



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

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Manuscript received: 09.06.2025

Review completed: 18.09.2025

Accepted for publication: 21.09.2025

Published online: 23.09.2025

ABSTRACT

The current study is a continue of the series “New records and noteworthy lichen species from Sakhalin and Kurils, Far East of Russia”. The previous work contained information on 9 lichens new to the territory. This work contain 11 new lichen records from Sakhalin and Kurils, including *Anisomeridium viridescens* – the first report in Asia and Russia and pantropical species *Agonimia pacifica* – a new record for Russia. *Buellia leptoclina*, *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. *Swinscovia stigmatella* found on Iturup and Kunashir is the first report for Kurils. *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, and photos are provided.

Keywords: corticolous species, boreal zone, broad-leaved forest, old-growth forest, rare species, tropical and subtropical lichens

РЕЗЮМЕ

Ежкин А.К., Яковченко Л.С., Каганов В.В., Галанина И.А. Новые и примечательные виды лишайников с о. Сахалин и Курильских островов, Дальний Восток России II. Данная работа является продолжением серии “Новые и примечательные виды лишайников с о. Сахалин и Курильских о-вов, Дальний Восток России”. В предыдущей работе представлены сведения о 9 видах лишайника, новых для территории. В новой работе представлена информация об 11 лишайниках с о-ва Сахалин и Курильских о-вов, включая новый для Азии и России – *Anisomeridium viridescens*, и новый для России пантропический вид – *Agonimia pacifica*. *Buellia leptoclina*, *Rinodina laevigata* и *Rhizocarpon polycarpum*, найденные на Сахалине впервые указываются для юга Дальнего Востока. *Julella sericea*, найденный на Сахалине, впервые приводится для Сахалинской области. *Swinscovia stigmatella*, найденный на Итурупе и Кунашире, впервые приводится для Курильских островов. *Arthothelium spectabile* впервые приводится для острова Шикотан. *Collema flaccidum*, *C. furfuraceum* и *C. japonicum* являются новыми для острова Итуруп. Для значимых находок представлены краткая информация по распространению, экологии и отличительным признакам, и фотографии.

Ключевые слова: бореальная зона, лишайники, обитающие на коре, редкие виды, старовозрастный лес, тропические и субтропические виды лишайников, 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 Takhtajan (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 continue of the series “New records and noteworthy lichen species from Sakhalin and Kurils, Far East of Russia”, where 9 species new to the territory were reported (Ezhkin et al. 2025). The second part of the series contains the data on 11 lichen species from Sakhalin and Kuril Islands including new records for Asia and Russia.

Most field work was performed in remote locations in the Sakhalin Region including old-growth forests and other

intact lichen habitations. The paper is based on the study of lichens collected from the middle and south Sakhalin – Tymovskiy, Smirnykhovskiy, Nevelskiy and Kholmiskiy districts and South Kurils – Iturup, Kunashir and Shikotan. 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-phenyldiamine (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 bark of *Acer pictum* Thunb., *Alnus hirsuta* (Spach) Rupr., *Phellodendron sakhalinense* (F. Schmidt) Sarg., *Quercus crispula* Blume, *Sorbus commixta* Hedl., *Ulmus laciniata* (Trautv.) Mayr., rock and dead wood.

Agonimia pacifica (Harada) Diederich (Verrucariaceae)

The species is characterized by light green to brownish minutely squamulose thallus, loosely attached to the substratum, central parts of the thallus almost crustose and tightly attached to the substratum, not papillate, with branched to dissected lobes below 0.05 mm wide and grey to black ascromata, asci mostly monosporous, but 2- to 4-spored asci also occur, spores strongly muriform $44\text{--}140(200) \times 20\text{--}29 \mu\text{m}$ (Fig. 1A). The species was firstly described as *Agonimiella pacifica* H. Harada (Harada 1993), but reduced to synonymy as *Agonimia pacifica* (H. Harada) Diederich in Aptroot et al. (1997) so the differences between the new genus and *Agonimia* Zahlbr. were not significant. *Agonimia pacifica* is a corticolous species with pantropical distribution, known from South and Central America, East and South-East Asia including China and Japan (Aptroot 2002, Aptroot et al. 2008, Kalb et al. 2012), New Zealand (de Lange et al. 2018) and Africa (Kirika et al. 2012). In Sakhalin Region *Agonimia pacifica* seems to be a rare lichen as it is known only from one location although it is widespread in tropical and subtropical regions. The species is very close to morphologically similar cosmopolitan *Agonimia tristicula* (Nyl.) Zahlbr from which it can be distinguished by the thallus lacking papillates, the presence of uniform perithecium wall, long sparsely branched and anastomosing paraphyses, and ascospores remaining always hyaline, ascospores of *A. tristicula* turn brown when mature. *Agonimia tristicula* is mostly terricolous and lichenicolous lichen, and occurs on bark very rare (Breuss 2020). This is the first report of *Agonimia pacifica* in Russia.

Specimen examined: RUSSIA, Kunashir Island, Dubovoye village vicinity, $43^{\circ}46'47.60''\text{N } 145^{\circ}29'48.69''\text{E}$, 69 m, oak forest, on bark of *Quercus crispula*, 23.08.2017, Ezhkin 2460 (SAK).

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

The species is characterized by whitish or pale fawn thallus, sometimes pinkish when fresh, with circular to ellipsoid, mostly scattered, brownish ascromata $0.14\text{--}0.2 \times 0.1\text{--}0.15$ mm, KOH+ green (Fig. 1B). Pseudoparaphyses $0.8\text{--}1 \mu\text{m}$ thick, persistent, much branched with cells $4\text{--}10 \mu\text{m}$

long. Asci $31\text{--}49 \times 11\text{--}17 \mu\text{m}$, obclavate to short cylindrical. Ascospores $12\text{--}17(-19) \times 3.5\text{--}4.7 \mu\text{m}$, 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, Nordén & Aptroot 2018). The species is probably often overlooked when collecting. The species differs from close species *Anisomeridium polyperi* (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, $50^{\circ}38'41.17''\text{N } 142^{\circ}45'58.18''\text{E}$, 153 m, old-growth riparian forest, on bark of *Ulmus laciniata*, 05.06.2017, Ezhkin 2466 (SAK).

Arthothelium spectabile A. Massal. (Arthoniaceae)

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*, $43^{\circ}46'50.66''\text{N } 146^{\circ}42'16.39''\text{E}$, 50 m, 17.06.2017, Ezhkin 2523 (SAK).

Buellia leptoclina (Flot.) A. Massal. (Caliciaceae)

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, $12\text{--}16(-18) \times 6\text{--}8(-11) \mu\text{m}$ (Fig. 1C). Close species *Buellia saxorum* A. Massal. and *B. subdisciformis* (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

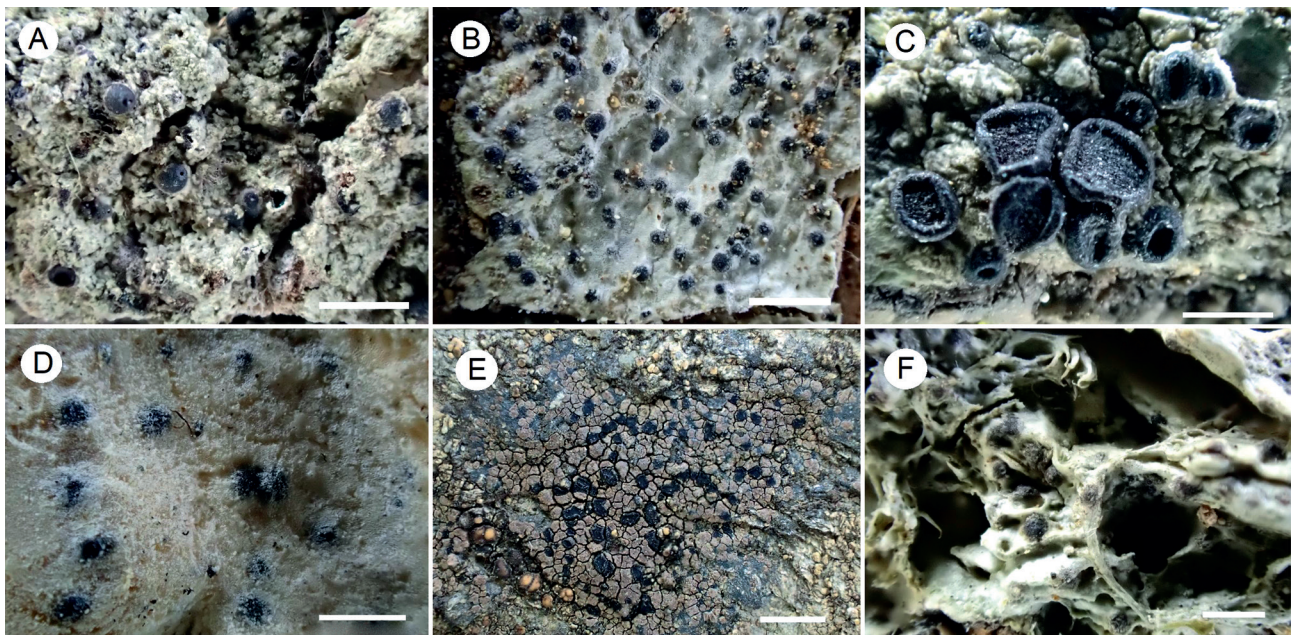


Figure 1 Noteworthy species of lichens: A – *Agonimia pacifica* (H. Harada) Diederich, B – *Anisomeridium viridescens* (Coppins) R.C. Harris, C – *Buellia leptoclina* (Flot.) A. Massal., D – *Julella sericea* (A. Massal.) Coppins, E – *Rhizocarpon polycarpum* (Hepp) Th. Fr., F – *Swinscovia stigmatella* (Ach.) S.H. Jiang. Scale bar: A, B, D, F – 1mm, C – 0.5 mm, E – 2 mm

Arctic European 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. (Collemaaceae)

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 (Collemaaceae)

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, Kurilskiy 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 (Collemaaceae)

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 to Iturup.

Specimen examined: RUSSIA, Iturup Island, Kurilskiy 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 (Thelenellaceae)

The species (Fig. 1D) 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, Nevelskiy 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., Kholm'skiy district, Chekhov Village vicinity, Arkansas River valley, 47°31'16.5"N 141°59'01.9"E, 83 m, broadleaved forest, on bark of *Phellodendron sakhalinense*, 29.06.2016, Ezhkin 4023, 4052, 4026 (SAK).

Rhizocarpon polycarpum (Hepp) Th. Fr. (Rhizocarpaceae)

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 × 8–11(–14) μm (Fig. 1E). 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 (Physciaceae)

Rinodina laevigata is characterized by grey to grey-brown thin thallus, spores *Physcia-Physconia*-type, ontogeny of type A (Sheard 2010), with broadly attached apothecia becoming narrowly attached, 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 north-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. (Strigulaceae)

The species (Fig. 1F) 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, 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 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).

ACKNOWLEDGMENTS

The study of AE and VK was carried out in the framework of the state task according to the thematic plan of the IMGG FEB RAS on the topic “Comprehensive assessment of the impact of environmental factors on the geosystems of Sakhalin and the Kuril Islands” (AAAA-A18-118012290122-1). The research of LY and IG was carried out within the state assignment of Ministry of Science and Higher Education of the Russian Federation (theme No. 124012400285-7).

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