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Source: Willdenowia, 36(2) : 895-912

Published By: Botanic Garden and Botanical Museum Berlin (BGBM)

URL: <https://doi.org/10.3372/wi.36.36221>

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MARKUS HAUCK &amp; SAMJAA JAVKHLAN

## Additions to the lichen flora of Mongolia: records from Khentey and Khangay

### Abstract

Hauck, M. & Javkhlán, S.: Additions to the lichen flora of Mongolia: records from Khentey and Khangay. – Willdenowia 36: 895-912. – ISSN 0511-9618; © 2006 BGBM Berlin-Dahlem. doi:10.3372/wi.36.36221 (available via <http://dx.doi.org/>)

Seventy-eight lichen species are added to the known lichen flora of the N Mongolian province Khentey and six lichen species are reported for the first time from the province and phytogeographical region Khangay, which covers parts of central and NW Mongolia. One lichen species is new to the Mongolian Altay in W Mongolia. Seven crustose epiphytic lichens are new to Asia, viz. *Caloplaca thuringiaca*, *Candelariella viae-lacteeae*, *Hypocnomyce leucococca*, *Lecidea leprarioides*, *Pyrrhospora cinnabarina*, *Rinodina degeliana*, and *Strangospora microhaema*. Thirty-one further species are first records for Mongolia, viz. *Arthonia apathetica*, *Buellia badia*, *B. triphragmioides*, *Caloplaca cerinella*, *C. chrysophthalma*, *Chaenotheca chrysocephala*, *C. trichialis*, *Cladonia humilis*, *Collema subflaccidum*, *Graphis scripta*, *Lecanora circumborealis*, *L. intricata*, *Lecidea nyländeri*, *Lepraria jackii*, *Micarea peliocarpa*, *Mycobilimbia tetramera*, *Parmeliopsis hyperopta*, *Phaeophyscia rubropulchra*, *Physcia adscendens*, *Physciella chloantha*, *P. melanchra*, *Porpidia macrocarpa*, *Ramalina calicaris*, *Rhizocarpon hochstetteri*, *Schismatomma pericleum*, *Tuckermannopsis americana*, *Usnea articulata*, *Verrucaria margacea*, *V. praetermissa*, *Xanthoria fulva*, *X. ulophylloides*.

Key words: lichenes, phytogeography, Central Asia, NE Asia.

### Introduction

Cogt (1995) compiled in his catalogue of the lichens of Mongolia a total of 912 species. The data in Cogt's survey derived from his own field research and from earlier work especially of Golubkova (1981). Other relevant publications, which were subsumed in Cogt (1995), include, e.g., Schubert & Klement (1971) and Biazrov (1983, 1989). Subsequent to Cogt (1995) only a few new species have been added to the known Mongolian lichen flora (Biazrov 2001, Palka & Śliwa 2004, 2006, Enkhtuya 2005).

The survey of Cogt (1995) is well suited as a basis for further research. Own studies in his herbarium at the Institute of Biological Sciences of the Mongolian Academy of Science in Ulaanbaatar (UBA) revealed that Cogt's identifications are generally very reliable. Moreover, Cogt (1995), as did Golubkova (1981), provided information on the regional distribution of all lichen

species. For regionalization they used Grubov's (1982, 2001) classification of Mongolia, separating 16 phytogeographical provinces. While Cogt (1995) provided with his catalogue an excellent overview of the state of knowledge at that time, the lichen flora of such a huge country as Mongolia, where only a few lichenologists have been working, is of course still only incompletely known. Hence, in the present paper, we compiled data of 85 lichen species new to the flora of Mongolia or new to one of the phytogeographical provinces, respectively.

Most records given are from the two adjacent provinces Khentey and Khangay in northern and central Mongolia. Sites studied in the Khangay (Tamir River, Khorgo-Terkhiyn Tsaagan Nuur National Park) and the southern Khentey (near Ulaanbaatar) belong to the forest steppe belt, which is characterized by *Larix sibirica* dominated forests on northern slopes and grasslands on southern slopes and in valleys (Vostokova & Gunin 2005). The northern Khentey (Eroo valley) is located in the mountain taiga. Northern slopes and valley bottoms of lower elevations in this area are primarily covered with *Betula platyphylla-Larix sibirica* subtaiga (= light taiga) forests, whereas steppes occur on southern slopes (Dulamsuren & al. 2005a-b). *Pinus sibirica*, *Abies sibirica* and *Picea obovata* form the dark taiga forests of the upper montane belt (Dulamsuren & al. 2005a).

The data compiled in the present paper result from five travels through the country in 2002-05. Specimens cited are deposited in the personal herbarium of the first author (presently at GOET).

## The species

*Acarospora oligospora* (Nyl.) Arnold – Khentey, Eroo valley, Baziin Am (49°2'N, 107°15'E), c. 1100 m, 3.8.2005, *M. Hauck*.

Common on small stones of siliceous rock scattered on the ground of open, herb-rich shortgrass meadow steppes in the western Khentey Mts (*Pulsatilla ambigua* meadow steppe sensu Dulamsuren & al. (2005a-b)). Often associated with *Caloplaca arenaria* and *Sarcogyne picea*. Previously *A. oligospora* was only reported from E Mongolia (phytogeographical regions Khingan and Eastern Mongolia; Cogt 1995).

*Anamylopsora pulcherrima* (Vainio) Timdal – Khentey, Eroo valley, Ulaan Burgas (49°4'N, 107°16'E), c. 1000 m, 11.8.2004, *M. Hauck*.

This species is discussed here to smooth out taxonomic confusion in the literature dealing with the lichens of Mongolia. Cogt (1995) listed *A. pulcherrima* only from two localities in the Mongolian Altay and the Khangay. In addition, he included *Lecidea hedinii* H. Magn. from several phytogeographical regions in his checklist. Timdal (1991), however, recognized the Central Asian *L. hedinii* as a synonym of the more widely distributed *A. pulcherrima*. Samples listed in Cogt (1995) as *A. pulcherrima* or *L. hedinii*, respectively, do not represent different lichen taxa (if both species were accepted), but are in fact records from different authors meaning the same taxon. *A. pulcherrima* is a frequent inhabitant of hard siliceous rock in Mongolia.

*Arthonia apatetica* (Massal.) Th. Fr. – Khentey, Eroo valley, Baziin Am (49°2'N, 107°15'E), c. 1100 m, 4.8.2005, *M. Hauck*.

On bark of the shrub *Spiraea aquilegifolia* on southern slope with mountain steppe; associated with *Caloplaca holocarpa* and *Lecidella elaeochroma*. First record of an *Arthonia* species from Mongolia. The distribution of *A. apatetica* is insufficiently known because the species is inconspicuous and often confused with closely related *Arthonia* species, such as *A. leucodontis* and *A. muscigena* (Coppins 1989). Published records of *A. apatetica* are from Europe (Wirth 1995), NW Siberia (Sedelnikova & Taran 2000) and North America (Brodo 1995).

*Aspicila contorta* (Hoffm.) Kremp. – Khentey, Eroo valley, Ulaan Burgas (49°4'N, 107°16'E), c. 1000 m, 11.8.2004, *M. Hauck*.

On slate in montane meadow steppe. Already known from Mongolia from the phytogeographical provinces Khangay, Mongolian Dauria, Khingan and Eastern Mongolia (Cogt 1995).

*Baeomyces rufus* (Huds.) Rebert. – Khentey, Ilchlegiyn Gol, Eroogiyn Khaluun Rashaan (49°1'N, 107°32'E), 1230 m, 2.8.2002, *M. Hauck*.

On loamy soil of a forest road. Biazrov (1983) already found the species in Mongolia in the Khangay.

*Biatora chrysantha* (Zahlbr.) Printzen – Khentey, Sangastay (49°10'N, 107°18'E), 1570 m, 29.7.2005, *M. Hauck* & *S. Javkhlan*; Khentey, Tsansai (48°10'N, 106°53'E), c. 20 km N Ulaanbaatar, c. 1500 m, 10.9.2005, *M. Hauck*.

On trunk bases of *Pinus sibirica* in high-montane dark taiga forest of *P. sibirica*, *Abies sibirica* and *Picea obovata* of the western Khentey Mts as well as in montane *Pinus sibirica*-*Pinus sylvestris* forest of the southern Khentey Mts. First records for the Khentey. Palka & Šliwa (2006) found *B. chrysantha* on *Larix sibirica* at Lake Khovsgol in NW Mongolia. *B. chrysantha* has a circumpolar distribution with occurrences in Europe, Siberia and North America (Printzen 1995).

*Biatora vernalis* (L.) Fr. – Khentey, Sangastay (49°10'N, 107°18'E), 1570 m, 28.7.2005, *M. Hauck* & *S. Javkhlan*.

Over bryophytes on trunk bases of *Picea obovata* in the dark taiga. *B. vernalis* has already been collected in Mongolia in *Larix sibirica* forests of the Khovsgol area and the Khangay (Cogt 1995).

*Buellia badia* (Fr.) Massal. – Khangay, Arkhangay district, eastern shore of Terkhiyn Tsagaan Nuur (48°11'N, 99°49'E), 2070 m, 29.7.2004, *M. Hauck*.

On volcanic rock growing on the thallus of *Melanelia tominii*. New to Mongolia. In Asia so far known from Russia (S Siberia) and Turkey (Öztürk 1990, Sedelnikova & Lashchinskiy 1991). The world distribution of *B. badia* comprises Europe, N Africa, North America and New Zealand (Scheidtger 1993).

*Buellia griseovirens* (Turner & Borrer ex Sm.) Almb. – Khentey, Sangastay (49°10'N, 107°18'E), 1570 m, 30.7.2005, *M. Hauck* & *S. Javkhlan*.

On trunks and branches of *Abies sibirica* and *Picea obovata* in the dark taiga. Palka & Šliwa (2004) already found *B. griseovirens* on conifer wood in Mongolia near Lake Khovsgol (Palka & Šliwa 2004).

*Buellia triphragmioides* Anzi – Khangay, Arkhangay district, mountain N Terkhiyn Tsagaan Nuur (48°12'N, 99°47'E), c. 2300 m, 29.7.2004, *M. Hauck*.

On twigs of *Larix sibirica* in larch forest of a northern slope in the forest steppe. New to Mongolia. Our record links two previously known localities from Asia in N Siberia (Jennisey) and India (Himalayas; Nordin 2000). *B. triphragmioides* has been most often sampled in N Europe and W North America on *Alnus*, *Betula*, *Picea*, *Populus*, *Salix* and *Sorbus* (Nordin 2000).

*Caloplaca arenaria* (Pers.) Müll. Arg. – Khentey, Eroo valley, Baziin Am (49°2'N, 107°15'E), c. 1100 m, 3.8.2005, *M. Hauck*.

Common on small, siliceous stones in open *Pulsatilla ambigua* meadow steppe of the western Khentey Mts, usually associated with *Acarospora oligospora* and *Sarcogyne picea*. More rarely on rock outcrops together with, e.g., *Xanthoparmelia conspersa*, *X. pulla* and *X. stenophylla*. In Mongolia, previously found in Mongolian Dauria and in the Khangay (Cogt 1995).

*Caloplaca cerinella* (Nyl.) Flagey – Khentey, Eroo valley, Baziin Am (49°2'N, 107°15'E), c. 1100 m, 7.8.2005, *M. Hauck*.

Frequent on *Spiraea aquilegifolia* and *Ulmus pumila* in mountain steppes and *Ulmus pumila* open woodlands on southern slopes of the western Khentey Mts. Furthermore, on *Salix schwerinii* in floodplain forest. New to Mongolia. *C. cerinella* is widespread in Eurasia and further known from N Africa and Australia (Khodosovtsev & al. 2004). The similar *C. cerinelloides* (Erichsen) Poelt with 8 instead of 12-16 ascospores per ascus was already reported from *Larix* bark from the Khangay Mts by Schubert & Klement (1971).

*Caloplaca chrysophthalma* Degel. – Khentey, Eroo valley, Khonin Nuga (49°5'N, 107°17'E), 950 m, 3.8.2002, *M. Hauck*.

On trunk of *Betula platyphylla* in riverine forest. New to Mongolia. In Asia already known from Taiwan (Aptroot & Sparrius 2003), otherwise recorded from Europe and North America (Laundon 1992, Esslinger & Egan 1995).

*Caloplaca holocarpa* (Hoffm.) Wade – Khentey, Eroo valley, Baziin Am (49°2'N, 107°15'E), c. 1100 m, 3.8.2005, *M. Hauck*.

Abundant in the western Khentey Mts on the bark of *Ulmus pumila* and *Spiraea aquilegifolia* in *U. pumila* open woodlands and mountain steppes of southern slopes, often growing together with *C. cerina*, *C. cerinella* and *Candelaria concolor*. Previous records of *C. holocarpa* from Mongolia are from the Mongolian Altay, the Khangay and Middle Khalka, where *C. holocarpa* occurs as an epiphyte of *Caragana* and *Larix* (Cogt 1995).

*Caloplaca saxicola* (Hoffm.) Nordin – Khentey, Eroo valley, Khonin Nuga (49°4'N, 107°17'E), 950 m, 18.8.2005, *M. Hauck*.

On concrete. The species has already been found in E Mongolia in the phytogeographical region Khingan (Golubkova 1981).

*Caloplaca thuringiaca* Søchting & Stordeur – Khentey, Eroo valley, Baziin Am (49°2'N, 107°17'E), c. 1100 m, 3.8.2005, *M. Hauck*.

On plant debris, e.g. *Artemisia*, close to the soil surface in open meadow steppe, locally common, sometimes associated with *Amandinea punctata*, *C. cerina* or *Diploschistes muscorum*. New to Asia. So far known from xerothermic European grasslands with relatively continental climate (Germany, Austria, Switzerland, Italy), where *C. thuringiaca* occurs in similar microhabitats and with the same accessory species as in Mongolia (Søchting & Stordeur 2001, Stordeur 2003). A frequent substrate of *C. thuringiaca* in Europe is decaying *Artemisia campestris*. Geological preferences are vague, as *C. thuringiaca* was found over gypsum, lime and calcarenite in Europe, but over slate in Mongolia. The discovery of *C. thuringiaca* in Mongolia suggests that this recently described species (Søchting & Stordeur 2001) might be widespread throughout the Eurasian steppe belt.

*Candelariella viae-lacteeae* Thor & V. Wirth – Khangay, Arkhangay district, Tamir river (46°51'N, 103°23'E), c. 18 km WSW Kharkhorin, 25.7.2004, *M. Hauck*.

On *Populus* bark, in a strip of *Salix-Populus* floodplain forest in the meadow steppe; associated with *Physcia stellaris*, *Physciella melanchra*, *Xanthoria fallax* and *X. fulva*. *C. viae-lacteeae* is new to Asia. Its known range is considerably enlarged by the record from Mongolia, as all findings published so far are from S and Central Europe (Spain, Italy, Hungary, Greece, Germany), where *C. viae-lacteeae* is a rare epiphyte of various tree species including *Populus* (Thor & Wirth 1990, Wirth 1995, Tretiach 1997, Aragón & Martínez 2002).

*Candelariella xanthostigma* (Pers. ex Ach.) Lettau – Khentey, Eroo valley, Bayantogol (49°5'N, 107°17'E), c. 1100 m, 8.8.2005, *M. Hauck*.

On trunks of *Betula platyphylla* in *B. platyphylla-Larix sibirica* subtaiga forests. Previously known in Mongolia from Khovd, the Mongolian Altay and the Khangay (Schubert & Klement 1971, Golubkova 1981).

*Cetrelia cetrarioides* (Del. ex Duby) W. Culb. & C. Culb. – Khentey, Eroo valley, Bayantogol (49°5'N, 107°17'E), c. 1100 m, 12.8.2005, *M. Hauck*.

On inclined trunk of *Betula platyphylla* in *B. platyphylla-Larix sibirica* subtaiga forest. Furthermore, on branches of *Abies sibirica* and *Picea obovata* in *Pinus sibirica* dominated dark taiga forest. Associated species were, among others, *Bryoria nadvornikiana*, *Collema nigrescens*, *Leplogium saturninum* and *Nephroma helveticum*. *C. cetrarioides* has already been reported for Mongolia from the Khangay (Biazrov 1983).

*Chaenotheca chrysocephala* (Turner ex Ach.) Th. Fr. – Khentey, Sangastay (49°10'N, 107°18'E), 1570 m, 30.7.2005, *M. Hauck & S. Javkhlan*.

At the base of trunks of *Abies sibirica*, *Picea obovata* and *Pinus sibirica* in the dark taiga, sometimes associated with *C. trichialis* and *Chrysothrix candelaris*. New to Mongolia. *C. chrysocephala* has a wide distribution primarily in temperate and boreal Eurasia and North America, but also occurs in N Africa, Central America, Australia and New Zealand (Nimis 1993). Sedelnikova & al. (1989), Sedelnikova & Lashchinskiy (1991) and Urbanaviciene (1998) reported *C. chrysocephala* from S Siberia, as did Wei (1991) from China.

*Chaenotheca trichialis* (Ach.) Th. Fr. – Khentey, Sangastay (49°10'N, 107°18'E), 1570 m, 30.7.2005, *M. Hauck & S. Javkhlan*.

On trunks of *Abies sibirica* and *Picea obovata* in the dark taiga, rarer than *C. chrysocephala*, which was always associated with *C. trichialis*. First record for Mongolia, but already known from S Siberia (Sedelnikova & al. 1989, Sedelnikova & Lashchinskiy 1991, Urbanaviciene 1998). *C. trichialis* occurs on all continents except Antarctica (Nimis 1993).

*Chrysothrix candelaris* (L.) J. R. Laundon – Khentey, Sangastay (49°10'N, 107°18'E), 1510 m, 26.7.2002, *M. Hauck*.

In the dark taiga on trunk bases of *Picea obovata* and *Pinus sibirica*. Schubert & Klement (1971) reported *C. candelaris* from siliceous rock in the Khangay. Because of the substratum, which would be unusual for *C. candelaris*, this record is questionable (like many identifications by Klement; Hauck 1996).

*Cladonia crispata* (Ach.) Flotow – Khentey, tributary to the river Ilchlegiyn Gol, 4 km SW Erogiyn Khaluun Rashaan (49°9'N, 107°31'E), 1100 m, 31.7.2002, *M. Hauck*.

On acidic soil in open situation. In Mongolia only known from the Khangay so far (Biazrov 1974).

*Cladonia humilis* (With.) J. R. Laundon – Khentey, Eroo valley, Bayantogol (49°5'N, 107°17'E), c. 1100 m, 16.8.2005, *M. Hauck*.

Terricolous at the edge of dry *Pinus sylvestris* subtaiga forest bordering on montane meadow steppe. New to Mongolia. *C. humilis* has a wide distribution with occurrences in Europe, Asia, North America and New Zealand (Purvis & James 1992a). Abbas & al. (1991) and Wei (1991) reported *C. humilis* from China, where it was, among others, found in the provinces of Xinjiang, Inner Mongolia and Heilongjiang, which border on Mongolia.

*Cladonia mongolica* Ahti – Khentey, Eroo valley, Bayantogol (49°5'N, 107°17'E), c. 1100 m, 12.8.2005, *M. Hauck*.

On logs of *Larix sibirica* in subtaiga forest of *Betula platyphylla* and *Larix sibirica*, together with other *Cladonia* species, such as *C. amaurocraea*, *C. cenotea* and *C. contiocraea*. Previously only published from Mongolia from Lake Khovsgol (type locality) and the Khangay (Huneck & al. 1987, Palka & Śliwa 2006). *C. mongolica* differs from the similar, oceanic *C. ramulosa* (With.) J. R. Laundon by the ecarticate base of the podetia. Specimens from Mongolia named as *C. ramulosa* (Biazrov 1983, Cogt 1995) probably all belong to *C. mongolica* (Huneck & al. 1987). Outside Mongolia, *C. mongolica* has been reported from the Russian Far East (Ahti 1992), China (Ahti 1991), India (Himalayas), Nepal and Bhutan (Ahti & al. 2002).

*Collema crispum* (Huds.) F. H. Wigg – Khentey, Eroo valley, Baziin Am (49°2'N, 107°15'E), c. 1100 m, 3.8.2005, *M. Hauck*.

On open soil in montane *Pulsatilla ambigua* meadow steppe, together with *Psora globifera*, *Cladonia pyxidata* and *Xanthoparmelia camtschadalis*. Outside the Khentey, *C. crispum* has already been reported from various parts of Mongolia (Mongolian Altay, Khangay, Mongolian Dauria, Eastern Mongolia).

*Collema nigrescens* (Huds.) DC. – Khentey, Eroo valley, Bayantogol (49°5'N, 107°17'E), c. 1100 m, 12.8.2005, *M. Hauck*.

In *Betula platyphylla*-*Larix laricina* subtaiga forest on trunks of *B. platyphylla* and on dead wood with, e.g., *L. saturninum* and *Nephroma helveticum*. Moreover, on *Salix*, in floodplains of the Eroo valley. Schubert & Klement (1971) and Biazrov (1983) already found *C. nigrescens* in Mongolia in the Khangay. The specimens of *C. nigrescens* from the Eroo valley differ from the similar *C. subnigrescens*, which is already known from the Khentey (Cogt 1995), by their narrower, 4-5 µm wide, acicular ascospores. Makryi (1990) reported *C. nigrescens* and *C. subnigrescens* from S Siberia near Lake Baikal.

*Collema subflaccidum* Degel. – Khentey, Eroo valley, Bayantogol (49°5'N, 107°17'E), c. 1100 m, 8.8.2005, *M. Hauck*.

On trunk of living *Betula platyphylla* in *B. platyphylla*-*Larix sibirica* subtaiga forest, together with, e.g., *Candelariella xanthostigma*, *Parmelia sulcata* and *Physcia stellaris*. First record for Mongolia. The species is widespread in Asia including Siberia and China (Degelius 1974). Furthermore, *C. subflaccidum* is found in Europe, North America and Australia (Degelius 1974).

*Collema tenax* (Sw.) Ach. – Khentey, Eroo valley, Ulaan Burgas (49°4'N, 107°16'E), c. 1000 m, 11.8.2004, *M. Hauck*.

Between terricolous bryophytes on southern slope in the *Pulsatilla ambigua* meadow steppe. *C. tenax* was already known from W and central Mongolia (Khovd, Mongolian Altay, Khangay, Valley of Great Lakes; Cogt 1995).

*Diploschistes scruposus* (Schreb.) Norman – Khentey, Eroo valley, Bayantogol (49°5'N, 107°17'E), c. 1100 m, 16.8.2005, *M. Hauck*.

On siliceous rock in mountain steppe. *D. scruposus* has already been published from N, W and central Mongolia (Mongolian Altay, Khovsgol, Khangay; Cogt 1995).

*Evernia esorediosa* (Müll. Arg.) Du Rietz – Khentey, Eroo valley, Ulaan Burgas (49°4'N, 107°16'E), c. 950 m, 11.8.2004, *M. Hauck*.

Widespread in the canopy of *Betula platyphylla*-*Larix laricina* subtaiga forests in the valley of the river Eroo, more rarely on *Picea obovata* in the dark taiga of the upper montane belt. Records from Mongolia were so far published from the phytogeographical regions Khovsgol and Khangay (Cogt 1995).

*Flavopunctelia flaventior* Stirt. (Hale) – Khentey, Eroo valley, Baziin Am (49°2'N, 107°15'E), c. 1100 m, 7.8.2005, *M. Hauck*.

At trunk basis of *Ulmus pumila* in *U. pumila* open woodland surrounded by mountain steppe. *F. flaventior* was previously found in Mongolia in the Khangay (Biazrov 1987). The closely related *F. soredica* is frequent in the subtaiga of the western Khentey Mts.

*Fuscopannaria leucophaea* (Vahl) P. M. Jørg. – Khentey, Eroo valley, Okhin Tolgoi (49°5'N, 107°178'E), c. 1000 m 8.8.2004, *M. Hauck*.

On quartzite stones on the forest floor in *Betula platyphylla*-*Larix sibirica* subtaiga forest on steep northern slope. *F. leucophaea* has already been known from central Mongolia (Khangay, Middle Khalka; Cogt 1995).

*Graphis scripta* (L.) Ach. – Khentey, Sangastay (49°10'N, 107°18'E), 1570 m, 25.7.2002, *M. Hauck*.

At trunk bases of *Abies sibirica* and more rarely *Picea obovata* in *Pinus sibirica* dominated dark taiga forest of the upper montane belt. First record of a *Graphidaceae* species from Mongolia. *G. scripta* is widespread throughout the temperate zone of the northern hemisphere (Staiger 2002). The range of *G. scripta* in Russia includes S Siberia, north of the Mongolian Khentey (Urbana- vicene 1998).

*Hypocomyce leucococca* R. Sant. – Khentey, Sangastay (49°10'N, 107°18'E), 1570 m, 30.7.2005, M. Hauck & S. Javkhlan.

On trunk of *Abies sibirica* and *Picea obovata* in the dark taiga. First record for Asia. The distribution of *H. leucococca* is insufficiently known, however, published records from Europe and North America (Tønssberg 1992) as well as the present record from the N Mongolian mountain taiga suggest a circumboreal range.

*Imshaugia aleurites* (Ach.) S. L. F. Meyer – Khentey, Sangastay (49°10'N, 107°18'E), 1550 m, 25.7.2002, M. Hauck.

On conifer wood (logs, branches) of, e.g., *Pinus sibirica* in the dark taiga. Already known from similar substrate from Mongolian Dauria (Golubkova 1981).

*Lecanora cenisia* Ach. – Khentey, Eroo valley, Baziin Am (49°2'N, 107°15'E), c. 1100 m, 7.8.2005, M. Hauck.

On rock outcrops of quartzite on southern slopes with mountain and meadow steppe. Biazrov (1983) reported *L. cenisia* from the Khangay.

*Lecanora circumborealis* Brodo & Vitik. – Khentey, Sangastay (49°10'N, 107°18'E), 1570 m, 30.7.2005, M. Hauck & S. Javkhlan.

On trunks and more rarely branches of *Abies sibirica*, *Picea obovata* and *Pinus sibirica* in the dark taiga. New to Mongolia. As indicated by its name, *L. circumborealis* is widely distributed in the northern coniferous forests of Eurasia and North America (Makarevicz 1971, Brodo 1984, Brodo & Vitikainen 1984).

*Lecanora intricata* (Ach.) Ach. – Khentey, Sangastay (49°10'N, 107°18'E), 1520 m, 10.8.2004, M. Hauck.

Together with *Rhizocarpon hochstetteri* on hard, sun-exposed siliceous rock in the upper montane belt in a clearing within the dark taiga. New to Mongolia. *L. intricata* is a widely distributed species, which is, amongst others, known from Siberia and China (Makarevicz 1971, Makryi 1990, Sedelnikova 1990, Wei 1991).

*Lecanora piniperda* Körber – Khentey, Eroo valley, Bayantogol (49°5'N, 107°17'E), c. 1100 m, 8.8.2005, M. Hauck.

On trunk bases and branches of *Larix sibirica* at sun-exposed, dry sites at the edge of a *Betula platyphylla*-*L. sibirica* subtaiga forest. Previously reported for Mongolia from the Mongolian Altay and the Khangay (Schubert & Klement 1971, Golubkova 1981).

*Lecanora polytropa* (Ehrh. ex Hoffm.) Rabenh. – Khentey, Sangastay (49°10'N, 107°18'E), 1520 m, 10.8.2004, M. Hauck.

On sun-exposed, hard siliceous rock in a clearing of the dark taiga, together with *Aspicilia cinerea*, *Rhizocarpon geographicum* and *R. hochstetteri*. *L. polytropa* is widespread throughout N, W and central Mongolia (Khovd, Mongolian Altay, Khovsgol, Khangay; Cogt 1995).

*Lecidea leprarioides* Tønssberg – Khentey, Sangastay (49°10'N, 107°18'E), 1570 m, 30.7.2005, M. Hauck & S. Javkhlan.

On trunk base of *Pinus sibirica* in dark taiga forest, together with *L. nylanderii*. New to Mongolia. *L. leprarioides* has probably a circumboreal range, but records have only been published from boreal and oroboreal forests of Europe (Tønssberg 1992, Türk & Berger 1999) and North America (Tønssberg 1993, Schnull & al. 2002, Hauck & Spribille 2005). Andreev (1998) reported *L. leprarioides* as *L. turgidula* var. *pulveracea* Th. Fr. from Russia without mentioning any localities. Therefore, our record is the first substantiated one of *L. leprarioides* from Asia.

*Lecidea nylanderii* (Anzi) Th. Fr. – Khentey, Sangastay (49°10'N, 107°18'E), 1570 m, 30.7.2005, M. Hauck & S. Javkhlan.



Together with *L. leprarioides* on *Pinus sibirica*. First record for Mongolia. Already known in Asia from S Siberia (Andreev 1998, Urbanavichene 1998). *L. nylanderi* primarily occurs in the boreal zone and the montane belt of the temperate zone in Europe and North America (Tønsberg 1992, Andreev 1998).

***Lecidella euphorea*** (Flörke) Hertel – Khentey, Eroo valley, Baziin Am (49°2'N, 107°15'E), c. 1100 m, 3.8.2005, *M. Hauck*.

On *Ulmus pumila* on southern slopes. Cogt (1995) and Palka & Śliwa (2004) reported the species from NW and central Mongolia (Mongolian Altay, Khovd, Khovsgol, Khangay). The taxonomy of *L. euphorea* is controversial; Wirth (1995) subsumed the species under *L. elaeochroma* (Ach.) M. Choisy, a name not yet applied to specimens from Mongolia. *L. euphorea* differs from *L. elaeochroma* in apothecial anatomy, secondary chemistry and distribution (Purvis & James 1992b, Knoph & Leuckert 1999, 2004).

***Lepraria jackii*** Tønsberg – Khentey, Ilchlegiyn Gol, Eroogiyn Khaluun Rashaan (49°1'N, 107°32'E), 1230 m, 2.8.2002, *M. Hauck*.

Frequent in dark taiga forests of the western Khentey Mts, primarily on trunk bases of *Abies sibirica*, *Picea obovata* and *Pinus sylvestris*. First records for Mongolia. *L. jackii* is widespread in the coniferous forests of the northern hemisphere. Records have been published from Europe (including Russia) and North America (Tønsberg 1992, Kümmerling & al. 1995, Kukwa & al. 2003). Single collections of saxicolous populations of *L. jackii* were made in N Korea and Australia (Kümmerling & al. 1995).

***Leptogium hildenbrandii*** (Garov.) Nyl. – Khentey, Eroo valley, Bayantogol (49°5'N, 107°17'E), c. 1100 m, 12.8.2005, *M. Hauck*.

On *Ulmus pumila* on southern slope in small *U. pumila* open woodlands, which are surrounded by mountain steppe; associated with, e.g., *Melanelixia albertana* and *Phaeophyscia ciliata*. Furthermore, on *Salix rorida* and *Betula platyphylla* in riverine birch forest. The range of *L. hildenbrandii* comprises W and S Europe, Siberia, Mongolia, N India, China and Japan (Jørgensen 1997). *L. hildenbrandii* has already been known from central and N Mongolia (Khangay, Mongolian Dauria; Cogt 1995).

***Lichinella stipatula*** Nyl. – Khentey, Eroo valley, Bayantogol (49°5'N, 107°17'E), c. 1100 m, 16.8.2005, *M. Hauck*.

On siliceous rock in mountain and meadow steppes of southern slopes. *L. stipatula* is widespread throughout Mongolia and has already been reported from the phytogeographical regions of Mongolian Altay, Khangay, Valley of the Great Lakes, Mongolian Dauria, Middle Khalka, Eastern Gobi and Eastern Mongolia (Cogt 1995).

***Melanelixia albertana*** (Ahti) O. Blanco & al. (≡ *Melanelia albertana* (Ahti) Essl.) – Khentey, Eroo valley, Baziin Am (49°2'N, 107°15'E), c. 1100 m, 3.8.2005, *M. Hauck*.

Repeatedly found on trunks of *Ulmus pumila* in *U. pumila* open woodlands on southern slopes. *M. albertana* is listed here to summarize its status in Mongolia, as it had been dubious until recently. The species is not included in Cogt (1995). Ahti (1977) mentioned it as “recently detected in Mongolia”, but did neither quote a locality nor a specimen. The reference given by Ahti (1977) in this context only contains records from North America (Ahti 1969), where it is found in the northern Great Plains of Alberta, Saskatchewan, Manitoba and Minnesota (Brodo & al. 2001). Actually, Ahti’s report of *M. albertana* for Mongolia is based on a sample he took near Terelsh in the Khentey Mts, 75 km NE Ulaanbaatar. Later, this specimen was cited by Urbanavichene & Urbanavichus (1998), who also quoted a collection of *M. albertana* sampled by Biazrov in the Khangay. The collector himself published this specimen at a later date as new to the Khangay (Biazrov 2001). In Russia, Urbanavichene & Urbanavichus (1998) found *M. albertana* in S Siberia in the Lake Baikal area and Poryadina (2006) in Yakutia. *M. albertana* is a continental, boreal to temper-

ate species. Its world distribution reflects similarities in climate and vegetation of the northern margin of the interior prairies of North America with the forest steppe and ultracontinental taiga forests of N Mongolia, Transbaikalia and Yakutia.

***Melanelixia fuliginosa*** (Fr. ex Duby) O. Blanco & al. (= *Melanelia fuliginosa* (Fr. ex Duby) Essl., *M. glabrata* (Lamy) Essl.) – Khangay, Arkhangay district, Khorgo Vulcano, 4 km E Terkhiyn Tsagaan Nuur (48°11'N, 99°51'E), c. 2700 m, 26.7.2004, *M. Hauck*.

On twigs of *Larix sibirica* in open larch forest on volcanic rock. So far only known from a *L. sibirica* forest in the Khentey near Ulaanbaatar (Cogt 1995). The superficially similar *Melanohalea exasperatula* is much more frequent in the coniferous forests of Mongolia.

***Melanelixia subaurifera*** (Nyl.) O. Blanco & al. (= *Melanelia subaurifera* (Nyl.) Essl.) – Khentey, Eroo valley, Baziin Am (49°2'N, 107°15'E), c. 1100 m, 4.8.2005, *M. Hauck*.

On *Ulmus pumila* on southern slope in *U. pumila* woodland surrounded by mountain steppe. Previously recorded from the Khangay (Biazrov 1983).

***Micarea peliocarpa*** (Anzi) Coppins – Khentey, Sangastay (49°10'N, 107°18'E), 1550 m, 26.7.2004, *M. Hauck*.

On log of *Pinus sibirica*. First record for Mongolia. Already known in Asia from Hongkong and Turkey (Öztürk 1990, Aptroot & Seaward 1999). The known range comprises otherwise Europe, North America, Madagascar, Australia and New Zealand (Coppins 1992).

***Mycobilimbia tetramera*** (De Not.) Vitik. & al. – Khentey, Eroo valley, Bayantogol (49°5'N, 107°17'E), c. 1100 m, 12.8.2005, *M. Hauck*.

Over bryophytes on inclined trunk surface of *Betula platyphylla* in *B. platyphylla*-*Larix sibirica* subtaiga forest. New to Mongolia. The nearest published occurrences of *M. tetramera* are in Russia near Lake Baikal (Urbanavichene 1998). Widespread in Eurasia and North America (Nimis 1993, Esslinger & Egan 1995).

***Mycoblastus sanguinarius*** (L.) Norman – Khentey, Sangastay (49°10'N, 107°18'E), 1570 m, 29.7.2005, *S. Javkhlan*.

On branch of *Picea obovata* in the dark taiga, together with, e.g., *Bryoria nadvornikiana*, *Buellia schaeferi*, *Japewia tornoensis*, *Lecanora symmicta* and *Parmelia squarrosa*. Biazrov (1983) and Huneck & al. (1987) already found *M. sanguinarius* in Mongolia in the Khangay. *M. sanguinarius* is also known from S Siberia (Urbanavichene 1998).

***Nephroma parile*** (Ach.) Ach. – Khentey, Sangastay (49°9'N, 107°17'E), 1510 m, 25.7.2002, *M. Hauck*.

On bryophyte cushions in boulder field of siliceous rock in the upper montane belt. Already found by Biazrov (1983) in Mongolia in the Khangay.

***Nephroma resupinatum*** (L.) Ach. – Khentey, Sangastay (49°10'N, 107°18'E), 1570 m, 30.7.2005, *M. Hauck* & *S. Javkhlan*.

Over bryophytes in dark taiga forest dominated by *Pinus sibirica*. Biazrov (1983) published *N. resupinatum* from the Khangay.

***Ochrolechia arborea*** (Kreyer) Almb. – Khentey, Sangastay (49°10'N, 107°18'E), 1570 m, 10.8.2004, *M. Hauck*.

On branches and trunks in the dark taiga of the upper montane belt of the western Khentey Mts. Most often found on *Abies sibirica* and *Picea obovata*, more rarely on *Pinus sibirica*. Locally abundant. Already known from the mountain taiga and forest steppe in N and central Mongolia (Khovsgol, Khangay, Mongolian Dauria; Golubkova 1981).

***Parmelia squarrosa*** Hale – Khentey, Sangastay (49°10'N, 107°18'E), 1570 m, 10.8.2004, *M. Hauck*.

Locally frequent on trunks and branches of *Abies sibirica*, *Picea obovata* and *Pinus sibirica* in dark taiga forest of the western Khentey Mts; often associated with *P. sulcata*, *Hypogymnia bitteri* and *H. physodes*. Already reported for Mongolia from the Khangay by Biazrov (2001). *P. squarrosa* occurs in E Asia (China, Korea, Japan), North America and Europe (Hyvönen 1985, Kurokawa 1994).

***Parmeliopsis hyperopta*** (Ach.) Arnold – Khentey, Sangastay (49°10'N, 107°18'E), 1570 m, 29.7.2005, *M. Hauck & S. Javkhlan*.

On *Picea obovata* and *Pinus sibirica* in the dark taiga. New to Mongolia. *P. hyperopta* is known from Europe, Asia as well as North and South America (Purvis 1992, Calvelo & Adler 2001). For S Siberia reported from Lake Baikal (Urbanavichene 1998).

***Phaeophyscia ciliata*** (Hoffm.) Moberg – Khentey, Eroo valley, Baziin Am (49°2'N, 107°15'E), c. 1100 m, 3.8.2005, *M. Hauck*.

Dominant epiphyte of *Ulmus pumila* in the western Khentey, usually associated with *Xanthoria fallax* s. str. and lower amounts of *Caloplaca cerina*, *C. holocarpa*, *Candelaria concolor* and *Melanelia albertana*. Rarely on *Spiraea aquilegifolia* in *Ulmus pumila* open woodlands and mountain steppe of southern slopes devoid of light or dark taiga forests. Furthermore, on *Salix* in riverine forests. Despite its abundance in the western Khentey, only single collections of *P. ciliata* from the Mongolian Altay and the Khangay have been published from Mongolia so far. Sedelnikova (1985, 1993), Makryi (1990), Sedelnikova & Lashchinskiy (1991) and Urbanavichene (1998) found the species in S Siberia.

***Phaeophyscia rubropulchra*** (Degelius) Moberg – Khentey, Eroo valley, Bayantogol (49°5'N, 107°17'E), c. 1100 m, 14.8.2005, *M. Hauck*.

Over bryophytes on siliceous rock on southern slope with mountain and montane meadow steppe. New to Mongolia. Previously known from, e.g., China (including Xinjiang, Abbas & al. 1991), Japan (Kurokawa 2003) as well as E and (rarely) W North America (Neitlich & McCune 1997, Brodo & al. 2001).

***Physcia adscendens*** (Fr.) Oliv. – Mongolian Altay, Khobdo valley, 2.7.1971, *U. Cogt & N. S. Golubkova*, det. *N. S. Golubkova* (sub *P. tenella*), rev. *M. Hauck* (UBA); Khentey, Eroo valley, Bayantogol (49°5'N, 107°17'E), c. 1100 m, 11.8.2005, *M. Hauck*.

New to Mongolia. A recent collection from the Khentey Mts is from *Spiraea aquilegifolia* on a sunlit slope covered with *Ulmus pumila* open woodland. An older specimen from a twig of *Picea obovata* had been mistaken for *P. tenella* by Golubkova. *P. adscendens* has a nearly worldwide distribution in the temperate and boreal zones and has been found on all continents except Antarctica (Nimis 1993).

***Physcia dimidiata*** (Arnold) Nyl. – Khentey, Eroo valley, Baziin Am (49°2'N, 107°15'E), c. 1100 m, 3.8.2005, *M. Hauck*.

On rock outgroup of schist on southern slope with mountain steppe and *Ulmus pumila* open woodland. Previously known from one site of the Mongolian Altay (Golubkova 1981).

***Physcia tenella*** (Scope) DC. – Khentey, Eroo valley, Bayantogol (49°5'N, 107°17'E), c. 1100 m, 12.8.2005, *M. Hauck*.

Since the collection of Golubkova & Cogt, which is now ascribed to *P. adscendens* (see above), was the only sample deposited as *P. tenella* in UBA (and samples from LE were not studied), the status of *P. tenella* in Mongolia (Golubkova 1981, Cogt 1995) became dubious. Therefore, the recent specimen of *P. tenella* from the western Khentey Mts is cited. The sample is from *Betula platyphylla*.

***Physciella chloantha*** (Ach.) Essl. – Khentey, Eroo valley, Baziin Am (49°2'N, 107°15'E), c. 1100 m, 3.8.2005, *M. Hauck*.

On *Ulmus pumila* together with, e.g., *Caloplaca holocarpa* on southern slope with *U. pumila* open woodland and mountain steppe. New to Mongolia. Previously known in Central Asia from Kazakhstan (Moberg 1996) and China (Wei 1991). The world range further comprises E Asia, Europe and North America (Nimis 1993).

***Physciella melanchra*** (Hue) Essl. – Khangay, Arkhangay district, Tamir river (46°51'N, 103°23'E), c. 18 km WSW Kharkhorin, 25.7.2004, *M. Hauck*.

On *Populus* bark, in a strip of *Salix-Populus* floodplain forest in the meadow steppe. New to Mongolia. The range of *P. melanchra* comprises E Asia (Japan, Taiwan) and North America (Esslinger & Egan 1995, Aptroot & al. 2002, Kurokawa 2003).

***Physconia detersa*** (Nyl.) Poelt – Khentey, Eroo valley, Bayantogol (49°5'N, 107°17'E), c. 1100 m, 12.8.2005, *M. Hauck*.

On inclined trunk of living *Betula platyphylla* in *B. platyphylla-Larix sibirica* subtaiga forest. Associated species were, e.g., *Candelaria concolor*, *Collema nigrescens*, *Lecanora chlarotera*, *Leptogium saturninum*, *Nephroma helveticum* and *Phaeophyscia ciliata*. Schubert & Klement (1971) published *P. detersa* from a *Populus densa* floodplain forest of the Khangay.

***Placynthiella icmalea*** (Ach.) Coppins & P. James – Khentey, Eroo valley, Bayantogol (49°5'N, 107°17'E), c. 1100 m, 3.8.2005, *M. Hauck*.

On lying, dead trunk of *Larix sibirica* in light subtaiga forest of *Betula platyphylla* and *L. sibirica*, together with *Trapeliopsis granulosa*. Palka & Śliwa (2004) recorded *P. icmalea* already from Mongolia from Lake Khovsgol.

***Placynthiella uliginosa*** (Schrad.) Coppins & P. James – Khentey, Eroo valley, Baziin Am (49°2'N, 107°15'E), c. 1100 m, 3.8.2005, *M. Hauck*.

On twig of *Ulmus pumila*. Earlier collections from Mongolia are from the Mongolian Altay, where Schubert & Klement (1971) reported *P. uliginosa* from soil, as well as from bark and soil of *Larix sibirica* at Lake Khovsgol (Palka & Śliwa 2006).

***Porpidia crustulata*** (Ach.) Hertel & Knoph – Khentey, Ilchlegiyn Gol, Eroogiyn Khaluun Rashaan (49°1'N, 107°32'E), 1230 m, 2.8.2002, *M. Hauck*.

On gravel of siliceous rock on a forest road. Biazrov (1989) reported *P. crustulata* from the Khangay, however, without providing a location.

***Porpidia macrocarpa*** (DC.) Hertel & Schwab – Khentey, Sangastay (49°10'N, 107°18'E), 1520 m, 10.8.2004, *M. Hauck*.

On sunlit siliceous rock with *Lecanora polytropa* in a clearing of the dark taiga. First record for Mongolia. *P. macrocarpa* is widespread throughout Eurasia, North America, Australia and New Zealand (Galloway & Coppins 1992, Fryday 2005). Wei (1991) listed *P. macrocarpa* for China, as did Sedelnikova (1985, 1990) for S Siberia.

***Pyrrhospora cinnabarina*** (Sommerf.) M. Choisy – Khentey, Sangastay (49°10'N, 107°18'E), 1570 m, 30.7.2005, *M. Hauck* & *S. Javkhan*.

On trunks of *Abies sibirica* in the dark taiga. New to Asia. Records from boreal and oroboreal forests of Europe and North America (Tønsberg 1992, Hauck & Spribille 2005) combined with the occurrence in the N Mongolian mountain taiga suggest that *P. cinnabarina* has a circumboreal distribution.

***Ramalina calicaris*** (L.) Fr. – Khentey, Eroo valley, Khonin Nuga (49°5'N, 107°17'E), 950 m, 3.8.2002, *M. Hauck*.

On bark in riverine forest. New to Mongolia. *R. calicaris* has already been reported for NE Asia from S Siberia on deciduous trees including *Betula*, *Salix* and *Sorbus* (Sedelnikova & al. 1989, Sedelnikova & Lashchinskiy 1991, Sedelnikova 1993, Urbanavice 1998). Wei (1991)

listed *R. calicaris* for China. Other findings of *R. calicaris* are from Europe and North America (Nimis 1993, Esslinger & Egan 1995).

***Ramalina capitata*** (Ach.) Nyl. – Khentey, Eroo valley, Baziin Am (49°2'N, 107°15'E), c. 1100 m, 7.8.2005, *M. Hauck*.

On siliceous rock outcrops in mountain steppe. Previously known in Mongolia from the phytogeographical regions of Khovd, Khangay and Eastern Mongolia (Cogt 1995).

***Ramalina sinensis*** Jatta – Khentey, Eroo valley, Baziin Am (49°2'N, 107°15'E), c. 1100 m, 7.8.2005, *M. Hauck*.

On *Spiraea aquilegifolia* and *Ulmus pumila* in mountain steppe and *U. pumila* open woodland as well as on *Salix* sp. and *Betula platyphylla* in riverine forest. Cogt (1995) reported *R. sinensis* from central Mongolia (Middle Khalkha), where it was found on *Salix*. Urbanavichene (1998) published the species from S Siberia.

***Rhizocarpon geographicum*** (L.) DC. – Khentey, Sangastay (49°10'N, 107°18'E), 1520 m, 10.8.2004, *M. Hauck*.

On sun-exposed siliceous rock. Already known in Mongolia from the phytogeographical regions of Mongolian Altay, Khovsgol and Khangay.

***Rhizocarpon hochstetteri*** (Körb.) Vainio s. str. – Khentey, Sangastay (49°10'N, 107°18'E), 1520 m, 10.8.2004, *M. Hauck*.

On sun-exposed, hard siliceous rock in the upper montane belt. New to Mongolia. Previously known from Europe, Siberia, North America and New Zealand (Fryday 2002).

***Rinodina degeliana*** Coppins – Khentey, Eroo valley, Bayantogol (49°5'N, 107°17'E), c. 1100 m, 8.8.2005, *M. Hauck*.

On inclined trunk of a living tree of *Betula platyphylla* in *B. platyphylla*-*Larix sibirica* sub-taiga forest. Associated species were, e.g., *Bryoria nadvornikiana*, *Hypogymnia physodes*, *Lecanora symmicta*, *Nephroma helveticum*, *Nephromopsis laureri* and *Parmelia sulcata*. *R. degeliana* is new to Asia. It was previously recorded from Europe, where it is known from the British Isles (Coppins 2002), Sweden (Coppins 1983), Norway (Tønsberg 1992), Estonia (Aptroot & al. 2005) and Austria (Tønsberg & al. 2001), and from North America (Esslinger & Egan 1995). In Europe and North America, the species grows on various deciduous trees including *Betula*.

***Sarcogyne clavus*** (DC.) Kremp. – Khentey, Eroo valley, Baziin Am (49°2'N, 107°15'E), c. 1100 m, 3.8.2005, *M. Hauck*.

On small pieces of quartzite on the ground of open *Pulsatilla ambigua* meadow steppe on southern slope. More common on other small stones of the same area was the Central Asian endemic species *S. picea* with smooth apothecial margins and a hyaline to light brown exciple. *S. clavus* was already known from Mongolian Dauria and the Khingan (Schubert & Klement 1971, Golubkova 1981).

***Schismatomma pericleum*** (Ach.) Branth & Rostrup – Khentey, Sangastay (49°10'N, 107°18'E), 1570 m, 29.7.2005, *M. Hauck* & *S. Javkhlan*.

On trunk bases of *Abies sibirica* and *Picea obovata* in *Pinus sibirica* dominated dark taiga forest. First record of *Schismatomma* from Mongolia. *S. pericleum* is known from Eurasia and North America (Tehler 1993, Navrotskaya & al. 1996, Yildiz & John 2002).

***Strangospora microhaema*** (Norman) R. A. Anderson – Khentey, Eroo valley, Baziin Am (49°2'N, 107°15'E), c. 1100 m, 10.8.2005, *M. Hauck*.

On trunks of *Ulmus pumila* in *U. pumila* open woodland surrounded by mountain steppe. First record for Asia. So far known from Europe and North America (Golubkova 1978, Duke & Coppins 1992).

*Trapeliopsis granulosa* (Hoffm.) Lumbsch – Khentey, Eroo valley, Bayantogol (49°5'N, 107°17'E), c. 1100 m, 12.8.2005, *M. Hauck*.

On conifer logs in light and dark taiga forests of the western Khentey Mts. The species has been found in Mongolia before in the Khangay (Biazrov 1989).

*Tuckermannopsis americana* (Spreng.) Hale – Khentey, Ilchlegiyn Gol, Eroogiyn Khaluun Rashaan (49°1'N, 107°32'E), 1230 m, 2.8.2002, *M. Hauck*.

Common on *Abies sibirica*, *Betula platyphylla*, *Larix sibirica*, *Picea obovata* and *Pinus sylvestris* in light and dark taiga forests of the western Khentey Mts. More frequent on branches than on trunks. New to Mongolia. *T. americana* is the most widespread species of the *T. ciliaris* group with occurrences in W and E North America, Finland, European Russia, Siberia and Japan (Culberson & Culberson 1967, Randlane & Saag 1992, Kärnefelt & Thell 2001). *T. ciliaris* (Ach.) Gyeln. should be deleted from the Mongolian lichen flora, as samples named *Cetraria ciliaris* Ach. by Biazrov (1987, 1989) probably belong to *T. americana*, which is suggested both by Randlane & Saag (1992) and our own records of *T. americana*.

*Usnea articulata* (L.) Hoffm. – Khentey, Sangastay (49°10'N, 107°18'E), 1570 m, 30.7.2005, *M. Hauck* & *S. Javkhan*.

Locally abundant in the canopy of dark taiga forest with *Abies sibirica*, *Picea obovata* and *Pinus sibirica*, sometimes associated with *Dolichousnea longissima* ( $\equiv$  *Usnea longissima*). New to Mongolia. Records of *U. articulata* from Asia have already been published from Turkey, Saudi Arabia and China (Wei 1991, Huneck & al. 1992, Abo-Khatwa 1997). Otherwise known from Europe and Africa (Nimis 1993).

*Verrucaria funckii* (Spreng.) Zahlbr. – Khentey, Eroo valley, Khonin Nuga (49°5'N, 107°17'E), 950 m, 11.8.2004, *M. Hauck*.

On regularly submerged granite stones at the bank of the river Eroo, together with *V. margacea* and *V. praetermissa*. *V. funckii* has already been collected in the Khangay by Schubert & Klement (1971).

*Verrucaria margacea* (Wahlenb.) Wahlenb. – Khentey, Eroo valley, Khonin Nuga (49°5'N, 107°17'E), 950 m, 11.8.2004, *M. Hauck*.

On regularly submerged granite. New to Mongolia. *V. margacea* is known from Europe, Asia and North America (Nimis 1993, Esslinger & Egan 1995). Sedelnikova (1985) reported the species from S Siberia, as did Aptroot & Seaward (1999) from China (Hongkong).

*Verrucaria praetermissa* (Trevis.) Anzi – Khentey, Eroo valley, Khonin Nuga (49°5'N, 107°17'E), 950 m, 11.8.2004, *M. Hauck*.

On regularly submerged granite. New to Mongolia; already known from China (Hongkong; Aptroot & Seaward 1999).

*Xanthoria fallax* (Hepp) Arnold s. str. – Khangay, Arkhangay district, Tamir river (46°51'N, 103°23'E), c. 18 km WSW Kharkhorin, 25.7.2004, *M. Hauck*; Khentey, Eroo valley, Baziin Am (49°2'N, 107°15'E), c. 1100 m, 3.8.2005, *M. Hauck*.

Records of *X. fallax* by Cogt (1995) do apparently not refer to the species in the strict sense, but to the whole *X. fallax* group, which has been recently revised by Poelt & Petutschnig (1992) and Kondratyuk & Kärnefelt (2003). This is inferred from the lack of any other species of the *X. fallax* group in the list of Cogt (1995). Therefore, the cited samples from the Khangay and the Khentey, where the species was found on *Populus*, *Ulmus pumila* and *Spiraea aquilegifolia*, are presently the only records of *X. fallax* s. str. from Mongolia.

*Xanthoria fulva* (Hoffm.) Poelt & Petutschnig – Khangay, Arkhangay district, Tamir river (46°51'N, 103°23'E), c. 18 km WSW Kharkhorin, 25.7.2004, *M. Hauck*.

This species of the *X. fallax* group was found on *Populus* in a riverine *Salix-Populus* forest in the meadow steppe. First record of *X. fulva* from Mongolia. The range of *X. fulva* comprises North America and Eurasia including Russia (Kondratyuk 2004).

*Xanthoria ulophyllodes* Räsänen – Khentey, Eroo valley, Ulaan Burgas (49°4'N, 107°16'E), c. 950 m, 11.8.2004, *M. Hauck*.

On trunk of *Betula platyphylla* in a birch-dominated floodplain forest. New to Mongolia. Like *X. fulva*, *X. ulophyllodes* is found both in Eurasia and North America (Kondratyuk 2004).

### Acknowledgements

The field studies in the western Khentey Mts were supported by Prof. Dr Michael Mühlenberg (University of Göttingen), who provided the facilities of Khonin Nuga Research Station during several stays of the senior author in 2002-05 and one stay of the second author.

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