

ЛИШАЙНИКИ — LICHENS

A contribution to the lichen flora of Tlyaratinskiy Protected Area (East Caucasus, Dagestan, Russia)

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Abstract. The lichen flora of the Tlyaratinskiy Protected Area (Zakaznik) in Dagestan, North-Eastern Caucasus is surveyed. In total 165 species, including 162 lichenized and 3 lichenicolous fungi, representing 82 genera are listed here with their localities and substrates. *Caloplaca diphyodes* is new to the Russian Caucasus. *Arthonia intexta*, *Bryoria smithii*, *Protoparmelia badia* and *Sphaerellothecium reticulatum* are new to Dagestan. Two species (*Tornabea scutellifera*, *Usnea florida*) represent those listed in the Red Data Book of Russia. The territory of Tlyaratinskiy Protected Area is the only known locality in the Caucasus of the species *Carbonea assimilis*, *Lecidea silacea*, *Rhizocarpon ridescens* and *R. superficiale*.

Keywords: lichens, lichenicolous fungi, floristic study, biodiversity, pine forest, new records, red-listed species, highlands.

Материалы к лихенофлоре федерального заказника «Тлярятинский» (Восточный Кавказ, Дагестан, Россия)

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Резюме. Впервые изучено разнообразие лихенофлоры федерального заказника «Тлярятинский» (Дагестан, Восточный Кавказ). Представлен список 165 видов лишайников и лихенофильных грибов, для которых приведены сведения о месте сбора и субстрате. *Caloplaca diphyodes* — новый вид для Российского Кавказа и второе местонахождение на Кавказе. *Arthonia intexta*, *Bryoria smithii*, *Protoparmelia badia* и *Sphaerellothecium reticulatum* впервые приводятся для Дагестана. На территории заказника произрастают два вида (*Tornabea scutellifera*, *Usnea florida*), включенных в Красную книгу России. В заказнике локализованы единственные известные на Кавказе местонахождения видов *Carbonea assimilis*, *Lecidea silacea*, *Rhizocarpon ridescens*, *R. superficiale*.

Ключевые слова: лишайники, лихенофильные грибы, флористические исследования, биоразнообразие, сосновый лес, новые находки, охраняемые виды, высокогорья.

Introduction

Exploration of biodiversity in mountainous ecosystems represents important fundamental research. Mountains harbour a large number of species diversity, especially in protected areas. The lack of data about lichen diversity in protected areas in Dagestan is a gap in knowledge that needs to be filled. This is the aim of our work.

The lichens of some protected areas of Dagestan have been investigated to some extent: Sarykum barkhan State Sanctuary — 40 species (Urbanavichus *et al.*, 2010) and Samurskiy State Sanctuary — 138 species (Ismailov *et al.*, 2017). The two latter surveys revealed 97 new species to Dagestan, 18 to the Caucasus and 5 to Russia.

The present study in the State Wildlife Sanctuary Tlyaratinskiy (further Tlyaratinskiy Zakaznik) in high-mountainous part of Dagestan enhances knowledge of lichen flora in protected areas of Dagestan. Only sixteen lichen species were known in the Tlyaratinskiy Zakaznik before our investigations started (Krasnaya..., 1998; Ismailov, 2015; Ismailov, 2017). As a result of our survey 149 new species were registered in different parts of the Tlyaratinskiy Zakaznik. In our total check-list, 165 species of lichens and lichenicolous fungi of the Tlyaratinskiy Zakaznik are provided.

Study area

The Tlyaratinskiy Zakaznik is situated in Dagestan, along the eastern part of the Greater Caucasus Range at the border with Georgia and Azerbaijan (Fig. 1). The Zakaznik is located in Tlyarata District in the upper reaches of the Avarskoe Koisu River (the Dzhurmut River Basin) and covers the northern slopes of the Greater Caucasus Range and the south-western spurs of the Nukatl Range. On the south it borders on the Lagodekhi Nature Reserve of Georgia and Zagatala State Reserve of Azerbaijan. The area of the Tlyaratinskiy Zakaznik is 83500 ha. The altitudinal range of the protected area is 1500–3932 m. The annual rainfall is 800–1000 mm. Relative air humidity is 65–75 %. The absolute minimum of temperature is –33 °C in January. The hottest months are July and August with maximum temperature of 35 °C. Bedrock is represented by variable slates throughout the territory (Fizicheskaya..., 1996; Yarovenko *et al.*, 2004).

Various mountainous habitats are present in the Tlyaratinskiy Zakaznik — nival zone with glaciers and snowfields, alpine and subalpine meadows, scrubby birch woodlands, pine, mixed and deciduous mountain forests, meadows and shrub thickets, rocky slopes with xerophytic

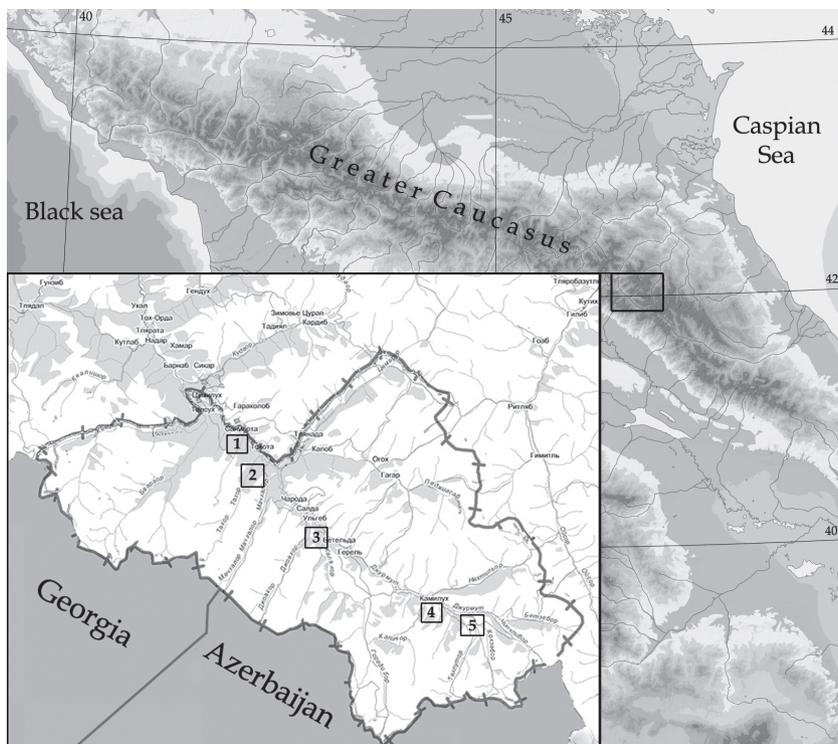


Fig. 1. Location of the study area in the Greater Caucasus (with numbers of investigated sites).

Рис. 1. Местоположение района исследований на Большом Кавказе (с указанием точек сбора).

vegetation, outcrops of rocks and cliffs in river valleys. Cultivated landscapes (settlements and fields) only occupy small areas. Pine forest of *Pinus kochiana* C. Koch predominates in the lower part of the Tlyaratinskiy Zakaznik. Large areas above altitude of 1700–1800 m are covered by mixed forests of pine with *Betula litwinowii* Doluch., *B. pendula* Roth, *B. raddeana* Trautv. and *Acer* species (Fig. 2). Mixed forest is replaced by scrubby birch woodland at about 2300–2500 m. At timberline (2500–2600 m), forests are gradually replaced by dwarf shrubs of *Rhododendron caucasicum* Pall. Most of the area of the Tlyaratinskiy Zakaznik is located above the timberline and is covered by subalpine and alpine meadows. Above 3000 m in landscape slate talus slopes are prevailing.

The flora of the Tlyaratinskiy Zakaznik consists of more than 600 species of vascular plants including 60 species of trees and shrubs. There are



Fig. 2. Pine forest with *Betula* sp., *Populus tremula*, *Quercus macranthera* in the canyon of the Dzhurmut River (site 2).

Рис. 2. Сосновый лес с примесью березы, осины, дуба в ущелье реки Джурмут (точка сбора 2).

many endemic [120 species, e. g. *Dianthus tlaratensis* Husseinov, *Gentiana lagodechiana* (Kusn.) Grossh., *Paeonia mlokosewitschii* Lomakin, *Primula juliae* Kusn.] and vulnerable [20, e. g. *Colchicum speciosum* Steven, *Mandenovia komarovii* (Menden.) Alava, *Pseudovesicaria digitata* (C. A. Mey.) Rupr., *Vavilovia formosa* (Steven) Fed.] species (Yarovenko *et al.*, 2004; Krasnaya..., 2009).

Material and methods

Specimens (about 400) were collected from 5 localities (see list below) during a short field work in the Tlyaratinskiy Zakaznik in August 2014 (Fig. 1). Morphological and microscopic investigations were done by light microscopy and using routine spot tests (KOH, KI, hypochlorite, paraphenylenediamine and UV light) in Mountain Botanical Garden DSC RAS and Komarov Botanical Institute RAS. The geographic coordinates (WGS84) and altitudes of each locality were measured by hand-held GPS

navigator. The lichen nomenclature mainly follows Nordin *et al.* (2011). For the species new to Dagestan, the information of their distribution in the Caucasus and herbarium specimen number are given. The specimens are stored in the herbaria of Mountain Botanical Garden, Dagestan Science Centre RAS, Makhachkala (DAG).

Investigated sites. All sites: Russia, North Caucasus, Republic of Dagestan, Tlyaratinskiy District, Tlyaratinskiy Zakaznik. **1** — 42°01'10"N, 46°27'06"E, 1800 m a. s. l., pine forest between Saniorta and Tokhota villages, 17.08.2014; **2** — 42°00'16"N, 46°27'35"E, 2000–2200 m a. s. l., vicinity of Tokhota village, left bank of the Dzhurmut River, pine forest with *Betula* sp., *Populus tremula* L., *Quercus macranthera* Fisch. et C. A. Mey. ex Hohen., 18.08.2014; **3** — 41°56'90"N, 46°32'13"E, 1900–2100 m a. s. l., vicinity of Gortnob village, left bank of the Dzhurmut River, pine forest, 19.08.2014; **4** — 41°54'08"N, 46°38'44"E, 2200 m a. s. l., vicinity of Kamilukh village, left bank of the Dzhurmut River, sparse growth of birch on northern slope, 20.08.2014; **5** — 41°53'25"N, 46°40'28"E, 2100–2200 m a. s. l., vicinity of Kamilukh village, confluence of Dzhurmut and Kokzebor rivers, NE slope with rock outcrops, 20.08.2014.

The list of species

The species are listed in alphabetical order followed by the collection locality numbers and substrata. New species to Dagestan are marked with «!», new to the Russian Caucasus — «!!». Lichenicolous species are marked with asterisk «*».

Acarospora badiofusca (Nyl.) Th. Fr. — 4, 5: on slate.

Allocetraria madreporiformis (Ach.) Kärnefelt et A. Thell — 5: on soil.

Alyxoria varia (Pers.) Ertz et Tehler — 2: on bark of *Betula* sp., *Populus tremula*.

Anaptychia ciliaris (L.) Körb. — 2, 3, 5: on bark of *Pinus kochiana*, *Betula* sp., rarely on soil.

!***Arthonia intexta** Almq. — 2: in apothecia of *Lecidella stigmatea* growing on slate (DAG 0870). Previously reported for the Caucasus from Republic of North Ossetia (Vainio, 1899), Armenia (Gasparyan *et al.*, 2015).

Blastenia hungarica (H. Magn.) Arup *et al.* — 1–3: on bark and twigs of *Pinus kochiana*.

Bryoria bicolor (Ehrh.) Brodo *et D.* Hawksw. — 4: on soil among mosses (Is-mailov, 2017).

B. furellata (Fr.) Brodo *et D.* Hawksw. — 2, 3: on trunk of *Betula* sp., *Pinus kochiana*.

B. fuscescens (Gyeln.) Brodo *et D.* Hawksw. — 2, 3: on trunk of *Betula* sp., *Pinus kochiana*.

!B. smithii (Du Rietz) Brodo et D. Hawksw. — 2: on rock among mosses (DAG 0871). Previously reported for the Caucasus from Georgia (Barkhalov, 1986) and Republic of Adygeya (Otte, 2001).

Buellia aethalea (Ach.) Th. Fr. — 5: on slate.

Caloplaca cerina (Hedw.) Th. Fr. — 2, 4: on bark of *Betula* sp., *Populus tremula*, *Quercus macranthera*.

!!C. diphodes (Nyl.) Jatta — 5: on slate (DAG 0872). Conf. by Jan Vondrák. Previously reported for the Caucasus from Armenia (Harutyunyan *et al.*, 2011).

Candelaria concolor (Dicks.) Stein — 1–3: on bark of *Betula* sp., *Pinus kochiana*, *Populus tremula*, *Quercus macranthera*.

Candelariella antennaria Räsänen — 2: on bark of *Betula* sp.

C. efflorescens R. C. Harris et W. R. Buck — 3: on bark of *Pinus kochiana*.

C. vitellina (Hoffm.) Müll. Arg. — 2, 4, 5: on slate and bark of *Betula* sp.

C. xanthostigma (Ach.) Lettau — 2–4: on bark of *Betula* sp., *Pinus kochiana*.

Carbonea assimilis (Körb.) Hafellner et Hertel — 5: on slate.

Catillaria chalybeia (Borrer) A. Massal. — 5: on slate.

Cetraria aculeata (Schreb.) Fr. — 2, 4, 5: on soil.

C. ericetorum Opiz — 5: on soil.

C. islandica (L.) Ach. — 2–5: on soil.

Cetrelia olivetorum (Nyl.) W. L. Culb. et C. F. Culb. — 3: at the base of *Pinus kochiana* trunk.

Chaenotheca furfuracea (L.) Tibell — 2: on the base of *Betula* sp. trunk.

Chrysothrix candelaris (L.) J. R. Laundon — 4: on bark of *Pinus kochiana*.

Cladonia coniocraea (Flörke) Spreng. — 2, 3: on the base of *Pinus kochiana* trunk, on stump and soil.

C. fimbriata (L.) Fr. — 1, 2: on basis of *Pinus kochiana* trunk, on stump and soil.

C. foliacea (Huds.) Willd. — 1, 4, 5: on soil.

C. furcata (Huds.) Schrad. — 1–4: on soil.

C. gracilis (L.) Willd. — 2, 3, 5: on soil among mosses.

C. mitis Sandst. — 3, 4: on soil among mosses.

C. pocillum (Ach.) Grognot — 2, 3: on soil.

C. pyxidata (L.) Hoffm. — 2, 3, 5: on the base of *Betula* sp. and *Pinus kochiana* trunks, on soil.

C. squamosa Hoffm. — 2, 3: on soil among mosses.

C. subrangiformis Sandst. — 4, 5: on soil.

Collema subflaccidum Degel. — 2: on bark of *Betula* sp.

Cornicularia normoerica (Gunnerus) Du Rietz — 5: on slate.

***Dactylospora saxatilis** (Schaer.) Hafellner — 5: on thallus of *Pertusaria excludens* growing on slate.

Dermatocarpon minutum (L.) W. Mann — 3, 4: on slate.

D. velleureum Zschacke — 2: on slate.

Dimelaena oreina (Ach.) Norman — 1, 4, 5: on slate.

Diploschistes muscorum (Scop.) R. Sant. — 1–3, 5: on soil over plant debris, rarely on basis of *Pinus kochiana* trunk.

Evernia divaricata (L.) Ach. — 3–5: on bark of *Betula* sp., *Pinus kochiana*, rarely on soil among rock outcrops.

E. prunastri (L.) Ach. — 2–4: on trunk of *Betula* sp., *Pinus kochiana*, *Quercus macranthera*, on rotten stumps.

Flavocetraria cucullata (Bellardi) Kärnefelt et A. Thell — 2–5: on soil among mosses and plant debris.

F. nivalis (L.) Kärnefelt et A. Thell — 2, 5: on soil among mosses and plant debris.

Flavoparmelia caperata (L.) Hale — 1–5: on bark of *Betula* sp., *Pinus kochiana*, on rotten stumps, rarely on soil among rock outcrops.

F. soledians (Nyl.) Hale — 2: on slate under the forest canopy.

Flavopunctelia soledica (Nyl.) Hale — 2–4: on bark of *Betula* sp., *Pinus kochiana*, *Quercus macranthera*, on rotten stumps, rarely on soil over the mosses and plant debris.

Fuscopannaria praetermissa (Nyl.) P. M. Jørg. — 3: on soil.

Gyalolechia flavovirescens (Wulfen) Söchting et al. — 5: on slate.

G. lenae (Söchting et Figueras) Söchting et al. — 5: on slate.

Hypogymnia austerodes (Nyl.) Räsänen — 3: at the base of *Pinus kochiana* trunk.

H. farinacea Zopf — 2, 3: on bark of *Betula* sp., *Pinus kochiana*.

H. physodes (L.) Nyl. — 2, 3: on bark of *Betula* sp., *Pinus kochiana*, on rotten stumps.

H. tubulosa (Schaer.) Hav. — 2, 3: on bark of *Betula* sp., *Pinus kochiana*.

Hypotrachyna revoluta (Flörke) Hale — 3: on bark of *Pinus kochiana*.

Immersaria cupreoatra (Nyl.) Calat. et Rambold — 2: on slate (Ismailov, 2017).

Lecania erysibe (Ach.) Mudd — 4, 5: on slate.

Lecanora allophana Nyl. — 2–4: on bark of *Betula* sp., *Populus tremula*, *Pinus kochiana*.

L. argopholis (Ach.) Ach. — 1: on slate.

L. carpinea (L.) Vain. — 2: on bark of *Betula* sp., *Quercus macranthera*.

L. chlarotera Nyl. — 2: on bark of *Betula* sp., *Pinus kochiana*, *Quercus macranthera*.

L. polytropa (Hoffm.) Rabenh. — 3–5: on slate.

L. rupicola (L.) Zahlbr. — 5: on slate.

L. symmicta (Ach.) Ach. — 3: on bark of *Pinus kochiana*.

Lecidea silacea Ach. — 4: on slate (Ismailov, 2017).

Lecidella carpathica Körb. — 4, 5: on slate.

L. euphorea (Flörke) Hertel — 1–3: on bark of *Betula* sp., *Pinus kochiana*, *Quercus macranthera*.

L. patavina (A. Massal.) Knoph et Leuckert — 2, 5: on slate.

L. stigmatea (Ach.) Hertel et Leuckert — 2: on slate.

Leptogium saturninum (Dicks.) Nyl. — 1–4: on bark of *Betula* sp., *Populus tremula*, *Pinus kochiana*.

Lobothallia alphoplaca (Wahlenb.) Hafellner — 1, 4, 5: on slate.

L. praeradiosa (Nyl.) Hafellner — 5: on slate.

Melanelia stygia (L.) Essl. — 3: on slate (Ismailov, 2015).

Melanelixia glabra (Schaer.) O. Blanco et al. — 2, 3: on bark of *Betula* sp., *Pinus kochiana*, *Quercus macranthera*.

M. subargentifera (Nyl.) O. Blanco et al. — 2, 3: on bark of *Betula* sp., *Pinus kochiana*, *Quercus macranthera*.

- Melanohalea exasperata** (De Not.) O. Blanco et al. — 2: on bark of *Betula* sp.
M. exasperata (Nyl.) O. Blanco et al. — 2–4: on bark of *Betula* sp., *Pinus kochiana*, *Quercus macranthera*.
Micarea misella (Nyl.) Hedl. — 3: on lignum of *Pinus kochiana* stump.
Montanelia disjuncta (Erichsen) Divakar et al. — 3: on slate (Ismailov, 2017).
Myriolecis crenulata (Hook.) Śliwa et al. — 5: on slate.
Neofuscelia delisei (Duby) Essl. — 3, 5: on slate.
N. loxodes (Nyl.) Essl. — 5: on slate.
N. pulla (Ach.) Essl. — 4, 5: on slate.
Nephroma parile (Ach.) Ach. — 2, 3: on slate (Ismailov, 2015).
Pannaria conoplea (Ach.) Bory — 2: on bark of *Betula* sp.
Parmelia saxatilis (L.) Ach. — 3: on slate (Ismailov, 2015).
P. serrana A. Crespo et al. — 2, 3: on bark of *Pinus kochiana*.
P. sulcata Taylor — 1–4: on bark of *Betula* sp., *Pinus kochiana*, *Quercus macranthera*.
Parmelina carporrhizans (Taylor) Poelt et Vězda — 2: on bark of *Betula* sp.
P. quercina (Willd.) Hale — 2: on bark of *Betula* sp.
P. tiliacea (Hoffm.) Hale — 2, 3: on bark of *Pinus kochiana*, *Quercus macranthera*.
Parmeliopsis ambigua (Wulfen) Nyl. — 3: on bark of *Pinus kochiana*.
Parmotrema perlatum (Huds.) M. Choisy — 2: on bark of *Betula* sp.
Peltigera canina (L.) Willd. — 1–3, 5: on soil.
P. didactyla (With.) J. R. Laundon — 3, 4: on soil.
P. leucophlebia (Nyl.) Gyeln. — 3: on soil, sometimes over the mosses.
P. neckeri Hepp ex Müll. Arg. — 2, 4: on soil over the mosses and plant debris.
P. polydactylon (Neck.) Hoffm. — 2, 4: on soil over the mosses and plant debris.
P. praetextata (Flörke ex Sommerf.) Zopf — 1–4: on soil over plant debris and mosses, rarely at the base of mossy trunk of *Betula* sp.
P. rufescens (Weiss) Humb. — 4, 5: on soil.
P. venosa (L.) Hoffm. — 2, 4, 5: on soil.
Pertusaria amara (Ach.) Nyl. — 2: on bark of *Betula* sp.
P. excludens Nyl. — 5: on slate.
Phaeophyscia ciliata (Hoffm.) Moberg — 2: on bark of *Betula* sp.
P. hirsuta (Mereschk.) Essl. — 2: on bark of *Betula* sp., *Quercus macranthera*.
P. orbicularis (Neck.) Moberg — 2: on bark of *Betula* sp., *Populus tremula*, *Quercus macranthera*.
P. sciastra (Ach.) Moberg — 4, 5: on slate.
Physcia adscendens H. Olivier — 1, 2: on bark of *Betula* sp., *Pinus kochiana*, *Quercus macranthera*.
P. aipolia (Ehrh. ex Humb.) Fűrnr. — 2: on bark of *Quercus macranthera*.
P. aipolioides (Nádv.) Breuss et Türk — 2: on bark of *Quercus macranthera*.
P. caesia (Hoffm.) Fűrnr. — 1, 2, 5: on slate.
P. dubia (Hoffm.) Lettau — 5: on slate.
P. stellaris (L.) Nyl. — 2–4: on bark of *Betula* sp., *Pinus kochiana*, *Quercus macranthera*, often on twigs.
P. subalbinea Nyl. — 3: on slate.

Physconia distorta (With.) J. R. Laundon — 2–4: on bark of *Betula* sp., *Pinus kochiana*, *Quercus macranthera*.

P. muscigena (Ach.) Poelt — 4, 5: on soil over mosses.

Pleurosticta acetabulum (Neck.) Elix et Lumbsch — 2: on bark of *Quercus macranthera*.

Porpidia macrocarpa (DC.) Hertel et A. J. Schwab — 2: on slate (Ismailov, 2017).

Protopannaria pezizoides (Weber) P. M. Jørg. et S. Ekman — 4: on soil (Ismailov, 2015).

!Protoparmelia badia (Hoffm.) Hafellner — 2: on slate (DAG 0873). Previously reported for the Caucasus from Republic of Adygeya (Otte, 2007), Republic of Karachayevo-Cherkessiya, Republic of Kabardino-Balkariya [Slonov, 2002, as *Lecanora badia* (Pers.) Ach.], Republic of North Ossetia — Alania, Georgia, Armenia, Azerbaijan (Barkhalov, 1983, as *Lecanora badia*).

Protoparmeliopsis garovaglii (Körb.) Arup et al. — 4, 5: on slate.

P. muralis (Schreb.) M. Choisy — 1–5: on slate.

Pseudevernia furfuracea (L.) Zopf — 2–4: on bark of *Betula* sp., *Pinus kochiana*.

Punctelia jeckeri (Roum.) Kalb — 3: on bark of *Pinus kochiana*.

P. subrudecta (Nyl.) Krog — 2: on bark of *Betula* sp.

Ramalina asahinana Zahlbr. — 2, 3: on bark of *Betula* sp., *Pinus kochiana*, *Quercus macranthera*.

R. farinacea (L.) Ach. — 2–4: on bark of *Betula* sp., *Pinus kochiana*, *Quercus macranthera*.

R. fraxinea (L.) Ach. — 2: on bark of *Betula* sp.

R. pollinaria (Westr.) Ach. — 2: on bark of *Betula* sp., *Quercus macranthera*.

Rhizocarpon disporum (Nägeli ex Hepp) Müll. Arg. — 1, 2, 5: on slate.

R. geminatum Körb. — 5: on slate.

R. geographicum (L.) DC. — 1–5: on slate.

R. lavatum (Fr.) Hazsl. — 2: on slate (Ismailov, 2017).

R. ridescens (Nyl.) Zahlbr. — 2: on slate (Ismailov, 2017).

Rhizoplaca chrysoleuca (Sm.) Zopf — 1–5: on slate.

R. melanophthalma (DC.) Leuckert et Poelt — 4, 5: on slate.

Rusavskia elegans (Link) S. Y. Kondr. et Kärnefelt — 2, 5: on slate.

Scoliciosporum umbrinum (Ach.) Arnold — 4: on slate.

Solorina saccata (L.) Ach. — 4: on soil over the mosses among rock outcrops.

!*Sphaerellothecium reticulatum (Zopf) Etayo — 3: on thallus of *Parmelia saxatilis* growing on slate (DAG 0874). Previously reported for the Caucasus from Republic of Adygeya (Urbanavichus, Urbanavichene, 2007).

Squamarina cartilaginea (With.) P. James — 2: on slate.

Stereocaulon alpinum Laurer — 5: on soil.

Thamnia vermicularis (Sw.) Schaer. — 5: on soil.

Toninia physaroides (Opiz) Zahlbr. — 5: on soil among rock outcrops.

Tornabea scutellifera (With.) J. R. Laundon — vicinity of Kamilukh village (Krasnaya..., 1998).

Umbilicaria cylindrica (L.) Delise ex Duby — 1–5: on slate.

U. decussata (Vill.) Zahlbr. — 4: on slate (Ismailov, 2017).

- U. deusta** (L.) Baumg. — 3: on slate (Ismailov, 2015).
U. hirsuta (Sw. ex Westr.) Hoffm. — 2, 4: on slate (Ismailov, 2017).
U. virginis Schaer. — 2, 4, 5: on slate.
Usnea articulata (L.) Hoffm. — 3: on bark of *Pinus kochiana*.
U. barbata (L.) F. H. Wigg. — 2: on bark of *Betula* sp.
U. dasopoga (Ach.) Nyl. — 2: on bark of *Betula* sp.
U. florida (L.) F. H. Wigg. — vicinity of Kamilukh village (Krasnaya..., 1998).
U. hirta (L.) F. H. Wigg. — 1–3: on bark of *Pinus kochiana*.
Vulpicida pinastri (Scop.) J.-E. Mattsson et M. J. Lai — 1–4: on bark of *Pinus kochiana*, often on stumps.
Xanthomendoza ulophyllodes (Räsänen) Søchting et al. — 2: on bark of *Betula* sp., *Populus tremula*.
Xanthoparmelia camtschadalis (Ach.) Hale — 4, 5: on soil.
X. conspersa (Ehrh. ex Ach.) Hale — 4, 5: on slate.
X. stenophylla (Ach.) Ahti et D. Hawksw. — 2, 4, 5: on slate and bark of *Pinus kochiana*.
X. tinctoria (Maheu et A. Gillet) Hale — 2: on slate.
Xanthoria parietina (L.) Th. Fr. — 2–4: on bark of *Betula* sp., *Pinus kochiana*, *Populus tremula*, *Quercus macranthera*.

Discussion

The present species list from the Tlyaratinskiy Zakaznik contains 162 lichenized fungi and 3 lichenicolous fungi (*Arthonia intexta*, *Dactylospora saxatilis*, *Sphaerellothecium reticulatum*) categorized in 82 genera and 30 families. *Caloplaca diphodes* is new to the Russian Caucasus, but it was previously reported from the Armenian Caucasus (Harutyunyan et al., 2011). *Arthonia intexta*, *Bryoria smithii*, *Protoparmelia badia* and *Sphaerellothecium reticulatum* are new to Dagestan. The territory of the Tlyaratinskiy Zakaznik is the only known locality in the Caucasus for the species *Carbonea assimilis*, *Lecidea silacea*, *Rhizocarpon ridescens* and *R. superficiale*. The species *Caloplaca diphodes*, *Candelariella antennaria*, *Rhizocarpon lavatum* are known in the Russian Caucasus only from the Tlyaratinskiy Zakaznik. Among the vulnerable lichens *Tornabea scutellifera* and *Usnea florida* have been included in the Red Data Book of Russia (Krasnaya..., 2008).

At this stage most epiphytic lichens were recorded on the bark of *Betula* sp. (51 species) and *Pinus kochiana* (48). These phorophytes are dominant in forests of the study area. 24 species were recorded on *Quercus macranthera*, 8 species on *Populus tremula*.

Few species were recorded on dead wood of rotten stumps, logs and snags, e. g. *Cladonia coniocraea*, *C. fimbriata*, *Evernia prunastri*, *Flavoparmelia caperata*, *Flavopunctelia soledica*, *Hypogymnia physodes*, *Micarea misella*, *Vulpicida pinastri*.

Most interesting and rare terricolous species are *Allocetraria madreporiformis*, *Bryoria bicolor*, *Fuscopannaria praetermissa* and *Protopannaria pezizoides*. Each was found locally in one of the investigated sites.

The saxicolous *Gyalolechia lenae* was previously known only from calcareous substrate, but in the study area it is growing on non-calcareous slate. *Pertusaria excludens* in the Russian Caucasus is known only from Dagestan. For the Caucasus this species has also been reported from Azerbaijan (Barkhalov, 1983). Apart from Dagestan, *Carbonea assimilis* is known in Russia only from the Arctic part of Far East (Urbanavichus, 2010). *Lecidea silacea*, *Rhizocarpon ridescens* and *R. superficiale*, known in northern and arctic regions of Russia, are in the Caucasus only reported from Dagestan.

The most common lichens found in 3 or more sites include *Anaptychia ciliaris*, *Blastenia hungarica*, *Candelariella vitellina*, *Cetraria aculeata*, *Cladonia furcata*, *C. gracilis*, *Dimelaena oreina*, *Evernia divaricata*, *Flavocetraria cucullata*, *Flavopunctelia soledica*, *Lecanora polytropa*, *Lecidella euphorea*, *Leptogium saturninum*, *Lobothallia alphoplaca*, *Melanohalea exasperatula*, *Parmelia sulcata*, *Peltigera venosa*, *Physcia caesia*, *Physconia distorta*, *Protoparmeliopsis muralis*, *Ramalina farinacea*, *Rhizocarpon disporum*, *Rhizoplaca chrysoleuca*, *Umbilicaria cylindrica*, *Vulpicida pinastri*, *Usnea hirta* and *Xanthoparmelia stenophylla*.

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