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AN ENDEMIC PSAMMOPHILOUS PLANT ASSOCIATION *ASTRAGALO OLCHONENSIS-CHAMAERHODETUM GRANDIFLORAE* ASS. NOVA FROM OLKHON ISLAND ON LAKE BAIKAL AND ITS SYNTAXONOMIC POSITION

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Abstract. A new endemic plant association *Astragalo olchonensis-Chamaerhodetum grandiflorae* from Olkhon Island on Lake Baikal is described. The association is a type of pioneer psammophilous vegetation and represents *Oxytropidion lanatae* Chytrý *et al.* 1993, *Oxytropidetalia lanatae* Brzeg & Wika *ordo nov.* and *Oxytropidetea lanatae* Brzeg & Wika *cl. nov.* The differentiation of the association is presented.

Key words: Phytosociology, syntaxonomy, psammophilous vegetation, endemic plant association, nomenclature, *Oxytropidion lanatae*, Lake Baikal, Olkhon Island, Russia

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INTRODUCTION

In July 1996, during investigations carried out on migrating sands on Olkhon Island (Lake Baikal, eastern Siberia), 12 plant communities were initially distinguished on the basis of 32 phytosociological relevés. These plant communities consisted of 52 vascular plant species, 3 moss species and 7 lichen species. In six locations (Fig. 1) of wind-flattened dunes near the villages of Peschannaya (1), Ulan-Khushin (2), Khuzhir (3), Malyi Khuzhir (4), Yalga (5) and Sem Sosen (6), 18 phytosociological relevés were made, including the Baikal endemite *Astragalus olchonensis* and/or the Baikal subendemite *Chamaerhodos grandiflora*. Phytocoenoses of psammophilous pioneer vegetation with a share of these plant species were described as an *Astragalus olchonensis-Chamaerhodos grandiflora* community (Wika *et al.* 1997). In the explanation of photograph no. 11 from that paper, even the name 'an endemic association of *Astragalo-Chamaerhodosetum grandiflorae*' was used. At that time the principal author of the geobotanical aspects of that work (S. Wika) suggested in many discussions that it could be a new associ-

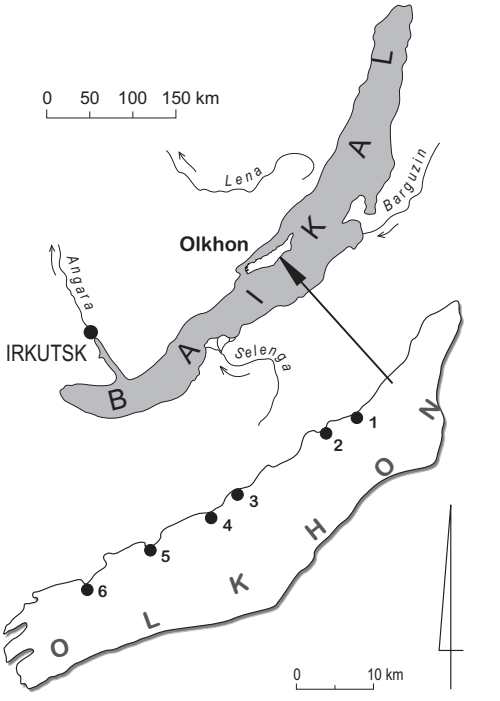

Fig. 1. Schematic map of the investigated area. 1–6 – localities.

ation. However, the authors did not precisely describe the association's structure, differentiation or position in the phytosociological system. Some information in relation to the syntaxon's variability and habitat was presented in a separate paper (Snytko *et al.* 1997b), but the authors did not identify and describe the rank of the units they considered.

This paper is intended to provide a complete description (with revised identification of some plant species) of the *Astragalo olchonensis-Chamaerhodetum grandiflorae* association in accordance with the requirements of the International Code of Phytosociological Nomenclature (ICPN) (Weber *et al.* 2000), and then to present the local differentiation of this association, specifying its syntaxonomic position as well as defining the nomenclatural types of the described syntaxa.

STUDY AREA

Olkhon Island is the largest of 30 rocky islands on Lake Baikal. It covers *ca* 700 km^2 and is located in the middle of the deepest lake in the world near the Pribaikalskie Gory Mts. The island is only 1.5 km from the nearest land. The island has a ferry connection with the mainland, so it can be inhabited. The permanent inhabitants, mainly Buryats, live in five villages and 6 isolated farms in the western part of the island, and the population density is low, two persons per km^2. The local people are engaged in sheep farming, fishing, forestry and cattle breeding.

Olkhon is an island of tectonic origin, produced by tectonic movements in the so-called 'Baikal rift.' It originated as the result of the splitting of the Olkhon Block from the Pribaikalskie Gory Mts. The block consists mainly of old magmatic and metamorphic rock. In some places on the western shore, weakly cemented Tertiary sands and clays are also present. The Olkhon Block is distinctly inclined to the northwest, so the northwestern part of the island is lower and descends gently, whereas the mountainous southeastern part is rocky and steep.

The distribution of vegetation on Olkhon Island is determined by local climate, soils and relief. The climate is dry continental. Annual precipitation oscillates between 200 and 250 mm, so the island is one of the driest places in the whole Baikal region. Snow cover in the southwestern part of the island is 5–10 cm deep, and strong winds in the winter freeze plants. There are no significant rivers, only small streams which generally dry up in the summer. In such conditions two plant formations are dominant here: steppe and eastern Siberian thin taiga which is more diversified (Katsura & Federovsky 1966; Pavlovsky 1968; Rossolimo 1971; Abalakov *et al.* 1989; Szczypek 1995; Snytko *et al.* 1997a).

MATERIALS AND METHODS

From 7 to 10 July 1996, 32 phytosociological relevés were made according to the Braun-Blanquet method in patches of various psammophilous swards. Twenty of them are compiled in Table 1. *Oxytropis lanata*, *Thymus baikalensis*, *Festuca rubra* subsp. *baicalensis*, *Poa attenuata*, *Chamaerhodos grandiflora*, rarely *Astragalus olchonensis*, and others participate in them. The effect of exposure on the floristic composition of psammophilous vegetation was investigated by Wika *et al.* (1997) and Snytko *et al.* (1997b).

Latin names of vascular plants are given according to Popov (1957) and in part according to Malyshev and Peshkova (1979), lichens according to Fałtynowicz (1993), and mosses according to Corley *et al.* (1981). The syntaxonomic classification of higher units generally follows *The USSR vegetation syntaxa prodromus* (Korotkov *et al.* 1991), and in some particulars follows Chytrý *et al.* (1993). Lists of diagnostic species (characteristic or differential) are elaborated on the basis of the authors' analysis of over 150 original relevés (Wika *et al.* 1997, 1999, and unpublished analytic and synthetic tables; Szczypek *et al.* 2000) and other previous materials (Kovár & Volkova 1981; Mirkin *et al.* 1985, 1992; Korotkov *et al.* 1991; Chytrý *et al.* 1993, 1995).

List of localities of phytosociological relevés from Table 1 (field nos. in parentheses):

1(38) – Sem Sosen, sandy area *ca* 900 m SE of Baikal Lake shore;

2(9), 5(10), 6(11), 7(8) – Ulan-Khushin, sandy area 500 m N of village;

3(40) – Sem Sosen, sandy area *ca* 1000 m SE of Baikal Lake shore;

4(37) – Sem Sosen, sandy area *ca* 600 m SE of Baikal Lake shore;

8(26) – Yalga, dune in complex of pastured sand areas;

9(31), 10(30), 14(29) – Malyi Khuzhir, sandy area 500 m NE of village;

11(18) – Khuzhir, sandy area 1000 m NE of village, 50 m from Baikal Lake shore;

12(17) – Khuzhir, sandy area 1000 m NE of village, 150 m from Baikal Lake shore;

13(2) – Peschannaya, sandy area 100 m S of village;

15(16) – Khuzhir, sandy area 1000 m NE of village, *ca* 300 m from Baikal Lake shore;

16(21) – Peschannaya, sandy area *ca* 300 m S of village;

17(4) – Peschannaya, sandy area *ca* 300 m SW of village;

18(6) – Peschannaya, sandy area 200 m S of village, *ca* 300 m from taiga;

19(1) – Peschannaya, sandy area 50 m S of village;

20(3) – Peschannaya, sandy area 100 m S of village.

RESULTS

GENERAL CHARACTERISTICS OF THE ASSOCIATION

Patches of the *Astragalo olchonensis-Chamaerhodetum grandiflorae* association were found on the northwestern shore of Olkhon Island within deflation areas where Tertiary clays and weakly cemented sands have occurred for millions of years. Across the ages they have been shaped by strong winds, creating dunes of different types. The dunes are covered partly by eastern Siberian thin pine-larch taiga and partly by pine taiga, both with *Rhododendron dauricum* in the shrub layer. This type of taiga represents the *Irido ruthenicae-Laricetea sibiricae* Zhitluchina & Mirkin 1987 *ex* Ermakov 1995 class (= *Rhytidio-Laricetea sibiricae* Ermakov & Korotkov 1999) (cf. Chytrý *et al*. 1993). The consolidated dunes can also be covered by steppes, for example from the order *Stipetalia sibiricae* Arbuzova & Zhitluchina 1987 (*nom. inval*., Art. 1, 2a ICPN) and other higher units of the class *Cleistogenetea squarrosae* Mirkin *et al*. *ex* Gogoleva *et al*. 1987. Increasing human impacts (fires, forest cutting, cattle and sheep grazing, building and tourism) have created the secondary effect of causing the eolian sands to become mobile. On these widespread sandy areas, interesting processes of succession and degeneration can be observed today. The best-developed patches of the described association were found on dunes located near the western shore of Lake Baikal in the vicinity of Ulan-Khushin, Khuzhir, Malyi Khuzhir and Peschannaya villages, especially in places of extensive deflation. In this area the number of clumps of dominating species *Oxytropis lanata*, *Thymus baikalensis* and subendemite *Chamaerhodos grandiflora*, as well as the endemite *Astragalus olchonensis* in some stands, was the highest, and the area of patches fluctuated between 30 and 100 m^2. The occurrence of the association is not visibly connected to the level of exposure. Most slopes had slight inclinations of 2–10°, and the areas were rarely completely flat.

The floristic composition of the *Astragalo olchonensis-Chamaerhodetum grandiflorae* association is presented in Table 1, relevés 3–20.

The physiognomy of phytocoenoses of the association is determined by three species: *Oxytropis lanata*, *Chamaerhodos grandiflora* and *Thymus baicalensis*. On the Braun-Blanquet scale, the quantity of *Oxytropis lanata* and *Thymus baikalensis* fluctuates from 'r' to '3.' They are typical pioneer plants which are well developed on semimobile and mobile, dry and acidic oligotrophic sands. Patches with plant cover of this type occur in localities influenced by dry continental climate, but with the participation of remissive wet masses of air blown from the western side of Lake Baikal.

The permanent component of the association is *Chamaerhodos grandiflora*, a subendemic species of the Baikal region (Popov 1957; Malyshev & Peshkova 1979). On dunes, within patches of *Astragalo olchonensis-Chamaerhodetum grandiflorae*, its specimens are occasionally covered with sand, and can be injured by sand granules during strong, gusty winds. In such cases it creates a ground rosette. The plant is lower, has a much thicker stem, and its root system seems to be better developed. Despite high constancy, the cover of this species is rather low. Particular specimens grow mainly close to each other, making small turfs which can stop the sand and create so-called 'mini-dunes.' Of similar importance are *Oxytropis*

Table 1. *Oxytropido lanatae-Festucetum baicalensis* Chytrý, Pešout & Anenchonov 1993 (rel. 1–2) and *Astragalo olchonensis-Chamaerhodetum grandiflorae* Wika in Wika *et al.* 1997 *ex* Brzeg & Wika 2001 *ass. nova* (rel. 3–20) *typicum* Wika in Brzeg & Wika 2001 *subass. nova* (rel. 3–15), and *Astragalo olchonensis-Chamaerhodetum grandiflorae patrinietosum sibiricae* Wika in Brzeg & Wika 2001 *subass. nova* (rel. 16–20).

No. of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Constancy	16	17	18	19	20	Constancy	Constancy
Date	08.07.96	10.07.96	10.07.96	10.07.96	08.07.96	08.07.96	08.07.96	09.07.96	10.07.96	10.07.96	09.07.96	09.07.96	07.07.96	10.07.96	09.07.96		08.07.96	07.07.96	07.07.96	07.07.96	07.07.96		
Exposition	NE	E	E	E	S	E	N	W	–	S	W	NE	W	N	S		SW	E	SE	SW	S		
Inclination (°)	15	20	25				5	10	–						15		40	2	3	2	10		
Cover of herb layer c (%)	20	20	20	10	30	30	50	15	10	50	40	20	20	10	40		20	30	50	50	50		
Cover of moss layer d (%)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	+		50	–	–	–	–		
Area of relevé (m^2)	50	50	50	50	50	50	50	40	50	50	50	30	30	50	10	3–15	10	50	10	50	10	16–20	3–20
Number of species	5	8	7	7	5	6	9	11	8	10	14	7	8	9	13		18	12	15	14	10		
Ch., D. *Astragalo olchonensis-Chamaerhodetum grandiflorae*																							
Chamaerhodos grandiflora (Pallas *ex* Schultes) Bunge	.	.	+.2	+.2	+.2	+.2	2.3	+.2	+.2	+.2	+.2	1.2	1.2	.	+.2	V	2.3	1.2	+.2	+.2	.	IV	V
Carex pediformis C. A. Mey. (D)	+.3	.	+.3	+.3	1.2	1.2	+.2	.	1.2	2.2	+.2	+.3	2.3	1.3	+.3	V	+.3	+.2	+.2	2.2	3.3	V	V
Thymus baicalensis Serg. (D)	.	+.3	.	.	.	+.3	3.3	+.3	+.3	2.3	+.3	+.3	.	+.2	2.3	IV	+.2	+.3	2.3	2.3	+.3	V	IV
Poa attenuata Trin. (D)	.	.	.	.	+.2	+.2	.	.	1.2	2.2	3.3	.	+.2	.	3.3	III	+.3	+.3	3.3	+.2	1.2	V	IV
Silene jenisseensis Willd.	.	.	.	.	.	.	.	.	+.2	+.2	+.2	+.2	+.2	1.2	+.2	III	+.2	+.2	+.2	+.2	+.2	V	IV
Alyssum microphyllum (C. A. Mey.) Steudel	.	.	.	.	.	.	.	.	.	.	.	+.2	1.2	+.2	r	II	+.2	+.2	+.2	+.2	+.2	V	III
Astragalus olchonensis Gontsch.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	–	+.2	r	+.2	+.2	+.3	V	II
D. *A.o.-Ch.g. patrinietosum sibiricae*																							
Patrinia sibirica (L.) Juss.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	–	1.3	r	+.2	+.2	.	IV	II
Artemisia sericea Weber *ex* Stechm. (Ch. Cl.)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	–	+	r	.	.	2.2	III	I
Ch. *Oxytropidion lanatae*, *Oxytropidetalia lanatae*, *Oxytropidetea lanatae*																							
Oxytropis lanata (Pallas) DC.	+.2	1.2	2.2	2.2	3.3	3.3	1.2	+.2	2.2	1.2	2.2	2.2	1.2	2.2	1.2	V	2.3	2.3	1.2	2.2	1.3	V	V
Polygonum angustifolium Pallas	1.3	1.3	+	+	.	.	1.1	+	.	r	.	+.3	.	+.3	1.3	IV	.	.	+	1.3	r	III	IV
Festuca rubra L. subsp. *baicalensis* (Griseb.) Tzvelev	2.2	1.3	+.3	.	.	.	+.2	+.2	.	+.2	+.2	.	.	.	.	II	.	.	+.2	+.2	+.2	III	III

Bromopsis inermis (Leysser) Holub (reg.)	+	2.2	2.2	.	.	+	+.3	.	.	.	+	.	.	.	+	II	.	+	1.1	1.1	.	III	III
Scrophularia gmelinii Turcz.	.	.	.	+	r	.	.	1.3	.	.	r	.	r	r	.	III	.	r	.	.	.	I	II
Phlojodicarpus baicalensis M. Popov	.	.	.	.	.	.	.	+	.	.	r	.	.	.	1.3	II	1.3	.	+.3	1.3	.	III	II
Stellaria dichotoma L.	.	+	+	+	.	.	1.2	+	.	.	+	.	.	.	.	II	.	.	.	.	.	–	II
Leymus secalinus (Georgi) Tzvelev	.	.	.	.	.	.	.	+.2	.	.	.	.	.	.	.	I	.	.	.	.	.	–	I
Carex sabulosa Turcz. *ex* Kunth	.	+.3	.	.	.	.	.	.	.	.	.	.	.	.	.	–	.	.	r	.	.	I	I
Others																							
Sanguisorba officinalis L.	.	.	.	.	.	.	.	.	.	.	+.2	.	+.2	.	+.2	II	+.2	.	+.2	+.2	.	III	II
Artemisia gmelinii Weber *ex* Stechm.	.	.	.	.	.	.	.	.	+.2	1.2	+.2	.	.	r	1.2	II	+.2	.	.	.	.	I	II
Carex korshinskyi Kom.	.	.	.	.	.	.	.	.	+	+	.	.	.	+	.	II	.	.	.	.	.	–	I

Sporadic species: *Agropyron cristatum* (L.) P.Beauv. 7(+.3), 8(+.2); *Carex obtusata* 8(2.3); *Cladina portentosa* (Dufour) Follman 15(+); *Didymodon rigidulus* Hedw. 16(3.4); *Linaria buriatica* Turcz. *ex* Ledeb. 2(r), 4(r); *Papaver nudicaule* L. fo. (cf. *popovii*) 11(r); *Physcia caesia* (Hoffm.) Hampe 16(1.3); *Pseudevernia furfuracea* (L.) Zopf 16(+); *Youngia tenuifolia* (Willd.) Babc. & Stebbins 16(r); *Xanthoria elegans* (Link.) Th.Fr. 16(2.2)

lanata, *Astragalus olchonensis*, *Silene jenisseensis*, *Phlojodicarpus baicalensis*, *Patrinia sibirica* and *Alyssum microphyllum* and also *Artemisia* and *Carex* species. On the other hand, *Thymus baicalensis*, which makes turfs from a few cm in diameter to 2–3 meters, prefers stronger, leeward habitats, partly grazed by cattle.

In this association other plants have high constancy, for example *Festuca rubra* subsp. *baicalensis*, *Polygonum angustifolium*, *Poa attenuata*, *Bromopsis inermis*, *Stellaria dichotoma* and *Carex* species, especially *C. pediformis* (other species, *C. sabulosa*, *C. obtusata* and *C. korshinskyi*, grow rarely; cf. Snytko *et al*. 1997b, Wika *et al*. 1997). However, *Polygonum angustifolium* and *Stellaria dichotoma* occur more often and are more numerous on secondarily eutrophicated habitats which are rich in nitrogen.

In Table 1, 31 plant species were specified and their number in particular relevés fluctuated from 5 to 18. The phytocoenoses of the association are loose, colorful psammophilous swards, which have a simple one- or two-layered structure, that is, a well-developed herb layer and an insignificant moss-lichen layer which is absent in many cases. Cryptogams are frequent in patches protected by forest or the leeward side of inselbergs or granitoidal monoliths in a deflation area. Relevé 16 is different from the others because it was made on a granitoidal monolith gradually being covered by fine-grained sand. That is why cryptogamic plants make synusial complexes there, more connected with a consistent rather than a labile substratum.

At some stands, patches of *Astragalo olchonensis-Chamaerhodetum grandiflorae* develop in a local mosaic with phytocoenoses of *Oxytropido lanatae-Festucetum baicalensis* Chytrý, Pešout & Anenchonov 1993, also described from the Baikal region. The latter syntaxon is a floristically poor, pioneer ‘central association’ of the *Oxytropidion lanatae* alliance (Table 1, rel. 1–2; compare Chytrý *et al.* 1993), without its own characteristic species.

A species combination similar to *Astragalo olchonensis-Chamaerhodetum grandiflorae* was found on sandy hillocks covered by *Rhododen-*

dron dauricum or a mixture of *Larix sibirica* and *Pinus sylvestris*. Depending on the local situation, these atypical phytocoenoses could originate in two ways: as further developmental stages of *Astragalo olchonensis-Chamaerhodetum grandiflorae* or as initial stages of this association created recently within wind-flattened sandy hills and previously covered with thin eastern Siberian taiga. Patches of this type (with shrubs or trees also) are treated as individual plant communities (Snytko *et al*. 1997b; Wika *et al*. 1997).

DIFFERENTIATION OF THE ASSOCIATION

After compilation and ordination of 18 phytosociological relevés (Table 1, rel. 3–20) the significant diversity of the *Astragalo olchonensis-Chamaerhodetum grandiflorae* association was evident. Two subassociations were identified: *Astragalo olchonensis-Chamaerhodetum grandiflorae typicum* and *Astragalo olchonensis-Chamaerhodetum grandiflorae patrinietosum sibiricae*. These units differ in respect to floristic composition, mean number of species, vegetation cover, habitat and distribution of patches.

Patches of *Astragalo olchonensis-Chamaerhodetum grandiflorae typicum* (Table 1, rel. 3–15) are represented at all localities of the association on Olkhon. Most frequently they are found 400–500 m from Baikal shores on widespread sandy areas. In this area are parabolic dunes, deflation hollows of different dimensions (with noticeable ripple marks), dune hummocks of nebkha type, and deflation inselbergs of different sizes. There are also stones and granitoidal monoliths protruding from the sand cover, which is of considerable depth up to a few meters. Fine-grained sand consisting of 90% quartz is well washed by Baikal's waters. Usually it is well sorted and its grains are well turned (Szczypek & Snytko 1998).

Patches of this subassociation partly represent the initial and partly the optimal stage of development of the association. At some localities they develop from phytocoenoses of *Oxytropido lanatae-Festucetum baicalensis*. Loose swards of this type are widespread on the driest mobile sands shaped by the wind. The majority of dicotyledonous plants growing there have leaf rosettes, so neighboring plants create smaller or bigger turfs. Species from *Poaceae* and *Cyperaceae* families, having rich and well developed root systems or stolones, efficiently bind labile grains of sand. The discussed unit does not have its own characteristic (differential) species. It occurs patchily at the edges of pine-rhododendron and pine-larch forests, as well as in nearby forest steppes or *Stipa*-steppes. The main factor for their presence consists in local habitat conditions.

Patches of *Astragalo olchonensis-Chamaerhodetum grandiflorae patrinietosum sibiricae* (Table 1, rel. 16–20) represent an advanced stage of evolution of psammophilous vegetation and develop only in the dynamic pine-rhododendron eastern Siberian taiga. They overgrow habitats similar to those in the previously described unit. This subassociation is positively distinguished by 3 species: *Astragalus olchonensis* (present but very rare in typical phytocoenoses), *Artemisia sericea* and *Patrinia sibirica*. *Patrinia sibirica* from the *Valerianaceae* family is a perennial species. If it is grazed or injured by the wind, it develops a fleshy, clavate stem. From its top, partly covered with sand, numerous flower sprouts shoot up. The plant blooms and bears fruit quite abundantly. *Patrinia sibirica* is more often found on Olkhon Island in the herb layer of the taiga forest, especially in places with high participation of *Rhododendron dauricum*. Species with high constancy in this subassociation are *Poa attenuata*, *Silene jenisseensis*, *Phlojodicarpus baicalensis* and *Alyssum microphyllum*. Vegetation in some aspects similar to the described subassociation was reported by Chytrý *et al.* (1995) as the *Phlojodicarpus baicalensis-Festuca ovina* community (*nom. inval.*, Art. 3c ICPN). This community also develops in the lee of coniferous trees and shrubs.

SYNTAXONOMIC POSITION OF THE ASSOCIATION

On the basis of the data on xerophytic, psammophilous vegetation of eastern Siberia (Chytrý *et al.* 1993, 1995; Wika *et al.* 1997, 1999; Szczypek *et al.* 2000 and unpublished relevés and tables from 1994–2001) the authors ascertained that these plant communities form a separate, coherent, monotypic group which can be distinguished at

the level of high-rank syntaxa. It is different from all steppe vegetation units of the class *Cleistogenetea squarrosae*. The newly described class *Oxytropidetea lanatae*, however, is incomparably poor in character species.

Class ***Oxytropidetea lanatae*** Brzeg & Wika 2001 *cl. nov. hoc loco*

NOMENCLATURAL TYPE: *Oxytropidetalia lanatae* Brzeg & Wika 2001 holotypus hoc loco

Ch. Cl. = Ch. Or.

Xerophytic, psammophilous vegetation of eastern Siberia (analogue to the European *Koelerio glaucae-Corynephoretea canescentis* Klika in Klika & Novák 1941)

Order ***Oxytropidetalia lanatae*** Brzeg & Wika 2001 *ordo nov. hoc loco*

NOMENCLATURAL TYPE: *Oxytropidion lanatae* Chytrý, Pešout & Anenchonov 1993 holotypus hoc loco [nomenclatural type of *Oxytropidion lanatae* (holotype): *Oxytropido lanatae-Festucetum baicalensis* Chytrý, Pešout & Anenchonov 1993; nomenclatural type of *Oxytropido lanatae-Festucetum baicalensis* (holotype): Table 13, rel. 9 (Chytrý *et al.* 1993: 372–373)]

Ch. Or. et Cl.: *Alyssum obovatum* (C. A. Mey.) Turcz., *Artemisia sericea* Weber *ex* Stechm., *Carex sabulosa* Turcz. *ex* Kunth, *Leymus secalinus* (Georgi) Tzvelev, *Oxytropis lanata* (Pallas) DC., *Phlojodicarpus baicalensis* M. Popov, *Stellaria dichotoma* L. and transgressive Ch. All. et Ch. Ass.

Alliance ***Oxytropidion lanatae*** Chytrý, Pešout & Anenchonov 1993

SYNONYMS: cf. *Festuco-Thymion gobici* Mirkin in Kashapov *et al.* 1987 *nom. inval.* (Art. 1, 2a ICPN) p.p., cf. *Festuco-Thymion gobici* Mirkin in Korotkov *et al.* 1991 *nom. inval.* (Art. 2b, 8 ICPN) p.p., *Scrophularion incisae* Chytrý, Pešout & Anenchonov 1993 *nom. inval.* (Art. 3a ICPN)

Ch. All.: *Bromopsis inermis* (Leysser) Holub fo. (reg.), *Craniospermum subvillosum* Lehm., *Festuca rubra* L. subsp. *baicalensis* (Griseb.) Tzvelev, *Isatis oblongata* DC., *Polygonum* (*Aconogonum* Meisn.) *angustifolium* Pallas, *P.* (*A.*) *ocreatum* L. (= *P. laxmannii* Lepech.), *P.* (*A.*) *sericeum* Pallas *ex* Georgi, *Scrophularia gmelinii* Turcz. (= *S. incisa* Turcz. *non* Weim.) and other transgressive Ch. Ass.

Pioneer psammophilous swards of Dauriya and Pribaikal'e.

Association ***Astragalo olchonensis-Chamaerhodetum grandiflorae*** Wika in Wika *et al.* 1997 *ex* Brzeg & Wika 2001 *ass. nova hoc loco*

NOMENCLATURAL TYPE: Table 1, rel. 13 (orig.) holotypus hoc loco

Ch. Ass.: *Alyssum microphyllum* (C. A. Mey.) Steudel [= *A. biovulatum* N. Busch. var. *microphyllum* (C. A. Mey.) N. Busch.], *Astragalus olchonensis* Gontsch., *Chamaerhodos grandiflora* (Pallas *ex* Schultes) Bunge, *Silene jenisseensis* Willd.

D. Ass. (against the other associations or communities of the alliance): *Carex pediformis* C. A. Mey., *Poa attenuata* Trin., *Thymus baicalensis* Serg.

Subassociation ***Astragalo olchonensis-Chamaerhodetum grandiflorae typicum*** Wika in Brzeg & Wika 2001 *subass. nova hoc loco*

NOMENCLATURAL TYPE: Table 1, rel. 13 (orig.) holotypus hoc loco (typus Ass. et Subass.)

Subassociation ***Astragalo olchonensis-Chamaerhodetum grandiflorae patrinietosum sibiricae*** Wika in Brzeg & Wika 2001 *subass. nova hoc loco*

NOMENCLATURAL TYPE: Table 1, rel. 17 (orig.) holotypus hoc loco

D. Subass.: *Artemisia sericea* Weber *ex* Stechm., *Astragalus olchonensis* Gontsch., *Patrinia sibirica* (L.) Juss.

Further known syntaxa of *Oxytropidion lanatae* are *Oxytropido lanatae-Festucetum baicalensis* (see above), *Craniospermo-Leymetum secalini* Chytrý, Pešout & Anenchonov 1993 (Ch. Ass.: *Craniospermum subvillosum*, *Isatis oblongata*), community of *Oxytropis lanata-Artemisia sericea* Wika unpubl. (?Ch., D. Ass.: *Allium anisopodium*, *Alyssum obovatum* codom., *Artemisia pubescens*, *A. sericea* codom., *Astragalus propinquus*, *Kitagawia baicalensis*) and cf. (syntaxonomic position unclear; mountain community on dry rock, which can also belong to the next mentioned alliance) *Saxifrago bronchialis-Phlojodicarpetum baicalensis* Chytrý, Pešout & Anenchonov 1993 (Ch., D. Ass.: *Calamagrostis korotkyi*, *Pulsatilla tur-*

czaninovii, *Saxifraga bronchialis*, *Selaginella rupestris*, *Youngia tenuifolia*).

To the second alliance of *Oxytropidetalia lanatae* (*Oxytropido lanatae-Agropyrion cristati nom. prov.*), without *Bromopsis inermis*, *Festuca rubra* subsp. *baicalensis*, *Polygonum angustifolium*, *Scrophularia gmelinii* and others, but positively characterized (or differentiated) by relatively constant participation of *Agropyron cristatum* and *Chamaerhodos erecta*, as well as transgressive with low constancy Ch. Cl. *Cleistogenetea squarrosae* (*Artemisia* div. spec., *Festuca lenensis*, *Koeleria cristata*, *Potentilla acaulis*) belong psammophilous grassland communities, which are a type of vegetation transitional to steppe. Among them are the community with *Oxytropis lanata* and *Bromopsis pumpelliana* Wika unpubl. (?Ch. Ass.: *Bromopsis pumpelliana*, *Oxytropis turczaninovii*) and the *Oxytropis lanata-Corispermum elongatum* community Wika in Szczypek *et al.* 2000 (?Ch., D. Ass.: *Corispermum elongatum*, *Dontostemon perennis*, *Dracocephalum foetidum*, *Leymus buriaticus*).

SUMMARY

In the article a formal description of the new plant association *Astragalo olchonensis-Chamaerhodetum grandiflorae* is presented, as well as its position in the phytosociological system. Two new syntaxa of higher rank are formally described: the order *Oxytropidetalia lanatae* and the class *Oxytropidetea lanatae*. Also, the general picture of the diversity of psammophilous swards on a large part of eastern Siberia, belonging to *Oxytropidetea lanatae*, is presented.

Astragalo olchonensis-Chamaerhodetum grandiflorae has been divided into two subassociations: *Astragalo olchonensis-Chamaerhodetum grandiflorae typicum* subass. nova, and *Astragalo olchonensis-Chamaerhodetum grandiflorae patrinietosum* subass. nova. The diversity of the association depends on the following factors: type of substratum, looseness of moving sands more or less stabilized by vegetation, the vicinity of forests or dense steppes, settlement and eutrophication. The new association is a pioneer psammophilous sward, endemic to the Baikal region.

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