Zhukova & Rebristaya, 1986, 1987), but afterwards almost completely revised by A. D. Potemkin (1993). His annotated list (l.c.) included 121 species, two of which, *Gymnocolea fascinifera* and *Prasanthus jamalicus*, were described as new species, and 35 infraspecific taxa, with two new forms of *Tritomaria* described (see Potemkin 1990, 1992a, 1993). Two publications are devoted to hepatics of the Gydan Peninsula and adjacent territories (see Zhukova & Rebristaya 1987; Potemkin 1994). In the former, there is an annotated list of 34 species, including the only known in YG locality of *Radula prolifera*. In the latter, 47 species are reported from the southwestern part of Gydan Peninsula. With respect to liverworts, it appears that YG is now one of the best studied areas of the Russian Arctic. Taking into consideration the prevalence of lowlands in this territory, it is likely that the 122 species reported herein reflect the real richness of the hepatic flora of this region. Only in this region of the Russian Arctic has living material been studied.

TAIMYR (TA). Data on liverworts of this territory are scattered in many publications. The first comprehensive contribution on the hepatic flora of Lower Yenisey River was by S. O. Lindberg & H. Arnell (1889). They recorded 51 species,including original descriptions of *Calycularia laxa* and *Jungermannia (Mesoptychia) sahlbergii*. Some species from the coast of the Taimyr Peninsula are mentioned in "Die Moose der Vega-Expedition" of H. Arnell (1917), and widespread northern liverworts were reported by E. Ja. Zenkova (1953, 1954). In the 1970's and 1980's, Zhukova published a number of papers on Taimyr hepatics (see Zhukova, 1973a, 1974, 1977, 1979, 1981, 1986; Zhukova & Matveeva 1986), and she prepared a list of liverworts of the Taimyr Peninsula that unfortunately was not published, but was made available to us. Some additional data were published by L. S. Blagodatskikh & J. Duda (1982). At present, 133 species are known from this region. It is apparent that the hepatic flora of this area will continue to be augmented.

SEVERNAYA ZEMLYA (SZ). The only contribution to the hepatic flora of Severnaya Zemlya Archipelago was recently published by Potemkin (Andreev & al. 1993). Distribution, ecology, and in some instances, peculiarities of morphology, of 32 species and 7 infraspecific taxa were presented in this paper. It is certain that many additional species will be found here in the future.

ANABAR-OLENEK AND KHARAULAKH REGIONS (AO and KH). The description of the histo-

ry of exploration of these two phytogeographical subprovinces is combined because explorers usually collected liverworts on both the right and left sides of the Lena River, which is the border between AO and KH. A comprehensive treatment of liverworts (47 species) of the Lower Lena River was published by H. Arnell (1913). Later, *Pseudolepicolea fryei* (Ladyzhenskaja 1963, 1964) and Anastrophyllum cavifolium (Zinovjeva 1969) were added, and Z. N. Smirnova and A. E. Katenin (1973) listed 15 species. In 1960, 1962, 1979, and 1988, V. R. Filin collected hepatics on the left and right banks of the Lena River, and Konstantinova identified 78 species among these collections (unpublished), including 20 species new to arctic Yakutia (Republic of Sakha). At present, 96 species are known from AO and KH. There can be no doubt that the liverwort floras of both regions are much richer than present documentation indicates.

Yana-Kolyma Region (YK). This region is the most poorly known with respect to hepatics. Fifty-five species from Lower Indigirka River Basin were reported by O. M. Afonina & J. Duda (1978), while 26 species were recorded by N. A. Stepanova & J. Duda (1984) from Lower Kolyma. At present, 53 species and 3 infraspecific taxa are documented for this area. Without doubt the number of liverworts known in this region will increase more than two times in the future.

Novosibirskie Islands (NS). The first list of liverworts (32 species) of this subprovince was published by B.N.Gorodkov (1956) for Kotelny Island. Subsequently, 11 species were reported by I. I. Abramov (1963) for the same island, and identification of O. I. Sumina's collection by Zhukova added 11 species (Zhukova & Sumina 1976). Zhukova (1982b) published a list of 55 taxa for Bolshoy Lyakhovsky Island, based on the collections of V. D. Alexandrova. According to Zhukova (1982b), the hepatic flora of NS is comprised of 72 species, but some of these have been excluded in the course of our study, and presently 64 species are known for NS. Taking into consideration the absence in the published lists of widespread northern species as well as the diversity of microhabitats it is evident that much more species might be found there in the future.

Chukotka (including CC, SC, BC and WI). Chukotka is divided herein into Continental, Southern and Beringian Chukotka, and Wrangel Island. Up to the end of the 1960's, only 20 liverwort species were known from Chukotka as a whole (Abramova & al., 1985). Detailed investigations of the liverwort flora of Chukotka were initiated in 1969 by Afonina, who studied the mosses, but also collected numerous hepatic specimens, which were identified by Duda. A detailed account of these studies and annotated lists of species were published by Afonina & Duda (1993). Some specimens from Chukotka were revised by us, which resulted in the addition of several new species for this region (e. g., *Cephaloziella aspericaulis, Orthocaulis hyperboreus,* etc.).

Continental Chukotka (CC) has been insufficiently studied. Some data on the liverworts of CC were published in the first half of the century (see Arnell, 1917; Gorodkov, 1939), and recently, Afonina & Duda (1992) listed 69 species.

Southern Chukotka (SC). Information on the liverwort flora of this area can be found in articles by Afonina & Duda (1983, 1987, 1989). A total of 121 species are presently known from SC. Data on liverworts of this region may be apparently enxpanded.

Beringian Chukotka (BC) is one of the best known areas of the Russian Arctic with respect to liverworts, and the data on the flora are scattered in many publications, which are summarized in Abramova & al. (1985). A total of 152 species are known from this region, which has the richest flora in the Russian Arctic. The richness of the flora can be explained by the presence of mountains, a more-or-less oceanic climate, the apparent absence of glaciation; and relatively thorough exploration.

Wrangel Island (WI). The first data on liverworts (26 species) of this region were published by Gorodkov (1958). Zhukova (1978) discovered *Metacalypogeia schusterana* and *Cryptocolea imbricata* on this island, and she later compiled an annotated list of 55 taxa (see Zhukova 1987). A more comprehensive list, which includes 86 species, was published by Afonina & Duda (1988).

LIST OF SPECIES

	ZF	KP	PU	NZ	YG	TA	SZ	AO	KH	YK	NS	CC	WI	SC	BC
Anastrophyllum (Spruce) Steph. [LOPHOZIACEAE]															
sphenoloboides Schust. (1)					!s	!r									r
Aneura Dum. [ANEURACEAE]															
pinguis (L.) Dum.			s	s	!s	!s		!s	!s	s	s	!c	!c	!c	!c
var. *denticulata* Nees (2)					r										
Anthelia (Dum.) Dum. [ANTHELIACEAE]															
julacea (L.) Dum. (3)			s	s		r					r	s		s	s
juratzkana (Limpr.) Trev.	!s	!s	!s	s	!c	!c	!r	!r	!r		c	!c	!c	!c	!c
Apometzgeria Kuwah. [METZGERIACEAE]															
pubescens (Schrank) Kuwah.													r	r	r
Arnellia Lindb. [ARNELLIACEAE]															
fennica (Gott.) Lindb.		r			!r	!s	!r	!s	!s	r	s	s	s	s	s
Asterella P. Beauv. [AYTONIACEAE]															
gracilis (F. Web.) Und.			r			r		r				r	r	r	r
saccata (Wahlenb.) Evans														!r	
Athalamia Falc. [CLEVEACEAE]															
hyalina (Sommerf.) Hatt.						s			!r						r
Barbilophozia Loeske [LOPHOZIACEAE]															
barbata (Schmid. ex Schreb.) Loeske			!s		!r	!s	!r	!r	!r	r	s	c	c	c	c
var. *amphigastriata* K. Muell.					!r										
hatcheri (Evans) Loeske		!s	!s	c	!s	!s		!s	!r			c	c	c	c
lycopodioides (Wallr.) Loeske		!s	!s		!s	s			!r			c	c	c	c
rubescens (Schust. & Damsh.) Karttunen & Soederstroem (4)	!r			!s	!s										
Blasia L. [BLASIACEAE]															
pusilla L.			!s		!s	s					r			!s	!s
Blepharostoma (Dum.) Dum. [TRICHOCOLEACEAE]															
trichophyllum (L.) Dum.	c	!s	!c	c	!r	!s		!c	!c	c	c	!c	!c	!c	!c
var. *brevirete* Bryhn & Kaal.			!r		!c	!c	!s	!s	!s	s	c	c	c	c	c
Bucegia Radian [MARCHANTIACEAE]															
romanica Radian									r				!r		r
Calycularia Mitt. [ALLISONIACEAE]															
laxa Lindb. & H. Arnell					!c	!r		s		r		!c	!c	!c	!c
Calypogeia Raddi [CALYPOGEIACEAE] (5)															
integristipula Steph.														!s	!s
muelleriana (Schiffn.) K. Muell.			!r		!r	r		!r		s				s	s
neesiana (C. Mass. & Carest.) K. Muell.		r				r								r	r
sphagnicola (H. Arnell & J. Perss.) Warnst. & Loeske			r		!r				!r	r		r		r	r
Cephalozia (Dum.) Dum. [CEPHALOZIACEAE]															
ambigua C. Mass.			r	s	!r	s							r		r
bicuspidata (L.) Dum.	!r	!s	!c	s	!c	!c	!r	!s	!s	s	r	!c	!c	!c	!c
var. *lammersiana* (Hueb.) Schust. (6)										r		r			!r
otaruensis Steph.															r
connivens (Dicks.) Lindb. (7)			?		!r	r					r				
leucantha Spruce		!r	r		!r	r									r
loitlesbergeri Schiffn.			r			r									
lunulifolia (Dum.) Dum.		!r	!s	r	!s	r						r			r
pleniceps (Aust.) Lindb.	r	!s	!s		!c	!c		!s	!s	s	r	s	s	s	s
Cephaloziella (Spruce) Schiffn. [CEPHALOZIELLACEAE] (8)															
arctica Bryhn & Douin	!c		r	r	!c	!c	!c	!r		r	c	c	!c	!c	!c
arctogena (Schust.) Konst. (9)				!r	!s	!s	!r		!r						!r

	ZF	KP	PU	NZ	YG	TA	SZ	AO	KH	YK	NS	CC	WI	SC	BC
aspericaulis Joerg. (10)												!r		!s	!s
divaricata (Sm.) Schiffn. (11)		r	!s		!s	s		!s	!r		s		s	s	s
var. *ericetorum* C. Jens. (12)			r	!c		r									
var. *polystratosa* (Schust. & Damsh.) Potemk. (13)	!r				!r						!r				
var. *scabra* (M. A. Howe) S. Arnell (11)					!r								?	?	?
elegans (Heeg) Schiffn. (14)			?		!r	r									r
grimsulana (Jack ex Gott. & Rabenh.) Lacout s.str.	r	!s		s	!r	!r	!r	!s				!s	!s		!s
hampeana (Nees) Schiffn. (15)			r	r	!s	r					r		r		r
var. *sibirica* C. Jens. (12)					r	r									
rubella (Nees) Warnst.			r		!r	s					s				r
var. *bifida* (Schreb. ex Schmid.) Douin (12)						r									
subdentata Warnst. (16)		!r	r	?	!s	!s				r	r		r		r
uncinata Schust.		!r		!r	!s	!s	!r	!r							
Chiloscyphus Corda [GEOCALYCACEAE] (17)															
fragilis (A. Roth.) Schiffn.				r	!c	!s						r			r
pallescens (Ehrh. ex Hoffm.) Dum. (18)						r		!r		r	r	r	r	r	r
polyanthos (L.) Corda			!s	r				r					r	r	r
rivularis (Schrad.) Hazsl.						s									
Cladopodiella Buch [CEPHALOZIACEAE]															
fluitans (Nees) Buch (19)		!r			!r	r									r
francisci (Hook.) Buch ex Joerg.			r		!r										
Conocephalum Hill. [CONOCEPHALACEAE]															
conicum (L.) Und.			r						r						
Crossogyna (Schust.) Schljak. [JUNGERMANNIACEAE]															
undulifolia (Nees) Schljak.			!r										r		r
Cryptocolea Schust. [JUNGERMANNIACEAE]															
imbricata Schust.					!r	!r		!r				!r	r		r
Diplophyllum (Dum.) Dum. [SCAPANIACEAE]															
albicans (L.) Dum.														!s	!s
obtusifolium (Hook.) Dum.			!s											!r	
taxifolium (Wahlenb.) Dum. (20)		!r	!c	!s	!s	!r				r	s	!c	!c	!c	!c
Eocalypogeia (Schust.) Schust. [CALYPOGEIACEAE] (21)															
schusteriana (Hatt. & Mizut.) Schust.													r		r
Fossombronia Raddi [CODONIACEAE]															
alaskana Steere & H. Inoue					!r									!r	
Frullania Raddi [JUBULACEAE]															
nisquallensis Sull. (22)						s			!r		r			r	r
tamarisci (L.) Dum. (22)			?										?	?	?
Gymnocolea (Dum.) Dum. [LOPHOZIACEAE]															
fascinifera Potemkin					!r										
inflata (Huds.) Dum.		s	!s	r	!c	!s		!s		s	r	c	c	c	c
var. *acutiloba* (Kaal.) S. Arnell (23)	?				!r	!r									
Gymnomitrion Corda [GYMNOMITRIACEAE]															
apiculatum (Schiffn.) K. Muell. (24)			s	r	!s	r						!r		!r	
concinnatum (Lightf.) Corda (25)	!c	r	!c	r	!s	!c	!r	!r	!r		s	c	c	!c	c
corallioides Nees	!c	r	!s	r	!c	!c	!c	!r	!r	r	s	c	c	c	c
pacificum Grolle															!r
Harpanthus Nees [GEOCALYCACEAE]															
flotovianus (Nees) Nees		!r	!r											!r	r
Herbertus S. Gray [HERBERTACEAE]															
sakuraii (Warnst.) Hatt.						r			!r			s	s	s	s

	ZF	KP	PU	NZ	YG	TA	SZ	AO	KH	YK	NS	CC	WI	SC	BC
Isopaches Buch [LOPHOZIACEAE]															
alboviridis (Schust.) Schljak.					!s									!r	!r
bicrenatus (Schmid. ex Hoffm.) Buch			!r		!r	r									
decolorans (Limpr.) Buch					!r										
Jungermannia L. [JUNGERMANNIACEAE]															
borealis Damsh. & Vana (26)						?		r	r		?		r	!r	r
exsertifolia Steph.														r	r
eucordifolia Schljak. (26)								r							r
polaris Lindb. (27)	c		r		!s	!c	!r		!r		s		r	!r	r
pumila With.	c		!r		!r	s		!r	!r		s		r	r	r
Leiocolea (K. Muell.) Buch [LOPHOZIACEAE]															
alpestris (F. Web.) Isov.(28)	!r		r		!r	r			!r	s		r	c	c	c
badensis (Gott. ex Rabenh.) Joerg.		r	r		!r	s		r	!r		r			r	r
bantriensis (Hook.) Joerg.			r			r									r
gillmanii (Aust.) Evans	r		!r	r	!r	s		!s	!r	r	r	r		r	r
heterocolpos (Thed. ex Hartm.) Buch.	!r	!r	!s	s	!c	!s	!r	!s	!r	s	!s	!c	!c	!c	c
var. *arctica* (S. Arnell) Maort. ex S. Arnell					!s	!s			!r						!r
var. *harpanthoides* (Bryhn & Kaal.) S. Arnell	!r				!r	s						s	s		s
kateninii Schljak.															r
rutheana (Limpr.) K. Muell.					!r	!s		!r		r	s	s	s	s	s
Lejeunea Libert. [LEJEUNNEACEAE]															
cavifolia (Ehrh.) Lindb.									!r						
Lepidozia (Dum.) Dum. [LEPIDOZIACEAE]															
reptans (L.) Dum.		r												r	
Lophocolea (Dum.) Dum. [GEOCALYCACEAE]															
heterophylla (Schrad.) Dum.		r	r												
minor Nees			!s		!r	r								r	r
Lophozia (Dum.) Dum. [LOPHOZIACEAE]															
confertifolia Schiffn. sensu Schljak. in Konstantinova & al. 1992 (29)		!r	!c		!c	!r		!r	!r	r				s	s
excisa (Dicks.) Dum.	c		s	s	!c	!c	!r	!r		r	s	c	c	!c	c
var. *elegans* Schust. (30)					!r										
var. *infuscata* Schust.					!s										r
var. *succulenta* Schust. & Damsh.					!s										
heteromorpha Schust. & Damsh. (31)					!r	r					r				
jurensis Meyl. ex K. Muell.			r		!s	!r	!r								!r
longidens (Lindb.) Macoun (32)			!s		!r	s		!r					s	s	s
longiflora (Nees) Schiffn.					!c	!s			!s		r	r			r
major (C. Jens.) Schljak.	r				!s	!s		!s				c		c	c
pellucida Schust.													r		
var. *minor* Schust. (33)					!r	!r	!r								r
rubrigemma Schust. (34)	!s		!r		!r										
rufescens Schljak. (35)								!r							r
savicziae Schljak. (36)			!r		!s	?	!r							!r	r
schusterana Schljak. (37)												?			?
sudetica (Nees ex Hueb.) Grolle (38)	c	!s	s	c	!s	c		!s		s	c	!s	!s	!s	!s
ventricosa (Dicks.) Dum. s.str. (39)	r	s	s	s		c		!r	!r	s	s	c	c	c	c
wenzelii (Nees) Steph.		r	r	r	!s	r		r	!r	r	c	c	c	c	c
Macrodiplophyllum (Buch) H. Perss. [SCAPANIACEAE]															
microdontum (Mitt.) H. Perss.														s	!s
plicatum (Lindb.) H. Perss.															!c

	ZF	KP	PU	NZ	YG	TA	SZ	AO	KH	YK	NS	CC	WI	SC	BC
Mannia Opiz [Aytoniaceae]															
fragrans (Balb.) Frye & Clark.												r			
pilosa (Horn.) Frey & Clark						r		r						r	r
sibirica (K. Muell.) Frey & Clark													r		
triandra (Scop.) Grolle													r	r	r
Marchantia L. [Marchantiaceae]															
alpestris (Nees) Burgeff (40)	c	!r	!s	r	!r	r			!r				r		r
aquatica (Nees) Burgeff (40)					!r	r					s				
polymorpha L. (40)		s	s	s	!s	!c		!s	s	s	s	c	c	c	c
Marsupella Dum. [Gymnomitriaceae]															
aquatica (Lindenb.) Schiffn. (41)						r								!r	
arctica (Berggr.) Bryhn & Kaal.											s		!c	!c	!c
boeckii (Aust.) Lindb. ex Kaal. (42)													!r	!r	!r
commutata (Limpr.) H. Bern.														r	
condensata (Aongstr. ex C. Hartm.) Lindb. ex Kaal.			r										r		r
emarginata (Ehrh.) Dum.			!r			r					r	s	s	!s	!s
sphacelata (Gieseke ex Lindenb.) Dum.			r												
sprucei (Limpr.) H. Bern.			!r		!s	!s									r
Mesoptychia (Lindb.) Evans [Mesoptychiaceae]															
sahlbergii (Lindb. & H. Arnell) Evans (43)					!r	!c		!s	!s		r	c	c	!c	c
Moerckia Gott. [Pallaviciniaceae]															
blyttii (Moerck) Brockm. (44)		r		r	!r	r									
hibernica (Hook.) Gott.						r								!r	r
Mylia S. Gray [Jungermanniaceae]															
anomala (Hook.) S. Gray		!s	s		!s	s								r	
taylori (Hook.) S. Gray														!r	!r
Nardia S. Gray [Jungermanniaceae]															
breidleri (Limpr.) Lindb.		r				r									
geoscyphus (De Not.) Lindb.			!s	r	!c	c		!r				c	!c	!c	!c
var. *bifida* Schust.					!r	r									
insecta Lindb.			r		!r									!r	
japonica Steph.			!r		!r									!r	!r
scalaris S. Gray (45)			?			?						!s		!s	!s
Obtusifolium S. Arnell [Lophoziaceae]															
obtusum (Lindb.) S. Arnell (46)			!s			r			r						
Odontoschisma (Dum.) Dum. [Cephaloziaceae]															
elongatum (Lindb.) Evans					!s	!s		!r					!s	!s	!s
macounii (Aust.) Und.	r		s	r	!s	!s	!r	!s		r	r	c	c	!c	c
Orthocaulis Buch [Lophoziaceae]															
atlanticus (Kaal.) Buch (47)			?		!r	r									
attenuatus (Mart.) Evans (48)		?		r											
binsteadii (Kaal.) Buch		!r	!s	!r	!c	!c				r	r	s	s	!s	s
floerkei (F. Web. & Mohr.) Buch (49)	!r	!r	!s			r									r
hyperboreus (Schust.) Konst. (50)			!r	!r	!s	!r	!r	!r							!r
kunzeanus (Hueb.) Buch (51)	?	!r	!s	s	!c	!c		!s		r	c	!c	!c	!c	!c
quadrilobus (Lindb.) Buch (52)	s	r	s	c	!s	!c	!r	!s	!r	r	c	c	c	!c	c
var. *glareosa* Joerg.	r				!s	r	!r	r							
Pellia Raddi [Pelliaceae]															
endiviifolia (Dicks.) Dum.														r	!r
epiphylla (L.) Corda			r			r								r	
neesiana (Gott.) Limpr.		!r	!s		!s	s		r	r					!r	r
Peltolepis Lindb. [Cleveaceae]															
quadrata (Saut.) K. Muell.				r		r		!r	!r					r	r

	ZF	KP	PU	NZ	YG	TA	SZ	AO	KH	YK	NS	CC	WI	SC	BC
Plagiochila (Dum.) Dum. [PLAGIOCHILACEAE]															
arctica Bryhn & Kaal. (53)	!r							!s	!r	r	c	c	c	c	c
porelloides (Torrey ex Nees) Lindenb. (54)	!r	!r	!s		!r	!r	!r			r				r	r
Plectocolea (Mitt.) Mitt. [JUNGERMANNIACEAE]															
hyalina Lyell			r		!s	!s									!s
obovata (Nees) Lindb. s.l (55)			!r		!s	!s		!r		r	r			!s	!s
Pleurocladula Grolle [CEPHALOZIACEAE]															
albescens (Hook.) Grolle		!s	!s		!c	!c				s		!c	!c	!c	!c
Prasanthus (Lindb.) Lindb. [GYMNOMITRIACEAE]															
jamalicus Potemkin					!r										
suecicus (Gott.) Lindb.			!s		!c	!s								r	r
Preissia Corda [MARCHANTIACEAE]															
quadrata (Scop.) Nees			!r	r	!s	s		!r	!r	r	r	c	c	c	c
subsp. *hyperborea* (Schust.) Schust. (56)					!s										
Protolophozia (Schust.) Schljak. [LOPHOZIACEAE]															
debiliformis (Schust. & Damsh.) Konst.			!r		!r										
elongata (Steph.) Schljak. (57)			!r											r	
Pseudolepicolea Fulf. & J. Tayl. [TRICHOCOLEACEAE]															
fryei (H. Perss.) Grolle & Ando					!s	!r		r	r	r	r	s	s	s	s
Ptilidium Nees [PTILIDIACEAE]															
ciliare (L.) Hampe		!c	!c	c	!c	!c	!r	!c	!c	c	c	!c	!c	!c	!c
pulcherrimum (G. Web.) Vain.			!s												
Radula Dum. [RADULACEAE]															
complanata (L.) Dum.								!r				r		r	r
prolifera H. Arnell			r		!r	!s	!r	r			s	c	!c	!c	!c
Riccardia S. Gray [ANEURACEAE] (58)															
chamaedrifolia (With.) Grolle					!r										
latifrons (Lindb.) Lindb.			r		!s			r							
Riccia L. [RICCIACEAE]															
bifurca Hoffm.						r									
cavernosa Hoffm.						r									
glauca L.						r									r
sorocarpa Bisch. (59)						r									
subsp. *arctica* Schust.					!r										
Saccobasis Buch [LOPHOZIACEAE]															
polita (Nees) Buch			s			?								r	r
polymorpha (Schust.) Schljak.														r	r
Sauteria Nees [CLEVEACEAE]															
alpina (Nees) Nees			r	r		s		!r	r			r	r	r	r
Scapania (Dum.) Dum. [SCAPANIACEAE]															
brevicaulis Tayl. (60)			?			?						!r	r		
calcicola (H. Arnell & J. Perss.) Ingham (61)						?					?				
curta (Mart.) Dum.		r	!r	r	!r	r	!r	s			r		r		r
var. *grandiretis* Schust.					!s									!r	
cuspiduligera (Nees) K. Muell.			r	r	!r	!s		r		r			s	s	s
var. *diplophyllopsis* Schust.					!r	!r									
degenii Schiffn. ex K. Muell.			r		!r	s	!r				r		c	c	c
gymnostomophila Kaal. (62)	s		r		!r	c	!r		!r	r	r		s	!s	s
hyperborea Joerg.		r	s	r	!s	!c		!r	!r		r		s	s	s
irrigua (Nees) Nees		r	!s	r	!s	c		!r		r	c	c	c	c	c
var. *rufescens* (Loeske) Loeske					!r										
kaurinii Ryan (63)				!r	!r	r						!s		!s	!s

	ZF	KP	PU	NZ	YG	TA	SZ	AO	KH	YK	NS	CC	WI	SC	BC
ligulifolia Schust.	!c					r									r
lingulata Buch (64)	?		!r	!r											
mucronata Buch			r	r	!r					r				r	
nemorea (L.) Grolle (65)			?								?				
subsp. *crassiretis* (Bryhn) Potemkin					!r	s				r	r			!r	!r
obcordata (Berggr.) S. Arnell	!r		!s		!s	!c	!s	!r	!r		r	s	s	s	s
paludicola Loeske & K. Muell.		!s	!s	r	!c	!s			r	s	r	c	c	c	c
var. *kaalaasii* K. Muell.															r
var. *rotundiloba* Schust.					!c										
paludosa (K. Muell.) K. Muell.								r		r					!r
praetervisa Meyl.				r	!s	!s	!r								!r
rufidula Warnst.															!r
scandica (H. Arnell & Buch) Macv.		!r	!s	!r	!c	!s		!r		s	r	!s	s	!s	s
var. *argutedentata* Buch					!r										
var. *grandiretis* (Schljak.) Schljak.					!r										
simmonsii Bryhn & Kaal.			r		!r	!c	!r	!r	!s	!s	c	!c		!c	!c
spitsbergensis (Lindb.) K. Muell.	!r					!s			!r					!s	!s
subalpina (Nees ex Lindenb.) Dum.		r	!r	s	!r	s		r						r	r
tundrae (H. Arnell) Buch		!r	r	r	!s	!r									r
uliginosa (Lindenb.) Dum.					!r	!r					r			s	s
undulata (L.) Dum. (66)			r			r	!r					s	s	s	s
zemliae S. Arnell	!s			!r	!s								!r		
Schistochilopsis (Kitag.) Konst. [Lophoziaceae]															
grandiretis (Lindb. ex Kaal.) Konst.	r				!r	s		!r				r	r	r	
hyperarctica (Schust.) Konst. (67)															?
incisa (Schrad.) Konst. (68)		r	!s	s	!s	c		!s		s	s	c	c	c	c
var. *inermis* (K. Muell.) Konst. (69)					!r	r							r		
opacifolia (Culm. ex Meyl.) Konst. (68)			!s		!s	!c		!r		r		c	!c	!c	c
Solenostoma Mitt. [Jungermanniaceae]															
caespiticium (Lindenb.) Steph.										r					r
confertissimum (Nees) Schljak.			!r		!s	!r				r		r	r		!r
pusillum (C. Jens.) Steph.			!r		!r	?									
rubrum (Gott. ex Und.) Schust. (70)															r
sphaerocarpum (Hook.) Steph.		r	!r	r	!s	s						s	s	s	s
var. *nana* Schust.		!r		!s	s										
Sphenolobus (Lindb.) Berggr. [Lophoziaceae]															
cavifolius (Buch & S. Arnell) K. Muell. (71)			?		!r	r		?	?						r
minutus (Schreb.) Berggr.	!c	!c	!c	!c	!c	!c	!c	!c	!c	c	c	!c	!c	!c	!c
var. *grandis* (Lindb.) Schust. (72)	!s				!s	!s	!r	!s	!s						
saxicola (Schrad.) Steph.			s		!s	!s		r	!r	r				s	
Tetralophozia (Schust.) Schljak. [Lophoziaceae]															
setiformis (Ehrh.) Schljak. (73)	r	r	!s	s	!s	!c		!r	!r	r	s	!c	!c	!c	!c
Tritomaria Schiffn. ex Loeske [Lophoziaceae]															
exsectiformis (Breidl.) Schiffn. ex Loeske					!s	!s									r
heterophylla Schust. (74)	!r				!r	!r			!r			!r	!r		!r
quinquedentata (Huds.) Buch (75)		!c	!c	c	!c	!c	!c	!c	!c	s	c	!c	!c	!c	!c
var. *grandigemma* Potemkin					!s										
var. *grandiretis* Buch & Arnell (76)				!r		s									
scitula (Tayl.) Joerg. (77)			s		!s	s		!r		r	s	!c	!c	!c	!c
Number of species	36	54	110	61	124	141	32	74	54	53	64	72	86	121	152
Number of varietes	6	1	2	3	28	14	4	3	3	3	3	3	4	4	9

SYNONYMS

Anastrophyllum cavifolium (Buch & S. Arnell) Lammes = *Sphenolobus cavifolius*
– *minutum* (Schreb.) Schust. = *Sphenolobus minutus*
– *minutum* var. *grandis* (Lindb.) Schust. = *Sphenolobus minutus* var. *grandis*
– *saxicola* (Schrad.) Schust. = *Sphenolobus saxicola*
Anthelia nivalis (Sw.) Lindb. = *Anthelia juratzkana*
Aplozia atrovirens (Dum.) Dum. = *Jungermannia atrovirens*
– *atrovirens* (Schleich.) Dum. = *Jungermannia atrovirens* [Basionym: J. atrovirens Schleich. in sched. in LAU, nom. invalid.]
– *lanceolata* (Schrad.) Dum. = *Liochlaena lanceolata*
– *polaris* (Lindb.) Bryhn & Kaal. = *Jungermannia polaris*
– *pusilla* C. Jens. = *Solenostoma pusillum*
– *sphaerocarpa* (Hook.) Dum. = *Solenostoma sphaerocarpum*
Asterella fragrans (Schleich.) Trev. = *Asterella saccata*
– *ludwigii* auct. non (Schwaegr.) Evans = *Asterella gracilis*
– *pilosa* (Wahlenb.) Trev. = *Asterella gracilis*
Barbilophozia atlantica (Kaal.) K. Muell. = *Orthocaulis atlanticus*
– *attenuata* (Mart.) Loeske = *Orthocaulis attenuatus*
– *floerkei* (F. Web. & Mohr) Loeske = *Orthocaulis floerkei*
– *hatcheri* (Evans) Loeske var. *grandiretis* Lammes = *Barbilophozia rubescens*
– *hyperborea* (Schust.) R. Stotl. & B. Stotl. ex Potemk. = *Orthocaulis hyperboreus*
– *kunzeana* (Hueb.) K. Muell. = *Orthocaulis kunzeanus*
– *lycopodioides* (Wallr.) Loeske var. *hatcheri* (Evans) Schljak. = *Barbilophozia hatcheri*
– *quadriloba* (Lindb.) Loeske = *Orthocaulis quadrilobus*
– *quadriloba* f. *glareosa* (Joerg.) Potemk. = *Orthocaulis quadrilobus* var. *glareosa* Joerg.
Blepharostoma setiforme (Ehrh.) Lindb. = *Tetralophozia setiformis*
Calypogeia muelleriana (Schiffn.) K. Muell. f. *sphagnicola* (H. Arnell & J. Perss.) Schljak. = *Calypogeia sphagnicola*
– *trichomanis* auct. non (L.) Corda = *Calypogeia azurea*
Cesius [*"Cesia"*] *concinnata* (Lightf.) S. Gray = *Gymnomitrion concinnatum*
– *corallioides* (Nees) Caruth. = *Gymnomitrion corallioides*
– *suecica* (Gott.) Lindb. = *Prasanthus suecicus*
Cephalozia albescens (Hook.) Dum. = *Pleurocladula albescens*
– *bicuspidata* (L.) Dum.
– *bicuspidata* subsp. *ambigua* (C.Mass.) Schust. = *Cephalozia ambigua*
– *bicuspidata* subsp. *lammersiana* (Hueb.) Schust. = *Cephalozia bicuspidata* var. *lammersiana*
– *bicuspidata* subsp. *otaruensis* (Steph.) Hatt. = *Cephalozia otaruensis*
– *bicuspidata* var. *ambigua* Schust. = misprinting for *Cephalozia bicuspidata* subsp. *ambigua*
– *bicuspidata* var. *atra* H. Arnell = *Cephalozia ambigua*
– *bicuspidata* var. *cavifolia* H. Arnell = *Cephalozia ambigua*
– *bifida* (Schreb.) Lindb. = *Cephaloziella rubella* var. *bifida*
– *denudata* (Nees) Spruce = *Odontoschisma denudatum*
– *divaricata* (Sm.) Dum. = *Cephaloziella divaricata*
– *fluitans* (Nees) Spruce = *Cladopodiella fluitans*
– *media* Lindb. = *Cephalozia lunulifolia*
– *striatula* C. Jens. = *Cephaloziella subdentata*
Cephaloziella alpina Douin = *Cephaloziella arctica*
– *alpina* var. *kaalaasii* Douin = *Cephaloziella arctica*
– *arctica* var. *alpina* Schust. = *Cephaloziella arctica*
– *bifida* (Schreb.) Schiffn. = *Cephaloziella rubella* var. *bifida*
– *divaricata* var. *incurva* Lindb. = *Cephaloziella divaricata* (according to Schuster 1980)
– *grimsulana* (Jack ex Gott. & Rabenh.) Lacout f. *arctica* (Bryhn & Douin) Schljak. = *Cephaloziella arctica*
– *grimsulana* f. *groenlandica* (Douin) Schljak. = *Cephaloziella arctica*
– *grimsulana* f. *kaalaasii* (Douin) Schljak. = *Cephaloziella arctica*
– *pearsonii* (Spruce) Douin = *Sphenolobopsis pearsonii*
– *rubella* (Nees) Warnst. var. *arctogena* Schust. = *Cephaloziella arctogena*
– *rubella* subsp. *arctogena* (Schust.) Schust. & Damsh. = *Cephaloziella arctogena*
– *starkei* (Funk ex Nees) Schiffn. = *Cephaloziella divaricata*
– *starkei* var. *ericetorum* C. Jens. ex Schiffn. = *Cephaloziella divaricata* var. *ericetorum*
– *striatula* (C. Jens.) Douin = *Cephaloziella subdentata*
– *striatula* var. *argudentata* S. Arnell = *Cephaloziella uncinata*
– *spinigera* (Lindb.) Joerg. emend. Schust. = *Cephaloziella subdentata*
Chandonanthus setiformis (Ehrh.) Lindb. = *Tetralophozia setiformis*
– *setiformis* var. *alpinus* (Hook.) Kaal. = *Tetralophozia setiformis* f. *alpina* (73)
Chiloscyphus minor (Nees) Engel & Schust. = *Lophocolea minor*
– *polyanthos* (L.) Corda var. *rivularis* (Schrad.) Nees = *Chiloscyphus rivularis*
– *pallescens* (Ehrh. ex Hoffm.) Dum. var. *fragilis* (A.Roth) K. Muell. = *Chiloscyphis fragilis*
– *polyanthos* (L.) Corda var. *fragilis* (A. Roth) K. Muell. = *Chiloscyphus fragilis*
– *profundus* (Nees) Engel & Schust. = *Lophocolea heterophylla*
Chomiocarpon ["*Chomocarpon*"*] quadratus* (Scop.) Nees = *Preissia quadrata*
– *commutatus* (Lindenb.) Lindb. = *Preissia quadrata*
Cladopus fluitans (Nees) Spruce = *Cladopodiella fluitans*
Clevea hyalina (Sommerf.) Lindb. = *Athalamia hyalina*
Conocephalum supradecompositum (Lindb.) Steph. = *Conocephalum japonicum*
Diplophyllum gymnostomophilum (Kaal.) Kaal.= *Scapania gymnostomophila*
– *plicatum* Lindb.= *Macrodiplophyllum plicatum*
– *microdontum* (Mitt.) Buch = *Macrodiplophyllum microdontum*
Eucalyx hyalinus (Lyell) Breidl. = *Plectocolea hyalina*
– *obovatus* (Nees) Breidl. = *Plectocolea obovata*
Fegatella conica (L.) Corda = *Conocephalum conicum*
Frullania tamarisci (L.) Dum. subsp. *nisquallensis* (Sull.) Hatt. = *Frullania nisquallensis*
Grimaldia pilosa (Horn.) Lindb. = *Mannia pilosa*
Grimaldia fragrans var. *sibrica* Ladyzh. = *Mannia sibirica*
Gymnocolea acutiloba (Schiffn.) K. Muell. = *Gymnocolea inflata* var. *acutiloba*

– *inflata* (Huds.) Dum.var.*heterostipa* (Carr.& Spruce) K. Muell. = *Gymnocolea inflata*
Gymnomitrion concinnatum (Lightf.) Corda var. *ambigua* Kaal. ex S. Arnell = *Gymnomitrion concinnatum*
– *concinnatum* var. *intermedium* Limpr. = *Gymnomitrion concinnatum*
Haplozia polaris (Lindb.) K. Muell. = *Jungermannia polaris*
Herbertus arcticus (H. Inoue & Steere) Schljak. = *Herbertus sakuraii*
Hepatica conica (L.) Lindb. = *Conocephalum conicum*
Jungermannia alpestris auct. non Schleich. ex Web. = *Lophozia sudetica*
– *alpestris* Schleich ex Web. = *Leiocolea alpestris*
– *badensis* Gott. ex Rabenh. = *Leiocolea badensis*
– *bicrenata* Schmid. ex Hoffm. = *Isopaches bicrenatus*
– *binsteadii* Kaal. = *Orthocaulis binsteadii*
– *caespiticia* Lindenb. = *Solenostoma caespiticium*
– *confertissima* Nees = *Solenostoma confertissimum*
– *crenulata* Sm. var. *gracillima* (Sm.) Hook. = *Solenostoma gracillimum* (excluded)
– *exertifolia* subsp. *cordifolia* (Dum.) Vana = *Jungermannia eucordifolia*
– *excisa* Dicks. = *Lophozia excisa*
– *globulifera* C. Jens. = *Scapania obcordata*
– *gracillima* Sm. = *Solenostoma gracillimum* (excluded)
– *gracilis* (Schleich. ex Nees) Heeg = *Orthocaulis attenuatus*
– *hatcheri* Evans = *Barbilophozia hatcheri*
– *heterocolpos* [“heterocolpa”] Thed. ex Hartm. = *Leiocolea heterocolpos*
– *hyalina* Lyell = *Plectocolea hyalina*
– *incisa* Schrad. = *Schistochilopsis incisa*
– *inflata* Huds. = *Gymnocolea inflata*
– *inflata* var.*heterostipa* Lindb.& Arnell = *Gymnocolea inflata*
– *jenseniana* Grolle = *Solenostoma pusillum*
– *kaurinii* Limpr. = *Leiocolea gillmanii*
– *kunzeana* Hueb. = *Orthicaulis kunzeanus*
– *kunzei* “Hueb.” ex Lindb., nom. inval. = *Orthocaulis kunzeanus*
– *kunzei* var. *plicata* (Hartm.) Lindb., nom illeg. = *Orthocaulis kunzeanus*
– *longidens* Lindb. = *Lophozia longidens*
– *lophocoleoides* Lindb. = *Leiocolea rutheana*
– *lycopodioides* Wallr. = *Barbilophozia lycopodioides*
– *minuta* Schreb. = *Sphenolobus minutus*
– *minuta* var. *grandis* (Gott. ex Lindb.) Lindb. & H. Arnell = *Sphenolobus minutus* var. *grandis*
– *murmanica* (Kaal.) H. Arnell = *Lophozia confertifolia*
– *obovata* (Nees) Lindb. = *Plectocolea obovata*
– *porphyroleuca* auct. non Nees = *Lophozia longiflora* var. *guttulata*
– *porphyroleuca* Nees = *Lophozia ventricosa*
– *quadriloba* Lindb. = *Orthocaulis quadrilobus*
– *quinquedentata* Huds. = *Tritomaria quinquedentata*
– *quinquedentata* Huds. var. *tenera* C. Jens. = *Tritomaria quinquedentata* f. *gracilis* (77)
– *quinquedentata* Huds. var. *turgida* Lindb. = *Tritomaria quinquedentata* var. *turgida*
– *rubra* Gott. ex Und. = *Plectocolea rubra*
– *saxicola* Schrad. = *Sphenolobus saxicola*
– *schiffneri* (Loitl.) Evans = *Jungermannia polaris*
– *sphaerocarpa* Hook. = *Solenostoma sphaerocarpum*
– *subelliptica* Lev.= *Plectocolea obovata*
– *ventricosa* Dicks. = *Lophozia ventricosa*
– *wenzelii* Nees = *Lophozia wenzelii*
Jamesoniella autumnalis (DC.) Steph. = *Crossogyna autumnalis*
– *undulifolia* (Nees) K. Muell. = *Crossogyna undulifolia*
Kantius [“Kantia”] trichomanis auct. non (L.) S. Gray = *Calypogeia muelleriana* s.l.
Kantius [“Kantia”] trichomanis (L.) S. Gray = *Calypogeia trichomanis*
Leiocolea heterocolpos var. *savicziae* Schljak. = *Leiocolea heterocolpos* var. *arctica*
– *kaurinii* (Limpr.) Joerg. = *Leiocolea gillmanii*
– *muelleri* (Nees ex Lindenb.) Joerg. = *Leiocolea alpestris*
Lophochaete fryei (H. Perss.) Schust. = *Pseudolepicolea fryei*
Lophozia alboviridis Schust. = *Isopaches alboviridis*
– *alpestris* auct. non (Schleich. ex Web.) Evans sensu Evans = *Lophozia sudetica*
– *alpestris* (Schleich. ex Web.) Evans = *Leiocolea alpestris*
– *alpestris* (Schleich.) Evans var. *gelida* (Tayl.) Macv. = *Lophozia sudetica*
– *alpestris* subsp. *polaris* Schust. = *Lophozia major*
– *alpestris* var. *polaris* Schust. = misprinting for *Lophozia alpestris* subsp. *polaris* Schust.
– *attenuata* (Mart.) Dum. = *Orthocaulis attenuatus*
– *badensis* (Gott. ex Rabenh.) Schiffn. ex Dalla Torre & Sarnth.= Leiocolea badensis
– *bantriensis* (Hook.) Steph. = *Leiocolea bantriensis*
– *barbata* (Schmid. ex Schreb.) Dum. = *Barbilophozia barbata*
– *bicrenata* (Schmid. ex Hoffm.) Dum. = *Isopaches bicrenatus*
– *binsteadii* (Kaal.) Evans = *Orthocaulis binsteadii*
– *collaris* (Nees) Dum. = *Leiocolea alpestris*
– *debiliformis* Schust. = *Protolophozia debiliformis*
– *decolorans* (Limpr.) Steph. = *Isopaches decolorans*
– *elongata* Steph. = *Protolophozia elongata*
– *floerkei* (F. Web. & Mohr) Schiffn. = *Orthocaulis floerkei*
– *fauriana* Steph. = *Lophozia longiflora*
– *gillmanii* (Aust.) Schust. = *Leiocolea gillmanii*
– *gracilis* Steph., nom. illeg. = *Orthocaulis attenuatus*
– *groenlandica* (Nees) Macoun sensu Schljak. 1979 = *Lophozia confertifolia*
– *groenlandica* (Nees) Macoun sensu Schuster, 1969, nom. ambig. = *Lophozia schusterana*
– *guttulata* (Lindb. & H. Arnell) Evans = *Lophozia longiflora* var. *guttulata*
– *guttulata* (Lindb. & H. Arnell) Evans var. *lapponica* Schljak. = *Lophozia longiflora*
– *hatcheri* (Evans) Steph. = *Barbilophozia hatcheri*
– *heterocolpos* (Thed. ex Hartm.) M. A. Howe = *Leiocolea heterocolpos*
– *heterocolpos* var. *arctica* (S. Arnell) Schust. & Damsh. = *Leiocolea heterocolpos* var. *arctica*
– *heterocolpos* var. *harpanthoides* (Bryhn & Kaal.) Schust. = *Leiocolea heterocolpos* var. *harpanthoides*
– *kateninii* (Schljak.) Duda = *Leiocolea kateninii*
– *kaurinii* (Limpr.) Steph. = *Leiocolea gillmanii*
– *kunzeana* (Hueb.) Evans = *Orthocaulis kunzeanus*
– *lycopodioides* (Wallr.) Cogn. = *Barbilophozia lycopodioides*
– *marchica* (Nees ex Limpr.) Steph. = *Schistochilopsis laxa*
– *murmanica* Kaal. = *Lophozia confertifolia*
– *obtusa* (Lindb.) Evans = *Obtusifolium obtusum*
– *polaris* (Schust.) Schust. & Damsh. = *Lophozia major*
– *quadriloba* (Lindb.) Evans = *Barbilophozia quadriloba*

– *quinquedentata* (Huds.) Cogn. = *Tritomaria quinquedentata*
– *rutheana* (Limpr.) M. A. Howe = *Leiocolea rutheana*
– *schultzii* Schiffn. = *Leiocolea rutheana*
– *silvicola* Buch = *Lophozia ventricosa*
– *uncinata* Schljak. = *Lophozia excisa* var. *infuscata*
Marchantia polymorpha L. var. *alpestris* (Nees) Gott., Lindenb. & Nees = *Marchantia alpestris*
– *polymorpha* var. *aquatica* (Nees) Gott., Lindenb. & Nees = *Marchantia aquatica*
Marsilia neesii "(Limpr.)" ex Lindb. = *Pellia neesiana*
Marsupella apiculata Schiffn. = *Gymnomitrion apiculatum*
– *aquatica* (Lindenb.) Schiffn. var. *gracilis* C. Jens. = *Marsupella aquatica*
– *pearsonii* Schiffn. ex Macv. = *Marsupella aquatica* f. *pearsonii* (41)
– *robusta* (De Not.) Evans f. *pearsonii* (Schiffn. ex Macv.) Schljak. = *Marsupella aquatica* f. *pearsonii* (41)
– *ustulata* Spruce = *Marsupella sprucei*
Martinellia bartlingii (Hampe ex Nees) Trev. = *Scapania cuspiduligera*
– *curta* (Mart.) Lindb. = *Scapania curta*
– *curta* (Mart.) Lindb. var. *viridissima* K. Muell. = *Scapania irrigua*
– *hyperborea* (Joerg.) Moell. = *Scapania hyperborea*
– *irrigua* (Nees) Lindb. = *Scapania irrigua*
– *irrigua* var. *alpina* (Bryhn) Moell. = *Scapania hyperborea*
– *paludicola* (Loeske & K. Muell.) C. Jens. = *Scapania paludicola*
– *paludosa* (K. Muell.) Arn. & Jens. = *Scapania paludosa*
– *rosacea* (Corda) Lindb. = *Scapania curta*
– *simmonsii* (Bryhn & Kaal.) H. Arnell = *Scapania simmonsii*
– *spitsbergensis* Lindb. = *Scapania spitsbergensis*
– *subalpina* (Nees) Lindb. = *Scapania subalpina*
Massula elegans (Schust.) Schljak. = *Lophozia excisa* var. *elegans*
– *grandiretis* (Lindb. ex Kaal.) Schljak. = *Schistochilopsis grandiretis*
– *hyperarctica* (Schust.) Schljak. = *Schistochilopsis hyperarctica*
– *incisa* (Schrad.) Schljak. = *Schistochilopsis incisa*
– *laxa* (Lindb.) Schljak. = *Schistochilopsis laxa*
– *opacifolia* (Culm. ex Meyl.) Schljak. = *Schistochilopsis opacifolia*
Massularia elegans (Schust.) Schljak. = *Lophozia excisa* var. *elegans*
– *grandiretis* (Lindb. ex Kaal.) Schljak. = *Schistochilopsis grandiretis*
– *hyperarctica* (Schust.) Schljak. = *Schistochilopsis hyperarctica*
– *incisa* (Schrad.) Schljak. = *Schistochilopsis incisa*
– *laxa* (Lindb.) Schljak. = *Schistochilopsis laxa*
– *opacifolia* (Culm. ex Meyl.) Schljak. = *Schistochilopsis opacifolia*
Metacalypogeia schusteriana Hatt. & Mizut. = *Eocalypogeia schusteriana*
Moerchia Gott. = *Moerckia*
Neesiella pilosa (Hornem.) Schiffn. = *Mannia pilosa*
Orthocaulis cavifolius Buch & S. Arnell = *Sphenolobus cavifolius*
– *elongatus* (Steph.) Evans = *Protolophozia elongata*
Pallavicinia blyttii (Moerck ex Hornem.) Lindb. = *Moerckia blyttii*
Peltolepis grandis (Lindb.) Lindb. var. *sibirica* (Lindb.) Lindb. = *Peltolepis quadrata*
– *grandis* (Lindb.) Lindb. var. *angustifrons* Lindb. = *Peltolepis quadrata*
Plagiochila arctica Bryhn & Kaal. var. *subarctica* (Joerg.) H. Inoue = *Plagiochila porelloides* f. *subarctica* (54)
– *asplenioides* (L.) Dum. subsp. *arctica* (Bryhn & Kaal.) Schust. = *Plagiochila arctica*
– *asplenioides* subsp. *porelloides* (Torrey ex Nees) Schust. = *Plagiochila porelloides*
– *asplenioides* subsp. *porelloides* f. *subarctica* (Joerg.) Schust. = *Plagiochila porelloides* f. *subarctica* (54)
Plectocolea subelliptica (Lindb.ex Kaal.) Evans = *Plectocolea obovata*
Pleurоclada albescens (Hook.) Spruce = *Pleurocladula albescens*
Riccardia pinguis (L.) S. Gray = *Aneura pinguis*
Riccia arvensis Austin = *Riccia bifurca*
– *crystallina* L. p.p. non "L. emend. Raddi" = *Riccia cavernosa* Hoffm. emend. Raddi
– *minima* L. = *R.* sorocarpa
Scapania arnellii Buch = *Scapania brevicaulis*
– *bartlingii* (Hampe ex Nees) Nees = *Scapania cuspiduligera*
– *crassiretis* Bryhn = *Scapania nemorea* subsp. *crassiretis*
– *curta* (Mart.) Dum. var. *rosacea* (Corda) Carring. = *Scapania curta*
– *globulifera* (C. Jens.) Schljak. = *Scapania obcordata*
– *irrigua* var. *alpina* Bryhn = *Scapania hyperborea*
– *jensenii* (K. Muell.) Schljak. = *Scapania obcordata*
– *lapponica* (H. Arnell & C. Jens.) Steph. = *Scapania obcordata*
– *lingulata* var. *microphylla* (Warnst.) Schust. = *Scapania lingulata*
– *microphylla* Warnst. = *Scapania lingulata*
– *mucronata* Buch var. *praetervisa* (Meyl.) Buch = *Scapania praetervisa*
– *mucronata* subsp. *praetervisa* (Meyl.) Schust. = *Scapania praetervisa*
– *nemorosa* (L.) Dum., nom. illeg. = *Scapania nemorea*
– *parvifolia* Warnst. = *Scapania scandica*
– *parvifolia* var. *grandiretis* Schljak. = *Scapania scandica* var. *grandiretis*
– *zemljae* = misprinting for *Scapania zemliae*
Scapaniella glaucocephala (Tayl.) Evans ex Verd. = *Scapania glaucocephala*
Solenostoma atrovirens (Dum.) K. Muell. = *Jungermannia atrovirens* (excluded)
– *levieri* (Steph.) Steph. = *Solenostoma confertissimum*
– *pumilum* (With.) K. Muell. = *Jungermannia pumila*
– *pumilum* subsp. *polaris* = *Jungermannia polaris*
– *subellipticum* (Lindenb.ex Kaal.) Schust.= *Plectocolea obovata*
Sphenolobus exsectiformis (Breidl.) Steph. = *Tritomaria exsectiformis*
– *politus* (Nees) Steph. = *Saccobasis polita*
Temnoma setiforme (Ehrh.) M.A. Howe = *Tetralophozia setiformis*
Tritomaria polita (Nees) Schiffn. = *Saccobasis polita*
– *polita* subsp. *polymorpha* Schust. = *Saccobasis polymorpha*
– *scitula* (Tayl.) Joerg. var. *spinosa* Herzog = *Tritomaria quinquedentata* f. *gracilis*

COMMENTS

1. *Anastrophyllum sphenoloboides* is a rather poorly known species that can be easily overlooked because of small size, occurrence usually as a small admixture, superficial similarity with *Sphenolobus minutus*.

2. *Aneura pinguis* var. *denticulata* was reported from Yamal by Andrejeva (1981). We were unable to study this specimen.

3. The distribution of *Anthelia julacea* is based on literature reports; however, numerous specimens identified as *A. julacea* represent misidentified *A. juratzkana* f. *elongata* Joerg.

4. *Barbilophozia rubescens* is a poorly known taxon. This large-celled liverwort was described recently from southern Greenland by Schuster (1988), and he tentatively considered it to be synonymous with a European endemic, *B. hatcheri* var. *grandiretis* Lammes. In Greenland female plants were found , while in northern Europe (Murmansk Region, on islands of Kandalaksha Bay of White Sea), only male plants are known. The record of this species from ZF is based on revision of a collection of *Orthocaulis kunzeanus*.

5. It is important to stress the necessity of identifying *Calypogeia* collections when fresh because of the importance of oil bodies for species determinations. The distribution listed herein is based on literature records and studies of dried material, so it may be not accurate.

6. The collection of *Cephalozia bicuspidata* var. *lammersiana* from BC is sparse; therefore, it cannot be identified with certainty.

7. The report of *Cephalozia connivens* from PU is based on sterile material; however, the ecology is not characteristic for *C. connivens* at the northern limit of its distribution, so we believe this record is doubtful. The voucher specimen was not available for us.

8. Old records of some species of *Cephaloziella* are unreliable because new species were described recently from the Arctic and some specimens probably represent these taxa.

9. *Cephaloziella arctogena* surely is much more widespread than our data indicate. When sterile, it is readily confused with *C. subdentata* (Schuster, 1988; Potemkin, 1992). In the last 5 years, *C. arctogena* has been found many times in the Arctic (Potemkin, 1992; Konstantinova & Filin, unpublished), as well as in southern Siberia (Konstantinova & Vasiljev, 1994) and Murmansk Region (Konstantinova, 1996).

10. *Cephaloziella aspericaulis* was identified from Chukotka by Potemkin (see Konstantinova & al., 1992) and later was found to be not very rare in this area.

11. According to Schljakov (1979), *Cephaloziella divaricata* is represented in Chukotka by the var. *scabra* only; however, the illustrations in his treatment resemble, in some respects, *C. aspericaulis*. Reports of *C. divaricata* var. *incurva* for ZF (Savicz, 1936), NS, WI (Gorodkov, 1956; 1958) should be attributed to *C. grimsulana* s. l. (Schljakov, l.c.).

12. *Cephaloziella divaricata* var. *ericetorum*, *C. hampeana* var. *sibirica, C. rubella* var. *bifida* are repoted by H.Arnell (1917: 22-23). We were unable to study these specimens and have no special opinion on these taxa.

13. The collections of *Cephaloziella divaricata* var. *polystratosa* from ZF and NS are based on sparse sterile material and should be considered tentative. Its taxonomic status, distribution, and differentiation need to be reassessed.

14. All Yamal (YG) collections of *Cephaloziella elegans* are based on sparse mostly sterile material and should be considered tentative.

15. *Cepaloziella hampeana* was tentatively recorded from NZ by S. Arnell (1947) (as *C.* cf. *hampeana*).

16. *Cephaloziella subdentata* was reported from NZ (Arnell, 1947), but all the material seen by us belong to other species of *Cephaloziella (C. uncinata, C. arctogena)*.

17. We completely agree with Schuster (1980: 254, 256; 1988 : 229) that the "disposition of Arctic plants of *Chiloscyphus* remains problematical". In many cases (especially in dead material), it is very difficult to differentiate *C. pallescens* from *C. polyanthos*. Most arctic specimens were not revised in the course of this study.

18. The report of *Chiloscyphus pallescens* from the Schokalsky Island (YG) by Zhukova & Rebristaya (1987) is based on specimens of *C. fragilis*.

19. When sterile, *Cladopodiella fluitans* can easily be confused with *Gymnocolea inflata*. For instance, in a specimen from Dudinka (see Lindberg & Arnell, 1889, LE) determined by H. Arnell as *C. fluitans*, only plants of *Gymnocolea inflata* were found. Differentiation of these species is discussed in detail by Schuster (1969: 792) and Schljakov (1979: 127).

20. The taxonomic status and distribution of *Diplophyllum taxifolium* var. *macrosticta* are unclear to us.

21. According to Schuster (1995), *Metacalypogeia* (Hatt.) H. Inoue subgenus *Eocalypogeia* (Schust.) Schust. should be considered as a separate genus, *Eocalypogeia* (Schust.) Schust.

22. All reports of *Frullania tamarisci* from the Russian Arctic are doubtful and more likely should be reffered to *F. nisquallensis* (Schljakov, 1982; Schuster, 1992). Unfortunately we were unable to study specimens from the Polar Urals and Chukotka. The record of *F. tamarisci* from ZF (see Steere & Inoue, 1978: 330; Schuster, 1992a: 51) reflects misinterpretation of the Russian text in Schljakov (1975).

23. *Gymnocolea inflata* var. *acutiloba* is very rare or absent in ZF. The collections from Rudolf Island could not be found, and collections reported from elsewhere in ZF do not belong to *Gymnocolea*.

24. *Gymnomitrion apiculatum* is probably more widespread in the Russian Arctic, but it is often confused with other species of the genus.

25. *Gymnomitrion concinnatum* is a highly polymorphic species, and we believe that most varieties described, including the var. *ambigua* Kaal. ex S. Arnell and the var. *intermedium* Limpr., are not distinct.

26. According to Vana (1973: 278), specimens from Bulkur and Kumachsur (Siberia, Lower Lena) determined as *Aplozia atrovirens* (see Arnell 1913) should be referred to *Jungermannia borealis*. Also, it is likely that specimens from TA (see Zhukova, 1973) and NS (see Gorodkov, 1956) represent *Jungermannia borealis* (cf. Damsholt & Vana 1977). Report of *Aplozia cordifolia* (Hook.) Dum. var. *sibirica* H. Arnell & C. Jens. from AO (H.Arnell, 1913:19) should be referred to *Jungermannia eucordifolia* Schljak. (J. Vana, pers. comm.).

27. *Jungermannia polaris* f. *cavifolius* (Schust.) Konst. & Potemk. comb. nov. (basionym: *Solenostoma polaris* f. *cavifolius* Schust. in Schust. & al., Natl. Mus. Canada Bull. 164:51, 1959) was found in ZF, YG, KH.

28. Only one specimen from ZF was identified as *Leiocolea* cf. *alpestris*. Plants reported under *L. alpestris* by Zhukova (1973) represent atypical *Lophozia major* with sporadic underleaves.

29. The junior author includes *Lophozia confertifolia* in *L. ventricosa* (see Potemkin, 1994), but in the present treatment, we follow Schljakov's concept (see Konstantinova & al., 1992: 121) and segregate it as a distinct species. *Lophozia groenlandica* is a nomen rejiciendum. *Lophozia confertifolia* evidently is much more widespread in the Arctic than our

data indicate.

30. *Lophozia excisa* var. *elegans* was found by Schljakov (1980) in specimens collected by Gorodkov on "one of the Arctic islands", and by Zhukova & Rebristaya (1987) from Schokalsky Island, in the Kara Sea (YG). The latter specimen (in LE) has been verified by us.

31. In spite of Schljakov's (1979) decision to treat *Lophozia heteromorpha* as synonymous with *L. confertifolia* (= *L. groenlandica* (Nees) Macoun sensu Schljakov), we consider it a distinct species.

32. Collections of *Lophozia longidens* from Yamal (YG) are sparse and cannot be identified with certainty. Thus, the occurrence of this species in this region needs to be verified.

33. Collection of *Lophozia pellucida* var. *minor* from SZ is sparse and cannot be identified with certainty. Thus, the occurrence of this species in this region needs to be verified.

34. Collections of Lophozia rubrigemma from PU and YG are sparse and cannot be identified with certainty. Therefore, the records for these regions need to be verified.

35. The taxonomic status of *Lophozia rufescens* is unclear to us.

36. *Lophozia savicziae* can be easily recognized in the field because of a very characteristic appearance, and under the microscope, the oil bodies in fresh material are distinctive. In contrast, the study of dry plants is often pointless. As noted by Potemkin (1993), the taxonomic status of plants with biconcentric and granulate oil bodies (see also Schljakov 1973, 1980) is unclear. All localities of L. savicziae included in the list should be considered tentative because they are based on identification of dried material only.

37. All identifications of *Lophozia schusteriana* from the Russian Arctic are based on dry plants (without oil bodies); therefore, they are doubtful.

38. We agree with Schuster (1969: 613) that *Lophozia sudetica* var. *gelida* is a xeromorphic phase of the species. Reports of *L. sudetica* from Chukotka are based, partly, on materials of other *Lophozia* species, *L. ventricosa* s.l. particularly.

39. Differentiation of *L. ventricosa* s.str. and *L. confertifolia* in dried herbarium material, i.e. without oil bodies, is troublesome. It seems that majority of records from the Russian Arctic should be referred to *L. confertifolia* (see Schljakov, 1980).

40. According to Bischler-Causses' and Boisselier-Dubayle's (1991) lectotypification of *Marchantia polymorpha*, three previously recognized species of the *M. polymorpha*-complex roughly correspond to three subspecies of *M. polymorpha*. *Marchantia polymorpha* corresponds to *M. polymorpha* ssp. *ruderalis* Bisch. & Boisselier, *M. aquatica* to ssp. *polymorpha*, and *M. alpestris* to ssp. *montivagans* Bisch. & Boisselier.

41. *Marsupella aquatica* has been revealed in collections from Chukotka. The senior author consider this taxon a distinct species (see Schljakov, 1981; Frahm, 1993). In WI *M. aquatica* f. *pearsonii* (Schiffn.) Schljak. was found.

42. *Marsupella boeckii* is often confused with *Cephaloziella* species. In collections from Chukotka, it was found as an admixture in many specimens of *M. arctica* and *M. emarginata*.

43. When sterile, *Mesoptychia sahlbergii* is subject for confusion with the more widespread *Leiocolea rutheana*. The differences between the two were discussed by Schuster (1969) and Schljakov (1979).

44. *Moerckia blyttii* was reported from PU erroneously by Zinovjeva (1973).

45. *Nardia scalaris* has a predominantly oceanic distribution, so the reports of this species from TA (Zhukova 1973b) and PU (Zinovjeva, 1973) seem doubtful. Voucher specimens were not available for us.

46. *Obtusifolium obtusum* was reported from ZF (see Zhukova 1973a,c) erroneously.

47. All Polar Urals specimens refered to *Orthocaulis atlanticus* were found to be other species.

48. Most Russian Arctic specimens refered to *Orthocaulis attenuatus* were found to be *O. binsteadii*.

49. *Orthocaulis floerkei* was found in one specimen from ZF (the Rudolf Island) that was determined by Zhukova as *O. kunzeana*.

50. *Orthocaulis hyperboreus* has been found in one specimen from Novaya Zemlya (Karmakulski, 13.9.1901 Ekstam, UPS), which was determined by H. Buch as "species nova?".

51. We cannot confirm the record of *Orthocaulis kunzeanus* from ZF; one of three available specimens represents an impoverished transitional form between *O. quadrilobus* f. *glareosa* and *O. kunzeanus*, while the rest represent other species. In collections from YG three forms of *Lophozia (Orthocaulis) kunzeana* (f. *acuta* Schust., f. *rotundiloba* Schust. and f. *wenzellioides* Schust.) were recorded (Potemkin, 1993).

52. *Barbilophozia (Orthocaulis) quadriloba* f. *cephalozielloides* (Schust.) Potemk. was recorded from YG by Potemkin (1993).

53. The distribution of *Plagiochila arctica* in the Russian Arctic, as well as its differentiation from *P. porelloides*, need to be assessed. In the Russian Arctic, these two species are not demarcated so distinctly as Schuster (1980) suggested.

54. All examined specimens reported as *Plagiochila arctica* from regions west of AO, except ZF, represent *P. porelloides* fo. *subarctica* (Joerg.) Konst. comb. nov. (basyonim: *Plagiochila asplenioides* var. *subarctica* Joerg., Bergens Mus. Skrifter 16:173, 1934). The latter taxon has been found in ZF!, SZ!, AO!, CC, SC, BC.

55. We follow Schljakov's (1981) concept and include *Plectocolea subelliptica* (Lindb.ex Kaal.) Evans in *P. obovata*.

56. The distribution of *Preissia quadrata* ssp. *hyperborea* in the Russian Arctic is unknown for the following reasons: 1) this subspecies was recently described (Schuster, 1985, 1995); 2) many arctic collections are sterile; and 3) northward the range of *P. quadrata* subsp. *quadrata* "remain undefined, chiefly because the taxonomy of the species remains unclarified" (Schuster, 1995: 370).

57. We agree with Schuster (1974) and Schljakov (1979) that report of *Protolophozia elongata* from ZF (Ladyzhenskaja & Zhukova, 1972b) is based on erroneous determinations, "judging from both text and figures of gemmi parous plants" (Schuster, 1974: 78). This specimen was not found in LE.

58. All reports of *Riccardia* spp. from the Russian Arctic are based on materials without oil bodies and cannot be considered reliable (see Potemkin 1991).

59. In the Arctic, *Riccia sorocarpa* is apparently represented by the recently described ssp. *arctica* (see Schuster 1992, Potemkin, 1993).

60. There are many misdeterminations of *Scapania brevicaulis* in materials from the Russian Arctic. The only verified specimen of this species is from Continental Chukotka.

61. Specimens identified as *Scapania calcicola* from ZF (see Zhukova, 1973b,c, LE) represent *S. ligulifolia, S. zemliae*, and *S. obcordata*. Materials from TA and NS were unavailable for study.

62. *Scapania gymnostomophila* f. *incurva* (Bryhn & Kaal. ex Bryhn) Schust. has been found by us in collections from YG, TA, SZ, KH.

63. The reports of *Scapania kaurinii* from NZ and YG are based on sparse, sterile material and should be considered tentative.

64. *Scapania lingulata* is a variable species. Transitional phenotypes between *S. lingulata* and *S. microphylla* occur, so we consider these taxa as representing a single species. Zhukova's (1973b) report of *S. lingulata* from ZF is erroneous, but S. Arnell (1947) correctly reported it from Novaya Zemlya and Waygach Island.

65. The report of *Scapania nemorea* from ZF (Zhukova, 1973c) belongs to *S. spitsbergensis* (Potemkin, 1994). Also, records of this species from Chukotka (Afonina & Duda, 1993) and Lower Indigirka (Afonina & Duda, 1978) represent *S. nemorea* subsp. *crassiretis*. Specimens from PU (Zinovjeva, 1973) and NS (Zhukova, 1982) were unavailable for study. Apparently, all reports of *S. nemorea* subsp. *nemorea* for the Arctic are erroneous (see Schuster, 1974; Schljakov, 1981).

66. *Scapania undulata* f. *aequatiformis* De Not. has been reported from PU (Novotny & Klimes, 1991).

67. All specimens of *Schistochilopsis hyperarctica* from the territory of Russia that we examined are attributed to other taxa, most often, to *S. opacifolia*. The only unrevised record of this species for the Russian Arctic is Schljakov's (Schljakov, 1980 : 238-239), and this specimen unfortunately was unavailable for study. The collection site, however, is atypical (peat hummock on brook bank, on peat) and distinctive features mentioned by the author (bright green color and larger gemmae) are not characteristic for *S. hyperarctica*. For this reason, we consider this report doubtful too.

68. In spite of Schuster's (1988) suggestion that *Schistochilopsis opacifolia* should be included in *S. incisa* as a subspecies,. We consicer it as a separate species.

69. *Schistochilopsis incisa* var. *inermis* (K. Muell.) Konst. *comb. nov.* (basyonym: *Lophozia incisa* var. *inermis* K. Muell., Leberm. in Rabenh. Kryptog.-Fl. 6, 1: 710. 1916). According to Mueller's original description this taxon differs from the type variety in entire leaves, which are longer than broad and bilobed to 1/2 their length, as well as in cells with bulging trigones. Schljakov (1979:64), however, interprets the var. *inermis* as mod. *edentata* (*densifolia & laxifolia, leptoderma & mesoderma*) of *S. incisa*, which is fairly common in the Arctic, and this may lead to erroneous reports of the variety. In our opinion, the most distinctive character of *S. incisa* var. *inermis,* associated with edentate leaves, is bulging trigones.

70. *Solenostoma rubrum* was reported from Chukotka by Schljakov (in Konstantinova & al., 1992). However this specimen is not available in LE.

71. Regional populations of *Sphenolobus cavifolius* differ greatly (see Schuster, 1969; Zinovjeva, 1969; Schuster & Damsholt, 1974; Schljakov, 1980), and this species often is a subject of confusion with *S. minutus*, especially its "var. *grandis*" phases.

72. *Sphenolobus minutus* var. *grandis* is often confused with *S. cavifolius* and also often has been not distinguished from *S. minutus* var. *minutum*. Therefore distribution of these taxa is known imperfectly.

73. *Tetralophozia setiformis* f. *alpina* (Hook.) Schljak. was recorded from ZF.

74. The specimen of *Tritomaria heterophylla* from ZF is poor, it cannot be identified with certainty. The f. *anomala* Potemkin (see Potemkin, 1990b, 1993) was recorded from the Yamal Peninsula.

75. *Tritomaria quinquedentata* f. *gracilis* Schust. has been found in many regions (ZF!, NZ!, YG!, TA!, SZ!, AO).

76. *Tritomaria quinquedentata* var. *grandiretis* was reported from Novaya Zemlya by Arnell (1947).

77. *Jungermannia quinquedentata* var. *tenera* H. Arnell & C. Jens. was considered by Mueller (1951-1958) to be synonymous with *Tritomaria scitula*. This lead to misinterpretation of the latter taxon and numerous erroneous reports of its occurrence in the Russian Arctic. *T. scitula* was not found in collections from ZF and NZ that were examined by us. We accept the synonymizatoion of *J. quinquedentata* var. *tenera* with *T. quinquedentata* f. *gracilis Schust.* (Schuster, 1969).

Erroneous and Doubtful Records From the Russian Arctic

Blepharostoma arachnoideum M.A.Howe (Zinovjeva (1973) is based on *B. trichophyllum* (L.) Dum. var. *brevirete* Bryhn et Kaal.

Calypogeia azurea Stotler & Crotz (Afonina & Duda, 1993). A doubtful record from Chukotka. Identifications were of plants without oil-bodies.

Calypogeia fissa (L.) Raddi (Zinovjeva, 1973). A doubtful record from the Polar Urals.

Cephalozia affinis Lindb. ex Steph. (Zinovjeva, 1973). A doubtful record from the Polar Urals.

Cephalozia lacinulata Jack ex Spruce (Zinovjeva, 1973; Zhukova & Katenin, 1975, 1976) – There are doubtful records from the Polar Urals and Chukotka Peninsula; ~~and~~ the record from the vicinity of Vorkuta (Kildjushevsky, 1975) is based on *C. bicuspidata* (Schljakov, 1979).

Cephaloziella biloba (Spruce) K.Muell. (Zhukova, 1973c, 1982b) is based on *C.* cf. *divaricata* var. *polystratosa*.

Cephalozilella dentata (Raddi) Migula (Zinovjeva, 1973) is based on *Cephaloziella* cf. *divaricata*.

Cephaloziella elachista (Jack ex Gott. & Rabenh.) Schiffn. (Zinovjeva, 1973) is based on *Cephalozia bicuspidata* (L.) Dum.

Conocephalum japonicum (Thunb.) Grolle (Afonina & Duda, 1993) is based on *Marchantia* sp. (very scant sterile material).

Frullania jackii Gott. (Zinovjeva, 1973). A doubtful record from the Polar Urals.

Geocalyx graveolens (Schrad.) Nees. Schljakov (1979b: 167) revised the specimens from Vorkuta (Kildjushevsky 1975) as *Lophozia collaris*. The specimens from Chukotka (LE) identified by J. Duda as *G. graveolens* do not include this species.

Gymnomitrium crenulatum Gott. ex Carring. (Zinovjeva, 1973). A doubtful record from the Polar Urals.

Gymnomitrium obtusum Lindb. (Zhukova, 1973) = *G. coralliodes*.

Harpanthus scutatus (F.Web. & Mohr) Spruce (Kildjuschevky, 1975). A doubtful record from the vicinity of Vorkuta. Zinovjeva's (1973) record of this species from Lagorta Pass, Vaykar River bank, does not fall within the Arctic territory as delimited herein.

Crossogyna autumnalis (DC.) Schljak. (Abramova & al., 1974, 1985) is based on *Plagiochila porelloides.*

Jungermannia atrovirens Dum. (Arnell, 1913; Zhukova, 1973a; Gorodkov, 1956) is based on *Jungermannia borealis* (see comment 26).

Jungermannia crenulata Smith var. *gracillima* (Smith) Hook. (Zhukova, 1972) is based on *Jungermannia polaris*.

Jungermannia gracillima Sm. (Abramova & al., 1985) = *Solenostoma rubrum* (Schljakov in Konstantinova & al., 1992).

Leiocolea gillmanii var. *ciliolata* Schust. (Zhukova 1973c).

A specimen from Hooker Island (26.VII. 1930, V.P. Savicz) represents *Leiocolea* cf. *alpestris*, whereas plants from Zemlya Alexandry Island (8.VII.1959, V. D. Alexandrova) are attributed to *Lophozia* aff. *excisa*.

Lophocolea heterophylla (Schrad.) Dum. (Zinovjeva, 1973). A doubtful record from the Polar Urals.

Lophozia ascendens (Warnst.) Schust. (Zhukova, 1982). A doubtful record from Bolshoy Lyakhovsky Island (Novosibirskie Islands).

Lophozia excisa var. *grandiretis* S.Arnell (Zhukova 1973c) is based on *L. rubrigemma* Schust. p.p. and *Lophozia excisa* var. *excisa*. This is the only typical material of *L. rubrigemma* from the Russian Arctic.

Lophozia uncinata Schljak. = *L. excisa* (Dicks.) Dum. var. *infuscata* Schust. & Damsh. The type material was unavailable for study. Other specimens identified by one of authors (ADP) are paroicous and represent *Lophozia excisa* var. *infuscata*. Recently, Schljakov (pers. comm.) has indicated that he considers these two taxa synonymous.

Mylia verrucosa Lindb. (reports from Russian Arctic) is based on *M. taylorii* (see Potemkin & Kazanovsky, 1993).

Odontoshcisma denudatum (Mart.) Dum.: all records of this species from the Russian Arctic are erroneous, and represent either *O. elongatum* or *O. macounii*.

Odontoschisma sphagni (Dicks.) Dum. (Zinovjeva, 1973). A doubtful record from the Polar Urals.

Scapania glaucocephala (Tayl.) Aust. (Zinovjeva, 1973). A doubtful record from the Polar Urals.

Scapania umbrosa (Schrad.) Dum. (Arnell, 1947) from NZ is based on *S. scandica* s.l. (20.VIII.1901 Ekstam, S!). The record from the vicinity of Vorkuta (Kildjushevsky, 1975) is doubtful.

Sphenolobopsis pearsonii Schust. & Kitag. (Zhukova, 1973b, LE) is based on *Sphenolobus minutus* (Schreb.) Berggr.

Schistochilopsis laxa (Lindb.) Konst. (Zhukova, 1986) is based on *L. incisa*.

Tritomaria quinquedentata var. *turgida* is based on *T. quinquedentata* var. *quinquedentata* (Potemkin, 1993: 80).

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LITERTURE CITED

Below we provide the complete and shortly annotated bibliography on liverworts of the Russian Arctic. So the list of literature cited is reduced to omit numerous repeatition and includes the papers on taxonomy or some general topics that were involved in discussion mostly in annotations and that are not devoted to liverworts of the Russian Arctic.

BISCHLER-CAUSSES, H & M. C. BOISSELIER-DUBAYLE 1991. Lectotypification of Marchantia polymorpha L. – *J. Bryol.* **16**: *361-365.*

DAMSHOLT, K. & J. VANA 1977. The genus Jungermannia L. emend. Dumort. (Hepaticae) in Greenland. – *Lindbergia* **4**(1-2): *1-26.*

GROLLE, R. 1983. Hepaticae of Europe including the Azores: an annotated list of species, with synonyms from the recent literature. – *J. Bryol.* **12**(3): *403-459.*

KONSTANTINOVA, N.A. & A. N. VASILJEV 1994. On the hepatic flora of Sayan Mountains (South Siberia). – *Arctoa* **3**: *123-132.*

[KONSTANTINOVA, N. A.] КОНСТАНТИНОВА Н. А. 1996. Новые для Мурманской области и редкие печеночники с территории Кандалакшского заповедника (Северо-запад России). – [New for Murmansk Region and rare liverworts from the territory of the Kandalakshsky State Nature Reserve (North-West of Russia)] – *Бот. журн. [Bot. Zhurn.]* **81**(8):

KOPONEN, T., P. ISOVIITA & T. LAMMES 1977. The bryophytes of Finnland: an annotated checklist. – *Flora Fennica* **6**: *1-77.*

MUELLER, K. 1905-1916. Die Lebermoose Deutschlands, Oesterreichs u. d. Schweiz. – *In: Rabenhort's Kryptogamen Flora,2 Aufl. Leipzig.* **6**(1): *1-870;* **6**(2): *1-947.*

MUELLER, K. 1951-58. Die Lebermoose Europas (Musci hepatici). Lfg 1-9. – *In: Rabenhorst's Kryptogamen Flora. Leipzig.* **6**(3): *1-1365.*

[POTEMKIN, A. D.] ПОТЕМКИН, А. Д. 1991. О состоянии изученности и задачах по изучению семейства Aneuraceae в СССР. – [Current status of knowledge and problems of studies of the family Aneuraceae in the USSR] *Бриология в СССР, ее достижения и перспективы (Мат. конф., Львов, 10-12 сент. 1991) (ред. Демкив, О. Т.), Львов, АН СССР, АН УССР [In: Demkiv, O. T. (ed.) Briologia v SSSR, ee dostizheniya i perspektivy (Proc. Conf., Lvov, 10-12 Sept. 1991). Lvov, Akad. Nauk SSSR & Akad. Nauk Ukr. SSR]: 169-174.*

POTEMKIN, A. D. & S. G. KAZANOVSKY 1993. On the genus Mylia S. Gray (Hepaticae, Jungermanniaceae, Mylioideae). – *Arctoa* **2**: *1-11.*

POTEMKIN, A. D. 1994. Studies on Scapania, Hepaticae. Sectio Rufidulae and sectio Nemorosae. – *J. Hattori Bot. Lab.* **77**: *273-285.*

SCHUSTER, R. M. 1966-1992. The Hepaticae and Anthocerotae of North America east of the hundredth meredian. – *New-York-London, Columbia Univ. Press* **1**: *802* (1966); **2**: *1062* (1969); **3**: *880* (1974); **4**: *1333* (1980); *Chicago, Field Museum of Natural History* **5**: *854* (1992); **6**: *937* (1992).

SCHUSTER, R. M. 1985. Some new taxa of Hepaticae. – *Phytologia* **57**(6): *408-414.*

SCHUSTER, R. M. 1988. The Hepaticae of South Greenland. – *Nova Hedwigia* **92**: *1-255.*

SCHUSTER, R. M. 1992. Studies on Marchantiales, I-III. – *J. Hattori Bot. Lab.* **71**: *267-287.*

SCHUSTER, R. M. 1995. Phylogenetic and taxonomic studies of Jungermanniidae, III. Calypogeiaceae. – *Fragm.*

Flor. Geobot. **40**(2): *825-888.*

SCHUSTER, R.M. & K.DAMSHOLT 1974. The Hepaticae of West Greenland from ca. 66° N to 72° N. – *Meddel. om Groenland* **199**(1): *1-373.*

STEERE, W. C. & H. INOUE 1978. The Hepaticae of Arctic Alaska. – *J. Hattori Bot. Lab.* **44**: *251-345.*

VANA, J. 1973. Studien uber die Jungermannioideae (Hepaticae). 2. – *Fol. Geobot. Phytotax.* **8**(3): *255-309.*

[YURTSEV, B.A., A.I.TOLMACHEV & O.V.REBRISTAYA] ЮРЦЕВ Б.А., А.И.ТОЛМАЧЕВ, О.В.РЕБРИСТАЯ 1978. Флористическое ограничение и разделение Арктики. – [The floristic delimitation and subdivision of the Arctic] *В кн.: Арктическая флористическая область (ред. Юрцев Б.А.), Л.: Наука [In: Yurtsev, B.A. (ed.) Arctic floristic province. Leningrad, Nauka]: 9-67.*

BIBLIOGRAPHY ON LIVERWORTS OF THE RUSSIAN ARCTIC

The following list includes 122 publications on liverworts of the Russian Arctic. Geobotanical papers, which mention some widespread liverworts only as well as abstracts are usually not included. For titles of papers published in Novosti Sist. Nizsh. Rast. translation is given in Latin (as this have done in this periodical), for others – in English.

[ABRAMOV, I. I.] АБРАМОВ, И. И. 1963. Мхи Новосибирских островов. – [Mosses of the Novosibirskie Islands] *Тр. Арктического и Антарктического научн. иссл. ин-та, Л., Морской транспорт [Trudy Arkticheskogo i Antarkticheskogo Nauch.-Issl. Inst.]. Leningrad, Morskoy transport* **224**: *206-222* [11 species are reported].

[ABRAMOVA, A. L.] АБРАМОВА, А. Л. 1956. Мхи северо-востока Азии. – [The Bryophytes of the North East of Asia] *Тр. бот. ин-та им. В. Л. Комарова АН СССР, сер. 2. Споровые растения [Trudy Bot. Inst. imeni V.L.Komarova Akad. Nauk SSSR, ser.2. Sporovye Rasteniya]* **10**: *490-511.* [Historical background of bryological study of North East Asia, Chukotka, Anadyr' River Region, 9 liverworts are reported].

[ABRAMOVA, A. L. & I. I. ABRAMOV] АБРАМОВА, А. Л., И. И. АБРАМОВ 1961. Metzgeria pubescens (Schrank) Raddi на северо-востоке Европы. – [Metzgeria pubescesns (Schrank) Raddi in the North-East of Europe] *Бот. матер. Отд. спор. раст. Бот. ин-та АН СССР [Bot. Mat. Otdela Spor. Rast. Bot. Inst. Akad. Nauk SSSR]* **14**: *279-281* [Morphology and ecology of *Metzgeria pubescens*].

[ABRAMOVA, A. L., O. M. AFONINA & J. DUDA] АБРАМОВА, А. Л., О. М. АФОНИНА, Й. ДУДА 1974. К флоре печеночных мхов Чукотского полуострова. – [Ad floram hepaticarum peninsulae Czukotka] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **11**: *311-317* [45 species are reported].

[ABRAMOVA, A. L., O. M. AFONINA & J. DUDA] АБРАМОВА, А. Л., О. М. АФОНИНА, Й. ДУДА 1976. К флоре печеночных мхов Чукотского полуострова II.- [Ad floram hepaticarum peninsulae Czukotka. II] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **13**: *208-214* [Annotated list of 54 species].

[ABRAMOVA, A. L., O. M. AFONINA & J. DUDA] АБРАМОВА, А. Л., О. М. АФОНИНА, Й. ДУДА 1980. К флоре печеночных мхов Чукотского полуострова. III. – [Ad floram hepaticarum peninsulae Czukotka. III] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **17**: *204-211* [Annotated list of 70 species].

[ABRAMOVA, A. L., O. M. AFONINA & J. DUDA] АБРАМОВА, А. Л., О. М. АФОНИНА, Й. ДУДА 1982. К флоре печеночных мхов Чукотского полуострова. IV. – [Ad floram hepaticarum peninsulae Czukotka. IV] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **19**: *184-186* [Annotated list of 67 species and 1 variety].

[ABRAMOVA, A. L., O. M. AFONINA & J. DUDA] АБРАМОВА, А. Л., О. М. АФОНИНА, Й. ДУДА 1985. Печеночные мхи Чукотского полуострова.- [The liverworts of the Chukotka Peninsula] *Магадан, ИПБС [Magadan, Inst. Probl. Biol. Severa]*: *1-40* [Annotated list of 154 species].

[ABRAMOVA, A. L., O. M. AFONINA & J. DUDA] АБРАМОВА, А. Л., О. М. АФОНИНА, Й. ДУДА 1987. Экология и распространение печеночных мхов на Чукотском полуострове. – [The Hepaticae of Chukotka Peninsula, their ecology and distribution] *Экология, распространение и жизненные формы растений Магаданской области, Владивосток [Ecology, distribution and life forms of plants of Magadan Region, Vladivostok]: 54-65* [Ecology, distribution of liverworts, Chukotka Peninsula].

[AFONINA, O. M. & J. DUDA] АФОНИНА, О. М., Й. ДУДА 1978. К флоре печеночных мхов низовьев р. Индигирки. – [Ad floram hepaticarum in fluxu inferiore fl. Indigirka vigentium notulla] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **15**: *212-218* [55 species, East Siberia].

[AFONINA, O. M. & J. DUDA] АФОНИНА, О. М., Й. ДУДА 1983. Материалы к флоре печеночных мхов бассейна реки Анадырь. – [Materies ad floram Hepaticarum in systemate fl. Anadyr] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **20**: *182-190* [Annotated list of 98 species, Chukotka].

[AFONINA, O. M. & J. DUDA] АФОНИНА, О. М., Й. ДУДА 1987. Материалы к флоре печеночных мхов бассейна реки Анадырь. 2. – [Materies ad floram Hepaticarum in systemate fl. Anadyr. 2] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **24**: *193-197* [Annotated list of 62 species, Chukotka].

[AFONINA, O. M. & J. DUDA] АФОНИНА, О. М., Й. ДУДА 1988. Материалы к флоре печеночных мхов острова Врангеля. – [Materies ad floram Hepaticarum insulae Wrangelii] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **25**: *170-175* [Annotated list of 62 species].

[AFONINA, O. M. & J. DUDA] АФОНИНА, О. М., Й. ДУДА 1992. К флоре печеночных мхов центральной

и западной Чукотки. – [Ad floram Hepaticarum partium centralis et occidentalis peninsulae Czukotka] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **28**: *140-144* [Annotated list of 66 species].

[AFONINA, O. M. & J. DUDA] АФОНИНА, О. М., Й. ДУДА 1993. Печеночные мхи Чукотки. – [Liverworts of Chukotka.] *Бот. журн. [Bot. Zhurn.]* **78**(3): *77-93* [Annotated list of 180 species].

[AFONINA, O. M. & I. I. MAKAROVA] АФОНИНА, О. М., И. И. МАКАРОВА 1981. Парциальная флора окружения горячих ключей: мхи и лишайники. – [Partial flora of surrounding of hot springs: bryophytes and lichens] *Экосистемы термальных источников Чукотского полуострова (ред. Юрцев, Б. А.) Л., Наука [In: Yurtsev B. A. (ed.) Ecosistemy termal'nykh istochnikov Chukotskogo poluostrova. Leningrad, Nauka]: 78-94.*

[ANDREEV, M. P., O. M. AFONINA & A. D. POTEMKIN] АНДРЕЕВ, М. П., О. М. АФОНИНА, А. Д. ПОТЕМКИН 1993. Мохообразные и лишайники островов Комсомолец и Большевик (архипелаг Северная Земля). – [Bryophytes and lichens of the Komsomolets and Bolshevik Islands (The Severnaya Zemlya Archipelago)] *Бот.журн. [Bot. Zhurn.]* **78**(2): *69-79* [Annotated list of 39 taxa new for Severnaya Zemlya].

[ANDREJEVA, E.N.] АНДРЕЕВА, Е. Н. 1981. О некоторых основных типах местообитаний мохообразных в южных гипоарктических тундрах Ямала. – [On some main types of habitats of bryophytes in southern hypoarctic tundras of Yamal] *В кн.: Брио-лихенологические исследования высокогорных районов и Севера СССР (ред. Шляков Р. Н.) [In: Schljakov, R. N. (ed.) Brio-likhenologicheskie issledovaniya vysokogornykh rayonov i Severa SSSR] Апатиты [Apatity]: 18-19* [23 hepatics from 11 localities of the Yamal Peninsula].

ARNELL, H. W. 1913. Zur Moosflora des Lena-Tales. – *Arkiv Bot.* **13**(2): *1-92* [The treatment of Nilson Ehle's bryophyte collection from the Lower Lena River including 61 liverworts, original description of *Radula prolifera*].

ARNELL, H. W. 1918. Die Moose der Vega-Expedition. – *Arkiv Bot.* **15**(5): *1-111* [The result of examination of F. R. Kjellman's bryophyte collection from the arctic coast of the Siberia including annotated list of 59 liverworts, original description of *Cephaloziella hampeana* var. *sibirica*].

ARNELL, S. 1947. Contributions to the knowledge of the hepatics of Novaya Zemlya. – *Svensk Bot. Tidskr.* **41**(2): *209-217* [55 species of liverworts, original description of *Scapania zemliae*, *Cephaloziella striatula* var. *argudentata*, *Tritomaria quinquedentata* var. *grandiretis*].

[ARNELL, S.] АРНЕЛЛЬ, З. 1948. Печеночные мхи, собранные на Новой Земле и Вайгаче О. Экстам в 1901-1902 гг. – [Liverworts collected of O.Ekstam in 1901-1902 in Novaya Zemlya and Vaijgach Island] *Бот. журн. [Bot. Zhurn.]* **33**(2): *254*. [23 species of liverworts new for Novaya Zemlya and Vaigach].

[BLAGODATSKICH, L. S. & J. DUDA] БЛАГОДАТСКИХ, Л. С., Й. ДУДА 1982. Дополнения к флоре печеночных мхов Таймыра. – [Additamenta ad floram hepaticarum paeninsulae Taimyr] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **19**: *199-200.*

[BLAGODATSKIKH, L.S., A. L. ZHUKOVA & N. V. MATVEEVA] БЛАГОДАТСКИХ, Л. С., А. Л. ЖУКОВА, Н. В. МАТВЕЕВА 1979. К флоре листостебельных и печеночных мхов окрестностей бухты Марии Прончищевой (Северо-Восточный Таймыр). – [On the bryophyte flora of vicinities of Mariya Pronchischeva Bay (north-eastern Taimyr)] *В кн.: Арктические тундры и полярные пустыни Таймыра (ред. Александрова В.Д., Н. В. Матвеева) [In: Aleksandrova, V.D. & N.V.Matveeva (eds.) Arcticheskie Tundry i Polarnye Pustyni Taimyra] Л., Наука [Leningrad, Nauka]: 133-139* [Annotated list of 46 species].

[BLAGODATSKIKH, L. S. & A. L. ZHUKOVA & N. V. MATVEEVA] БЛАГОДАТСКИХ, Л. С., А. Л. ЖУКОВА, Н. В. МАТВЕЕВА 1979. Листостебельные и печеночные мхи мыса Челюскин. – [Musci and Hepaticae of Cheluskin Cape] *В кн.: Арктические тундры и полярные пустыни Таймыра (ред. Александрова В. Д., Н. В. Матвеева) [In: Aleksandrova, V. D. & N. V.Matveeva (eds.) Arcticheskie Tundry i Polarnye Pustyni Taimyra] Л., Наука [Leningrad, Nauka]: 54-60* [Annotated list of 25 taxa of liverworts].

BUCH, H. 1928. Die Scapanien Nordeuropas und Sibiriens. II. Systematischer Teil. – *Soc. Sci. Fenn. Comment. Biol.* **3**(1): *1-175* [Keys,descriptions of liverworts,Scapaniaceae, Eurasia including Arctica].

[CZERNJADIEVA, I.V. & A. D. POTEMKIN] ЧЕРНЯДЬЕВА, И. В., А. Д. ПОТЕМКИН 1993. К флоре мохообразных Центрального Ямала. – [Ad Bryofloram Partis Centralis Paeninsulae Yamal.] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **29**: *165-172* [Annotated list of 72 mosses and 41 liverworts].

DUDA, J. 1977. Radula prolifera H. Arn. mit Perianthien. – *J. Bryol.* **9**(4): *505-507* [Description of perianth of *Radula proliphera*].

DUDA, J. 1984. Bemerkungen zur Lebermoosflora der Tschuktschen-halbinsel (Sowjetunion). – *Proc. of the Third Meeting of Bryologists from Central and East Europe. Praha: 213-216.* [Review of the liverwort flora of the Chukotka Peninsula].

[GORODKOV, B. N.] ГОРОДКОВ, Б. Н. 1939. Ботанико-географический очерк Чукотского побережья. – [Botanical and geographical outline of the Chukotka coast] *Уч. зап. Ленингр. гос. пед. ин-та, каф. физ. геогр. [Uchenye Zapiski Leningradsk. Gos. Pedag. Inst., Kafedra Fiz. Geogr.]* **21**: *99-175* [17 liverworts mentioned for different plant communities of the Chukotka coast].

[GORODKOV, B. N.] ГОРОДКОВ, Б. Н. 1956. Растительность и почвы о. Котельного (Новосибирский архипелаг). – [The vegetation and soils of Kotelny Island (Novosibirsky Archipelago] *В кн.: Растительность Крайнего Севера СССР и ее освоение (ред. Тихомиров В.А.) М.-Л., Изд. АН СССР [In: Tikhomirov, B. A. (ed.) Rastitel'nost' Krainego Severa SSSR i ee osvoenie, Moskwa-Leningrad, Izd. Akad. Nauk SSSR]* **2**: *7-132* [Frequency of 32 species in different plant communities is reported].

[GORODKOV, B. N.] ГОРОДКОВ, Б. Н. 1958. Почвенно-растительный покров острова Врангеля. – [The vegetation and soil of the Wrangel Island] *В кн.: Растительность Крайнего Севера СССР и ее освоение (ред. Тихомиров В.А.) М.-Л., Изд. АН СССР [In: Tikhomirov, B. A. (ed.) Rastitel'nost' Krainego Severa SSSR i ee osvoenie, Moskwa-Leningrad, Izd. Akad. Nauk SSSR]* **3**: *5-58* [Frequency of 27 taxa in different plant communities is reported].

[GRIBOVA, S. A. & A. D. POTEMKIN] ГРИБОВА, С. А., А. Д. ПОТЕМКИН 1988. К флоре печеночных мхов междуречья рек Томбой-яха и Се-яха (Центральный Ямал). – [On the flora of liverworts of interfluve of Tomboy-Yakha and Se-Yakha Rivers (the Central Yamal)] *Бот. журн. [Bot. Zhurn.]* **73**(5): *685-690* [Annotated list of 49 species].

[KATENIN, A. E. & M. S. BOCH] КАТЕНИН, А. Е., М. С. БОЧ 1970. Печеночники, мхи и лишайники. – [Liverworts, mosses and lichens] *Растительность Крайнего Севера СССР и ее освоение. [Rastitel'nost' Krainego Severa SSSR i ee osvoenie] Л., Наука [Leningrad, Nauka]* **10**: *47-55* [24 liverworts from Bolshezemelskaya tundra, north-eastern Europe].

[KILDJUSCHEVSKY, I. D.] КИЛЬДЮШЕВСКИЙ, И. Д. 1970. Главнейшие мхи и печеночники Севера. (Пособие для распознавания их по внешним признакам). – [Most common bryophytes of the North (Manual for their identificaion without microscope)] *Сыктывкар [Syktyvkar]: 1-91* [41 species of liverworts, north-east Europa].

[KILDJUSCHEVSKY, I. D.] КИЛЬДЮШЕВСКИЙ, И. Д. 1975. К флоре печеночников Коми АССР. – [Ad floram Hepaticarum RSSA Komi] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **12**: *301-306* [Annotated list of 41 species including 21 species from the Arctic].

[KONSTANTINOVA, N. A.] КОНСТАНТИНОВА, Н. А. 1989. Особенности таксономической структуры и сравнительная характеристика некоторых флор печеночников Севера. – [Special features of the taxonomical structure and comparative descri ption of some liverwort floras of the North] *В кн.: Проблемы бриологии в СССР (ред. Абрамов И. И.) Л., Наука [In: Abramov, I. I. (ed.) Problemy briologii v SSSR, Leningrad, Nauka]: 126-142* [Analysis of taxonomical and geographical structure and comparison of the liverwort floras of Arctic Alaska, West Greenland, the Chukotka Peninsula and the Murmansk Region, lists of differentiated species].

[KONSTANTINOVA, N. A.] КОНСТАНТИНОВА, Н. А. 1990. К флоре печеночников севера Архангельской области (по сборам Ф. И. Рупрехта, 1841 г.). – [On the liverwort flora of the North of the Arkhangelsk Region (on the basis of the F. I. Ruprecht's collection)] *В кн.: Ботанические исследования за Полярным Кругом (ред. Лукьянова Л. М.) Кировск, изд. Кольск. филиала АН СССР [In: Luk'yanova (ed.) Botanical Investigations Within the Arctic Circle, Kirovsk, Izd. Kol'sk. Fil. Akad. Nauk SSSR]: 92-97* [Annotated list of 30 hepatics from the Kolguev Island, the Kanin Peninsula and coast of the Barents Sea].

[KONSTANTINOVA, N. A. & I. V. CZERNJADIEVA] КОНСТАНТИНОВА, Н. А., И. В. ЧЕРНЯДЬЕВА 1995. Печеночники среднего течения реки Собь (Полярный Урал). – [De Hepaticis in regione fluxus medii fl. Sob (Ural Polaris) obviis notula] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **30**: *110-121* [Annotated list of 64 liverworts including 16 new to the Urals].

[KONSTANTINOVA, N. A. & W. B. KUVAJEV] КОНСТАНТИНОВА, Н. А., В. Б. КУВАЕВ. 1994. Класс Hepaticae (Hepaticopsida) – Печеночники . – [Class Hepaticae (Hepaticopsida) – (Liverwort)] *Растительный покров острова Сибирякова (Куваев, В. Б., А. Д. Кожевникова, С. В. Гудошников, М. П. Журбенко, Э. Л. Нездойминого), Москва [Rastitel'nyj pokrov ostrova Sibiryakova (Kuvajev, W. B., A. D. Kozhevnikova, S. V. Gudoshnokov, M. P. Zhurbenko, E. L. Nezdoiminogo), Moskwa]: 27 -30* [Annotated list of 15 hepatics].

[KONSTANTINOVA, N. A., A. D. POTEMKIN & R. N. SCHLJAKOV] КОНСТАНТИНОВА Н. А., А. Д. ПОТЕМКИН, Р. Н. ШЛЯКОВ 1992. Список печеночников и антоцеротовых территории бывшего СССР. – [Check-list of the Hepaticae and Anthocerotae of the former USSR.] – *Arctoa* **1**(1-2): *87-127* [List of 401 liverworts, disrtribution (including distribution of 192 species in 4 regions of the Russian Arctic), taxonomical comments and arrangement].

[LADYZHENSKAJA, K. I.] ЛАДЫЖЕНСКАЯ, К. И. 1953. Редкий вид печеночника Mesoptychia Sahlbergii (Lindb. et Arn.) Evans во флоре СССР. – [Rare hepatic, Mesoptychia sahlbergii (Lindb. et Arn.) Evans in the flora of USSR] *Бот. матер. отд. спор. раст. Бот. ин-та АН СССР. [Bot. Mat. Otd. Spor. Rast. Bot. Inst. Akad. Nauk SSSR]* **9**: *168-173* [Morphology and ecology of *Mesoptychia sahlbergii*, Siberia].

[LADYZHENSKAJA, K. I.] ЛАДЫЖЕНСКАЯ, К. И. 1963. Материалы для бриофлоры СССР. 3. Новый для СССР род печеночника Lepicolea Dum. – [On the bryoflora of the USSR. 3. The liverwort genus Lepicolea Dum. is new to the USSR] *Докл. АН БССР. [Doklady Akad. Nauk Belorusskoi SSR]* **7**(4): *270-273* [Morphology, ecology, distribution of *Lepicolea fryei*].

[LADYZHENSKAJA, K. I.] ЛАДЫЖЕНСКАЯ, К. И. 1964. К изучению редких печеночников Lepicolea fryei H. Perss. из Якутии и Neohattoria herzogii Kamim. с Курильских островов. – [Ad cognitionem Lepicolea fryei H.Perss. e Jakutia et Neohattoria Herzogii Kamim. ex insulis Kurilensibus] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* (1964): *256-264* [Morphology of *Lepicolea fryei* including first descri ption of perianth].

[LADYZHENSKAJA, K. I.] ЛАДЫЖЕНСКАЯ, К. И. 1971. О новых местонахождениях малоизвестного вида *Pseudolepicolea fryei* (Perss.) Grolle et Ando (Hepaticae) в Советской Арктике. – [De locis novis in Arctica Sovjetica speciei minus cognitae Pseudolepicolea fryei (Perss.) Grolle et Ando (Hepaticae)] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **8**: *314-318* [New reports of *Pseudolepicolea frei* from Siberia, its range map].

[LADYZHENSKAJA, K. I. & A. L. ZHUKOVA] ЛАДЫЖЕНСКАЯ, К. И., А. Л. ЖУКОВА 1971a. Эколого-морфологические особенности печеночных мхов в условиях высокоширотной Арктики. – [Eco-

logico-morphological peculiarities of hepatics under conditions of the High Arctic] *Экология [Ekologiya]* **3**: 26-30 [Peculiarities of ecology and morphology of 24 taxa of liverworts, Franz-Josef Land].

[LADYZHENSKAJA, K. I. & A. L. ZHUKOVA] ЛАДЫЖЕНСКАЯ, К. И., А. Л. ЖУКОВА 1972a. Печеночные мхи (Hepaticae) острова Земля Александры. – [On Hepaticae of Land Alexandra Island] *Бот. журн. [Bot. Zhurn.]* **57**(3): *348-353* [24 species, Franz-Josef Land].

[LADYZHENSKAJA, K. I. & A. L. ZHUKOVA] ЛАДЫЖЕНСКАЯ, К. И., А. Л. ЖУКОВА 1972b. Редкий вид Orthocaulis elongatus (Lindb.) Evans впервые во флоре печеночных мхов СССР. – [Orthocaulis elongatus (Lindb.) Evans – species rara primum in flora Hepaticarum URSS inventa] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **9**: *304-307* [Morphology and distribution of *Orthocaulis elongatus*, Franz-Josef Land].

[LADYZHENSKAJA, K. I., A. L. ZHUKOVA & E. S. KOROTKEVICZ] ЛАДЫЖЕНСКАЯ, К. И., А. Л. ЖУКОВА, Е. С. КОРОТКЕВИЧ 1970. К изучению флоры печеночных мхов Арктики СССР. 1. О малоизвестном печеночнике Lophozia opacifolia Culmann. – [Ad cognitionem florae hepaticarum Arcticae URSS. I. De Lophozia opacifolia Culmann specie minus cognita] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **7**: *318-324* [Morphology and distribution of *Lophozia opacifolia*, its differentiation from *L. incisa*].

LINDBERG, S. O. & H. W. ARNELL 1889. Musci Asiae borealis. I. Lebermoose. – *Kongl. Sv. Vet.-Akad. Handl.* **23**(5):*1-69* [96species including original description of species: *Jungermannia sahlbergii, J. guttulata, Calycularia laxa* and genus *Prasanthus*, Siberia].

NOVOTNY, I. & L. KLIMES 1991. Lophozia (Protolophozia) debiliformis Schust. & Damsh. (Hepaticae) in the Polar Ural Mountains. – *Acta Mus. Moraviae, Sci. Nat.* **76**: *281-282* [Description of locality of *Lophozia debiliformis*, associated species of hepatics].

[POHLE, R. R.] ПОЛЕ, Р. Р. 1915. Материалы для познания растительности северной России. I. К флоре мхов северной России. – [The materials for knowledge of the vegetation of the north of Russia. I. To the bryoflora of the North of Russia] *Тр. Импер. Бот. Сада [Trudy Imperatorskogo St.-Peterburgskogo Bot. Sada]* **33**(1): *1-148* [58 liverworts including 32 species from the Kanin-Pechora Region and 4 species from the Polar Urals].

[POTEMKIN, A. D.] ПОТЕМКИН, А. Д. 1988. О печеночных мхах арктических тундр Ямала. – [On the hepatics from arctic tundras of the Yamal Peninsula] *Тр. 2 Молодежн. конф. ботаников Ленинграда, апрель 1988, Ленинград, Ч. 1. Деп. ВИНИТИ 14.VII.1988 N 5682-B88 [Trudy 2 molodezhnoi konf. botanikov g. Leningrada, April 1988, Leningrad, Msc. reserved VINITI 14.VII.1988 N 5682-B88]: 96-101.*

[POTEMKIN, A. D.] ПОТЕМКИН, А. Д. 1989. Печеночные мхи арктических тундр Ямала. – [Liverworts of the Yamal Arctic tundras] *Бот. журн. [Bot. Zhurn.]* **74**(6): *806-815* [Annotated list of 62 species, analysis of flora].

[POTEMKIN, A. D.] ПОТЕМКИН, А. Д. 1990a. Lophozia alboviridis и L. decolorans на полуострове Ямал. – [Lophozia alboviridis and L. decolorans (Hepaticae) on the Yamal Peninsula] *Бот. журн. [Bot. Zhurn.]* **75**(8): *1086-1092* [Morphology, variation, differentiation, ecology and distribution of *Lophozia alboviridis* and *L. decolorans*].

[POTEMKIN, A. D.] ПОТЕМКИН, А. Д. 1990b. Род Tritomaria (Lophoziaceae, Hepaticae) на Ямале. – [The genus Tritomaria (Lophoziaceae, Hepaticae) in Yamal] *Бот. журн. [Bot. Zhurn.]* **75**(12): *1742-1753* [Morphology and ecology of *Tritomaria* species in Yamal, original descriptions of *Tritomaria quinquedentata* var. *grandigemma* and *T. heterophylla* f. *anomala*, key to recognized taxa].

[POTEMKIN, A. D.] ПОТЕМКИН, А. Д. 1990c. Анализ модификационной изменчивости печеночников полуострова Ямал. – [Analysis of modificational variability of hepatics of the Yamal Peninsula] *Труды 3 молодежной конференции ботаников г. Ленинграда, Л., БИН (Рукопись деп. в ВИНИТИ 14 ноября 1990, N 5700-B90) [Trudy 3 molodezhnoi konf. botanikov Leningrada, Leningrad (Msc. reserved VINITI 14.XI.1990, N 5700-B90)]: 235-254* [Morphological plastisity of diverse morphological characters, their correlative variability and correlations of their variability with ecological conditions, Yamal].

[POTEMKIN, A. D.] ПОТЕМКИН, А. Д. 1990d. Об изменчивости некоторых печеночных мхов из южных и арктических тундр полуострова Ямал. – [De mutabilitate specierum nonnullarum Hepaticarum e tundris partium australi ac arcticae peninsulae Jamal] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **27**: *147-153* [Morphology, variation and differentiation of *Calycularia laxa, Cryptocolea imbricata, Lophozia heteromorpha, L. rubrigemma, Sphenolobus saxicola*].

POTEMKIN, A. D. 1992a. A new species of Prasanthus (Hepaticae, Gymnomitriaceae) from the Yamal Peninsula, West Siberian Arctic. – *Ann. Bot. Fennici* **29**(4): *319-323* [Description of *Prasanthus jamalicus*, Gymnomitriaceae, West Siberia].

[POTEMKIN, A. D.] ПОТЕМКИН, А. Д. 1992b. Barbilophozia hyperborea (Schust.) Potemk. comb. nov. и Cephaloziella rubella (Nees) Warnst. var. arctogena Schust. в Советской Арктике. – [Barbilophozia hyperborea (Schust.) Potemk. comb. nov. et Cephaloziella rubella (Nees) Warnst. var. arctogena Schust. in Arctica Sovetica] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **28**: *148-155* [Morphology, differentiation, ecology and distribution, Yamal].

[POTEMKIN, A. D.] ПОТЕМКИН, А. Д. 1993a. О внутривидовой таксономии, размножении и синонимике Scapania scandica (H.Arn. et Buch) Macv. (по ямальским материалам). – [De taxonomia intraspecifica, multiplicatione ac synonymia Scapaniae scandicae (H.Arn. et Buch) Macv. secus materies e peninsula Yamal notula] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **29**: *153-157* [Synonymy of *S. scandica* and *S. parvifolia*, sporophyte description of *S. scandica* var. *argutedentata*].

POTEMKIN, A. D. 1993b. The Hepaticae of the Yamal Peninsula, West Siberian Arctic. – *Arctoa* **2**: *57-101* [Anno-

tated list of 156 liverwort taxa, original description of *Gymnocolea fascinifera*].

[POTEMKIN, A. D.] ПОТЕМКИН, А. Д. 1993c. О размножении некоторых печеночников. – [De Hepaticarum nonnullarum multiplicatione] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **29**: *145-152* [New data on sexual and asexual reproduction of arctic populations of 11 taxa].

[POTEMKIN, A. D.] ПОТЕМКИН, А. Д. 1994. Печеночные мхи низовьев реки Чугорьяха (юго-западная часть Гыданского полуострова, западносибирская Арктика). – [The liverworts of the lower reaches of the Chugoriyakha River (south-western part of the Gydan Peninsula, West Siberian Arctic)] *Бот. журн. [Bot. Zhurn.]* **79**(8): *51-57* [Annotated list of 47 hepatics].

POTEMKIN, A. D. & N. A. KONSTANTINOVA 1995. Rare liverworts of the Russian arctic – preliminary list and directions for future research.- *Cryptogamica Helvetica* **18**: *43-50* [List of 77 rare in Russian Arctic liverworts, an attempt of explanation of reasons of rarity of species].

[SAVICZ, L. I.] САВИЧ, Л. И. 1936. Мхи архипелага Земля Франца Иосифа, Северной Земли и о. Визе, собранные В. П. Савичем во время полярной экспедиции 1930 г. на ледоколе Г. Седов. – [Bryophytes of the Franz-Josef Land Archipelago, Severnay Zemlya and Wise Island collected by V. P. Savicz during polar expediton in 1930 on the ice-breaker "G.Sedov"] *Тр. Бот. инст. АН СССР, сер.II [Trudy Bot. Inst. Akad. Nauk SSSR, ser. II]* **3**: *505-508*.

[SAVICZ, L. I. & K. I. LADYZHENSKAJA] САВИЧ, Л. И., К. И. ЛАДЫЖЕНСКАЯ 1936. Определитель печеночных мхов севера Европейской части СССР. – [Manual of liverworts of the European North of the USSR] *М.-Л., Изд-во АН СССР [Moskwa, Leningrad, Isd. Akad. Nauk SSSR], 304* [Descriptions, key to genera and species, distribution within and outside the USSR].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1971a. Две новые крупноклеточные разновидности печеночников. – [Varietates duae novae magnicellulares Hepaticarum] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **8**: *327-334* [Original descriptions of *Leiocolea heterocolpos* var. *savicziae* and *Scapania parvifolia* var. *grandiretis*, Murmansk Region].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1971b. О родовой принадлежности и распространении печеночника Orthocaulis cavifolius Buch et S. Arnell. – [De positione generica et distributione Orthocaulis cavifolii Buch et S. Arnell Notula] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **8**: *335-340* [Confirmation of the K. Mueller's idea on position of *Orthocaulis cavifolius* in the genus *Sphenolobus*, based on detail analysis of morphology and anatomy].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1972. Систематические заметки по роду Scapania Dum. – [Notulae systematicae de genere Scapania Dum.] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **9**: *319-327* [Taxonomical position and morphology of *Scapania zemliae, S. brevicaulis* and *S. degenii*; taxonomical status of *S. mucronata* var. *praetervisa*].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1973a. Некоторые результаты изучения печеночных мхов европейского и западно-сибирского севера СССР. – [Some results of the study of hepatics of the European and West Siberian North of the USSR] *Бот. журн. [Bot. Zhurn.]* **58**(10): *1536-1553* [Species composition and taxonomic arrangement of liverworts of the North of the USSR].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1973b. Печеночный мох Bucegia romanica Radian на севере Якутии. – [De Bucegia romanica Radian (Hepaticae) in parte boreali Jakutiae inventa] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **10**: *285-286* [Morphology and distribution of *Bucegia romanica*, Siberia].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1973c. Систематические заметки по семейству Lophoziaceae Cavers. – [Notulae systematicae in Lophoziaceis Cavers] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **10**: *287-302* [taxonomical notes on *Barbilophozia hatcheri, Lophozia latifolia, L. murmanica, L. major,* original description of *L. savicziae*].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1974a. Дополнения к флоре мохообразных СССР. – [Additamenta ad Bryofloram URSS] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **11**: *354-360*. [9 rare liverworts, Northern Russia].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1974b. Новые таксоны рода Lophozia Dum. emend. Schljak. – [Taxa nova generis Lophozia Dum. emend. Schljak.] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **11**: *350-354* [Descriptions of 3 new varieties of Lophozia].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1975a. Дополнение к статье "Важнейшие систематические признаки в роде Lophozia Dum. s. str.". – [The complement to the article "Most significant taxonomic characters in the genus Lophozia Dum. s. str."] *Бот. Журн. [Bot. Zhurn.]* **60**(1): *150* [*Lophozia fauriana* Steph and *L. guttulata* var. *laponica* Schljak. are shown synonyms of *L. longiflora*].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1975b. Дополнения к флоре печеночников Советской Арктики. – [Additamenta ad floram hepaticarum Arcticae URSS] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **12**: *318-323* [19 new and rare liverworts from Chukotka].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1976. Печеночные мхи Севера СССР. 1. Антоцеротовые; печеночники: гапломитриевые-мецгериевые. – [Liverworts and hornworts of the North of the USSR. I. Anthocerotae; Hepaticae: Haplomitriaceae–Metzgeriaceae] *Л., Наука [Leningrad, Nauka], 91* [Descriptions and keys to species].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1977. Редкие виды мохообразных некоторых районов Севера СССР. – [Rare bryophytes in some regions of the North of the USSR] *В кн.: Охрана ботанических объектов на Крайнем Севере (ред. Андреев Г. Н.) Апатиты, изд-во Кольского филиала АН СССР [In: Andreev, G.N. (ed.) Okhrana botanicheskikh ob'ektov na Krainem Severe, Apatity, Izd. Kol'skogo Fil. Akad. Nauk SSSR]: 49-61* [Rare species, places of concentration of rare bryophytes, North of the USSR].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1978. Новые виды печеночников из Сибири и Дальнего Востока. – [Не-

paticarum species novae e Sibiria et Oriente Extremo] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **15**: *242-247* [Original description of *Cephaloziella violacea, Leiocolea kateninii, Crossocalyx koriakensis*, southern part of the East Siberian Lowland, Chukotka Peninsula, Koryakia].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1979a. Новые дополнения к флоре печеночников северных районов СССР. – [Additamenta nova ad floram hepaticarum regionum septentrionalium URSS] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **16**: *201-208* [11 species, original description of *Lophozia uncinata*].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1979b. Печеночные мхи Севера СССР. Вып. 2. Печеночники: гербертовые-геокаликсовые. – [Liverworts and hornworts of the North of the USSR. 2. Herbertaceae-Geocalicaceae] *Л., Наука [Leningrad, Nauka], 191* [Descriptions and keys for species].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1979c. Изученность мохообразных Крайнего Севера СССР и дальнейшие задачи их изучения. – [Bryophytes of the extreme North of the USSR and the problems of their investigation] *Биологические проблемы Севера: VIII Симпоз. Пленар. докл., ботаника [Biological problems of the North: VIII simposium. Abstracts]: 17-18.*

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1979d. О соотношении флор печеночников тундровой части Мурманской области и Чукотского полуострова. – [Comparison of the liverwort floras of tundra parts of the Murmansk Region and the Chukotka Peninsula] *Биологические проблемы Севера : VIII Симпоз. Пленар.докл., ботаника. [Biological problems of the North: VIII simposium. Abstracts]: 64-65.*

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1980a. Новые интересные находки печеночников из северных районов СССР. – [De hepaticis in regionibus borealibus URSS inventis novis et curiosis notula.] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **17**: *235-241* [original description of *Lophozia rufescens*, considerable range extension of *Massula hyperarctica* and *Nardia japonica*, Khibiny Mts., Timan Mts., Chukotka Peninsula].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1980b. Печеночные мхи Севера СССР. Вып. 3. Печеночники: лофозиевые, мезоптихиевые. – [Liverworts and hornworts of the North of the USSR. 3. Lophoziaceae – Mesoptychiaceae] *Л., Наука [Leningrad, Nauka], 188* [Descriptions and keys for species].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1981a. Номенклатурные заметки о некоторых таксонах печеночников. – [Notulae nomenclatoricae de taxis nonnullis Hepaticarum.] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **18**: *212-221* [Generic conception of *Sphenolobus*; namenclature of *Lophozia alpestris*; synonymy of *Scapania parvifolia* and *S. scandica*].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1981b. Печеночные мхи севера СССР. 4 Печеночники: юнгерманниевые-скапаниевые. – [Liverworts and hornworts of the North of the USSR. 4. Jungermanniaceae-Scapaniaceae.] *Л., Наука [Leningrad, Nauka], 220* [Descriptions and keys for species].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1982. Печеночные мхи севера СССР. 5. Лофоколеевые-риччиевые. – [Liverworts and hornworts of the North of the USSR. 5. Lophocoleaceae-Ricciaceae.] *Л., Наука [Leningrad, Nauka], 195* [Descriptions and keys for species].

[SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1983. Cephaloziella uncinata Schust. – новый вид для флоры печеночников СССР. – [Cephaloziella uncinata Schust. – species pro flora Hepaticarum URSS nova] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **20**: *203-205* [Records of *Cephaloziella uncinata* from Novaya Zemlya and Murmansk Region, morphology and ecolgy of this species].

SCHLJAKOV, R. N. & A. D. POTEMKIN 1990. The main features of the hepatic flora of the arctic floristic region of the USSR. *In: Schljakov, R. N. (ed.) Abstr. 7th Meeting Centr. & East Europ. Bryol. Working Group, Kirovsk – Apatity, 25-30 June 1990. Apatity, Acad. Sci. USSR, Kola Sci. Center, Polar-Alpine Bot. Garden: 61-62.*

SCHUSTER, R. M. & N. A. KONSTANTINOVA 1996. Studies on the distribution of critical arctic/subarctic Hepaticae with special reference to taxa found in Russia. – *Lindbergia* **21**: *26-48* [The geographical distribution and taxonomy of a large number of taxa including 30 species found in the Russian Arctic].

[SMIRNOVA, Z. N.] СМИРНОВА, З. Н. 1931. Материалы к бриофлоре Урала. – [To the bryoflora of the Urals] *Журн. Русс. Бот. Общ-ва [Zhurn. Russ. Bot. Obshch.]* **16**(5-6): *519-536* [60 hepatics from the Urals including 32 species from the Polar Urals].

SMIRNOVA, Z. N. & A. E. KATENIN] СМИРНОВА, З. Н., А. Е. КАТЕНИН 1973. К флоре печеночных мхов низовьев р. Лены. – [Ad floram Hepaticarum e regionibus fluxum inferiorem fluminis Lena Adjacentibus] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **10**: *277-283* [Annotated list of 15 liverworts from the Lower Lena, East Sibera].

[STEPANOVA, N. A. & J. DUDA] СТЕПАНОВА, Н. А., Й. ДУДА 1984. К флоре печеночных мхов нижнего течения р. Колымы. – [Ad floram Hepaticarum in fluxu inferiore fl. Kolyma inventarum] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **21**: *208-210* [Annotated list of 26 liverworts from the Lower Kolyma, East Siberia].

[ZENKOVA, E. J.] ЗЕНКОВА, Е. Я. 1953. К флоре печеночных мхов Таймыра. – [On hepatic flora of the Tajmyr] *Бот. матер. отд. спор. раст. Бот. ин-та АН СССР. [Bot. Mat. Otd. Spor. Rast. Bot. Inst. Akad. Nauk SSSR]* **9**: *162-168* [Annotated list of 13 species].

[ZENKOVA, E. J.] ЗЕНКОВА, Е. Я. 1954. Печеночные мхи из района раскопок Таймырского мамонта. – [Liverworts from the region of Taimyr mammoth excavation] *Бот. журн. [Bot. Zhurn.]* **39**(6): *915-917* [7 fossil species from peat and 11 liverworts of modern flora, Taimyr].

[ZHUKOVA, A. L.] ЖУКОВА, А. Л. 1972. К флоре печеночных мхов островов Хейса, Гекера и Солсбери из архипелага Земля Франца-Иосифа. – [Ad floram hepaticarum insularum Hayes, Salisbury et Hooker ex

archipelago Terrae Franz Joseph dictae] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **9**: *307-310* [Annotated list of 14 taxa].

[ZHUKOVA, A. L.] ЖУКОВА, А. Л. 1973a. Видовой состав и распределение печеночных мхов в растительных сообществах района Таймырского стационара. – [Composition and distribution of liverworts in the plant communities of the Taimyr Station district] *В кн.: Биогеоценозы Таймырской тундры и их продуктивность (ред. Тихомиров Б. А.) [In: Tikhomirov, B. A. (ed.) Biogeocenosy Taimyrskoi tundry i ikh productivnost'] Л., Наука [Leningrad, Nauka]* **2**: *120-127* [Annotated list of 53 taxa].

[ZHUKOVA, A. L.] ЖУКОВА, А. Л. 1973b. Печеночные мхи о. Рудольфа (архипелаг Земля Франца-Иосифа). – [De Hepaticis insulae Rudolfii (Terra Franz-Joseph)] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **10**: *272-277* [Annotated list of 15 taxa].

[ZHUKOVA, A. L.] ЖУКОВА, А. Л. 1973c. Флористический анализ печеночных мхов (Hepaticae) Земли Франца-Иосифа. – [Floristic analysis of Hepaticae from the Franz-Josef Land] *Бот. журн. [Bot. Zhurn.]* **58**(4): *528-539* [Floristic analysis of liverwort flora].

[ZHUKOVA, A. L.] ЖУКОВА, А. Л. 1974. Печеночные мхи (Hepaticae) из бухты Марии Прончищевой (северо-восточный Таймыр). – [Hepaticae in sinu Mariae Pronczischczevae (pars Boreali-Orientalis peninsulae Tajmyr) inventae] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **11**: *333-338* [Annotated list of 27 taxa].

[ZHUKOVA, A. L.] ЖУКОВА, А. Л. 1977. К флоре печеночных мхов Арктики: Остров Большой Бегичев. – [Ad floram hepaticarum Arcticae (insula Boljschoj Begiczev] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **14**: *234-236* [Annotated list of 14 species, Taimyr].

[ZHUKOVA, A. L.] ЖУКОВА, А. Л. 1978. Два интересных вида печеночных мхов с острова Врангеля. – [Two interesting species of liverworts from the Wrangel Island] *Бот. журн. [Bot. Zhurn.]* **63**(10): *1460-1466*. [New records, morphology, ecology and distribution of *Cryptocolea imbricata* and *Metacalypogeia schusterana*].

[ZHUKOVA, A. L.] ЖУКОВА, А. Л. 1979. К флоре печеночных мхов Арктики: Полуостров Челюскин. – [Ad floram hepaticarum Arcticae, in paeninsula Czeljuskin vigentium] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **16**: *196-201* [Annotated list of 17 species].

[ZHUKOVA, A. L.] ЖУКОВА, А. Л. 1981. Печеночные мхи среди лишайников плато Тулай-Киряка (северо-восточный Таймыр). – [The Hepaticae among the lichens of Tulai-Kirjak Plateau (North-Eastern Taimyr)] *Бот. журн. [Bot. Zhurn.]* **66**(5): *684-694* [Annotated list of 38 species].

[ZHUKOVA, A. L.] ЖУКОВА, А. Л. 1982a. Редкий вид Lophozia heteromorpha Schust. et Damsh. в Советском Союзе. – [Lophozia heteromorpha Schust. et Damsh. – species ad floram hepaticarum URSS nova] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **19**: *204-208* [First reports from the USSR, morphology, ecology and distribution of *Lophozia heteromorpha*, Novosibirskie Islands].

[ZHUKOVA, A. L.] ЖУКОВА, А. Л. 1982b. К флоре печеночных мхов острова Большой Ляховский (Новосибирские острова). – [A contribution to the flora of hepatic mosses from the Bolshoy Lyakhovsky Island (Novosiberian Islands)] *Бот. журн. [Bot. Zhurn.]* **67**: *1669-1673* [55 taxa of liverworts new to the Bol'shoy Lyakhovskiy Island, including ecological data and data on reproductivity].

[ZHUKOVA, A. L.] ЖУКОВА, А. Л. 1986. Печеночные мхи окрестностей пос. Кресты (подзона южных тундр, западный Таймыр). – [The liverworts of the Kresty Settlement vicinity (subzone of the southern tundra, West Taimyr)] *В кн.: Южные тундры Таймыра (ред. Чернов Ю. И, Н. В. Матвеева) Л., Наука [In: Chernov, Yu. I. & N. V. Matveeva (eds.) Yuzhnye Tundry Taimyra, Leningrad, Nauka]: 80-88* [Annotated list of 53 species, East Siberia].

[ZHUKOVA, A. L.] ЖУКОВА, А. Л. 1987. К флоре печеночных мхов острова Врангеля. – [To the liverwort flora of the Wrangel Island] *Бот. журн. [Bot. Zhurn.]* **71**(7): *901-903* [Annotated list of 55 taxa].

[ZHUKOVA, A. L. & S. A. GRIBOVA & T. K. YURKOVSKAYA] ЖУКОВА, А. Л., С. А. ГРИБОВА, Т. К. ЮРКОВСКАЯ 1981. Печеночные мхи в районе среднего течения р. Сулы (Малоземельская тундра). – [De hepaticis in fluxu medio fl.Sula (Tundra Terrae Minoris) inventis] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **18**: *208-212* [Annotated list of 21 species, north-eastern Europa].

[ZHUKOVA, A. L. & A E. KATENIN] ЖУКОВА, А. Л., А. Е. КАТЕНИН 1975. К флоре печеночных мхов Чукотского полуострова. – [Some new data on the Hepaticae of Chukotka Peninsula] *Бот. журн. [Bot. Zhurn.]* **60**(9): *1319-1325* [Annotated list of 41 species and 6 varieties].

[ZHUKOVA, A. L. & A. E. KATENIN] ЖУКОВА, А. Л., А. Е. КАТЕНИН 1976. Печеночные мхи из тундровых сообществ Чукотского полуострова. – [The liverworts from tundra communities of the Chukotka Peninsula] *В кн.: Биология и продуктивность растительного покрова Северо-Востока, Владивосток [In: Biologiya i productivnost rastitelnogo pokrova Severo-Vostoka, Vladivostok]*: *49-63* [41 species are reported].

[ZHUKOVA, A. L. & N. V. MATVEEVA] ЖУКОВА, А. Л., Н. В. МАТВЕЕВА 1986. Печеночные мхи из района среднего течения р. Сырадасай (Западный Таймыр). – [De Hepaticis e fluxu medio fl. Syradassaj (Taimyr Occidentalis) notula] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **23**: *234-241* [Annotated list of 34 species].

[ZHUKOVA, A. L. & O. V. REBRISTAYA] ЖУКОВА, А. Л., О. В. РЕБРИСТАЯ 1986. К флоре печеночных мхов района реки Матюйяха (полуостров Ямал). – [On the liverwort flora of the Matyuiyakha River region (Yamal Peninsula)] *Бот. журн. [Bot. Zhurn.]* **72**(5): *642-649* [Annotated list of 43 taxa].

[ZHUKOVA, A. L. & O. V. REBRISTAJA] ЖУКОВА, А. Л., О. В. РЕБРИСТАЯ 1987. К флоре печеночных мхов острова Белого (Карское море). – [Ad floram He-

paticarum insulae Albae (Belyi, Mare Caricum] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **24**: *208-213* [Annotated list of 46 species].

[ZHUKOVA, A. L. & O. V. REBRISTAJA] ЖУКОВА, А. Л., О. В. РЕБРИСТАЯ 1987. Печеночные мхи острова Шокальского (Карское море). – [De Hepaticis in insula Schokalskii (Mare Caricum) vigentibus notula] *Новости сист. низш. раст. [Novosti Sist. Nizsh. Rast.]* **24**: *203-208* [Annotated list of 34 species].

[ZHUKOVA, A. L. & O. I. SUMINA] ЖУКОВА, А. Л., О. И. СУМИНА 1976. К флоре печеночных мхов массивов байджарахов острова Котельного (Новосибирские острова). – [On liverworts flora of baydzherakh massifs at Kotelny Island (Novosibirsk Islands)] *Бот. журн. [Bot. Zhurn.]* **61**(4): *538-543* [27 species and their distribution in plant communities].

[ZINOVJEVA, L. A.] ЗИНОВЬЕВА, Л. А. 1969a. О встречаемости и изменчивости Tritomaria scitula (Tayl.) Joerg. на Приполярном и Северном Урале. – [On frequency and variability of Thritomaria scitula (Tayl.) Joerg. in the Northern and Polar Urals] *Уч. зап. Пермск. Гос. ун-та. Биология. [Uchenye Zapiski Permsk. Gos. Univ. Biologiya]* **179**: *274-281* [Distribution, variability and ecology of *Tritomaria scitula*].

[ZINOVJEVA, L. A.] ЗИНОВЬЕВА, Л. А. 1969b. Sphenolobus cavifolius (Buch et Arn.) K. Mueller и Sphenolobus minutus (Crantz) Steph. по уральским материалам. (Морфолого-систематические заметки). – [Sphenolobus cavifolius (Buch et Arn.) K. Mueller and Sphenolobus minutus (Crantz.) Steph. according to materials from the Urals. (Morphological and taxonomical notes)] *Уч. зап. Пермск. Гос. ун-та. Биология. [Uchenye Zapiski Permsk. Gos. Univ. Biologiya]* **179**: *282-288* [Morphology, taxonomy and ecology of *Sphenolodus cavifolius* and *S. minutus*, the Urals].

[ZINOVJEVA, L. A.] ЗИНОВЬЕВА, Л. А. 1973. К флоре печеночных мхов Полярного и Северного Урала. – [To the hepatic flora of the Polar and Northern Urals] *Уч. зап. Пермск. Гос. ун-та, ботаника [Uchenye Zapiski Permsk. Gos. Univ., Botanika]* **263**: *14-37* [Annotated list of 136 species, including 90 species from the Arctic].