



New records and noteworthy lichen species from Sakhalin and Kurils, Far East of Russia

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ABSTRACT

During the study of the lichen biota on Sakhalin and Kuril Islands – Iturup, Kunashir and Shikotan based on morphological and anatomical data 11 new lichen records were registered for the territory including *Anisomeridium viridescens*, which was previously recorded only in Europe, is the first report in Asia and Russia. *Buellia leptocline*, *Rinodina laevigata* and *Rhizocarpon polycarpum* found on Sakhalin are the first reports for the south of the Russian Far East. *Julella sericea* found on Sakhalin is the first report for the Sakhalin Region. *Swinscowia stigmatella* found on Iturup and Kunashir is the first report for Kurils. *Agonimia tristicula* is a new record to Kunashir. *Arthothelium spectabile* is a new record to Shikotan. *Collema flaccidum*, *C. furfuraceum* and *C. japonicum* are new records to Iturup. For noteworthy species, information on distribution, ecology and distinctive features of similar species is provided.

Keywords: corticolous species, boreal zone, broad-leaved forest, old-growth forest, rare species

РЕЗЮМЕ

Ежкин А.К., Яковченко Л.С., Каганов В.В., Галанина И.А. Новые и примечательные виды лишайников с острова Сахалин и Курильских островов, Дальний Восток России. В ходе изучения биоты лишайников на Сахалине и Курильских островах – Итуруп, Кунашир и Шикотан на основании морфологических и анатомических данных, 11 находок впервые приводятся для территории, включая новый для Азии и России – *Anisomeridium viridescens*, ранее известного только из Европы. *Buellia leptocline*, *Rinodina laevigata* и *Rhizocarpon polycarpum*, найденные на Сахалине впервые указываются для юга Дальнего Востока. *Julella sericea* и найденные на Сахалине, впервые приводятся для Сахалинской области. *Swinscowia stigmatella*, найденный на Итурупе и Кунашире, впервые приводятся для Курильских островов. *Agonimia tristicula* впервые приводится для острова Кунашир. *Arthothelium spectabile* впервые приводится для острова Шикотан. *Collema flaccidum*, *C. furfuraceum* и *C. japonicum* являются новыми для острова Итуруп. Для значимых находок представлена краткая информация по распространению, экологии и отличительным признакам.

Ключевые слова: бореальная зона, лишайники, обитающие на коре, редкие виды, старовозрастный лес, широколиственный лес

The lichen biota of the Sakhalin and Kuril Islands is still poorly known and new records and noteworthy species continue to be discovered. It is related to the isolation of remote areas where old-growth forest areas with the high biodiversity are still intact. The climate of the islands is temperate, monsoon type with a cold winter, but milder than in the continental part and with a cool rainy summer (Zemtsova 1968, Khomenko 2003). According to Takh-tajan (1978) northern parts of the Sakhalin Region belong to the Okhotsk-Kamchatka Province of the Circumboreal floristic Region while southern parts along with Hokkaido related to the East Asian floristic Region. The current study is a part of the work targeted to reveal new lichen records and rare species in remote locations of the Sakhalin Region including old-growth forests and other intact lichen habitations. We present information for 11 lichen species from the Sakhalin Island and Kuril Islands including a new record for Asia and Russia.

The paper is based on the study of lichens collected from the middle and south Sakhalin – Tymovskiy, Smirnykhovskiy, Nevelskiy and Kholmskiy districts, and South Kurils – Iturup,

Kunashir and Shikotan islands. Voucher specimens were deposited in the Herbarium of the Institute of Marine Geology and Geophysics (SAK) and Federal Scientific Center of East Asian Terrestrial Biodiversity (VLA). The specimens were examined using a stereomicroscope (MBS-10) and a compound microscope (LOMO Mikmed 3). Spot tests were made with 10 % potassium hydroxide solution (K), sodium hypochlorite solution (C), 1,4-p-phenylenediamine (PD) and Lugol's solution (I). The material was collected according to standard methods (Stepanchikova & Gagarina 2014) in mixed deciduous, broad-leaved and coniferous, forests including old-growth on the bark of trees, rock and dead wood.

Anisomeridium viridescens (Coppins) R.C. Harris (Family)

The species is characterized by whitish or pale fawn thallus, sometimes pinkish when fresh, with circular to ellipsoid, mostly scattered, brownish ascomata 0.14–0.2 × 0.1–0.15 mm, KOH+ green. Pseudoparaphyses 0.8–1 µm thick, persistent, much branched with cells 4–10 µm long. Asci 31–49 × 11–17 µm, obclavate to short cylindrical. Ascospores 12–17(–19) × 3.5–4.7 µm, 1-septate, upper cell

usually distinctly wider than lower, colourless or sometimes brownish and faintly warted when old; perispore indistinct. The species grows on smooth bark of deciduous trees in old woodlands. It is reported only from Europe – Western Britain, Ireland, Azores, Spain, Austria and Norway (Smith et al. 2009, Nordin & Aptroot 2018). The species is probably often overlooked when collecting. The species differs from close species *Anisomeridium polypori* (Ellis & Everh.) M.E. Barr by 1-septate ascospores with the cells $\pm$ equal in length. This is the first report of this lichen species in Asia and Russia.

Specimen examined: RUSSIA, Sakhalin Island, Tymovskiy district, Zonal'noye village vicinity, Tym' River valley, 50°38'41.17"N 142°45'58.18"E, 153 m, old-growth riparian forest, on bark of *Ulmus laciniata*, 05.06.2017, Ezhkin 2466 (SAK).

***Arthothelium spectabile* A. Massal. (Family)**

The species is widely distributed Europe, Macaronesia, North and South America, Asia, grows mostly on smooth bark of deciduous trees (Smith et al. 2009). It was reported in Far East of Russia from the continental part, Sakhalin, Kunashir and Iturup (Tchabanenko 2002). It is also known in Japan (Ohmura & Kashiwadani 2018). The species is new to Shikotan.

Specimen examined: RUSSIA, Shikotan Island, Mt. Notoro vicinity, mixed forest, on bark of *Acer pictum*, 43°46'50.66"N 146°42'16.39"E, 50 m, 17.06.2017, Ezhkin 2523 (SAK).

***Buellia leptoclina* (Flot.) A. Massal. (Family)**

The species is characterized by grey crustose, inconspicuous, immersed thallus K+ yellow, containing atranorin and medulla I+ blue, apothecia up to 1 (–1.5) mm wide, ascospores brown, 1-septate with wall faintly warted, 12–16(–18) $\times$ 6–8(–11) μ m. Close species *Buellia saxorum* A. Massal. and *B. subdisformis* (Leight.) Vain. have different chemistries (Smith et al. 2009). *Buellia leptoclina* is widely distributed lichen in Europe, Macaronesia, North America, Asia and Africa and grows on siliceous rocks in uplands (Smith et al. 2009). In Russia, the species occurs mostly in the European Arctic part, Northern Siberia, Ural and Caucasus and Far East – Commander Isles (Tolpysheva 2008). The species is new for Sakhalin and the south of the Russian Far East.

Specimen examined: RUSSIA, Sakhalin Island, Yuzhno-Sakhalinsk vicinity, Mt. Turgeneva, south slope, 47°0'22.07"N 142°47'57.55"E, 637 m, mixed forest, on rock, 09.11.2011, Ezhkin 4082 (SAK).

***Collema flaccidum* (Ach.) Ach. (Family)**

The species is widely distributed in the Northern hemisphere and known from Australasia, grows on base-rich tree bark in moist and shady places, also on rocks and mosses (Degelius 1954, Nash et al. 2004). It was reported in the Far East of Russia from the continental part, Sakhalin and Kunashir (Tchabanenko 2002) and Shikotan (Chesnokov & Konoreva 2022). It is also known in Japan (Ohmura & Kashiwadani 2018). The species is new to Iturup.

Specimen examined: RUSSIA, Iturup Island, Baranskogo Volcano vicinity, 45°07'49.7"N 147°47'06.4"E, 69 m, birch forest, on bark of *Sorbus commixta*, 11.08.2012, Ezhkin 4085 (SAK).

***Collema furfuraceum* (Schaer.) Du Rietz (Family)**

The species is widely distributed in the Northern Hemisphere and grows mostly on tree bark, rarely on rocks (Degelius 1954). It was reported in Far East of Russia from the continental part (Tchabanenko 2002), Sakhalin (Konoreva et al. 2018), Kunashir (Ezhkin 2019). It is also known in Japan (Ohmura & Kashiwadani 2018). The species is new to Iturup.

Specimen examined: RUSSIA, Iturup Island, Kuril'skiy district, Mt. Pereval'naya vicinity, 45°07'49.7"N 147°47'06.4"E, 253 m, old-growth oak forest with *Larix* sp., on bark of *Quercus crispula*, 01.06.2018, Ezhkin 4086 (SAK).

***Collema japonicum* (Müll. Arg.) Hue (Family)**

The species is mainly corticolous and known from Eastern Asia, Australia and Oceania (Degelius 1974). The species is known from the Russian Far East – Primorye Territory, Kunashir (Makryi & Skirina 2009), Shikotan (Ezhkin 2023) and Sakhalin (Ezhkin & Schumm 2018). It is also known in Japan (Ohmura & Kashiwadani 2018). The species is new for Iturup.

Specimen examined: RUSSIA, Iturup Island, Kuril'skiy district, Mt. Pereval'naya vicinity, 45°07'49.7"N 147°47'06.4"E, 253 m, old-growth oak forest with *Larix* sp., on bark of *Quercus crispula*, 01.06.2018, Ezhkin 4087, 4088, 4089 (SAK).

***Julella sericea* (A. Massal.) Coppins (Family)**

The species is widely distributed in Europe, Asia, North and Central America, grows on smooth bark of deciduous trees (Smith et al. 2009). In Russia the species was known from the continental part of Russian Far East – Primorye Territory (Tchabanenko 2002). It is also known in Japan (Ohmura & Kashiwadani 2018). The species is new for Sakhalin and the Sakhalin Region.

Specimen examined: Russia, Sakhalin Island, Nevel'skiy district, Shebuninka River valley, 46°26'23.5"N 141°57'38.7"E, 41 m, riparian forest, on bark of *Phellodendron sakhalinense*, 17.05.2016, Ezhkin 4021, 4022, 4024 (SAK). Ibid., Kholmskiy district, Chekhov Village vicinity, Arkanzas River valley, 47°31'16.5"N 141°59'01.9"E, 83 m, broad-leaved forest, on bark of *Phellodendron sakhalinense*, 29.06.2016, Ezhkin 4023, 4052, 4026 (SAK).

***Rhizocarpon polycarpum* (Hepp) Th. Fr. (Family)**

The species is characterized by pale to dark brown or reddish-brown, crustose, areolate thallus with black prothallus and rounded to polygonal apothecia, medulla I+ blue. Epithymenium brown to violet-brown with positive reaction of K+ purple-red, containing norstictic and stictic acids. Ascospores persistently colourless or becoming pale brown, mainly 1 septate, 17–30 $\times$ 8–11(–14) μ m. The species resembles *Rhizocarpon badioatrum* (Flörke ex Spreng.) Th. Fr. but the latter has a negative reaction of I in medulla and pigmented ascospores, another close species *R. richardii* (Lamy ex Nyl.) Zahlbr. has an olivaceous epithymenium with a negative reaction of K (Smith et al. 2009). The species is widely distributed in Holarctic – North America, Greenland and Eurasia and grows on siliceous rocks in moderately cold and humid areas in coasts and mountains (Nash et al. 2004, Smith et al. 2009). In Russia, it is reported mostly from the northern territories – Northern Ural, Chukotka, Yakutia and Wrangel Island area (Andreev et al. 1996) as well as European part and Siberia (Urbanavichus 2010). It is also known in Japan (Ohmura & Kashiwadani 2018). The species is new for Sakhalin and the south of the Russian Far East.

Specimen examined: RUSSIA, Sakhalin Island, Yuzhno-Sakhalinsk vicinity, Mt. Turgeneva, south slope, 47°0'22.07"N 142°47'57.55"E, 637 m, mixed forest, on rock, 09.11.2011, Ezhkin 4082 (SAK). Ibid., Ostraya Mt., south slope, 46°58'38.29"N 142°46'14.43"E, 332 m, mixed forest, on rock, 09.11.2011, Ezhkin 4083 (SAK).

***Rinodina laevigata* (Ach.) Malme (Family)**

The species is characterized by grey to grey-brown thin thallus, *Physcia-Physconia* – type spores of Type A development, with broadly attached apothecia becoming narrowly at-

tached, with black plane disc becoming convex. *Rinodina laevigata* can be confused with *R. sibirica* H. Magn. but differs by a less well-developed thallus, smaller spores, and thick lower apothecial cortex. Often morphological and anatomical features of these two species have overlapping sizes. *Rinodina laevigata* can be confused with *R. archaea* (Ach.) Arnold, see the differences (Sheard 2010). The species grows on tree bark and wood in different types of forest (Kotlov 2008, Sheard 2010, Galanina et al. 2021, 2023). It is a northern temperate species distributed in Europe (Mayrhofer & Moberg 2002), Asian Russia (Kotlov 2008, Galanina et al. 2021, 2023) and North America (Sheard 2010). In the Far East of Russia, the species is reported only from the northern territories – Magadan Region and Yakutia (Galanina et al. 2021, 2023). This species is reported for Sakhalin and the south of Russian Far East for the first time.

Specimen examined: RUSSIA, Sakhalin Island, Tymovskiy district, Slavy village vicinity, Tym' River valley, 51°02'17.04"N 142°37'16.08"E, 34 m, riparian forest, on dead wood – old fence, 24.06.2018, Ezhkin L-5038 (VLA). Ibid., Smirnykhovskiy district, Langeri River valley, 44°29'7.52"N 146°5'55.13"E, 23 m, mixed forest, on bark of *Alnus hirsuta*, 22.09.2018, Kaganov 2904, 2911 (SAK).

***Swinscowia stigmatella* (Ach.) S.H. Jiang, Lücking et Sérus. (Family)**

The species is widely distributed in temperate regions of the Northern Hemisphere, grows on bark of various woody plants (Nash et al. 2002). It was reported under its synonym *Strigula stigmatella* (Ach.) R.C. Harris in the southern Far East of Russia from the continental part – in Primorye Territory (Tchabanenko 2002) and Sakhalin (Konoreva et al. 2018). It is also known in Japan (Ohmura & Kashiwadani 2018) as *Strigula stigmatella* (Ach.) R.C. Harris). The species is new for Iturup and Kunashir and Kurils.

Specimen examined: RUSSIA, Iturup Island, Kurilsk Airport vicinity, 45°16'11.15"N 147°58'44.36"E, 101 m, oak forest, on the bark of *Quercus crispula*, 04.08.2018, Ezhkin 2462 (SAK); Kunashir Island, Dubovoye village vicinity, 43°46'28.71"N 145°31'00.95"E, 58 m, oak forest, on bark of *Quercus crispula*, 23.08.2017, Ezhkin 2464 (SAK).

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