



# Syntaxonomic notes on the class *Betulo davuricae–Quercetea mongolicae* (East Asian continental meso-xerophilous birch-oak forests): validation and description

Nikolai B. Ermakov<sup>1,2,3</sup>

Nikolai B. Ermakov<sup>1,2,3\*</sup>  
e-mail: brunnera@mail.ru

<sup>1</sup> Nikitsky Botanical Garden – National Scientific Center RAS, Nikita, Yalta, Crimea Republic, Russia

<sup>2</sup> Khakas State University, Abakan, Khakassia Republic, Russia

<sup>3</sup> Maykop State Technological University, Maykop, Adygeya Republic, Russia

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## ABSTRACT

Validation and description of the syntaxa names 'Betulo davuricae–Quercetea mongolicae' and 'Betulo davuricae–Quercetalia mongolicae' representing the moderately xerophilous birch-oak (*Betula davurica*, *Quercus mongolica*) forests from the continental part of Eastern Asia and adjacent areas of South-Eastern Siberia was carried out in accordance with the latest (2021) edition of the International Code of Phytosociological Nomenclature. For these higher units, the diagnostic species, peculiarities of ecology and geographical area are indicated. Prodrum of the class *Betulo davuricae–Quercetea mongolicae* is presented.

**Keywords:** syntaxonomy, forests, validation, *Quercus mongolica*, *Betula davurica*, East Asia

## РЕЗЮМЕ

Ермаков Н.Б. Синтаксономические заметки о классе *Betulo davuricae–Quercetea mongolicae* (Восточноазиатские континентальные мезо-ксерофильные березово-дубовые леса): валидизация и описание. Выполнены валидизация и описание названий синтаксонов 'Betulo davuricae–Quercetea mongolicae' и 'Betulo davuricae–Quercetalia mongolicae', представляющих умеренно сухолюбивые березово-дубовые (*Betula davurica*, *Quercus mongolica*) леса из континентальной части Восточной Азии и прилегающей территории Юго–Восточной Сибири в соответствии с последним (2021) изданием Международного Кодекса Фитосоциологической номенклатуры. Для этих высших единиц указаны диагностические признаки, особенности экологии и распространения. Приведен Продромус класса *Betulo davuricae–Quercetea mongolicae*.

**Ключевые слова:** синтаксономия, леса, валидизация, *Quercus mongolica*, *Betula davurica*, Восточная Азия

A peculiar zonal category of moderately xerophilous birch and birch-oak (*Betula davurica* Pall., *Quercus mongolica* Fisch. ex Ledeb.) forests occurring in the Daurian-Manchurian region (the continental part of the Eastern Asia) was described as a special class *Quercu mongolicae–Betuletea davuricae* Ermakov 1997 (Ermakov 1997). However, the names of this class and subordinated order 'Quercu–Betuletalia davuricae' have not been validly published in accordance with the International Code of Phytosociological Nomenclature (ICPN) (Theurillat et al. 2021). The name of the new order 'Quercu mongolicae–Betuletalia davuricae' is not validly published on page 65 in Ermakov (1997) although in the original diagnosis, there is only one suitable element designated as the nomenclatural type, namely the validly published alliance *Ligulario fisheri–Betuletum davuricae* Ermakov 1997. The invalidity is due to the fact that another validly published alliance *Kitagawio terebinthaceae–Betulion davuricae* Ermakov 1997 is also mentioned as the type of this new order name in the synoptic table on page 60. Actually, it is a typing error since the 'Ligulario fisheri–Betulion davuricae' is indeed the type designated for the 'Quercu–Betuletalia davuricae'. Nevertheless, two alliances are mentioned as suitable elements to be designated as the

type of the name 'Quercu mongolicae–Betuletalia davuricae' in the same paper. Therefore, the name of this order must be rejected according to Art. 5a (ICPN). The class name 'Quercu mongolicae–Betuletea davuricae' is also invalidly published in Ermakov (1997) because its original diagnosis contains only one invalidly published order *Quercu mongolicae–Betuletalia davuricae* Ermakov 1997 nom. inval., which was designated as the type (Art. 5a). This paper aims to publish the correct class and order names for the Daurian-Manchurian birch-oak forests in accordance with the ICPN. New data on this vegetation type and neighboring zonal forest syntaxa from Eastern Asia published by Stupnikova (2002), Krestov et al. (2006, 2023) and Zhi-Rong et al. (2010) are used for the corrections of floristic, ecological, phytocoenotic and geographical characteristics. Taxonomic reference: POWO 2024. Plants of the World Online. <https://powo.science.kew.org/> Last accessed 26 September 2024).

## Validation of the name

***Betulo davuricae–Quercetea mongolicae* cl. nov. Holotypus** – *Betulo davuricae–Quercetalia mongolicae* ord. nov. (described in this paper). **Diagnostic taxa of the class:** *Adenophora triphylla*, *A. tricuspidata*, *Artemisia argyi* var. *argyi*, *A. integrifolia*, *Aster scaber*, *A. tataricus*, *Atractylodes lancea*, *Betula davurica*, *Calamagrostis arundinacea* var. *brachytricha*,

*Campanula glomerata* subsp. *speciosa*, *Carex longirostrata*, *Dictamnus dasycarpus*, *Dioscorea nipponica*, *Fragaria orientalis*, *Geranium platyanthum*, *Hemerocallis middendorffii*, *Lathyrus humilis*, *Lespedeza bicolor*, *Lilium pensylvanicum*, *Iris uniflora*, *Patrinia scabiosifolia*, *Potentilla fragarioides*, *Pteridium aquilinum*, *Quercus mongolica*, *Sanguisorba officinalis*, *Saussurea elongata*, *Phedimus aizoon*, *Synurus deltoideus*, *Spodiopogon sibiricus*, *Vicia pseudo-orobus* and *V. unijuga*.  
**Syn.:** *Quercu mongolicae–Betuletea davuricae* Ermakov 1997 nom. inval. (Art. 5a, ICPN).

**Description.** These are cool-temperate continental birch and birch-oak (*Quercus mongolica*, *Betula davurica*) forests with a predominance of drought-resistant floristic elements. Their zonal position is related to the Daurian-Manchurian mountain forest-steppe where they occur on moderately xeric loamy soils in foothills and low mountains (250–1600 m a.s.l.), in a continental sub-Pacific climate. The forests of this class are replaced by broadleaved and mixed coniferous-broadleaved mesophilous vegetation types of the class *Quercetea mongolicae* Krestov, Dzizyurova et Korznikov 2023 that developed on the Asian mainland in humid conditions and with a lack of moisture deficits and/or droughts (Krestov et al. 2006, 2023).

**Betulo davuricae–Quercetalia mongolicae ord. nov.** **Holotypus** – *Ligulario fisheri–Betulion davuricae* Ermakov 1997 (Ermakov 1997, page 63).  
**Diagnostic taxa of the order:** the same as for the *Betulo davuricae–Quercetea mongolicae cl. nov.* (described in this paper).  
**Syn.:** *Quercu mongolicae–Betuletea davuricae* Ermakov 1997 nom. inval. (Art. 5a ICPN).

**Description.** The geography and ecology of the order are the same as for the class *Betulo davuricae–Quercetea mongolicae* (described in this paper).

Zhi-Rong et al. (2010) described the alliance *Poo nemoralis–Quercion mongolicae* Zhi-Rong, Fujiwara, Ohno et Zhao 2010 and included it in the class *Quercu mongolicae–Betuletea davuricae* Ermakov 1997. This name of the alliance was described invalidly (page 71 in Zhi-Rong et al. 2010) because the Latin word ‘typus’ (‘holotypus’) was not used for the designation of the type of the alliance name (the association *Aconito kusnezoffii–Quercetum mongolicae* Zhi-Rong et al. 2010) when the type is chosen among more than one suitable element (Art. 3o and 5a, ICPN). The alliance name is not validated in this paper because all subordinated associations are included in the alliance *Kitagawio terebinthaceae–Betulion davuricae* Ermakov 1997. It is indicated by a group of diagnostic species of the latter: *Achnatherum sibiricum*, *Adenophora gmelinii*, *Artemisia gmelinii*, *Bupleurum scorzonrifolium*, *Dendranthema zawadskii*, *Galium verum*, *Paeonia lactiflora*, *Polygonatum odoratum*, *Silene jensisensis* and *Spiraea pubescens*. The order name ‘*Poo nemoralis–Quercetalia mongolicae*’ was invalidly published by Zhi-Rong et al. (2010) (Art. 2b and 8, ICPN) because this order contains only one invalidly published alliance *Poo nemoralis–Quercion mongolicae* Zhi-Rong, Fujiwara, Ohno et Zhao 2010 nom. inval. (Art. 3o and 5a, ICPN).

## CONCLUSIONS

The syntaxonomical system of the class *Betulo davuricae–Quercetea mongolicae* representing the cool-temperate continental birch and birch-oak (*Quercus mongolica*, *Betula davurica*) forests with predominance of drought-resistant floristic elements is as follows.

## Class Order Alliance Association

*Betulo davuricae–Quercetea mongolicae cl. nov.*  
*Betulo davuricae–Quercetalia mongolicae ord. nov.*

*Ligulario fisheri–Betulion davuricae* Ermakov 1997

*Veronicastro sibiricae–Betuletum davuricae* Ermakov 1997

*Aquilegio parviflorae–Quercetum mongolicae* Ermakov et Petelin in Ermakov 1997

*Corylo heterophyllae–Quercetum mongolicae* Stupnikova 2002

*Corylo heterophyllae–Quercetum mongolicae calamagrostietosum brachytrichae* Stupnikova 2002

*Corylo heterophyllae–Quercetum mongolicae typicum* (Syn. C.h.–Q.m. pteridietosum aquilini Stupnikova 2002)

*Rhododendro daurici–Quercetum mongolicae* Stupnikova 2002

*Rhododendro daurici–Quercetum mongolicae typicum* (Syn. R.d.–Q.m. atractylodetosum Stupnikova 2002)

*Rhododendro daurici–Quercetum mongolicae spiracetosum ussuriensis* Stupnikova 2002

*Rhododendro daurici–Quercetum mongolicae laricetosum cajanderi* Stupnikova 2002

*Kitagawio terebinthaceae–Betulion davuricae* Ermakov 1997

*Artemisio desertori–Betuletum davuricae* Ermakov 1997

*Geranio davurici–Betuletum davuricae* Ermakov 1997

*Carici vanheurcki–Betuletum davuricae* Ermakov et Petelin in Ermakov 1997

*Aconito kusnezoffii–Quercetum mongolicae* Zhi-Rong, Fujiwara, Ohno et Zhao 2010

*Aconito kusnezoffii–Quercetum mongolicae typicum* Zhi-Rong, Fujiwara, Ohno et Zhao 2010

*Aconito kusnezoffii–Quercetum mongolicae achnatherietosum extremiorientalis* Zhi-Rong, Fujiwara, Ohno et Zhao 2010

*Aconito umbrosi–Quercetum mongolicae* Zhi-Rong, Fujiwara, Ohno et Zhao 2010

*Aconito umbrosi–Quercetum mongolicae typicum* (Syn. A.u.–Q.m. rheotosum franzenbachi Zhi-Rong, Fujiwara, Ohno et Zhao 2010)

*Aconito umbrosi–Quercetum mongolicae medicagoetosum sativae* Zhi-Rong, Fujiwara, Ohno et Zhao 2010

*Artemisio vestitae–Quercetum mongolicae* Zhi-Rong, Fujiwara, Ohno et Zhao 2010

*Larici gmelinii–Quercetum mongolicae* Zhi-Rong, Fujiwara, Ohno et Zhao 2010

*Larici gmelinii–Quercetum mongolicae typicum* Zhi-Rong, Fujiwara, Ohno et Zhao 2010

*Larici gmelinii–Quercetum mongolicae rubietosum sachalinensis* Zhi-Rong, Fujiwara, Ohno et Zhao 2010

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