

CONTRIBUTION TO THE HEPATIC FLORA OF MONGOLIA

К ФЛОРЕ ПЕЧЕНОЧНИКОВ МОНГОЛИИ

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Abstract

Annotated list of 43 species of hepatics was compiled based on identification of ca. 200 samples collected in recent years by Ts. Tsegmed and E. Enkhjargal in the area of Sharyn gol (Mongol Daur District) and Prikhubsugul District. 16 species are recorded as new for Mongolia: *Moerckia flotoviana*, *Riccardia palmata*, *Lejeunea cavifolia*, *Obtusifolium obtusum*, *Lophozia longidens*, *Scapania gymnostomophila*, *S. irrigua*, *S. mucronata*, *S. cf. paludicola*, *S. spitsbergensis*, *Tritomaria exsecta*, *Arnellia fennica*, *Liochlaena subulata*, *Leiocollea badensis*, *L. heterocolpos*, and *Mesoptychia sahlbergii*. The previous study of liverworts in Mongolia is overviewed.

Резюме

Приводится подробный аннотированный список 43 видов печеночников, полученный в результате обработки коллекций, собранных после 2005 г. Ц. Цэгмэд и Э. Энхжаргал. Впервые для флоры печеночников Монголии отмечается 16 видов: *Moerckia flotoviana*, *Riccardia palmata*, *Lejeunea cavifolia*, *Obtusifolium obtusum*, *Lophozia longidens*, *Scapania gymnostomophila*, *S. irrigua*, *S. mucronata*, *S. cf. paludicola*, *S. spitsbergensis*, *Tritomaria exsecta*, *Arnellia fennica*, *Liochlaena subulata*, *Leiocollea badensis*, *L. heterocolpos* и *Mesoptychia sahlbergii*. Приведён обзор изученности видов печеночных мхов Монголии и подчеркнута необходимость специального исследования печеночников в пределах страны.

KEYWORDS: flora, Hepatics, Mongolia, new records

INTRODUCTION

The study of mosses in Mongolia started in 1970. At present 456 species of mosses belonging to 164 genera and 41 families are known in the country (Tsegmed, 2010). The bryophyte herbarium of the Botanical Institute of Mongolian Academy of Science counts 20.000 specimens. Although the special study of hepatics have never been undertaken in Mongolia, hepatics were collected occasionally and accumulated in herbarium. We assume that a lot of specimens with admixture of hepatics are kept in our moss herbarium waiting for identification.

The first list of Mongolian bryophytes was published by V.F. Brotherus and L.I. Savicz-Lyubitskaya (Brotherus & Savicz, 1932). It includes 2 species of hepatics (*Marchantia polymorpha* and *Gymnomitrium corallioides*). In first publication on Mongolian hepatics based on identification of a rather large collection gathered by botanists in Mongolia, J. Duda (1968) recorded 12 taxa: *Ricciocarpos natans*, *Reboulia hemisphaerica*, *Mannia fragrans*, including *M. fragrans* fo. *inodora*, *M. pilosa*, *Marchantia polymorpha*, *Lophozia excisa* (*Lophozia excisa*), *Barbilophozia barbata*, *Plagiochila porelloides*, *Lophocolea minor*, *Cephaloziella hampeana*, and *C. subdentata*.

Later 8 hepatics (*Barbilophozia kunzeana* [Schljakovia kunzeana], *Barbilophozia lycopodioides*, *Tritomaria quinquententata*, *Ptilidium ciliare*, *P. pulcherrimum*, *Scapania degenii*, *S. paludosa*, *Frullania dilatata*) new for Mongolia were reported by Abramova & Abramov (1976, 1978) as well as 7 species (*Riccia bifurca*, *R. cavernosa*, *R. frostii*, *Oxymitra paleacea*, *Athalamia hyalina*, *Apometzgeria pubescens*, *Scapania cuspiduligera*) were added by Schubert *et al.* (1977).

An annotated list of liverworts was published by Abramov *et al.* (1979). Twelve species were added to the liverwort flora of Mongolia: *Riccia sorocarpa*, *Chandonanthus setiformis* (*Tetralophozia setiformis*), *Lophozia ventricosa*, *Tritomaria exsectiformis*, *Sphenolobus minutus*, *S. saxicola*, *Lophocolea heterophylla*, *Lepidozia reptans*, *Marsupella revoluta* (*Apomarsupella revoluta*), *Radula complanata*, *Porella platyphylla*, and *Frullania eboracensis*; also all literature data were compiled and as a result a list of 39 liverwort species from 24 genera known at that time in Mongolia, was published. In addition, a collection gathered by the Polish botanists who studied the flora and vegetation of Mongolia during 1974-1975 and 1977-1978, was identified by K. Karczmarz; he men-

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tioned three species of hepatics new for Mongolian flora: *Aneura pinguis*, *Lophozia incisa* (*Schistochilopsis incisa*), *Cephaloziella divaricata* (Karczmarz, 1981)

In "Synopsis of flora of mosses of Mongolia", I.I. Abramov and A.L. Abramova (1983) reported as new to Mongolia 10 species of liverworts: *Metzgeria furcata*, *Blasia pusilla*, *Barbilophozia hatcheri*, *Jungermannia pumila*, *Plagiochila asplenioides*, *Chiloscyphus pallescens*, *Blepharostoma trichophyllum*, *Calyptogeia neesiana*, *Scapania calcicola*, and *S. curta*; their list of Mongolian hepatics counted 52 species from 31 genus and 22 families. The authors noted that *Cephaloziella rubella*, which was recorded by K. Karczmarz and F. Swies (1981), was omitted in their synopsis.

In the set of publications of German bryologists (Grolle *et al.*, 1983, 1986; Meinunger *et al.*, 1991), that were based on collections of the German botanists another 5 species were added to Mongolian flora of hepatics: *Targionia hypophylla*, *Riccia fluitans*, *Plagiochasma japonicum*, *Frullania bolanderi* and *F. muscicola* (with notes that previous identification of *F. dilatata* could be wrong). Later A.D. Potemkin in the course of identification of some collections added to the list of Mongolian liverworts two species: *Cephaloziella elegans* and *Lophozia jurensis* (Potemkin & Tsegmed, 2007). Recently *Sauteria alpina* was recorded for Mongolia (Andrejeva & Borovichev, 2011). Thus liverwort flora of Mongolia included hitherto 61 species belonging to 34 genera and 22 families.

In 2011, in the Mycological Laboratory of the Forest Protection Center in Krasnoyarsk, Russia, the authors studied about 200 samples of liverworts, which were collected in recent years by T. Tsegmed and E. Enkhjargal in the area of Sharyn gol (Mongol Daur District) and in the area of Prihubsugulie District. This study revealed 16 species, 12 genera and 5 families new to Mongolia; therefore at present liverwort flora of Mongolia comprises 77 species, 45 genera, and 27 families. This is not a rich flora but results indicate that the liverworts are a little known group in Mongolian flora and they represent an interesting object for further studies.

ANNOTATED LIST OF SPECIES

The annotated list of liverworts includes 43 species from the 30 genera and 19 families. Five families, 12 genera and 17 species are recorded as new to the liverwort flora of Mongolia. Species new for Mongolia are marked with asterisks.

Nomenclature and systematic arrangement follow Konstantinova *et al.* (2009).

BLASIACEAE

Blasia pusilla L. – Mongol Dahur.: Darkhan Uul aimag, Sharyn Gol sum, upper course of Monostoi valley, edge of *Betula platyphylla* Sukacz. + *Pinus sylvestris* L. forest, on soil along stream, 16.VIII.2006.

MARCHANTIACEAE

Marchantia polymorpha L. – Mongol Dahur.: Darkhan Uul aimag, Sharyn Gol sum, upper course of Monostoi valley, 1295 m, *Betula platyphylla* grassy forest, on soil of tree-trunk, 20.VIII.2006; Khangai: Uburkhangai aimag, Uyanga sum, Naiman Nuur lake, Shireet lake, *Larix sibirica* Ledeb. + *Pinus sibirica* Du Tour. forest, on soil, 9.III.1976.

AYTONIACEAE

Reboulia hemisphaerica (L.) Raddi – Prihubsugul.: Khubsugul aimag, Renchinlumbe sum, southern slope of Toshloi mountain, *Larix sibirica* forest with rocky fields, on rock, 28.VI.2006.

Mannia fragrans (Balb.) Frye & L. Clark – East. Mong.: Sukhe-Baatar aimag, Munkh-Khan sum, Munkh-Khan mountain, 1400 m, on rock, 25.VII.1974, coll. N.S.Golubkova; Khentei aimag, Bat Shireet sum, Middle Nomgon mountain, 1400 m, on near rock, 16.VII.1974, coll. N.S.Golubkova.

MOERCKIACEAE

**Moerckia flotoviana* (Nees) Schiffn. – Prihubsugul.: Khubsugul aimag, Ulaan Uul sum, upper course of river Khugiin Gol, on soil along stream, 18.VII.2009.

ANEURACEAE

**Riccardia palmata* (Hedw.) Carruth. – Prihubsugul.: Khubsugul aimag, Ulaan Uul sum, Doodbulag range, *Pinus sibirica* + *Larix sibirica* + *Picea obovata* Ledeb. forest, on rotten log, 4.VII.2008.

METZGERIACEAE

Apometzgeria pubescens (Schrank) Kuwah. (= *Metzgeria pubescens* (Schrank) Raddi) – Prihubsugul.: Khubsugul aimag, Ulaan Uul sum, upper course of Baruun Uher stream, *Pinus sibirica*+*Larix sibirica* forest, under rock, 9.VI.2009.

RADULACEAE

Radula complanata (L.) Dumort. – Prihubsugul.: Khubsugul aimag, Tsagaan Nuur sum, West Taiga, Kholboo mountain, 2400 m, rocky slope, in rocky crevices, 28.VI.2007.

PORELLACEAE

Porella platyphylla (L.) Pfeiff. – Khentei: Environs of Ulaanbaatar city, Khentei range, Khandgait mountain, *Pinus sibirica*+*Larix sibirica* forest, on rock, 27.V.2006; Prihubsugul.: Khubsugul aimag, Tsagaan Uul sum, basin of Egiin Gol river, Udzichin stream, 1900 m, on rock along bank of stream, 2.VII.1972, coll. E. Kuk and U.Tsogt; same sum, Dood Nuur lake, Togost mountain, 1750 m, on stone, 6.VIII.1972, coll. E. Kuk and U.Tsogt; same aimag, Tsagaan Uur sum, Arig river, Ouyt mountain, 1380 m, southern slope of mountain, on stone and rock, 26.VII.1972, coll. E. Kuk and U.Tsogt; same aimag, Alag-Erdene sum, south-east bank of Khubsugul lake, on rock, in rock crevices and on soil near rock, 14.VII.2005.

FRULLANIACEAE

Frullania dilatata (L.) Dumort. – Khangai: Arkhan-

gai aimag, Tariat sum, lake Terkhiin Tsagaan huur, Khor-go mountain, Volcano plateau, 2090 m, on rock, 23.VI.1977; Mongol Dahur.: Darkhan Uul aimag, Sharyn Gol sum, Monostoi valley, 1200 m, edge of *Betula platyphylla*+*Pinus sylvestris* forest, on rock, 16.VIII.2005; same place, upper course of Monostoi valley, 1295 m, *Betula platyphylla* grassy forest, on rotten log, 20.VIII.2006; same aimag, Khongor sum, Ar Gakhait valley, 1211 m, southern slope of mountain, on rock, 22.VIII.2006; Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, Chachir mountain, 1750 m, *Larix sibirica* mossy (*Rhytidium rugosum*) forest, under rock, 25.VI.2006; same aimag, Ulaan Uul sum, Deed Taigas river, 1755 m, on rock along bank, 21.VII.2009; same aimag, Tsagaan Uul sum, cliff at 2 km to south from Urtyin Davaa pass, 1680 m, *Larix sibirica* open forest, on soil near rock, 22.VII.1972, coll. E. Kukuk and U. Tsogt; same sum, Dood Nuur lake, Togost mountain, 1750 m, on stone and rock, 6.VII.1972, coll. E. Kukuk and U. Tsogt.

LEJEUNEACEAE

**Lejeunea cavifolia* (Ehrh.) Lindb. – Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, Khoridol Saridag range, Khar Zurh mountain, *Picea obovata*+*Pinus sibirica*+*Larix sibirica* forest with rocky fields, on rock, 15.VII.2006; same sum, Khonog Tsol mountain, southern slope of mountain, *Pinus sibirica* open forest with rocky fields, on soil, 18.VII.2007.

PTILIDIACEAE

Ptilidium ciliare (L.) Hampe – Mongol Dahur.: Darkhan Uul aimag, Sharyn Gol sum, Khurgat river, *Betula platyphylla*+*Pinus sylvestris* forest, on tree trunk, 12.VIII.2005.; same sum, upper course of Monostoi valley, 1295 m, *Betula platyphylla* grassy forest, on rotten log, 20.VIII.2006; Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, southern slope of Zuulun mountain, *Larix sibirica* mossy (*Rhytidium rugosum*) forest, on tree-trunk, 7.VI.2006; same sum, mouth of Shishhit and Tengis rivers, Shiveet Khad mountain, *Pinus sibirica*+*Larix sibirica* forest, 9.VI.2006; same sum, Ulaan Shoroot valley, Uvuljuu mountain, *Larix sibirica* sedge-mossy (*Rhytidium rugosum*) forest, on rotten log, 20.VI.2006; same place, Khar Murugu mountain, *Betula platyphylla*+*Larix sibirica*+*Pinus sibirica* forest, on rock and wet soil, 21.VI.2006; same place, mountain summit, *Pinus sibirica*+*Larix sibirica* forest, on soil, 21.VI.2006; same sum, Elst river, meadow with *Larix sibirica* and shrubs, on soil, 21.VI.2006; same sum, Chachir mountain, *Larix sibirica* mossy (*Rhytidium rugosum*) forest, on soil, 25.VI.2006; same sum, Khalzan mountain, *Picea obovata*+*Larix sibirica* grassy forest, on tree-trunk and soil, 3.VII.2006; same sum, Khoridol Saridag range, Khar Zurh mountain, *Larix sibirica*+*Pinus sibirica* with *Picea obovata* forest, on soil and rock, 14.VII.2006; same sum, Ulaan Shoroot valley, Sul mountain, *Larix sibirica*+*Pinus sibirica* forest, on rock near stream, 4.VII.2007; same sum, Khoridol Saridag range, Khonog Tsol valley, on soil and tree-trunk, 7.VII.2007; same sum, Ulaan Khad mountain,

Picea obovata+*Larix sibirica* forest, on rotten log and soil, 16.VII.2007; same sum, East Taiga, Tsagaan Chuluut river, on rock, 8.VI.2008; same place, Tsagaan Chuluut mountain, rocky slope, on rock and wet soil, 10.VI.2008; same sum, Moorog mountain, on soil, 12.VI.2008; same sum, Bayan valley, 1985 m, *Larix sibirica* shrubby forest, on soil, 17.VI.2009; Tsagaan Nuur sum, West Taiga, Khunher Taiga pass, *Larix sibirica* forest, on soil, 7.VII.2008; same sum, Bor-Hoeg mountain, 2500 m, *Betula platyphylla*+*Pinus sibirica*+*Larix sibirica* forest, on rock, 29.VI.2007; Ulaan Uul sum, Deedbulag range, *Pinus sibirica*+*Picea obovata*+*Larix sibirica* forest, on soil, 17.VI.2007; same sum, Doodbulag range, *Pinus sibirica*+*Picea obovata*+*Larix sibirica* forest, on soil, 4.VII.2008; same sum, Temeen Chuluut mountain, 2463 m, *Pinus sibirica*+*Larix sibirica*, on soil, 13.VI.2009; same sum, mouth of Atraat and Hyaraa rivers, marsh with shrubs, on wet soil, 15.VII.2009; upper course of Khugiin Gol river, on soil along stream, 2009.VII.18; same sum, Deed Taigas river, 1755 m, on soil along river, 21.VII.2009.

P. pulcherrimum (Weber) Vain. – Mongol Dahur.: Darkhan Uul aimag, Sharyn Gol sum, Monostoi valley, *Betula platyphylla* grassy forest, on tree-trunk, 18.VIII.2006; same place, upper course of Monostoi valley, 1295 m, upper part of mountain, *Betula platyphylla*+*Pinus sylvestris* grassy forest, on tree-trunk and rotten log, 20.VIII.2006; same aimag, Khongor sum, upper course of Khuitten river, *Pinus sylvestris*+*Betula platyphylla* grassy forest, on tree-trunk, 18.VIII.2006; Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, East Taiga, Tsagaan Chuluut river, under rock, 8.VI.2008; same sum, Ulaan Shoroot valley, Khar Murugu mountain, *Larix sibirica*+*Pinus sibirica* forest, on rock, 21.VII.2006.

PSEUDOLEPICOLEACEAE

Blepharostoma trichophyllum (L.) Dumort. – Mongol Dahur.: Darkhan Uul aimag, Sharyn Gol sum, upper course of Monostoi valley, 1275 m, marshland with shrubs, on rotten log, 20.VIII.2006.; Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, Arasai river, *Larix sibirica*+*Picea obovata* forest, on wet soil along river, 17.VII.2006; same sum, Khoridol Saridag range, Bugatyn Tsookhor mountain, *Larix sibirica*+*Picea obovata* forest, on wet soil, 14.VII.2006; same sum, Ulaan Shoroot valley, Khar Murugu mountain, 1850 m alt., rocky field, on rock, 21.VI.2006; same sum, Sul mountain, *Larix sibirica*+*Pinus sibirica* forest, under rock, 14.VI.2007; same sum, Khoridol Saridag range, Bugatyn Tsookhor mountain, *Larix sibirica*+*Picea obovata* forest, on wet soil, 14.VII.2006; same place, Khonog Tsol mountain, *Pinus sibirica* open forest in southern slope of mountain, on soil, 8.VII.2007; same aimag, Tsagaan Nuur sum, West Taiga, Bor-Hoeg mountain, 2500 m, *Betula platyphylla*+*Pinus sibirica*+*Larix sibirica* forest, under rock, 29.VI.2007; same sum, Kholboo mountain, 2400 m, in crevice of rock, 28.VI.2007; Ulaan Uul sum, Doodbulag range, *Pinus sibirica*+*Larix sibirica*+*Picea obo-*

vata forest, on rotten log, 4.VII.2008; same sum, upper course of Khugiin Gol river, on soil, 18.VII.2009.

LEPIDOZIACEAE

Lepidozia reptans (L.) Dumort. – Mongol Dahur.: Darkhan Uul aimag, Sharyn Gol sum, Monostoi valley, edge of *Betula platyphylla*+*Pinus sylvestris* forest, on tree-trunk, 16.VIII.2006; same sum, upper course of Monostoi valley, 1390 m, mountain summit, *Betula platyphylla*+*Pinus sylvestris* grassy forest, on rotten log, 20.VIII.2006; same aimag, Khongor sum, upper course of Khuiten river, Khargyi pass, 1440 m, *Betula platyphylla* grassy forest, on rotten log, 18.VIII.2006; Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, Khoridol Saridag range, Tsagaan Nokhoit mountain, *Picea obovata*+*Pinus sibirica* grassy forest, on soil, 14.VII.2006; same range, Khonog Tsol mountain, on rotten log along river, 7.VII.2007.

LOPHOCOLEACEAE

Chiloscyphus pallescens (Ehrh. ex Hoffm.) Dumort. – Mongol Dahur.: Darkhan uul aimag, Sharyn Gol sum, upper course of Monostoi valley, 1380 m, edge of *Betula platyphylla*+*Pinus sylvestris* forest, on wet soil along bank of stream, 17.VII.2005; Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, Khoridol Saridag range, Bugatyn Tsookhor mountain, *Larix sibirica*+*Picea obovata* open forest, mossy marshland, on soil, 14.VII.2006.

Lophocolea minor Nees – Prikhubsugul.: Khubsugul aimag, Ulaan Uul sum, Middle Taiga, Temeen Chuluut mountain, 2462 m, *Pinus sibirica*+*Larix sibirica* forest, on wet soil, 13.VI.2009.

PLAGIOCHILACEAE

Plagiochila porelloides (Torr. ex Nees) Lindenb. – Mongol Dahur.: Darkhan Uul aimag, Sharyn Gol sum, upper course of Monostoi valley, 1380 m, upper edge of *Betula platyphylla*+*Pinus sylvestris* forest, on rock, 17.VII.2005; Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, Arasai river, *Larix sibirica*+*Picea obovata* shrubby forest, on soil, 16.VII.2006; same sum, Ulaan Khad mountain, *Picea obovata*+*Larix sibirica* forest, on wet soil, 16.VII.2007; same aimag, Ulaan Uul sum, valley of Khogiin Gol river, mountain Tsagaan Chuluut, rocky slope, on rock, 19.VI.2008.

ANASTROPHYLLACEAE

Tetralophozia setiformis (Ehrh.) Schljakov – Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, East Taiga, mountain Tsagaan Chuluut, rocky slope of mountain, on rock, 10.VI.2008.

SCAPANACEAE

Barbilophozia barbata (Schmidel ex Schreb.) Loeske – Prikhubsugul.: Khubsugul aimag, Khatgal sum, Khubsugul lake, Janhai pass, *Larix sibirica* grassy forest, on soil, 12.VII.2005; same aimag, Alag-Erdene sum, east-south bank of Khubsugul lake, on soil near rock, 12.VII.2005; same place, *Pinus sibirica* mossy forest, on rotten log, 14.VII.2005; Renchinlumbe sum, mouth of Shishhit and Tengis rivers, Shiveet Khad mountain, on rock, 9.VI.2006; same sum, Khoridol Saridag range, Tsaa-

gaan Nokhoit mountain, *Picea obovata*+*Larix sibirica*+*Pinus sibirica* grassy forest, on soil, 14.VII.2006; same sum, Ulaan Shoroot valley, Sul mountain, *Larix sibirica*+*Pinus sibirica* forest, on soil, 4.VI.2007; same place, Khonog Tsol valley, on wet soil along stream, 7.VII.2007; same place, south slope of mountain, *Pinus sibirica* forest with rocky fields, on soil near rock, 8.VII.2007; same sum, East Taiga, Moorog mountain, northern slope of mountain, on soil, 12.VI.2008; same sum, Tsagaan Chuluut mountain, rocky slope, under rock, 19.VI.2008; same aimag, Ulaan Uul sum, Khugiin Gol river, *Larix sibirica* shrubby bank river, on soil, 20.VI.2008; same place, upper course of Khugiin Gol river, on rock along stream, 18.VII.2009; same sum, Deed Taigas river, 1755 m, on soil along river, 21.VII.2009; same place, *Larix sibirica* shrubby forest, under rock, 21.VII.2009.

B. lycopodioides (Wallr.) Loeske – Prikhubsugul.: Khubsugul aimag, Alag-Erdene sum, south-east bank of Khubsugul lake, on soil near rock, 14.VII.2005; Renchinlumbe sum, East Taiga, Tsagaan Chuluut mountain, rocky slope of mountain, on soil, 10.VI.2008; Tsagaan Nuur sum, West Taiga, Mengebulag mountain, 2202 m, on soil, on rock and in rocky crevices, 27.VI.2007; same sum, Bor-Hoeg mountain, 2500 m, *Betula platyphylla*+*Pinus sibirica*+*Larix sibirica* forest, on soil, 29.VI.2007; same aimag, Ulaan Uul sum, Khusht Zurh mountain, rocky summit of mountain, on rock and under rock, 9.VI.2009; same sum, upper course of Khugiin Gol river, on rock near stream, 18.VII.2009.

Schistochilopsis incisa (Schrad.) Konstant. (= *Lophozia incisa* (Schrad.) Dumort., *Massula incisa* (Schrad.) Schljakov) – Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, Khoridol Saridag range, Khonog Tsol Uul, south slope of mountain, *Pinus sibirica* forest, 8.VII.2007.

**Obtusifolium obtusum* (Lindb.) S.W. Arnell – Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, Khoridol Saridag range, Khar Zurh mountain, *Picea obovata*+*Pinus sibirica*+*Larix sibirica* forest with rocky field, on rock, 15.VII.2006; same range, Deed Khonog Tsol valley, on soil along bank river, 7.VII.2007.

Schljakovia kunzeana (Huebener) Konstant. & Vilnet (= *Orthocaulis kunzeanus* (Huebener) H. Buch) – Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, East Taiga, Tsagaan Chuluut river, in rock crevices, 8.VI.2008; same aimag, Ulaan Uul sum, upper course of Khugiin Gol river, on soil along river, 18.VII.2009.

**Lophozia longidens* (Lindb.) Konstant. & Vilnet (= *Lophozia longidens* (Lindb.) Macoun) – Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, Khoridol Saridag range, mountain Tsagaan Nokhoit, *Picea obovata*+*Larix sibirica*+*Pinus sibirica* grassy forest, on soil, 14.VII.2006; same aimag, Tsagaan Nuur sum, West Taiga, Kholboo mountain, on rock, 28.VI.2007; same aimag, Ulaan Uul sum, Middle Taigas, Temeen Chuluut mountain, 2462 m, *Pinus sibirica*+*Larix sibirica* forest, on wet soil, 13.VI.2009.

Scapania cuspiduligera (Nees) Müll. Frib. – Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, Khoridol Saridag range, Khar Zurh mountain, *Picea obovata*+*Pinus sibirica*+*Larix sibirica* forest with rocky fields, on rock, 15.VII.2006.

S. degenii Schiffn. ex Müll. Frib. – Prikhubsugul.: Khubsugul aimag, Ulaan Uul sum, valley of Dooloon Modny Gol, Deedbulag range, *Pinus sibirica*+*Picea obovata*+*Larix sibirica* forest, on soil, 17.VI.2007.

**S. gymnostomophila* Kaal. – Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, Khoridol Saridag range, Khar Zurh mountain, *Picea obovata*+*Pinus sibirica*+*Larix sibirica* forest with rocky fields, on rock, 15.VII.2006; same aimag, Ulaan Uul sum, upper course of Khogiin Gol river, 2660 m, Orogdoh pass, on soil along stream, 18.VII.2009.

**S. irrigua* (Ness) Nees – Prikhubsugul.: Khubsugul aimag, Ulaan Uul sum, East Taiga, Tsagaan Chuluut mountain, rocky slope of mountain, in rock crevices, 10.VI.2008.

**S. mucronata* H. Buch – Mongol Dahur.: Darkhan uul aimag, Sharyn Gol sum, upper course of Monostoi valley, 1275 m, marshland with shrubs, on rotten log, 20.VIII.2006.

**S. cf. paludicola* Loeske & Müll. Frib. – Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, Khoridol Saridag range, Khar Zurh mountain, *Picea obovata*+*Pinus sibirica*+*Larix sibirica* forest with rocky fields, on rock, 15.VII.2006; same aimag, Ulaan Uul sum, East Taiga, Tsagaan Chuluut river, on wet soil, in rock crevices, 8.VI.2008.

**S. spitsbergensis* (Lindb.) Müll. Frib. – Prikhubsugul.: Khubsugul aimag, Ulaan Uul sum, East Taiga, Tsagaan Chuluut mountain, rocky slope of mountain, in rock crevices, 10.VI.2008; same place, Tsagaan Chuluut river, on wet soil, in rock crevices, 8.VI.2008.

Sphenobolus minutus (Schreb.) Berggr. var. *acutibolus* Schljakov – Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, Ulaan Shoroot valley, Khar Murugu mountain, *Larix sibirica*+*Pinus sibirica* forest, on soil, 21.VI.2006; same sum, Khoridol Saridag range, Tsagaan Nokhoit mountain, *Picea obovata*+*Larix sibirica* forest, on soil, 14.VII.2006; Ulaan Uul sum, Deedbulag range, *Pinus sibirica*+*Picea obovata*+*Larix sibirica* forest, on wet soil, 17.VI.2007.

S. saxicola (Schr.) Steph. – Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, Ulaan Shoroot valley, Khar Murugu mountain, rocky fields on northern slope of mountain, on rock, 21.VI.2006; same sum, East Taiga, Tsagaan Chuluut river, in rock crevices, 8.VI.2008.

**Tritomaria exsecta* (Schmidel) Loeske – Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, Khoridol Saridag range, Khonog Tsol Uul, south slope of mountain, *Pinus sibirica* forest, 8.VII.2007; same aimag, Ulaan Uul sum, Doodbulag range, *Pinus sibirica*+*Picea obovata*+*Larix sibirica* forest, on rotten log, 4.VII.2008.

T. exsectiformis (Breidl.) Loeske – Mongol Dahur.:

Darkhan Uul aimag, Sharyn Gol sum, Monostoi valley, 1295 m, edge of *Betula platyphylla*+*Pinus sylvestris* forest, on rotten log, 16.VIII.2006; Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, Ulaan Shoroot valley, Khar Murugu mountain, *Betula platyphylla*+*Pinus sibirica*+*Larix sibirica* forest, on wet soil, 21.VI.2006.

T. quinquedentata (Huds.) H. Buch – Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, Arasai river, 1280 m, *Larix sibirica*+*Picea obovata* forest, on soil, 16.VII.2006; that sum, Ulaan Shoroot valley, Khar Murugu mountain, *Larix sibirica*+*Pinus sibirica* forest, on rock, 21.VI.2006; that sum, Sul mountain, *Pinus sibirica*+*Larix sibirica* forest, 4.VI.2007; East Taiga, Tsagaan Chuluut river, on wet soil, 8.VI.2008; Tsagaan Nuur sum, West Taiga, Mengebulag spring, 2209 m, east bank of spring, on soil, 27.VI.2007; that sum Kholboo mountain, 2400 m, on wet soil, 28.VI.2007; Ulaan Uul sum, Middle Taiga, Temeen Chuluut mountain, 2462 m, *Pinus sibirica*+*Larix sibirica* forest, under rock, 13.VI.2009; that sum, Hugiin Gol valley, Uhart Gol river, *Larix sibirica* open forest, on soil, 23.VI.2008; Tsagaan Uur sum, Barang river, Oboot mountain, *Larix sibirica* forest, on soil, 29.VII.1972, coll. E.Kukk and U.Tsogt.

ARNELLIACEAE

**Arnellia fennica* (Gottsche) Lindb. – Prikhubsugul.: Khubsugul aimag, Ulaan Uul sum, upper course of Khogiin Gol river, 2660 m, Orogdoh pass, on soil along stream, 18.VII.2009; same place, valley of Khogiin Gol river, Dongol mountain, on soil and rocks, 29.VI.2008.

DELAVAYELLACEAE

**Lioclaena subulata* (A.Evans) Schljakov – Mongol Dahur.: Darkhan Uul aimag, Sharyn gol sum, upper course Monostoi Valley, 1275 m, marshland with shrubs, on rotten log, 20.VIII.2006.

JUNGERMANNIACEAE

**Leiocolea badensis* (Gottsche) Jørg. – Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, Ulaan Shoroot valley, mountain Khar Murugu, *Betula platyphylla*+*Larix sibirica* forest, on rotten log, 21.VI.2006; same sum, Arasai river, *Larix sibirica*+*Picea obovata* forest, on soil, 16.VII.2006; same sum, Khoridol Saridag range, Deed Khonog Tsol valley, on soil along bank of river, 7.VII.2007.

**L. heterocolpos* (Thed. ex C. Hartm.) H. Buch – Prikhubsugul.: Khubsugul aimag, Renchinlumbe sum, Ulaan Shoroot valley, Sul mountain, *Larix sibirica*+*Pinus sibirica* forest, under rock, 4.VI.2007; same place, Khar Murugu mountain, *Larix sibirica*+*Pinus sibirica* forest, on rock, 21.VI.2006; same aimag, Ulaan Uul sum, Doodbulag range, *Pinus sibirica*+*Picea obovata*+*Larix sibirica* forest, on soil, 4.VII.2008.

**Mesoptychia sahlbergii* (Lindb.) A. Evans – Prikhubsugul.: Khubsugul aimag, Ulaan Uul sum, valley of Dooloon Modny Gol, Doodbulag range, *Pinus sibirica*+*Picea obovata*+*Larix sibirica* forest, on soil, 4.VII.2008; same place, Deedbulag range, *Pinus sibirica*+*Picea obovata*+*Larix sibirica* forest, on soil, 17.VI.2007.

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