

Lichenicolous fungi from Far East of Russia

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Abstract: Twenty three species of lichenicolous fungi are newly reported for Jewish Autonomous Region of Russia. *Lichenostigma chlaroterae*, *Nectriopsis physciicola* and *Sphaerellothecium gallowayi* are new to Russia and Asia; *Trichonectria rubefaciens* is new to Asia; *Xenonectriella leptaleae* is new to Asian Russia; *Lichenostigma cosmopolites* and *Marchandiomyces corallinus* are new to Far Eastern Federal District of Russia. *Nectriopsis physciicola* is newly documented on *Heterodermia*, *Oviculiculispora parmeliae* on *Anaptychia*, *Pyxine* and *Rinodina*, *Trichonectria rubefaciens* on *Myelochroa* and *Xenonectriella leptaleae* on *Heterodermia*.

INTRODUCTION

So far lichenicolous fungi of the southern part of the Russian Far East have not been specifically inspected. In the period from 9 to 13 August 2013 I made a small survey of these fungi in state nature reserve Bastak located in Jewish Autonomous Region of Russia at its boundary with Khabarovsk Territory. The reserve occupies south-eastern slopes of Bureinskii range covered by coniferous-deciduous forests and northern part of Middle Amur lowland. The survey resulted in a list of 23 species presented below, three of which are new to Russia and four new to Asia.

MATERIAL AND METHODS

The study is based on 38 specimens examined with Zeiss microscopes Stemi 2000-CS and Axio Imager A1 equipped with Nomarski differential interference contrast optics. Microscopical examination was done in water, 10% KOH (K), Lugol's iodine, directly (I) or after a KOH pretreatment (K/I) or Brilliant Cresyl blue (BCr). The length, breadth, and length/breadth ratio (l/b) of asci and ascospores are given (where possible) as: (min-) {X-SD} - {X+SD} (-max), where min and max are the extreme values, X the arithmetic mean, and SD the corresponding standard deviation. The nomenclature of the host lichens follows Skirina (2007). Examined specimens are housed in the mycological herbarium of the V. L. Komarov Botanical Institute in Saint Petersburg (LE).

Collecting sites in state nature reserve Bastak, Jewish Autonomous Region, Far Eastern Federal District of Russia

- 1 – 25 km S of Birobidzhan, Skalistaya Mt. (636 m), 49°01'51"N, 132°53'26"E, alt. 580–630 m, Si-rock outcrops among *Pinus-Abies*-dominated forest.
- 2 – 30 km S of Birobidzhan, in the vicinities of Paseka Polkovnikova Cabin, 48°59'14"N, 132°53'40"E, alt. 200 m, coniferous-deciduous forest.
- 3 – near intersection of the road Birobidzhan-Kukan and Bastak River, 49°01'29"N, 133°01'40"E, alt. 170 m, open sandpit among coniferous-deciduous forest.
- 4 – by the road Birobidzhan-Kukan, 49°08'06"N, 133°08'47"E, alt. 160 m, open sandpit in coniferous-deciduous forest.
- 5 – near 39 km Cabin by the road Birobidzhan-Kukan, 49°06'31"N, 133°06'41"E, alt. 140 m, dwarf shrub bog with sparse *Larix* trees.
- 6 – near 39 km Cabin by the road Birobidzhan-Kukan, 49°05'26"N, 133°05'18"E, alt. 140 m, dwarf shrub bog with sparse *Larix* trees.
- 7 – same place, coniferous-deciduous forest.

THE SPECIES

ABROTHALLUS BERTIANUS De Not. – 5, on *Melanohalea olivacea* (apothecia, thallus), 12.08.2013, M. P. Zhurbenko 13128, LE 261193; 6, on *M. septentrionalis* (thallus), 13.08.2013, M. P. Zhurbenko 13122a, LE 261173a.

Note – Formerly known in Far Eastern Federal District of Russia from Khabarovsk Territory (Zhurbenko & Tugi, 2013).

ABROTHALLUS PARMELIARUM (Sommerf.) Arnold – 5, on *Parmelia squarrosa* (thallus), 12.08.2013, M. P. Zhurbenko 13102b, LE 261155b; 6, on *P. squarrosa* (thallus), 13.08.2013, M. P. Zhurbenko 13101, LE 261165.

Note – Formerly known in Far Eastern Federal District of Russia from Sakha (Yakutiya) Republic, Chukotka Autonomous Region and Kamchatka Territory (Alstrup & Ahti, 2007; Zhurbenko, 2009a; Zhurbenko et al., 2012).

ABROTHALLUS sp. (*Vouauxiomyces* anamorph) – 5, on *Melanelia septentrionalis* (thallus), 12.08.2013, M. P. Zhurbenko 13117, LE 261192.

Note – Examined material is similar to *Vouauxiomyces santessonii* D. Hawksw. (Hawksworth, 1981), but differs from the latter in having smooth vs. echinulate and somewhat longer conidia (Fig. 1), viz. $(6.9\text{--}7.7\text{--}12.1\text{--}16.5) \times (4.0\text{--}4.6\text{--}5.4\text{--}6.0) \mu\text{m}$ ($n = 40$, in water) vs. $(7\text{--}7.5\text{--}10.5\text{--}11.5) \times (5\text{--}5.5\text{--}7\text{--}7.5) \mu\text{m}$.

CORTICIFRAGA FUCKELI (Rehm) D. Hawksw. & R. Sant. – 1, on *Peltigera* sp. (thallus), 9.08.2013, M. P. Zhurbenko 1399, LE 261135.

Note – Formerly known in Far Eastern Federal District of Russia from Sakha (Yakutiya) Republic, Kamchatka Territory and Sakhalin Region (Zhurbenko et al., 2005, 2012; Zhurbenko, 2009b; Zhurbenko & Vershinina, 2014).

DACTYLOSPORA cf. GLAUCOMARIOIDES (Tuck.) Hafellner – 1, on *Ochrolechia akagiensis* (thallus, occasionally apothecia) growing on mosses over shaded rocks, 9.08.2013, M. P. Zhurbenko 13107, LE 261065.

Notes – Apothecia sessile, with medium olive brown, paraplectenchymatous stipe ca. $70\text{--}250 \times 60\text{--}150 \mu\text{m}$ (Fig. 2), rounded to angular compressed or lobed in surface view, disc plane to slightly convex, black, epruinose, matt, $100\text{--}450 \mu\text{m}$ diam., usually surrounded by elevated, often slightly cracked margin $40\text{--}60 \mu\text{m}$ wide, dispersed to occasionally confluent/concrescent by a few. Hymenium permanently I+ blue, K/I+ blue with red patches. Ascospores with $(1\text{--}3\text{--}6)$ transsepta and often 1–2 oblique or longisepta in central segments. Pathogenicity not observed. Examined material differs from the species descriptions in Hafellner (1979) and Joshi et al. (2010) in having: 1) stipitate ascomata; 2) amyloid hymenium (not hemiamyloid, i.e. I+ blue turning red); 3) somewhat smaller ascospores, viz. $(8.4\text{--}10.4\text{--}13.6\text{--}16.5) \times (4.0\text{--}4.4\text{--}5.4\text{--}6.4) \mu\text{m}$, $1/b = (1.6\text{--}2.1\text{--}2.9\text{--}3.8)$ ($n = 116$, in wa-

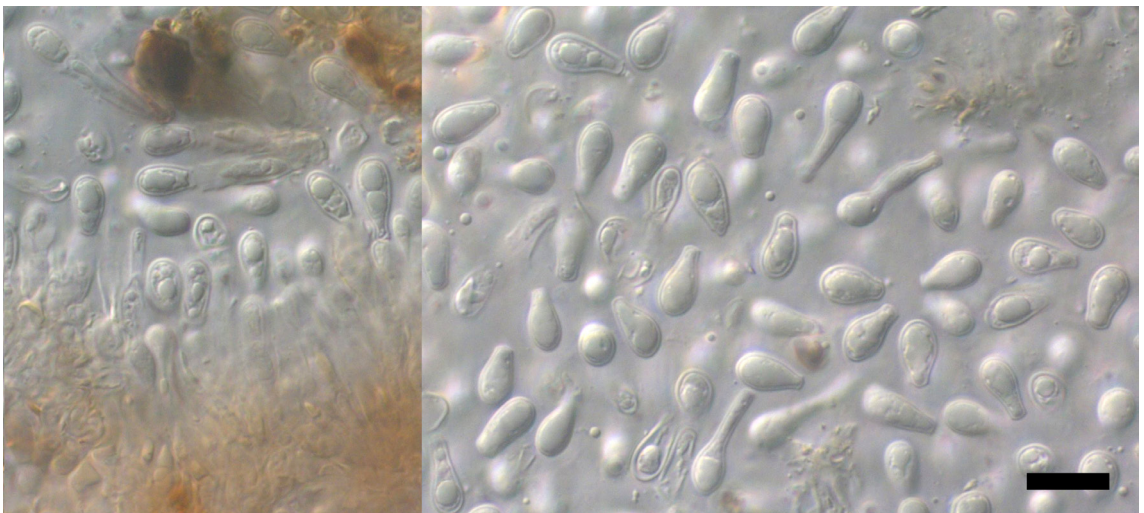


Fig. 1. *Abrothallus* sp. (*Vouauxiomyces* anamorph) on *Melanelia septentrionalis* (LE 261192). Coenocytogenous cells (left) and conidia (right) (in water). Bar = 10 μm .

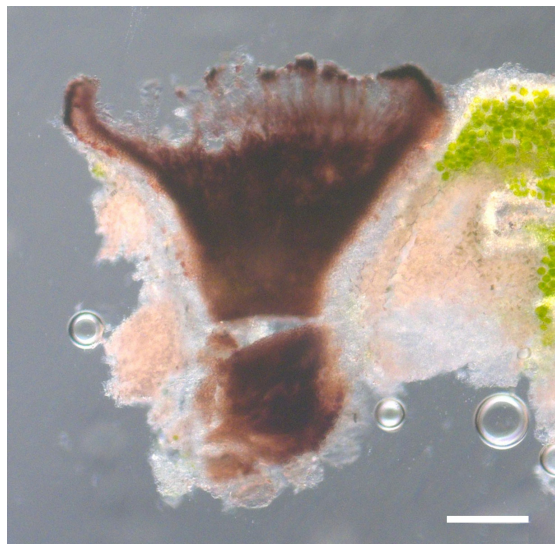


Fig. 2. *Dactylospora* cf. *glaucomarioides* (LE 261065). Stipitate ascomata in cross section (in water). Bar = 100 μ m.

ter, I or K/I) vs. 12.5–19 \times 5.5–7.5 μ m (Joshi et al., 2010) or 12.5–19 \times 5–7.5 μ m (Hafellner, 1979). The species was formerly reported in Far Eastern Federal District of Russia from Sakha (Yakutiya) Republic (Zhurbenko, 2009a).

HOMOSTEGIA PIGGOTII (Berk. & Broome) P. Karst. – 1, on *Parmelia shinanoana* (thallus), 9.08.2013, M. P. Zhurbenko 13104, LE 261175.

Notes – Formerly known in Far Eastern Federal District of Russia from Sakha (Yakutiya) Republic (Zhurbenko et al., 2005). *Parmelia shinanoana* is a new host species.

INTRALICHEN CHRISTIANSENI (D. Hawksw.) D. Hawksw. & M.S. Cole – 5, on *Nesolechia oxyspora* (hymenium of apothecia) growing on *Parmelia squarrosa*, 12.08.2013, M. P. Zhurbenko 13102c, LE 261155c.

Note – Formerly known in Far Eastern Federal District of Russia from Sakha (Yakutiya) Republic and Chukotka Autonomous Region (Zhurbenko, 2009a).

LICHENOCONIUM PYXIDATAE (Oudem.) Petr. & Syd. – 7, on *Cladonia ochrochlora* (podetia), 13.08.2013, M. P. Zhurbenko 13125, LE 261105.

Note – Formerly known in Far Eastern Federal District of Russia from Sakha (Yakutiya) Republic and Chukotka Autonomous Region (Zhurbenko & Alstrup, 2004).

LICHENOCONIUM USNEAE (Anzi) D. Hawksw. – 5, on *Melanohalea olivacea* (disc of apothecia), 12.08.2013, M. P. Zhurbenko 13116, LE 260902; 6, on *M. olivacea* (disc of apothecia), 13.08.2013, M. P. Zhurbenko 13115, LE 261163; 6, on *M. septentrionalis* (thallus), 13.08.2013, M. P. Zhurbenko 13122b, LE 261173b.

Note – Formerly known in Far Eastern Federal District of Russia from Sakha (Yakutiya) Republic, Chukotka Autonomous Region and Kamchatka Territory (Zhurbenko, 2009a; Zhurbenko et al., 2012; Zhurbenko & Vershinina, 2014).

LICHENOSTIGMA ALPINUM (R. Sant., Alstrup & D. Hawksw.) Ertz & Diederich – 1, on *Ochrolechia akagiensis* (thallus), 9.08.2013, M. P. Zhurbenko 13108, LE 261185.

Note – *Ochrolechia akagiensis* is a new host species.

LICHENOSTIGMA CHLAROTERAE (F. Berger & Brackel) Ertz & Diederich – 2, on *Lecanora symmicta* (apothecia, thallus), 10.08.2013, M. P. Zhurbenko 13121, LE 260985.

Notes – Formerly known from Europe (Austria, Germany and Portugal) (Berger & Brackel, 2011). New to Russia and Asia.

LICHENOSTIGMA COSMOPOLITES Hafellner & Calat. – 1, on *Xanthoparmelia stenophylla* (thallus), 9.08.2013, M. P. Zhurbenko 13113, LE 260942.

Notes – Formerly known in Russia from Karelia Republic and Zabaikal'e Territory of Russia (Alstrup et al., 2005; Zhurbenko & Yakovchenko, 2014). New to Far Eastern Federal District of Russia.

LICHENOSTIGMA MAURERI Hafellner – 5, on *Evernia mesomorpha* (thallus), 12.08.2013, M. P. Zhurbenko 13114, LE 261063; 6, on *E. mesomorpha* (thallus), 13.08.2013, M. P. Zhurbenko 13120, LE 260995.

Note – Formerly known in Far Eastern Federal District of Russia from Sakha (Yakutiya) Republic, Chukotka Autonomous Region, Magadan Region, Kamchatka Territory, Khabarovsk Terri-

tory and Primor'e Territory (Zhurbenko, 2009b; Zhurbenko et al., 2012; Zhurbenko & Tugi, 2013; Zhurbenko & Zhdanov, 2013).

MARCHANDIOMYCES CORALLINUS (Roberge) Diederich & D. Hawksw. – 3, on *Melanohalea* cf. *olivacea* (thallus), 12.08.2013, M. P. Zhurbenko 13129, LE 261073; 5, 12.08.2013, on *Hypogymnia physodes* (thallus), M. P. Zhurbenko 13130a, LE 261095a; on *Tuckermannopsis ciliaris* (thallus) and partly on adjacent phorophyte (*Larix*) bark with remnants of lichens thalli, M. P. Zhurbenko 13130b, LE 261095b.

Note – New to Far Eastern Federal District of Russia.

NECTRIOPSIS PHYSCIICOLA D. Hawksw. & Earland-Benn. – 7, on *Heterodermia* sp. (bleached lobes, occasionally rhizines, soralia and adjacent mosses with lichen soredia), 13.08.2013, M. P. Zhurbenko 13110, LE 261005.

Notes – Examined specimen fits in most features the original description (Earland-Bennett et al., 2006), except of the colour of the ascomata and the size of the ascospores. The ascomata are not pinkish but pale orange to clay-buff (Fig. 3). The ascospores are on an average somewhat longer than in the original description, $(16.7\text{--}18.4\text{--}21.4\text{--}22.9) \times (5.4\text{--}5.9\text{--}6.7\text{--}7.0) \mu\text{m}$, $l/b = (2.7\text{--}2.9\text{--}3.5\text{--}4.0)$ ($n = 46$, in water) vs. $(14\text{--}14.5\text{--}18\text{--}22.5) \times 5.5\text{--}8 \mu\text{m}$. So far the species was known from several collections in Spain



Fig. 3. *Nectriopsis physciicola* (LE 261005). Ascumata habitus. Bar = 200 μm .

(type) and Italy on *Physcia stellaris* (type) and *P. biziana* (Earland-Bennett et al., 2006; Brackel, 2011). New to Russia and Asia. *Heterodermia* is a new host genus.

NEOLAMYA PELTIGERAE (Mont.) Theiss. & Syd. – 7, on *Peltigera collina* (thallus), 13.08.2013, M. P. Zhurbenko 13100, LE 261075.

Note – Formerly known in Far Eastern Federal District of Russia from Sakha (Yakutiya) Republic, Chukotka Autonomous Region and Khabarovsk Territory (Alstrup & Ahti, 2007; Zhurbenko, 2009b).

NESOLECHIA OXYSPORA (Tul.) A. Massal. – 1, on *Punctelia* sp. (thallus), 9.08.2013, M. P. Zhurbenko 13103, LE 261195; 2, on *Myelochroa aurulenta* (thallus), 10.08.2013, M. P. Zhurbenko 13123, LE 261152; 5, on *Parmelia squarrosa* (thallus), 12.08.2013, M. P. Zhurbenko 13102a, LE 261155a.

Note – Formerly known in Far Eastern Federal District of Russia from Sakha (Yakutiya) Republic, Chukotka Autonomous Region and Kamchatka Territory (Zhurbenko, 2009a; Zhurbenko et al., 2012). *Myelochroa aurulenta* and *Parmelia squarrosa* are new host species.

OVICUCULISPORIA PARMELIAE (Berk. & Curt.) Etayo – 1, on *Cladonia* spp. (podetia and both sides of basal squamules) and adjacent *Parmelia* sp. (thallus), 9.08.2013, M. P. Zhurbenko 13132, LE 261025; 1, on *Heterodermia* cf. *obscurata* (both sides of lobes and rhizines), 9.08.2013, M. P. Zhurbenko 13133, LE 261143; 1, on *Myelochroa entotheiochroa* (thallus) and adjacent green mosses, 9.08.2013, M. P. Zhurbenko 13105, LE 261145; 1, on *Rinodina xanthophaea* (thallus), 9.08.2013, M. P. Zhurbenko 13134, LE 261093; 1, on neighbouring *Anaptychia* sp. (thallus) and *Heterodermia* cf. *microphylla* (thallus), 9.08.2013, M. P. Zhurbenko 13135, LE 261153; 1, on *Pyxine sorediata* (thallus), 9.08.2013, M. P. Zhurbenko 13111, LE 261055.

Notes – All collections are from the same site, where the species was rather common and abundant on various hosts growing on forested mossy rocks. Heavy infections cause slight bleaching of host lobes. Ascumata 150–400 μm diam., subglobose, pale to medium cream or pink orange, usually with conspicuous naked

and thus more brightly coloured small papilla, discrete to often concrescent by up to 6, sometimes associated with a subiculum. Exciple pale yellow-orange, K-. Asci usually with 4 microspores and one macrospore, sometimes with just 4 or 5 microspores. Ascospores can be roughly subdivided to microspores and macrospores, though many spores of intermediate size were also observed. Microascospores mostly ellipsoid, with small and large guttules, wall finely verruculose (hardly visible even at DIC), 1-septate or very rarely aseptate, not or slightly constricted at the septum, (6.8-)8.7-11.7(-16.5) × (3.3-)4.5-5.5(-7.0) μm, 1/b = (1.4-)1.7-2.5(-3.6) (n = 143, in water). Macroascospores ellipsoid to occasionally obovoid, ends rounded or very rarely acute, usually strongly constricted at the septum, 1- or very rarely 2-septate, sometimes heteropolar, easily broken down into individual cells, wall ca. 1.5 μm thick, smooth, usually with small guttules, (18.4-)42.4-73.0(-86.0) × (6.8-)18.3-33.3(-40.0) μm, 1/b = (1.9-)2.2-2.6(-2.9) (n = 311, in water). The sizes of the macroascospores strongly vary both in different perithecia and specimens, which agrees with the former observations on the species (Hawksworth & Booth, 1976; Etayo, 2010). For instance, in LE 261025 (on *Cladonia*) macroascospores are comparatively small, (18.4-)20.6-28.6(-32.0) × (6.8-)9.0-13.0(-14.2) μm, 1/b = (1.7-)2.0-2.6(-2.8) (n = 20, in water). On the whole examined macroascospores are larger than reported for the species by Hawksworth & Booth (1976) [34-50(-60) × 12-18(-20) μm] or Etayo (2010) (38-65 × 16-23 μm, 55-78 × 22-26 μm, 33-50 × 12-23 μm in different specimens) and constitute a transition to those of *Ovicuculispora macrospora* Etayo characterized by somewhat larger ascomata (300-500 μm diam.) and larger macroascospores (67-105 × 32-40 μm) (Etayo, 2010). However, the latter species is yet known only by the holotype from Peru, so its range of variation is obscure. *Ovicuculispora parmeliae* was formerly known in Russia from Primor'e Territory (Etayo, 2010). *Anaptychia*, *Pyxine* and *Rinodina* are new host genera.

PYRENIDIUM ACTINELLUM Nyl. - 4, on *Baeomyces rufus* (thallus), 12.08.2013, M. P. Zhurbenko 13119, LE 261105.

Note - Formerly known in Far Eastern Federal District of Russia from Sakha (Yakutiya)

Republic and Chukotka Autonomous Region (Zhurbenko, 2008, 2009a, b).

SPHAERELLOTHECIUM GALLOWAYI Diederich - 1, on *Heterodermia* sp. (thallus), 9.08.2013, M. P. Zhurbenko 13112, LE 261083.

Notes - Examined material agrees in all aspects with the species protologue (Diederich, 2007). Additionally we observed that the ascospores are occasionally pale brown, and the ascus wall is BCr-. So far the species was known from Australia and Papua New Guinea (Diederich, 2007). New to Russia and Asia.

TREMELLA CETRARIICOLA Diederich & Coppins - 5, on *Tuckermannopsis ciliaris* (thallus), 12.08.2013, M. P. Zhurbenko 13124, LE 261113.

Note - Formerly known in Far Eastern Federal District of Russia from Kamchatka Territory (Zhurbenko et al., 2012).

TRICHONECTRIA RUBEFACIENS (Ellis & Everh.) Diederich & Schroers - 1, on *Myelochroa subaurulenta* (thallus), 9.08.2013, M. P. Zhurbenko 13132, LE 260922.

Notes - Formerly known in Russia from Lenin-grad Region (Kuznetsova et al., 2012). New to Asia. *Myelochroa* is a new host genus.

XENONECTRIELLA LEPTALEAE (J. Steiner) Rossman & Lowen - 2, on *Heterodermia* sp. (lobes), 10.08.2013, M. P. Zhurbenko 13131, LE 261123; 7, on *Heterodermia* sp. (lobes), 13.08.2013, M. P. Zhurbenko 13109, LE 261085.

Notes - Acomata red or occasionally orange, subglobose to pyriform, papillate, up to 250 μm diam., protruding only in ostiolar area, dispersed to aggregated. Interascal filaments have not been mentioned for this genus in Rossman et al. (1999), however, in the examined specimens they are well-developed, 2-3.5 μm wide, branched. Exciple orange, K+ purple, yellow in lactic acid. Ascospores broadly ellipsoid, (9.3-)10.1-11.9(-13.9) × (6.0-)7.0-8.0(-8.6) μm, 1/b = (1.2-)1.3-1.7(-2.0) (n = 88, in water or K), at first hyaline and smooth-walled, then medium orange or yellow-brown and prominently tuberculate, 1-septate or very rarely aseptate, more or less constricted at the septum, mostly with one large guttule in each cell, uniseriate

in an ascus. Infected host lobes are strongly bleached. Examined material well fits description of the species in Rossman et al (1999), except "K+ pale brown to black" reaction of the exciple reported by the authors. Formerly known in Russia from Pskov Region, Leningrad Region and Komi Republic (Zhurbenko, 2007; Popov et al., 2008; Stepanchikova et al., 2011). New to Asian Russia. *Heterodermia* is a new host genus.

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