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Floodplain Ephemeretum of Middle Ob – a New Class for Siberia, Isoëto-Nanojuncetea Br.-Bl. et Tx. 1943 on the Northern Border of Expansion

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In 1986-1991 we explored the Ob floodplain within the limits of Aleksandrovskiy region of Tomsk oblast. The Aleksandrovskiy fragment of the Ob river is situated in the middle taiga subzone, between the mouths of the Tym and Vakh rivers, large tributaries of the Ob river. Its southern and northern extreme points have the coordinates of 59º28´ north, 79º33´ east and 60º43´ north, 78º05´ east.

In the process of studying the vegetation cover of Aleksandrovskiy floodplain, original communities short-living bank annual plants were discovered which in the West European syntaxonomical literature are ascribed to the class Isoëto-Nanojuncetea Br.-Bl. et Tx. 1943, or the class of small rush vegetation. Appearance of such communities is usually observed in dry years. Sprouting of ephemers begins after denudation of banks – on the average, in the middle of July, and continues almost till the end of the vegetation season. In the vicinities of the settlement of Aleksandrovskoye, development of ephemers in each concrete site of low-water bank is completed in 10-11 weeks after its denudation from water. A peculiarity of the ephemeretum of the Aleksandrovskiy floodplain is its certain floristic poverty. This is caused by the fact that these cenoses exist on the northern border of the areal of the small rush vegetation class. These are the most northern of the thoroughly studied habitats of this class (60º24´– 60º35´ north).

The communities of the Aleksandrovskiy floodplain belong to the association Cypero-Limoselletum (Oberd. 1957) Korneck 1960 which is quite usual in West Europe [1-10]. In the European part of Russia, it has been found in the middle reaches of the Volga [11]. There have been also reports of its being found in Siberia. So, M.D. Spiridonov [12, 13] made descriptions of two pioneer communities of willow sprouts in the floodplain of Irtysh, which may be ascribed to willow facies (salicosum triandro-viminalis) of the association. However, the researchers' attention is more often attracted by communities of the needle spike-rush facies (Cypero-Limoselletum eleocharitosum acicularis) which, as a rule, are identified by them with the association Eleocharitetum acicularis (Baumann 1911) Koch 1926 of the class Littorelletea. Such cenoses are found on the left tributary of the Ob, the Baksa river [14], and in the middle reaches of the Lena river [15]. In Yakutia, the expansion of the association Cypero-Limoselletum northwards is possible to the upper reaches of the Yana river (67º40´ north), where mudwort is found "on clayey banks of lakes and channels in river floodplains, sometimes very abundantly" [16, p. 94].

In middle reaches of the Ob river, the Cypero-Limoselletum is represented by two new subassociations whose detailed characteristics are contained in our deposited article [17]. Since it is planned to publish a complete classification of plant communities of the Aleksandrovskiy floodplain as a whole single paper, here we are going to content ourself with preliminary information – a synoptic table, nomenclature types of subassociations (see Table), and a brief characterization of the latter.

Table

Ass. Cypero-Limoselletum (Oberd. 1957) Korneck 1960 from middle Ob floodplain (Aleksandrovskiy region's piece)

Number of a syntaxon or a type	1	2	3	4	5	6	7	8	9
Number of relevé	3	11	13	6	16	5	6	1	1
Average area analysed, m²	20	24	23	6	8	9	11	20	10
Average total cover, %	42	49	36	22	44	42	45	50	50
Total number of vascular plants	25	45	39	30	36	24	20	25	11
Average number of species	22.0	22.3	22.8	20.8	15.6	13.4	14.5	29	15
D. s. of ass. Cypero-Limoselletum									
Limosella aquatica	100	100	100	100	94	100	17	4	1
Physcomitrella patens	100	100	100	.	6	.	.	1	r
Chenopodium rubrum f. *humile*	33	82	77	33	6	.	.	+	.
D. s. of subass. C.-L. rumicetosum ucranici									
Marchantia alpestris	100	64	77	50	.	.	100	r	.
Rumex ucranicus	100	100	100	.	.	20	.	+	.
Bidens radiata	100	82	77	.	13	20	.	r	.
D. s. of subass. C.-L. coleanthetosum и var. Coleanthus subtilis									
Coleanthus subtilis	.	.	100	83	100	100	17	.	4
Polygonum volchovense	.	9	38	33	63	80	.	.	1
Eleocharis acicularis	.	.	31	50	100	100	.	.	+
Botrydium granulatum	.	.	23	17	69	80	.	.	r
D. s. of Isoeto-Nanojuncetea, Cyperetalia fusci, Elatini-Eleocharition ovatae									
Gnaphalium sibiricum	100	100	100	100	94	100	100	1	1
Physcomitrium sphaericum	67	64	85	100	81	20	100	r	+
Riccia huebeneriana + *R. cavernosa*	100	91	92	100	56	20	100	+	+
Juncus bufonius	33	36	69	83	6	.	67	r	.
Juncus nastanthus	.	27	38	.	.	.	.	r	.
Spergularia rubra	.	9	.	50	.	.	33	.	.
Dichostylis micheliana	.	.	31	.	.	.	.	.	.
Riccia bifurca	.	9	.	.	.	.	.	.	.
D. s. of Bidentetea									
Rorippa palustris	100	100	100	100	100	100	100	1	1
Polygonum scabrum	33	82	54	33	31	.	33	r	
Chenopodium glaucum	.	18	62	17	.	.	.	r	.
Rumex maritimus	.	36	15	.	.	.	.	.	.
D. s. of Salicetea purpureae									
Salix viminalis (incl. *S. dasyclados*) (juv.)	100	91	77	100	.	.	100	r	.
Salix triandra (juv.)	100	45	38	83	.	.	100	.	.
Salix alba (juv.)	100	64	38	.	.	.	.	r	.
Mentha arvensis	100	9	.	33	6	.	.	.	.
Salix spp. (perjuv., indet.)	.	.	.	.	94	20	.	.	+
D. s. of Plantaginetea									
Agrostis stolonifera	100	82	100	100	94	80	100	+	+
Plantago major (juv.)	67	73	92	33	31	.	.	+	.
Chamomilla suaveolens	.	36	46	.	.	.	.	.	.
D. s. of Phragmito-Magnocaricetea									
Eleocharis palustris	67	82	69	50	94	100	17	+	r
Carex acuta + *C. aquatilis* (juv.)	33	73	38	100	100	60	100	r	+
Rorippa amphibia	100	45	62	83	25	40	50	.	.
Other species									
Callitriche verna	33	55	85	100	94	100	50	r	2
Equisetum arvense f. *prostratum*	100	82	85	83	6	20	100	r	.
Ranunculus repens	67	27	8	50	.	20	17	rj	.

Number of a syntaxon or a type	1	2	3	4	5	6	7	8	9
Potentilla paradoxa + *P. norvegica* (juv.)	100	64	15	.	.	.	.	r	.
Achillea cartilaginea	.	.	8	83	19	.	17	.	.
Epilobium tetragonum	.	9	15	17	50	20	.	.	.

Species present with low constancy: *Alisma plantago-aquatica* - 2(9), 5(6); *Alopecurus aequalis* - 5(6), 7(34); *Androsace filiformis* - 5(6); *Artemisia vulgaris* - 3(23j); *Atriplex* sp. - 2(9); *Bidens tripartita* - 2(9), 5(6); cf. *Bryum argenteum* - 1(33), 2(9); *Chenopodium suecicum* - 3(23), 5(6); *Comarum palustre* - 6(20); *Elatine hydropiper* - 5(6); *Epilobium palustre* - 3(8), 4(17); *Equisetum fluviatile* - 1(33), 7(17); *E.* x *litorale* - 5(12), 6(20); *Galium palustre* - 4(33); *Glyceria maxima* - 4(17j); *Inula britannica* - 2(18); *Lemna minor* - 5(6); *Leptodictyum riparium* - 5(13), 6(40); *Lythrum salicaria* - 3(15); *Matricaria perforata* – 1(33), 2(18), 5(6), 8(r); *Myosotis caespitosa* - 2(18), 6(20), 8(r); *Myosoton aquaticum* - 2(18), 3(8), 8(r); *Naumburgia thyrsiflora* - 1(33), 2(9); *Phalaroides arundinacea* - 1(33), 2(27); *Poa annua* - 2(27), 3(38); *Poa pratensis* - 2(9); *Polygonum amphibium* - 4(17); *P. minus* - 5(6); *Populus nigra* (juv.) - 2(18), 3(8); *Potentilla anserina* - 2(9), 6(20); *Ranunculus gmelinii* - 4(17), 5(6); *R. reptans* - 5(6); *R. sceleratus* - 2(27); *Riccia fluitans* f. *terrestris* - 5(6); *Rumex aquaticus* - 4(17j); *Sagittaria sagittifolia* - 5(6); *Sagittaria* sp. - 4(17j); *Sium latifolium* - 5(6); *Sparganium emersum* - 5(6), 7(17); *Stachys palustris* - 2(9); *Stellaria crassifolia* - 2(18), 5(6), 6(20); *Typha angustifolia* - 2(9j), 3(15j).

Names of these syntaxa: subass. C.-L. rumicetosum ucranici, var. typicum, facies: 1 – salicosum, 2 – (6) limosellosum (4) physcomitrellosum (1) rumicosum ucranici; var. Coleanthus subtilis, facies: 3 – (6) limosellosum (6) physcomitrellosum (1) coleanthosum; subass. C.-L. coleanthetosum, facies: 4 – gnaphaliosum; 5 – (11) typicum (5) callitrichosum; 6 – eleocharitosum acicularis; 7 – fragment of acc. Cypero-Limoselletum, facies salicosum viminali-dasycladi; 8 – nomenclature type of subass. C.-L. rumicetosum ucranici Taran 1994: Tomsk oblast, Aleksandrovskiy region near settl. Aleksandrovskoye – 17 km NNW, island Kiselevskiy, relevé 537, 24.09.91; 9 – nomenclature type of subass. C.-L. coleanthetosum Taran 1994: Tomsk oblast, Aleksandrovskiy region near settl. Aleksandrovskoye – 7 km WNW, relevé 508, 13.09.91.

The little sorrel subassociation (C.-L. rumicetosum ucranici Taran 1994) unites East European-Siberian communites with *Rumex ucranicus* and *Bidens radiata*[1] spread in floodplains of sufficiently large rivers within the taiga zone. Diagnostic species are *Rumex ucranicus, Bidens radiata, Marchantia alpestris.* In the Aleksandrovskiy floodplain, these communites are found along the main bed of the Ob river in low parts of islands and large banks. The subassociation is represented here by two variants: typical that of mossgrass (var. Coleanthus subtilis). The latter is indicated by diagnostic species of the subassociation C.-L. coleanthetosum from whose communities diaspores are carried out by littoral flows. At the same time, in islands remote from littoral flows, the mossgrass is rare.

The physiognomical diversity of little sorrel subassociation in the Aleksandrovskiy floodplain is limited to five facies: mudwort (limosellosum aquaticae), physcomitrellosum patentis, willow (salicosum triandro-viminalis), little sorrel (rumicosum ucranici), mossgrass (coleanthosum subtilis).

The subassociation C.-L. coleanthetosum Taran 1994 unites mossgrass–water starwort communites in shors near the mouths of Ob and Irtysh tributaries within the limits of the taiga zone. Diagnostic species are *Coleanthus subtilis*, *Polygonum volchovense* Tzvel., *Eleocharis acicularis* (loc.), *Botrydium granulatum* (loc.). The leading species is *Coleanthus subtilis. Polygonum volchovense* has been found as a mossgrass satellite on Volkhov and Bolshoi Salym rivers [21, 22]. *Eleocharis acicularis* и *Botrydium granulatum* are auxiliary species underlining the ecological differences of habitats of the little sorrel and mossgrass subassociations.

In the middle reaches of the Ob, the subassociation is represented first of all by mossgrass–waters starwort (*Callirtiche verna*) communities. These are attached to backwater zones that arise in the lower reaches of the Ob's tributaries due to protracted spring-summer floods. Stagnation of tributaries' waters causes, on the one hand, an abundant sedimentation of silt fractions of alluvium and, on the other hand, late drying of the formed silt banks, which hinders the development of closed grass communities of perennial species. On more or less large tributaries, the lower part of the backwater zone can have the form of a kind of internal

[1] Names of vascular plant and moss species are given according to [18-20].

delta – a mouth shor [23]. Therein, the main bed of the tributary is divided into a large number of channels and temporary small flows separated by vast areas of naked banks. The latter spread over the the whole width of the tributary's floodplain terrace. Mouth shors of tributaries of the middle reaches of the Ob river represent hydrologically almost annually dried ponds. They are primary habitats of mossgrass communities and natural prototypes of fish ponds of Central Europe where the mossgrass is also found [24-26]. Very characteristic of tributaries of the Amur river in its lower reaches to which another large fragment of this species is attached, are similar hydro-geomorphological formations – dam lakes at river mouths [27].

The subassociation C.-L. coleanthetosum was described from Lar'yogan in whose lower reaches there is a well-formed mouth shor, 4.5 km long and about 0.5 km width. The physiognomical diversity of Lar'yogan communities is limited to 4 facies: typical (callitricho vernae-coleanthosum), water starwort (callitrichosum vernae), cudweed (gnaphaliosum sibirici), and needle spike-rush.

With respect to area, absolutely prevalent are communities of the typical and water starwort facies spread on the main surface of the shor banks, where in dry years they occupy about 50 hectares. The mossgrass population density is here about 450 spec/m². Since 100 million seeds are formed on 1 hectare at the density of 5 spec/m² [25], it seems that in the Lar'yogan shor about 450 billion diaspores are formed in dry years. Analysis of hydrological and meteorogical data taking into account the altitudinal position of communities of the mossgrass variant little sorrel subassociation has demonstrated that for the period of 1936-1991, the probability of annual appearance of mossgrass and its reaching the fruit bearing stage was about 55 %.

The needle spike-rush facies replaces successionally and topologically the typical one as the bank surface become higher, forming a more or less pronounced microzone. The cudweed facies is spread above the mouth shor, upstream Lar'yogan. As the surface of mouth banks becomes higher, the cudweed communities are replaced by those of willow sprouts (*Salix viminalis, S. dasyclados*) – syntaxonomical fragments of Cypero-Limoselletum.

Since the mossgrass has been entered into the Red Book of Russia [28], the Lar'yogan shor is the only reliably discovered habitat where the species is reproduced steadily and in mass, it is necessary to declare it to be a monument of nature or a botanical forbid territory.

REFERENCES

1. H. Ant, H. Diekjobst, *Arch. Hydrobiol*., 1967, 62, 439-452.
2. D. Blazkova, *Preslia*, 1980, 52, 61-70.
3. E. Burrichter, *Ber. dtsch., bot. ges*., 1960, 73: 1, 24-37.
4. H. Diekjobst, H. Ant, *Decheniana*, 1967, 118: 2, 139-144.
5. S. Loster, *Zesz. Nauk. UJ, Prace Bot*., 1976, 4, 7-70.
6. G. Philippi, *Veröff. Landesstelle Natursch. U. Landschaftspflege Baden-Württenberg*, 1968, 36, 65-130.
7. W. Pietsch, *Abh. Ber. Naturkundemus. Görlitz*, 1963, 38: 2, 1-80.
8. W. Pietsch, W.R. Müller-Stoll, *Verhandlungen des Botanischen Vereins der Provinz Brandenburg*, 1974, 109, 56-95.
9. J. Vicherek, *Preslia*, 1968, 40, 387-396.
10. M. Zając, A. Zając, *Zesz. Nauk. UJ, Prace Bot*., 1988, 17, 155-159.
11. A.I. Solomeshch, V.A. Gavrilov, Syntaxonomy of Aquatic and Littoral-Aquatic Vegetation of the Cheremshansky Gulf of the Kuybyshev Reservoir. Moscow, 1989. 15 p. Deposited at the VINITI 12.10.89, No 6232-V89 (in Russian).
12. M.D. Spiridonov, *Izv. Bot. sad*, *Leningrad*, 1927, 26: 5, 473-516 (in Russian).
13. M.D. Spiridonov, *Izv. Bot. sad*, *Leningrad*, 1928, 27: 1, 53-79 (in Russian).
14. J.B. Falinski, F. Pedrotti et al., *Phytocoenosis 2 (N.S.) Archivum Geobotanicum*, 1990, 1, 1-48.
15. K.E. Kononov, P.A. Gogoleva, L.G. Naumova, P.D. Pavlov, Grassy Vegetation of «40 Islands» of the Lena River Floodplain, Moscow., 1989, 34 p. Deposited at the VINITI 12.10.89, No 6238-V89 (in Russian).

16. T.M. Zaslavskaya, *Botan. Zhurn*., 1992, 77: 12, 86-97 (in Russian).
17. G.S. Taran, Syntaxonomy of Vegetation of Middle Ob Floodplain (Aleksandrovskoe Fragment). II. Communities of Macrophytes and Annual Plants, Novosibirsk, 1994, 50 p. Deposited at the VINITI 04.04.94, No 816-B94 (in Russian).
18. S.K. Cherepanov, Vascular Plants of USSR, Leningrad, Nauka, 1981 (in Russian).
19. M.S. Ignatov, O.M. Afonina, *Arctoa*, 1992, 1, 1-85 (in Russian).
20. N.A. Konstantinova, A.D. Potemkin, R.N. Shlyakov, *ibid*, 1992, 2, 87-127 (in Russian).
21. N.N. Tsvelev, *Nov. Sist. Vyssh. Rast.*, v. 25, Leningrad, Nauka, 1988, 187-188 (in Russian).
22. Flora of Siberia. V. 5, Novosibirsk, Nauka, Sib. Dept., 1992 (in Russian).
23. G.S. Samoilova, Geografiya i Khozyaistvo. Moscow, 1958, 3-4, 75-78 (in Russian).
24. W. Pietsch, W.R. Müller-Stoll, *Mitt. Flor.-soziol. Arbeitsgem. N.F*., 1968, 13, 14-47, Todenmann/Rinteln.
25. S. Hejny, *Folia Geobot., Phytotax*., 1969, 4: 4, 345-399.
26. J. Vicherek, Vlastivedny Sbornik Vysociny. Oddil ved prirodnich, 1972, VII, 35-52.
27. L.P. Avaryaskin, Transact. Khabarovsk Pedagog. Inst, 1970, 25, 69-75 (in Russian).
28. The Red Book of Russia (Plants), Moscow, Rosagropromizdat, 1988 (in Russian).