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Abstract

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Nineteen records of vascular plant species are added to the known flora of the phytogeographical region Khentej in northern Mongolia. Of these, six species and one subspecies, i.e., *Calamagrostis* ×*kuznetzovii, Cystopteris sudetica, Dryopteris expansa, Poa skvortzovii, Pyrola minor, Spiraea dahurica* and *Calamagrostis inexpansa* subsp. *micrantha* are new to Mongolia.

Introduction

The Khentej Mountains northeast of the Mongolian capital Ulaanbaatar have an interesting phytogeographical position in the transitional zone between the southern parts of the central Siberian taiga and the Mongolian-Daurian forest steppe. Central Siberian taiga forests are also situated within a transitional zone, i.e., between the western Siberian dark taiga and the eastern Siberian light taiga (Walter & Breckle 1986). Main tree species of the dark taiga are *Picea obovata, Abies sibirica, Pinus sibirica* and *Larix sibirica*. In the light taiga *Betula platyphylla* and related species as well as *Larix* sp. and *Pinus sylvestris* prevail. *Larix dahurica,* which is the typical larch species of the ultracontinental light taiga forests in Yakutia (Ermakov & al. 2002), is replaced by the western Siberian *L. sibirica* south of Lake Baikal in the Transbaikalian Mountains and the Khentej Mountains (Walter & Breckle 1986).

The transition of the southern central Siberian forests, which are themselves a transitional vegetation type to the Mongolian-Daurian forest steppe, causes the occurrence of a unique flora and vegetation. Therefore, Meusel & al. (1965) classified the Khentej Mountains (together with the Transbaikalian Mountains and the Daurian forest steppe) as an own phytogeographical province, i.e., the Daurian province, which is part of the Central Siberian-Daurian phytogeographical region.

The special phytogeographical position and a highly diverse relief result in high plant diversity in the Khentej Mountains. This is especially true for the western Khentej, which is less dry than the eastern and southern parts (Žukov & al. 1978, Dulamsuren 2004). Nonetheless, less bo-

tanical research has been carried out in the western Khentej than in the eastern and southern Khentej (Cedendaš 1995, Savin & al. 1988, Żoeo 2000). This is one reason why the National University of Mongolia in Ulaanbaatar and the University of Göttingen, Germany, founded a joint ecological research station in the western Khentej Mountains (Khonin Nuga Research Station; Mühlenberg & al. 2000). As a result of the field work carried out at this station, Dulamsuren & Mühlenberg (2003) published 44 vascular plant species as new for Grubov's (1955, 1982, 2001) phytogeographical region Khentej, five of which had been new to Mongolia. In the present paper, we report on the occurrence of further 20 species new to the phytogeographical region Khentej, six of which are new to Mongolia.

Study area

Khonin Nuga Research Station (49°04'48"N, 107°17'15"E) is located 250 km north of Ulaanbaatar. The study area has a size of 500 km^2 and comprises dark taiga forests of the upper and lower montane belt, light subtaiga forests, meadow steppe and mountain steppe of the lower montane belt as well as riverine vegetation (forests, shrublands and meadows). Elevation ranges from 900 to 1600 m. Location, climate, geology and vegetation of the study area have been described in detail by Dulamsuren & Mühlenberg (2003) and Dulamsuren (2004).

New records for the Khentej Mountains

The records of new plant species for the Khentej Mountains are listed in alphabetical order of the genera together with their known distribution in Mongolia. Specifications to the distribution of species in Mongolia refer to the 16 phytogeographical regions of Grubov (1955, 1982, 2001). Nomenclature is based on Gubanov (1996). Specimens cited have been collected by the first author, unless otherwise stated, and are deposited in her private herbarium; duplicate samples of most gatherings will be deposited in the Herbarium of the National University of Mongolia (UBU). Geographical coordinates are cited in the text when a location is mentioned for the first time.

Aconitum volubile Pall. ex Koelle – Songinotyn Khjasaa (49°04'N, 107°19'E), 30.6.2003; Ulaan Burgas (49°03'N, 107°15'E), 2.7.2003; Eroogijn Khaluun Rašaan (Hot Springs; 49°01'N, 107° 33'E), 31.7.2003.

A. volubile grows in *Larix sibirica-Betula platyphylla* forests and meadow steppe at forest edges. Furthermore it occurs in riverine shrublands along the rivers Eroo, Khongi and Šarlan. In Mongolia, the species was known so far from the Khangaj and from the Mongolian Altaj (Gubanov 1996).

Calamagrostis inexpansa A. Gray subsp. ***inexpansa*** (≡ *Calamagrostis neglecta* subsp. *inexpansa* (A. Gray) Tzvelev) – Eroogijn Khaluun Rašaan (Hot Springs), 4.7.2001, conf. N. N. Cvelev.

C. inexpansa subsp. *inexpansa* was found in a boggy clearing within a *Picea obovata* dark taiga forest of the lower montane belt. According to Grubov (2001) the taxon colonizes boggy meadows as well as the surroundings of springs and meadows in the subalpine belt. It was previously known from Mongolian Dauria, Great Khingan and Eastern Mongolia (Gubanov 1996). Dulamsuren & Mühlenberg (2003) already reported *C. inexpansa* as new to the Khentej without identifying the sample to subspecies rank; this material turned out to belong to *C. inexpansa* subsp. *micrantha.*

Calamagrostis inexpansa subsp. ***micrantha*** (Kearney) Stebbins – Sangastaj (49°08'N, 107°18'E), 22.7.2000; Eroogijn Khaluun Rašaan (Hot Springs), 4.7.2001 – det. N. N. Cvelev.

This subspecies was found in a *Pinus sibirica-Picea obovata* dark taiga forest of the upper montane belt and in a floodplain meadow. The specimen from Eroogijn Khaluun Rašaan was reported as *C. inexpansa* by Dulamsuren & Mühlenberg (2003). *C. inexpansa* subsp. *micrantha* is

new to Mongolia. The species has already been reported from the phytogeographical region Great Khingan (Grubov 2001).

Calamagrostis ×kuznetzovii Cvel. (*C. epigeios* (L.) Roth × *C. obtusata* Trin.) – Ilchlegijn Gol (49°04'N, 107°24' E), 19.8.2002 – det. N. N. Cvelev.

This hybrid species occurred in a west exposed mixed *Betula* subtaiga forest of the lower montane belt, dominated by *Larix sibirica* with some *Pinus sibirica, Picea obovata* and *Betula platyphylla* intermixed. It is the first record of the taxon from Mongolia. *C. ×kuznetzovii* was originally described from western Siberia (Cvelev 1976).

Carex hancockiana Maxim. – Sangastaj, 20.7.2000; Khonin Nuga (49°05'N, 107°17'E), 28.6. 2002 – conf. T. V. Egorova.

C. hancockiana inhabits moist meadows and *Salix* riverine forests as well as coniferous forests and mixed conifer-*Betula platyphylla* forests in the lower and upper montane belt. Similar habitats are colonized in the phytogeographical regions Khangaj and Great Khingan (Grubov 2001).

Chenopodium hybridum L. – Songinotyn Khjasaa, 23.6.2002; Ulaan Burgas, 16.8.2002.

In the study area, *C. hybridum* was found in *Betula fusca* riverine shrubland. Former records from Mongolia come from shady habitats near rocks and in boulder fields, narrow valleys, shrubberies and floodplain meadows (Grubov 2001). At such sites it occurs in the phytogeographical regions Khangaj, Mongolian Dauria, Great Khingan and Mongolian Altaj. In the regions Middle Khalkha, Eastern Mongolia, Depression of the Great Lakes, Valley of Lakes, Gobi Altaj, Dzungarian Gobi, Transaltaj Gobi and Alašan Gobi, *C. hybridum* grows in sayrs, i.e., saline, gravelly sites in semideserts and deserts, such as old riverbeds.

Cirsium arvense (L.) Scop. (= *C. setosum* (Willd.) Bess.) – Khonin Nuga Research Station, 20.6.2002.

This species was found in a floodplain meadow on a terrace of the river Eroo near the research station. So far, *C. arvense* has been reported from moist meadows and ruderal sites from the regions Khangaj, Mongolian Dauria, Mongolian Altaj, Eastern Mongolia, Depression of the Great Lakes, Valley of Lakes, Gobi Altaj, Dzungarian Gobi and TransAltaj Gobi (Grubov 2001).

Cystopteris sudetica A. Br. & Milde – Sangastaj, 26.7.2002 – det. R. V. Kamelin.

C. sudetica was found in a *Pinus sibirica* dominated dark taiga forest of the upper montane belt. It is the first record from Mongolia. The distribution of this fern ranges from Scandinavia over central and eastern Europe and Siberia to Japan (Kharkevič 1985). The main habitat of the species are rocks and stones in conifer and mixed conifer forests.

Delphinium crassifolium Schrad. ex Spreng. – Sangastaj, 21.7.2000; Khonin Nuga, 20.6.2002.

This species occurs in *Larix sibirica-Betula platyphylla* subtaiga forests of the lower montane belt and in forest clearings in the dark taiga of the upper montane belt. In the phytogeographical regions Khubsugul, Khangaj, Khovd and Mongolian Altaj, *D. crassifolium* also inhabits moist and floodplain meadows.

Dryopteris expansa (C. Presl) Fraser – Sangastaj, 26.7.2002 – det. R. V. Kamelin.

D. expansa, which is new to Mongolia, was found in a *Pinus sibirica* dominated dark taiga forest of the upper montane belt. In general, the species prefers humid sites with acidic soil in woodlands (Sebald & al. 1993a). *D. expansa* has a disjunct, holarctic distribution (Kharkevič 1985). In Russia it is known from coniferous forests as well as from deciduous forests of *Populus* or *Betula* and ascends up to the subalpine belt.

Elsholtzia ciliata (Thunb.) Hylander – Khonin Nuga, 18.6.2002 – conf. Sančir Č.

E. ciliata was found near a road at a forest edge close to the research station. Grubov (2001) reports the species from Mongolian Dauria, where it primarily occurs in meadows.

Euphorbia discolor Ledeb. – Khonin Nuga, 31.8.2002.

The record of this species is from a mountain steppe. Outside the Khentej Mountains, it occurs in numerous phytogeographical regions, i.e., Khubsugul, Khangaj, Mongolian Dauria, Great Khingan, Khovd, Mongolian Altaj, Middle Khalkha, Eastern Mongolia, Depression of the Great Lakes and Gobi Altaj. In these regions, it inhabits woodlands of *Larix sibirica, Larix sibirica-Pinus sibirica, Pinus sylvestris* and *Betula platyphylla.* Further it occurs in forest clearings, boulder fields, shrublands and on stony slopes (Grubov 2001).

Festuca venusta St.-Yves – Burmijn Khar Torlog (49°02'N, 107°19'E), 16.7.2000.

This species was found in a moist meadow. It is endemic to northern Mongolia and the Transbaikalian Mountains. Previous findings from Mongolia are from moist and boggy meadows in the phytogeographical regions Khubsugul and Khangaj (Gubanov 1996, Grubov 2001).

Mentha arvensis L. – Khonin Nuga, 25.6.2002; Ulaan Burgas, 17.8.2002.

M. arvensis was found on a river bank in perennial herb vegetation and in a moist floodplain meadow. So far the species was known from moist and boggy meadows and riverine *Salix* forests and shrublands in the phytogeographical regions Khangaj, Mongolian Dauria, Great Khingan, Khovd, Middle Khalka, Eastern Mongolia, Depression of Great Lakes, Valley of Lakes, Eastern Gobi and Dzungarian Gobi (Gubanov 1996, Grubov 2001).

Picris japonica Thunb. – Khonin Nuga, 17.7.2001.

P. japonica was found in riverine *Betula fusca* shrubland. Grubov (2001) reports the species from herb-rich meadows, meadow steppes and shrublands of the regions Khangaj, Mongolian Dauria, Great Khingan and Eastern Mongolia.

Poa skvortzovii Probat. – Songinotyn Khjasaa, 30.6.2002; Ulaan Burgas, 2.7.2002 – det. N. N. Cvelev.

In the study area the species occurs in riverine habitats, i.e., *Betula platyphylla* forest and *Betula fusca* shrubland. *P. skvortzovii* has not been reported from Mongolia so far. It has an eastern Asiatic distribution and occurs in the Russian Far East, southern Siberia, northeastern China and Korea (Malyšev & Peškova 1990). In contrast to our findings, Malyšev & Peškova (1990) mentions *P. skvortzovii* only from dry habitats.

Poa urssulensis Trin. – Ulaan Burgas 16.8.2002 – det. N. N. Cvelev.

P. urssulensis colonizes floodplain meadows, river banks and *Betula platyphylla* riverine forests. As with *P. skvortzovii*, *P. urssulensis* is said by Malyšev & Peškova (1990) to prefer dry habitats. *P. urssulensis* was already known from Mongolia from the phytogeographical regions Khangaj and Great Khingan (Gubanov 1996).

Pyrola minor L. – Sangastaj, 26.7.2002 – leg. & det. M. Hauck & C. Dulamsuren.

This species is recorded for the first time for Mongolia from a *Pinus sibirica-Abies sibirica* dark taiga forest of the upper montane belt. *P. minor* has a circumboreal distribution; aside from coniferous and deciduous forests, it primarily inhabits shrublands and moist, stony slopes (Malyšev & Peškova 1979, Sebald & al. 1993b).

Saussurea recurvata (Maxim.) Lipsch. – Khonin Nuga, 20.8.1999; Eroogijn Khaluun Rašaan (Hot Springs), 20.6.2001; Songinotyn Khjasaa, 30.6.2002; Ilchlegijn gol, 19.8.2002.

S. recurvata grows in *Larix sibirica-Betula platyphylla* subtaiga forests, in coniferous forests, in mixed conifer-*Betula platyphylla* forests as well as in shrubberies in the lower and upper montane belt. So far, the species was known from shrublands and floodplain meadows in Great Khingan (Grubov 2001).

Spiraea dahurica (Rupr.) Maxim. – Eroogijn Khaluun Rašaan (Hot Springs), 29.7.2001; Songinotyn Khjasaa.

These first records for Mongolia are from the lower montane belt, from humid mixed coniferous forest and dry *Pinus sylvestris* forest. Gubanov (1996) gives no records from Mongolia. Grubov (2001) mentioned the possibility that *S. dahurica* could occur in Mongolian Dauria.

Discussion

Four years of field work in the study area of 500 km^2 yielded a total of 64 vascular plant species new to the phytogeographical region Khentej as published in the present paper and in Dulamsuren & Mühlenberg (2003). Eleven of them are new to Mongolia (Gubanov 1996, Grubov 2001). These findings give evidence of the high plant diversity of the western Khentej Mountains and their high conservation value. As in Dulamsuren & Mühlenberg (2003), most records published in the present paper are from species inhabiting woodland. This is because forest vegetation of the western Khentej differs more from forest vegetation of the botanically better explored eastern and southern Khentej than steppe vegetation (Cedendaš 1995, Żoeo 2000).

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