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New records of lichens from Middle Urals, Russia

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Abstract: Twelve species of lichenized ascomycetes are reported from the Middle Urals, in the limits of Sverdlovsk Region. *Anema nummularium* and *Fellhaneropsis vezdae* are new to Russia. *Collema dichotomum*, *Epiphloea byssina* and *Lemmopsis arnoldiana* are new to the Urals; seven species are new to the Middle Urals. Most of the reported lichens are known from one locality only, some of them are regarded as vulnerable.

Kokkuvõte: Samblike uued leiud Kesk-Uraalidest, Venemaal

Esitatakse andmeid 12 liheniseerunud kottseene liigi leidude kohta Sverdlovski oblastis, Kesk-Uraalides. *Anema nummularium* ja *Fellhaneropsis vezdae* on esmasleiud Venemaal. *Collema dichotomum*, *Epiphloea byssina* ja *Lemmopsis arnoldiana* on uued Uraalidele; seitse liiki on uued Kesk-Uraalidele. Enamus uutest leidudest on seni teada vaid ühest leukohast, mõnesid neist käsitletakse ohualtidena.

INTRODUCTION

The known biodiversity of lithophilous lichens of Middle Urals comprises more than 200 species (Paukov & Trapeznikova, 2005; Paukov, 2009). Our recent investigations of lichens in the Middle ~~and South~~ Urals resulted in discovering several new species of cyanolichens and one chlorolichen new to the Middle Urals, Ural Mountains and Russia.

The zonal vegetation of the Middle Urals consists of coniferous forests with pine (*Pinus sylvestris* L.) and fir (*Picea obovata* Ledeb.). On the south of Sverdlovsk Region and further to the south the coniferous forests are gradually changed by birch (*Betula pendula* Roth) and aspen (*Populus tremula* L.) forests and finally by steppe vegetation. The territory has a complicated geological structure. Different types of rocks (acidic, basic, ultramafic and calcareous) form abundant small mountains or rocky outcrops on rivers permitting various lichen species to harbour the area due to the diversity of habitats.

MATERIAL AND METHODS

Lichens were collected in 9 localities in the Middle Urals within the limits of Sverdlovsk Region (Fig. 1) by the authors. Some of them were collected in 1997–2000 but were kept indetermined, others were collected in 2007–2011 during a study of limestone lichen vegetation of the Middle Urals. The visited localities are as follows.

1. Krasnoufimsk district, Nizhne-Irginsk village, 56°51'N, 57°24'E;
2. Nizhne-Serginsk district, vicinity of Bazhukovo village, Nature Park "Olen'ji Ruchji", 56°31'N, 59°15'E;
3. Pervoural'sk district, vicinity of Kourovka, 57°01'N, 59°37'E and Sloboda villages, 57°01'N, 59°33'E;
4. Tagil district, Nizhniy Tagil town, 57°52'N, 59°53'E;
5. Verkhotur'e district, Verkhotur'e town, 58°51'N, 60°48'E;
6. Alapaevsk district, Ust'yanchiki village, 57°45'N, 61°37'E and Melkozerovo village, 57°44'N, 61°27'E;
7. Alapayevsk district, 5 km S of Aramashevo village, 57°34'N, 61°44'E;
8. Sysert' district, vicinity of Dvurechensk, 56°36'N, 61°02'E;
9. Kamensk-Ural'skiy district, vicinity of Kluchi, 56°25'N, 61°39'E and Kodinka, 56°25'N, 61°48'E villages.

Species were identified using a stereomicroscope or compound microscope with the help of traditional chemical reactions (e.g. Lugol's iodine). The specimens are kept in the herbarium of Ural Federal University, some specimens were sent to LE and BG.

THE SPECIES

Symbols used: * – new species to Russia, ** – new species to the Urals. Numbers of collection localities are cited according to Fig. 1.

ANEMA DECIPIENS (A. Massal.) Forssell – 3: 57°01'51"N, 59°37'28"E, limestone outcrops on Shishim river, 22.06.1999; 6: "Rodnikovyi kamen" rock, 57°45'53"N, 61°37'10"E, limestone outcrops on river Neiva, on limestone, 05.10.2008 (BG); 6: "Polyakov kamen" rock, 57°44'09"N, 61°27'53"E, serpentine outcrops on river Neiva, on serpentine, 05.10.2008; 7: 57°34'33"N, 61°44'36"E, limestone outcrops on river Rezh, on limestone, 11.01.2009. The species recently reported from the Southern Urals (Urbanavichus & Urbanavichene, 2011) was found by the authors several times on dry

limestone and ultramafic outcrops in the Middle Urals.

* *ANEMA NUMMULARIUM* (Dufour ex Durieu & Mont.) Nyl. ex Forssell – 2: 56°31'35"N, 59°15'56"E, limestone outcrops on river Serga, on limestone, 20.08.2011. The specimens are fertile and agree well with descriptions given by Moreno and Egea (1992) and Ahti et al. (2007). *A. nummularium* is recognized by small (up to 0,5 cm in our material), black, convex, centrally attached, minutely lobulate rosettes with contrasting, brownish when wet ascomata. The species was previously known from Europe (Austria, Belgium, Germany, Scandinavia), the Mediterranean area and Northern Africa (van den Boom, 1996; Hafellner, 2001; Ahti et al., 2007). In the Urals it was found on xeric calcareous rocks and is known from one locality only so far.

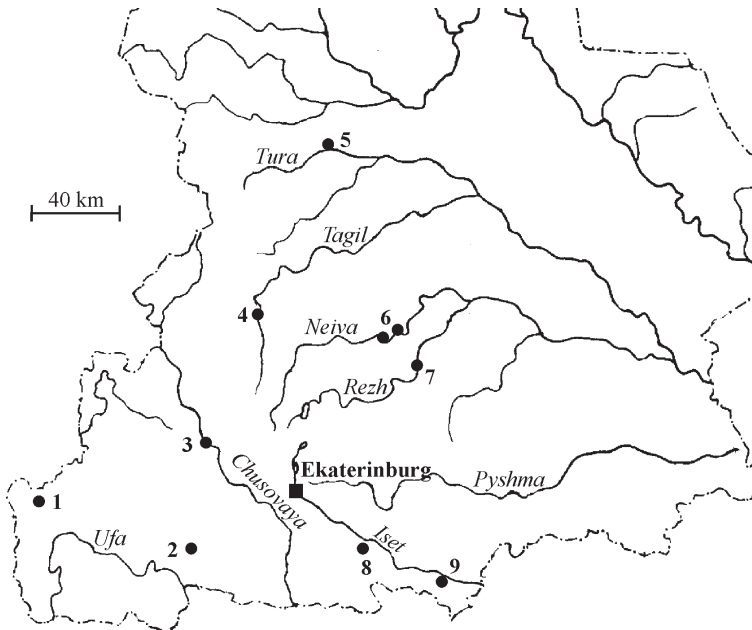


Fig. 1. Collection localities of lichens in Sverdlovsk Region.

1 – Krasnoufimsk District, Nizhne-Irginsk village (56°51'N, 57°24'E); 2 – Nizhne-Serginsk District, vicinity of Bazhukovo village, Nature Park "Olen'ji Ruchji" (56°31'N, 59°15'E); 3 – Pervoural'sk District, vicinity of Kourovka (57°01'N, 59°37'E) and Sloboda villages (57°01'N, 59°33'E); 4 – Tagil District, Nizhniy Tagil town, Golyi Kamen' mountain (57°52'N, 59°53'E); 5 – Verkhotur'e District, Verkhotur'e town (58°51'N, 60°48'E); 6 – Alapayevsk District, Ust'yanchiki (57°45'N, 61°37'E) and Melkozzerovo villages, (57°44'N, 61°27'E); 7 – Alapaevsk District, 5 km S of Aramashevo village (57°34'N, 61°44'E); 8 – Sysert' District, vicinity of Dvurechensk (56°36'N, 61°02'E); 9 – Kamensk-Ural'skiy District, vicinity of Kluchi (56°25'N, 61°39'E) and Kodinka villages (56°25'N, 61°48'E).

** COLLEMA DICHOTOMUM (With.) Coppins & J. R. Laundon [syn. *Collema fluviatile* (Huds.) Steud.] – 2: 56°30'13"N, 59°16'59"E, on temporarily submersed limestone in river Serga, 13.08.2010 (LE, BG). The species is recognized by firmly attached blackish rounded thalli up to 3 cm in diameter with narrow lobes growing above a water level. *C. dichotomum* is known from NW Russia, Great Britain, Germany, France and Romania where it is very rare or overlooked (Degelius, 1954). The species is probably extinct in Estonia (Trass & Randle, 1987). It is rare and vulnerable also in the Middle Urals. It has been found in a single locality in spite of abundance of potential habitats in other rivers within the area.

** EPIPHLOEA BYSSINA (Hoffm.) Henssen & P. M. Jørg. – 3: 57°01'36"N, 59°33'52"E, limestone outcrops on Chusovaya river, on soil, 04.08.2002. The species is distinguished by a greyish crustose thallus with sessile reddish-brown apothecia. Morphologically it is somewhat similar to *Protopannaria* or *Moelleropsis* species but differs in having muriform spores. Widespread in the Northern hemisphere, but becoming rare and extinct in many localities (Ahti et al., 2007). In Russia it is known from Eastern Siberia (Jørgensen, 1994). *E. byssina* is a pioneer species on bare soil; it has been found in a single locality only in the Middle Urals.

* FELLHANEROPSIS VEZDAE (Coppins & P. James) Sérus. & Coppins – 2: 56°30'47"N, 59°15'17"E, floodland with *Alnus* and *Padus* along river Serga, on bryophytes on a fallen trunk, 20.08.2011. The collected specimen has a thallus with tiny greenish convex areoles covering dying parts of hepatics. It is sterile but it can be easily distinguished by round light-brownish sitting pycnidia which strongly elongate later and contain pycnoconidia up to 50 µm long. *F. vezdae* is known from Europe (Estonia, Lithuania, Czech Republic, Austria, Sweden, Great Britain, Madeira, Cape Verde Islands), Northern and Southern America (USA and Brazil) (Coppins & James, 1978; Arup & Ekman, 1991; Poelt, 1994; Tønsberg, 1997; Motiejūnaitė, 1999; Palice, 1999; Lücking & Kalb, 2000; Suija et al., 2005; Llop & van den Boom, 2009). This species is known as a single specimen occasionally collected with another lichen – *Leptogium rivulare*. Probably not rare but easily overlooked.

** LEMMOPSIS ARNOLDIANA (Hepp) Zahlbr. – 2: 56°31'04"N, 59°15'21"E, limestone outcrops on river Serga, on limestone, 20.08.2011. *L. arnoldiana* is recognized by a thin black areolate thallus which develops reddish-brown (especially when wet) subglobose apothecia with concolourous proper margin. This species is rare and scattered in Europe, and is known also from North-Eastern Russia (Türk et al., 1998; Guttová & Palice, 2001; Ahti et al., 2007). *L. arnoldiana*, like other crustose cyanolichens, can be definitely determined only if apothecia are present, and so it is difficult to estimate the true distribution of this species in the Middle Urals.

LEPTOGIUM RIVULARE (Ach.) Mont. – 2: 56°30'47"N, 59°15'17"E, floodland with *Alnus* and *Padus* along river Serga, on bryophytes on fallen trunk, 20.08.2011. *L. rivulare* is known from Europe (Baltic countries, Belarus, France, NW Russia) and Tanzania (Jørgensen & James, 1983; Alstrup & Christensen, 2006; Ahti et al., 2007; Motiejūnaitė et al., 2011). In the Urals the species was previously known from Pechora-Ilych Natural Reserve (Northern Urals) (Hermansson et al., 1998). We found it on bryophytes on submersed during a spring flood fallen trunks of *Alnus incana*. Suitable substrates for this species are abundant but only a single locality is known in the Middle Urals. We regard this species vulnerable and suppose that it can thrive only in unpolluted water streams.

LEPTOGIUM SCHRADERI (Bernh.) Nyl. – 9: 56°25'53"N, 61°39'27"E, basalt outcrops on Iset river, on basalt, 21.05.1999; 5: 58°51'10"N, 60°48'38"E, rocky outcrops on Tura river, on rock and moss, 21.10.2000; 3: 57°01'52"N, 59°37'28"E, limestone outcrops on river Shishim, on limestone and moss, 23.09.2007 (BG, LE). This species is known from Europe and Northern America (Guttová, 1996; Tønsberg, 1998; Ahti et al., 2007). In Russia it has previously been found in Belgorod region (Muchnik & Urbanavichus, 2001) and was recently reported from Southern Urals (Urbanavichus & Urbanavichene, 2011).

LEPTOGIUM SUBTILE (Schrad.) Torss. – 8: 56°36'33"N, 61°02'25"E, pine forest, on soil, 19.07.1997; 4: 57°52'57"N, 59°53'37"E, Golyi Kamen' mountain, rocky outcrops under forest canopy, on soil, 19.08.2001; 1: 56°51'59"N, 57°24'03"E, limestone outcrops on Irgina

river, on soil, 13.06.2009 (BG); 8: 56°35'53"N, 61°03'13"E, naked soil on a border of a road, 23.07.2011. The species is known from Europe (Christensen et al., 1997; Ahti et al., 2007), Northern America (Goward & Ahti, 1991) and Asia (Kashiwadani et al., 2002). It is also known from Russia (Jørgensen, 1994; Pystina, 2001). *L. subtile* belongs to the group of pioneers on naked soil and it is the most widespread species growing in such slightly disturbed habitats among cyanolichens. Modest human impact seems to favour this species.

PSOROTICHIA SCHAERERI (A. Massal.) Arnold – 2: 56°31'35"N, 59°15'56"E, limestone outcrops on Serga river, on limestone, 02.06.2002 (BG). The species is widespread in temperate parts of the Northern hemisphere (Ahti et al., 2007). In Russia it is known from many localities in the European part and Siberia (Sedelnikova, 1996; Davydov, 2001; Poryadina, 2001). *P. schaeferi* is probably a common species in the Middle Urals but like other crustose cyanolichens it can be definitely determined only with apothecia.

PYRENOPSIS HAEMALEELLA (Nyl.) Blomb. & Forssell – 9: 56°25'16"N, 61°48'57"E, limestone outcrops on river Iset', on limestone, 28.06.1999 (BG); 2: 56°31'35"N, 59°15'56"E, limestone outcrops on Serga river, on limestone, 02.06.2002. The species is recorded from Northern America and Europe (Scandinavia, Kola peninsula and Northern Urals) (Ahti et al., 2007). It grows on wet calcareous rocks and like the previous species may be overlooked when sterile.

SYNALISSA RAMULOSA (Hoffm. ex Bernh.) Fr. – 7: 57°34'33"N, 61°44'36"E, limestone outcrops on river Rezh, on limestone, 11.01.2009; 6: 57°45'14"N, 61°37'35"E, limestone outcrops on river Neiva, on limestone, 23.06.2009. (BG). The species is widespread in the Northern hemisphere (Ahti et al., 2007).

DISCUSSION

Two species reported here – *Anema nummularium* and *Fellhaneropsis vezdae* – are new for Russia. *Collema dichotomum*, *Epiphloea byssina* and *Lemmopsis arnoldiana* are new for the Urals. Seven species – *Anema decipiens*, *Leptogium rivulare*, *L. schraderi*, *L. subtile*, *Psorotichia schaeferi*, *Pyrenopsis haemalella* and *Synal-*

issa ramulosa are new for the Middle Urals. We regard *Collema dichotomum*, *Leptogium rivulare* and *L. schraderi* as vulnerable. Two of them are hygrophilous lichens and depend on the quality of water in rivers, while the last species is found on rocks with seepage water streaks. We propose these species to be included into the next issue of Red Book of Sverdlovsk Region as vulnerable taxa. Most of other lichens are also rare but this is rather due to a lack of information on their true distribution in the Middle Urals.

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