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Overview of the Study of the Genus *Myricaria* Desv. in Siberia

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Abstract

Myricaria is a shrub. it grows on pebble, and rocky banks of the mountainous rivers in the southern regions of Siberia. The academician P.S. Pallas was the first who became interested in Myricaria plants when traveling in the mountains of South Siberia. C.L. Willdenow (1816), C.G. Ehrenberg (1827), A.A. Bunge (1835), K.J. Maximovich (1889), S.G. Gorshkova (1949) and other scientists studied the species of this genus. E.G. Bobrov (1967) made the first review of this genus. A detailed analysis of literature and herbarium specimens of the Siberian species of the genus *Myricaria* was performed. There is no consensus on taxonomy of Siberian species of this genus in botanical literature. Therefore, study of moot points in taxonomy of these species on the basis of an analysis of characters for treatment of the genus *Myricaria* is of great importance. The features are: size and shape of leaves, peculiarities of structure and size of inflorescences. The author collected plants in the southern Siberia: in the Altay Mountains, Tyva, Pribaikalye and Zabaikalye during expeditions from 1990 to 2006. Also we collected seeds and cuttings of species of *Myricaria* and grew up them in the nursery of the Laboratory of Dendrology, SB CSBG RAS. When studying of morphological features forming the basis for description of the species, it has been established that only two species: *M. bracteata* and *M. longifolia*, instead of four from the botanical literature, grow in Siberia. Differences in the biological peculiarities and areas also are characteristic of the two species. The author does the critical overview and offers system of the Siberian species of the genus *Myricaria*.

Key words: *Myricaria*, Siberia, species, taxonomy, diagnostic characters

Introduction

When developing an assortment of species for various urban plantings, a reasonable combination of local plants and those from different regions is required. Unfortunately, until the present time trees and shrubs of Siberian flora have been little used and some ornamental plants are unknown to landscapers.

Myricaria Desv. of the family *Tamaricaceae* Link is one of the promising genera for urban plantings. It is characterized by good resistance in winter, high growth rate and ornamental qualities. Members of this genus are shrubs, as pioneer plants they occupy exclusively sandy or pebble sites along rivers and streams in Southern Siberia: in the Altai Mountains, Tyva, Pribaikalye and Zabaikalye (Photo 1). The author collected plants in the wild during expeditions and grew them in the nursery of the Laboratory of Dendrology, CSBG SB RAS.

Academician Peter Simon Pallas was the first scientist who became familiar with the representatives of the genus *Myricaria* during expeditions in Southern Siberia late in the 18th century. Myricaria was assigned to tamarisks and named by C. Linnaeus as *Tamarix germanica* L. Later on C. L. Willdenow engaged in an overview of tamarisks worked with Pallas' samples. Descriptions of Myricaria species were at the end of the list of tamarisks as *Tamarix longifolia* Willd. and *T. davurica* Willd.(1816). When A. N. Desvaux (1825) studied on the family *Tamaricaceae*, he described the genus *Myricaria* Desv. in which he placed Pallas' plants described by Willdenow. Two years later, a new refined overview of the genus was written by K. G. Ehrenberg (1827). N.S. Turczaninow (1842-1845) studied plants of Pribaikalian Siberia with special emphasis on two South-Siberian myricaria species – *M. longifolia* (Willd.) Ehrenb. and *M. davurica* (Willd.) Ehrenb.

When the botanists had studied on the area adjacent to Southern Altai, they became familiar with one more species which was almost at the same time described twice in Russian Dzhungaria as *M. macrostachya* Kar. et Kir. and *M. alopecuroides* Schrenk ex Fisch.et C.A. Mey. (1841). To obtain further information on the genus, a great deal was done by Russian researchers in Central Asia who collected large herbaria during their trips. The collections were treated by K. I. Maximowicz (1889a; 1889b) who published the overviews of Central-Asian species in the first issues of "Enumeratio plantarum regions Tangutica" (1889a) and "Enumeratio plantarum Mongolica" (1889b).

In the system of Myricaria species of S. G. Gorshkova (1949) in "Flora of the USSR," there are 4 species placed in two orders:

Series 1. Germanica Gorschk. Leaves are small, 2-4(9) mm long, 0.5-1 mm wide, acutate, broadest at the base; clusters are dense.

M. squamosa Desv.; *M. alopecuroides* Schrenk

Series 2. Dahuricae Gorschk. Leaves are large, 0.4-0.5 cm long, 1-3 mm wide, blunt-pointed or pointed,

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tapered at the base.

M. longifolia (Willd.) Ehrenb.; *M. dahurica* (Willd.) Ehrenb.

Later E. G. Bobrov (1967) published a complete overview of the genus *Myricaria* in which he listed three species for Siberia: *M. bracteata* Royle (*M. alopecuroides* Schrenk), *M. davurica* (Willd.) Ehrenb., and *M. longifolia* (Willd.) Ehrenb.

Methods

During the acquaintance with herbarium and literature concerned with Myricaria species we encountered the necessity of understanding species composition of plants growing in Siberia. Research should be conducted only on reliable taxonomic base. Herbaria of Siberian plants kept in various cities of Russia and Commonwealth of Independent States were studied: P. N. Krylov Tomsk State University (TK), Botanical Institute, RAS (LE, St.-Petersburg), Main Botanical Garden (MHA) and Moscow State University (MW, Moscow), scientific-production association "Botany" (Tashkent) and Central Siberian Botanical Garden, SB RAS (NS, NSK, Novosibirsk) (areas of *M. longifolis* and *M. bracteata* are shown in Figure 1 & 2).

The author collected plants in the southern Siberia: in the Altay Mountains, Tyva, Pribaikalye and Zabaikalye during expeditions from 1990 to 2006. Also we collected seeds and cuttings of species of *Myricaria* and grew up them in the nursery of the Laboratory of Dendrology, SB CSBG RAS.

Fig. 1. The area of *Myricaria bracteata* in Western Siberia.

Fig. 2. The area of *Myricaria longifolia* in Central and Eastern Siberia.

Discussion

Problems of taxonomy of *M. longifolia* (Willd.) Ehrenb. (*M. dahurica* (Willd.) Ehrenb.)

M. longifolia (Willd.) Ehrenb. and *M. dahurica* (Willd.) Ehrenb. were assigned to "large-leaved" by S. G. Gorshkova (1949). P. S. Pallas was the first who collected "large-leaved" plants and later on tried to tell the difference between Caucasian species and Siberian montane one for which he intended to give a special name (*T. decandra)*.

Willdenow (1816) was the first who mentioned flower racemes arrangement as an important diagnostic character: *T. longifolia* – "spica terminalis", *T. davurica* – "spicae laterales". In the overview of the family K. G. Ehrenberg (1827) also pointed to flower racemes arrangement as a diagnostic character: *M. dahurica* (the genus *Myricaria* had been already separated out by Desvaux) – "florum racemis subspicatis brevibus lateralibus".

S. G. Gorshkova (1949) identifies the species by the same character:

"*M.longifolia*. Leaves: lance-linear or linear, 0.4-1.5 cm long, 1.0-1.5 mm wide; flower racemes: terminal, sparse; bracts: ovate-oblong, with narrow pointed tips.

M.dahurica. Leaves: oblong-ovate, elongated or linear-oblong, 0.4-1.0 cm long, 1.0-3.0 mm wide; flower racemes: lateral, rarely terminal, dense; bracts: rhomboidal or ovate-oblong".

E. G. Bobrov (1967) considered both species should be distinguished by branching nature and leaf shape:

"*M. davurica* – branches: almost accumbent, usually fasciculate, 3.0-8.0 cm long, somewhat narrowed at the base; leaves: well-spaced, lanceolate, 1.0-1.5 cm long, petals: 2.5-3.0 mm wide;

M. longifolia – irregularly branching shrubs; branches: divaricate and longer; leaves: tapering to the base and to the tip or widened at the base, lance-linear or linear, narrow, 0.8-1.5 cm long, 1.0-1.5 mm wide, calyx: 3.0-4.0 mm long, petals: 5.0-6,0 mm long. The areas of *M. davurica* and *M. longifolia* are almost coincident and both species often occur together as, e.g. along the Irkut River. In recent years the botanists, including P. N. Krylov, M. G. Popov and L. M. Cherepnin, have stopped distinguishing these species due to their similarity and joint growth. However, they should be distinguished as it was done earlier by K. F. Ledeburg, N. S. Turchaninov and A. A. Bunge. Turchaninov himself collected both species on the bank of the Irkut River near s. Vvedenskoye in 1828. He considered a narrow-leaved Myricaria to be *M. longifolia* and a broad-leaved one to be a new species, *M. latifolia* (LE). But he did not describe the latter as he was convinced of its identity with *M. davurica* described earlier".

We viewed the herbarium collected by Turchaninov in Irkutsk Oblast. There was an annual shoot with narrower leaves under the name *M. longifolia* and a shoot of the previous year with wider leaves under the name *M. latifolia*. Thus characters of shoots of different age had been compared which is not a reliable distinction between two species. The author considered the two species to be well distinct, their joint growing to be connected with the fact they were not closely related as they belonged to different species series. In so doing he did not explain why he assigned them to different series.

Both A.A. Bunge (1835) and C. J. Maximowicz (1889b) regarded them as two varieties of one species.: Bunge A.A. 1835, Verzichniss 581 (1836 in Mem. Ac.Sci.Petersb. 2: 581). *M. dahurica a. microphylla*; *M. dahurica в. macrophylla*.

Maximowicz C.J. 1889, Enum. pl. Mong.:113, tab.9, f. 10–4. *M. longifolia a. typica*; *M. longifolia в. dahurica.*

M.G. Popov ("Flora of Central Siberia", 1957) considers treatment of the genus in "Flora of the USSR" as unsatisfactory due to relative distinctions between these two species. He clarifies that these are not two species but "...only separate forms of growth of the same species: in the high mountains the form is *dahurica*; racemes are produced (at the tips of the branchlets of the current year) in the lateral position, they are denser and shorter, their bracts are wider; and in low warm regions, e.g. in Selenginskaya Dauria, prevail growth branches at the ends of which racemes become looser".

V. I. Kurbatskiy (1977) thinks that *M. longifolia* and *M. dahurica* cannot be recognized as distinctive species since they are not distinguishable by a complex of morphological characters, grow in the same area and do not exhibit any distinctions in ecological growth conditions.

Problems of taxonomy of *M. bracteata* Royle (*M. alopecuroides* Schrenk)

M. bracteata, *M. alopecuroides* and *M. squamosa* are "small-leaved species" (Gorshkova, 1949).

M. bracteata was described for the first time by J. F. Royle (1839) in "Illustration of Botany of the Himalayas". *M. elegans* was described for the first time too.

Royle pointed *M. bracteata* has "spicis terminalibus solutariis", *M. elegans* – "racemes paniculatis lateralibus". Calendar periods of plant collection were ignored either. In general this mistake extends to all species of this genus.

Later on *M. bracteata* Royle was twice described in Russian Jungaria as *M. alopecuroides* Schrenk ex Fisch.et Mey.and *M. macrostachya* Kar. et Kir.(1841).

D. I. Litvinov (1908) indicated in his article that publications with descriptions of *M. alopecuroides* Schrenk and *M. macrostachya* Kar.et Kir. appeared in the same year (1841) and consequently both synonyms were equal. He recognized the name of Schrenk as one accepted later by all authors including G. S. Karelin and I. P. Kirillov. V. P. Bochantsev (1976) presented the following dates: Schrenk 15 VI 1841 *M. alopecuroides*; Kar et Kir 2 VII 1841 *M. macrostachya*. He considered the name *M. alopecuroides* to be priority as it had been published a little bit earlier than *M. macrostachya*.

However, E. G. Bobrov (1967) restored an older name *M. bracteata*. He pointed to the fact that "those names published in 1841 were assigned to the species description of which had been published two years

earlier; that species was determined by the specimens from the Western Himalayas as *M. bracteata* Royle".

Royle (1839) describes "*M. bracteata:*

caule angulato striato, foliis lineari-lanceolatis sessilibus subpatentibus, spicis terminalibus solitariis, bracteis deciduis latis cordatis membranaceis pedicello longioribus".

There are the same characters in the description of *M. alopecuroides* Schrenk. Therefore, E. G. Bobrov (1967) who reduced *M. alopecuroides* to the synonym of *M. bracteata* in his review is right. We agree.

M. squamosa Desv. In his description A. N. Desvaux (1825) indicated "habitat in Oriente". The plant struck him by big bracts unlike bracts of known *M. germanica* which was also given there. Absence of comprehensive description and exact locality presented great difficulties to scientists in studying Myricaria. Moreover, nobody saw original specimens for more than 100 years. Desvaux himself had only seen a dry herbarium specimen (v.s.). A question: what is *M. squamosa* Desv – *M. alopecuroides* or *M. germanica* remains open.

He describes that leaves of *M. squamosa* Desv are imbricate and carinate. This means that the midrib is prominent forming a carina; it is rigider than in "long-leaved" species which have flat leaves, i.e. this is a "small-leaved" species. What does "Oriente" mean? Europeans could not get to the Tibet, Himalayas and Afghanistan at that time. French scientists could only go to Central Asia. But collections from Central Asia date at not earlier than 1840s (Karelin and Kirillov).

O. P. de Candolle (1828) did not mention any "small-leaved" species from the East (to the east of the Caucasus) and named *M. squamosa* as "something unknown but supposing a synonym of *dahurica*". He did not see *M. bracteata* and equated *M. squamosa* with *M. dahurica.* But these species differ in areas and such a character as leaf size.

Gorshkova (1949) consideres racemes arrangement to be the main distinguishing feature between "small-leaved" *M. alopecuroides* and *M. squamosa*: in *M. alopecuroides* racemes are terminal (rarely lateral) and in *M. squamosa* – lateral. In *M. squamosa* there are numerous scales at the base of flower clusters due to which it was called squamose. In addition, in the "Flora of the USSR" bract structure is given as an important diagnostic character. In *M. alopecuroides* bracts are broad-ovate or broad-oval with wide husked erosely dentate margins at the base, with elongated declinate points, and in *M. squamosa* – they are ovate-elliptic, blunt and wide. As it was reported in the summary Index Kewensis, *M. squamosa* was a synonym of *M. germanica* which did not grow in Siberia.

Such authors as S. S. Ikonnikov in the "Manual for the Identification of Higher Plants of Badakhshan" (1979), P. N. Ovchinnikov in "Flora of Tajiki SSR" (1981) and T. I. Tsukervanik in the "Manual for the Identification of Plants of Central Asia" (1983) consider raceme arrangement: lateral in *M. squamosa*, terminal in *M. bracteata* as well as bract form to be the main diagnostic characters.

S. S. Ikonnikov (1979) and T. I. Tsukervanik (1983) indicate areas of *M. squamosa*: Jungarsky Alatau, Tien Shan and Pamirs-Altai in the middle and upper belts of the mountains at 2500-4000 m elevation. The Saur and Tarbagatai Ranges adjacent to the Altai are not indicated as localities of this species.

Incompleteness of morphological characteristics often derives from the fact that plants are only studied by herbarium specimens.

In the Herbarium of Botanical Institute until 1924 all "small-leaved" Myricaria species in collections from Central Asia were determined as *M. germanica*. Since 1924 S. G. Gorshkova identified Myricaria species, she re-identified all plants with terminal generative shoots as *M. germanica* var. *alopecuroides* (Schrenk) Maxim. Fl. Tangut. I (1889). On labels of 1935 plants with terminal generative shoots were identified as *M. alopecuroides*,and those with lateral ones – as *M. germanica* var. *squamosa* (Desv.) Maxim. Fl. Tangut. I (1889). Only in 1941 she identified an independent species *M. squamosa*. E. G. Bobrov did not re-identify plants in the Herbarium of Botanical Institute.

Opinions of botanists studying the genus *Myricaria* on the ranges of the two species differ. E. G. Bobrov (1967) specifies the range of *M. squamosa* "Central Asia, only eastern regions".

M. G. Popov writes in "Flora of Central Siberia" (1957) that 2 western species are wrongly given for Dauria in "Flora of the USSR": *M. alopecuroides* (Caucasus; Tien-Shan; Altai) and *M. squamosa* a doubtful species absent in this area.

M. E. Kirpichnikov in "Flora of Zabaikalye" (1975) points out a correct statement of M. G. Popov and absence of these species in Zabaikalye.

According to V. I. Kurbatskiy in "Flora of Krasnoyarsk Krai" (1977), *M. squamosa* does not occur in Krasnoyarsk Krai and *M. bracteata* (*M. alopecuroides*) is a rare plant in the West Sayan. The only population of *M. bracteata* was found in the valley of the Bolshoi Anzas River. We discovered the second population on the pebble bank in the valley of the Ona River near the mouth of the Bolshoi On River.

I. Yu. Koropachinskiy in "Woody plants of Siberia" (1983) presents only *Myricaria bracteata*, *M. alopecuroides* and *M. squamosa* are reduced to the synonyms of this species.

E. M. Lyakh treated the genus *Myricaria* for "Flora of Siberia" (1996).

Conclusion

As a result of studying of a large number of a herbarium samples from the nature and the plants which have grown in culture we believe there are two species of *Myricaria* in Siberia:

M. bracteata Royle, 1839, Ill. Bot. Himal.: 214, tabl. 44, fig. 2; – *M. alopecuroides* Schrenk 15 VI 1841, in Fisch. et Mey., Enum. Pl. I: 65; Ledeb. 1844, Fl. Ross. II: 131; Kryl. 1935b,Fl. Zab. Sib. VIII: 1918; Gorshk. 1949, Fl. SSSR. XV: 324, p.p., tabl. XVI, fig. 3. – *M. macrostachya* Kar. et Kir. 1841, Bull. Soc. Nat. Mosc. 14, 3: 423. – *M. germanica* auct. non Desv. 1825; – *M. germanica* var. *alopecuroides* Maxim. 1889, Fl. Tangut.: 96, p.p.; Maxim. 1889, Enum. Pl. Mong.: 112

p.p. – *M. germanica* var. *bracteata* (Royle) Franchet, 1883, Bot. Jahresb. II: 967.

Typus : in the vicinity of Cashmere (herb. Kew.).

Leaves: linear-oblong, blunt, slightly widened near the base, 2-5 mm long, 0.5-1 mm wide. Bracts: 5-13 mm long, broad-rhomb-shaped, almost entirely husked, usually erosely dentate along the margin, with long recurved point. Racemes: 5-20 cm long, lateral and/or terminal, simple (Photos 2, 3).

Valleys of the mountain rivers, pebbles or sandy alluvia.

West Siberia: Altai Krai, the Altai Republic; Central Siberia: the Khakasia Republic (the Bolshoi Anzas River, tributary of the Ona River; the Ona River near the mouth of the Bolshoi On River); East Europe, Central Asia, the Pamirs, East Kazakhstan, the Himalayas, Mongolia. Described in the West Himalayas.

2. *M. longifolia* (Willd.) Ehrenb. 1827 in Linnaea 2: 279; DC. 1828, Prodr. 3: 97; Turcz. 1844, Fl. baic.-dah. 1: 428; Ledeb. 1844, Fl. Ross. 2, 1: 131; Gorshk. 1949, Fl. SSSR. 15 : 326. – *M. longifolia a. typica* Maxim. 1889, Enum. Pl. Mong.: 113, tab. 9, f. 10-14. – *M. longifolia b. dahurica* Maxim. 1889, Enum. Pl. Mong.: 113; – *M. davurica* (Willd.) Ehrenb. 1927, in Linnaea 2: 279 ; DC. 1828, Prodr. 3: 98; Ledeb. 1831, Fl. alt. 3: 224, pro minor parte; Turcz. 1844, Fl. baic.-dah. 1: 456; Ledeb. 1844, Fl. Ross. 2, 1: 132; Kryl. 1935,Fl. Zab. Sib. 8: 1919; Gorsshk. 1949, Fl. SSSR. 15 : 327; – *T. germanica* auct. non L. 1753: Pall. 1776, Reise. 3: 713, Tab. F, fig. 2. – *Tamarix longifolia* Willd. 1812-1813 (1816), Abh. Akad. Berl.: 85. – *T. davurica* Willd. 1812-1813 (1816), Abh. Akad. Berl.: 85.

Typus: Zabaikalye, Pallas (herb. Willd., Berl.)

Leaves: lance-linear, pointed, tapering to the base, 5-10 mm long, 1-3 mm wide. Bracts: 5-8 mm long, broad-ovate, broad-husked, smooth-edged, slightly sharp-pointed at the tip.

Racemes: up to 10 cm long, lateral and/or terminal, simple or compound.

Pebble and stony banks of the mountain rivers, grow to tree-line.

West Siberia: the Altai Republic; Central Siberia: the Khakasia Republic, Krasnoyarsk Krai, the Tyva Republic; East Siberia: Irkutsk Oblast, the Buryatia Republic (Lake Baikal – typical habitat), Dauria, Mongolia.

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Photo 1. *Myricaria* in nature.

Photo 2. Blooming of lateral shoots of *Myricaria bracteata* (June).

Photo 3. Blooming of terminal shoot of *Myricaria bracteata* (July).