

New records of lichens and allied fungi from the Kostroma Region, Russia

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Abstract: 29 species of lichens, 3 non-lichenized calicioid fungi and 3 lichenicolous fungi are reported for the first time from the Kostroma Region. Among them, 15 species are new for the Central Federal District, including *Myrionora albidula* – a rare species with widely scattered locations, previously known only from the Southern Urals Mts in European Russia. The most important discoveries are confined to old-growth coniferous *Picea* sp. and *Abies sibirica* forests in the Kologriv Forest Nature Reserve. Two species (*Leptogium burnetiae* and *Menegazzia terebrata*) are included in the Red Data Book of Russian Federation. The distribution, ecology, taxonomic characters and conservation status of rare species and of those new for the Central Federal District are provided.

Keywords: *Biatora mendax*, *Myrionora albidula*, old-growth forests, southern taiga, Kologriv Forest Reserve, Central European Russia

INTRODUCTION

The Kostroma Region is a large (60,211 km²), most northeastern part of the Central Federal District in European Russia situated between Ivanovo, Yaroslavl, Vologda, Kirov and Nizhniy Novgorod regions (Fig. 1). It is located within the Eastern European Plain, once covered with ice during the Moscow glaciation which determined its modern topography. The regional relief is mostly flat with swampy lowlands and occasional moraines within the Volga River Basin. The climate is temperate-continental, with cold winters and warm summers; the average temperature is –13 °C in January and +18 °C in July; the annual average precipitation in the region is between 650 mm in the W and 550 mm in the NE (Red Data Book of Kostroma Region, 2009). Most of the Kostroma Region is located within the southern taiga subzones, where the natural forest landscapes have been heavily transformed by long-term human activity. Today the forests occupy c. 74% of the area of the region, of which about two-thirds are dominated by young or middle-aged tree stands (Dudin, 2000).

Early lichenological investigations of the Kostroma Region relate to the work of Elenkin (1906, 1907, 1911) and Ladyzhenskaya (1931), who published first data for Kostromskaya Gu-

berniya, listing 39 and 54 taxa, respectively. The recent published additions to the Kostroma lichen flora are from the Kologriv District by



Fig. 1. The location of the Kologriv Forest Reserve (diamond) and Kostroma Region (grey color) in the northeastern part of the Central Federal District. The abbreviations of the neighbouring regions: Iv – Ivanovo, Yar – Yaroslavl (within Central Federal District), Vol – Vologda (Northwestern Federal District), Kir – Kirov and NN – Nizhniy Novgorod (Volga Federal District). Blue line – the borders of the Federal Districts.

Kuznetsova and Skazina (2010) and the Makaryev and Chukhloma Districts by Himelbrant et al. (2018). In all, 190 species have been reported from the Kostroma Region.

Our results are based on investigations from field trips made in September 2018 to the Kologriv Forest State Nature Reserve (c. 59,000 hectares in size), established in 2006 in the northern part of the Kostroma Region (58°55'N, 43°52'E) in order to preserve southern taiga nature landscapes of the Russian plain. The territory of the reserve is dominated by a wavy relief generated by hills and inter-fluvial ranges from 150 to 180 m a.s.l. Rocky outcrops are absent, but erratic granitic, sometimes rather large, boulders are scattered throughout the territory. Forest management and clear-cutting was applied within this territory in 1950–1990s, the current landscape mostly represents recovering secondary deciduous and mixed deciduous-coniferous forests. Our field studies were carried out in the best-conserved old-growth fir-spruce and mixed aspen-spruce or lime-spruce forest communities.

The first investigation of the Kologriv Forest Reserve by lichenologists was carried out in the summer 2008 (Kuznetsova & Skazina, 2010) when 95 species of lichens and allied fungi were recorded. The present paper provides additions to the lichen flora of both the Kostroma Region and Kologriv Forest Reserve.

MATERIAL AND METHODS

Lichen specimens were collected from five localities in the northern part of the Kologriv Forest Reserve (Kologriv District, Kostroma Region).

1 – Quarter no. 24, right bank of the Sekha River, old-growth spruce-fir forest of *Picea* sp. and *Abies sibirica* Ledeb., with *Betula* sp., *Populus tremula* L., *Tilia cordata* L., *Salix* sp. and *Alnus incana* (L.) Moench.; 58°55'31.3"N, 43°49'44.2"E, alt. c. 150 m, 02.09.2018.

2 – Quarter no. 22, old-growth mixed forest of *Picea* sp., *Tilia cordata*, *Betula* sp., *Populus tremula*, with *Sorbus aucuparia* L., young *Acer platanoides* L. and *Fraxinus excelsior* L.; 58°55'15.4"N, 43°46'24.1"E, alt. c. 180 m, 03.09.2018. (Fig. 2).

3 – Quarter no. 31, old-growth mixed forest of *Populus tremula* and *Picea* sp. with *Pinus syl-*



Fig. 2. The old-growth mixed forest of *Picea* sp., *Tilia cordata*, *Betula* sp. and *Populus tremula* in locality no. 2.

vestris L.; 58°53'39.2"N, 43°51'25"E, alt. c. 165 m, 05.09.2018.

4 – Quarter no. 17, right bank of the Sekha River, old-growth mixed forest of *Picea* sp., *Abies sibirica* and *Tilia cordata*; 58°56'34.2"N, 43°50'42"E, alt. c. 145 m, 06.09.2018.

5 – Quarter no. 17, right bank of the Sekha River, old-growth spruce-fir forest of *Picea* sp., *Abies sibirica* with *Betula* sp.; 58°56'06,7"N, 43°50'14,8"E, alt. c. 145 m, 06.09.2018.

Air-dried specimens were examined using a stereo microscope, a light microscope and the usual spot tests with standard identification methods for lichenized and lichenicolous fungi; high performance thin-layer chromatography was undertaken where necessary (Orange et al., 2001). All listed specimens are deposited in the herbarium of Komarov Botanical Institute (LE) and in the personal herbarium of G. Urbanavichus. The nomenclature of the cited taxa mainly follows Nordin et al. (2011). The listed species are accompanied by the data on substrates, localities, distributions and references, and the most interesting records are briefly discussed. WGS 84 system was used for geographical (GPS) coordinates. In the following list of species, lichenicolous fungi are indicated by # and non-lichenized fungus by +, and the following abbreviations are used: CFD – Central Federal District, NWFD – Northwestern Federal District, VFD – Volga Federal District.

THE SPECIES

ARTHONIA RUANA A. Massal. – 2: on smooth bark of *Fraxinus excelsior*. Distribution in neighbouring territories: Yaroslavl Region (Muchnik et al., 2007) and Nizhniy Novgorod Region (Urbanavichene & Urbanavichus, 2001). In Russia occurs sporadically from the north of the European part to the southern part of the Far East. It is a widely distributed species in the Northern Hemisphere.

BIATORA MEIOCARPA (Nyl.) Arnold – 2: on decaying wood of stump of *Picea* sp.; 3: on bark of *Pinus sylvestris*. Unreported from neighbouring territories. In CFD previously known from Tver Region (Notov et al., 2011). The nearest locality in European Russia is known in VFD from Republic of Mari El (Bogdanov, 2015). Differs from the related species *B. helvola* Körb. ex Hellb. by ellipsoid or rectangular lumina of excipular hyphae, c. $7 \times 3.5 \mu\text{m}$, enlarged paraphyses-ends, c. $3.6\text{--}5.2 \mu\text{m}$ wide and presence of filiform conidia, c. $30 \times 1.5 \mu\text{m}$ (Ekman, 1994). Apothecia and thallus of *B. helvola* contain gyrophoric acid and C+ rose-red (Printzen & Otte, 2005). It is a widely distributed species in the Northern Hemisphere.

BIATORA MENDAX Anzi – 1: on bark of *Abies sibirica*. Unreported from neighbouring territories. New to CFD. In Russia recently published from the Northern Caucasus (Urbanavichene & Urbanavichus, 2014). Characterized by an esorediate PD+ red thallus, 1-celled ascospores, $2.5\text{--}5 \mu\text{m}$ wide, dark apothecia, and a brown epihymenium (sometimes also the hymenium and subhymenium) that is N- (Printzen & Otte, 2005). *B. mendax* is a very rare species and confined to old-growth coniferous or mixed forest; in Europe, it follows more or less the distribution area of *Abies alba* Mill. (Printzen & Palice, 1999). In the world it is known from the Central and Southern Europe (Austria, Czech Republic, France, Germany, Italy, Montenegro, Poland, Slovakia, Slovenia, Spain, Switzerland), the Caucasian region (Russia) and North America (U.S.A.).

BRYOBILIMBIA SANGUINEOATRA (Wulfen) Fryday, Printzen & S. Ekman – 1: on mossy fallen trunk of *Picea* sp. Unreported from neighbouring territories. The distribution of this species in Russia requires further investigation since it was previously treated as a synonym of *Mycobilimbia hypnorum* (Lib.) Kalb & Hafellner. *B. sanguineoatratra* has been recently reported from the Baikal Siberia (Urbanavichene et al., 2018), Republic

of Mordovia (Urbanavichene & Urbanavichus, 2015) and Republic of Adygea (Otte, 2001, as *Mycobilimbia sanguineoatratra* (Wulfen) Kalb & Hafellner). The species *Lecidea sanguineoatratra* auct., previously reported from some localities in Russia, e.g. Leningrad and Moscow Regions (Tomin, 1956), Magadan Region (Korolev & Tolpysheva, 1980) and Altai Territory (Davydov & Printzen, 2012), may also belong to *B. sanguineoatratra*. Distinguished from *B. hypnorum* by mainly simple, narrowly ellipsoid ascospores, $<5 \mu\text{m}$ wide, with a smooth and unwarted perispore (Fryday et al., 2014).

BRYORIA KUEMMERLEANA (Gyeln.) Brodo & D. Hawksw. – 5: on bark of *Picea* sp. Distribution in neighbouring territories: Nizhniy Novgorod Region (Sharapova, 2001). New to CFD. Thallus to 15 cm, hanging, ash-grey or brownish-grey, with fairly thick branches $0.5\text{--}0.8 \text{ mm}$ in diam., with KOH+ red and PD+ yellow to orange reactions. TLC: norstictic acid, connorstictic and atranorin. Rather common but not so frequently reported species; in Europe it is widespread from Fennoscandia to Mediterranean region, and recorded also in Southwestern Asia from Caucasian region (Russia, Iran) (Velmalala et al., 2014; Urbanavichene, 2018).

CHAENOTHECA CHLORELLA (Ach.) Müll. Arg. – 1: on bark of *Tilia cordata* and lignum of *Abies sibirica* stump; 5: on lignum of *Betula* sp. stump. Unreported from neighbouring territories. In CFD previously known from Tver Region (Notov et al., 2011). The nearest localities in European Russia are known in VFD from Republic of Mari El (Bogdanov, 2015) and Republic of Mordovia (Urbanavichene & Urbanavichus, 2015). Specialized species of biologically valuable old-growth forests in North-Western European Russia (Andersson et al., 2009).

CHAENOTHECA GRACILLIMA (Vain.) Tibell – 4: on lignum of *Abies sibirica* stump. Unreported from neighbouring territories. In CFD previously known from Tver Region (Notov et al., 2011). The nearest locality in European Russia is known in VFD from Republic of Mari El (Bogdanov, 2015). Specialized species of biologically valuable old-growth forests in North-Western European Russia (Andersson et al., 2009).

CHAENOTHECA SUBROSCIDA (Eitner) Zahlbr. – 2: on lignum of *Picea* sp. stump. Unreported from neighbouring territories. In CFD previously

known from Tver Region (Notov et al., 2011). Specialized species of biologically valuable old-growth forests in North-Western European Russia (Andersson et al., 2009). It is widely distributed in cool temperate and temperate areas of western Eurasia and western North America (Tibell & Beck, 2001). In Russia it occurs sporadically from the north of European part to Western Siberia.

+CHAENOTHECOPSIS PUSIOLA (Ach.) Vain. – 4: on lignum of *Abies sibirica* stump; 5: on lignum of *Picea* sp. stump. Distribution in neighbouring territories: Yaroslavl Region (Muchnik et al., 2007). The nearest locality in European Russia is known in VFD from Republic of Mari El (Bogdanov, 2015). An indicator species of biologically valuable old-growth forests in North-Western European Russia (Andersson et al., 2009).

+CHAENOTHECOPSIS VIRIDIREAGENS (Nádv.) A. F. W. Schmidt – 2: on bark of *Picea* sp. Distribution in neighbouring territories: Yaroslavl Region (Muchnik et al., 2007). The nearest locality in European Russia is known in VFD from Republic of Mordovia (Urbanavichus & Urbanavichene, 2014). Specialized species of biologically valuable old-growth forests in North-Western European Russia (Andersson et al., 2009).

CHEIROMYCINA PETRI D. Hawksw. & Poelt – 1: on bark of *Abies sibirica*. Unreported from neighbouring territories. New to CFD. Lichenized hyphomycete with bluish-grey hemispherical sporodochia, palmate branched multicellular conidia, slightly enlarged conidiogenous cells and terminal branches of conidia with 1–2 cells (Printzen, 2007). In European Russia previously known only in NWFD from Leningrad Region (Himmelbrant et al., 2013). Specialized species of biologically valuable old-growth forests in North-Western European Russia (Andersson et al., 2009). It is widespread in Holarctic region, with a few records in Russia from Leningrad Region, Caucasus and Far East.

CRESPONEA CHLOROCONIA (Tuck.) Egea & Torrente – 2: on bark of *Picea* sp. and *Tilia cordata*; 5: on bark of *Picea* sp. Unreported from neighbouring territories. In CFD known from Tver Region (Notov et al., 2011), Moscow Region (Kopaczewska et al., 1977). The nearest locality in European Russia is known in VFD from Republic of Mari El (Bogdanov, 2015).

#DACTYLOSPORA LOBARIELLA (Nyl.) Hafellner – 3: on thallus of *Lobaria pulmonaria* (L.) Hoffm. growing on *Populus tremula*. Unreported from neighbouring territories. New to CFD. The nearest locality in European Russia is known in NWFD from Komi Republic on the Northern Ural (Zhurbenko, 2004). This is a subcosmopolitan species reported on many species of *Lobaria* and *Ricasolia*. In addition to Komi Republic, it was formerly known in Russia from the Caucasus, Krasnoyarsk Territory, Republic of Altai and Primorye Territory (Zhurbenko, 2017).

DICTYOCATENULATA ALBA Finley & E. F. Morris – 1: on decaying wood of stump of *Picea* sp. Unreported from neighbouring territories. New to CFD. The nearest locality in European Russia is known in NWFD from Leningrad Region (Stepanchikova et al., 2010). It is rather widespread in tropical, subtropical, broad-leaved zones and is known from Northern and Central America, Asia, and Central and Eastern Europe. In Russia previously known also from the Far East, and more recently from the Baikal Siberia (Urbanavichene et al., 2018).

EVERNIA DIVARICATA (L.) Ach. – 1: on bark of *Picea* sp. Distribution in neighbouring territories: Vologda Region (Czhobadze & Philippov, 2014) and Nizhniy Novgorod Region (Urbanavichene & Urbanavichus, 2001). Specialized species of old-growth forests in North-Western European Russia (Andersson et al., 2009).

#HETEROCEPHALACRIA PHYSCIACEARUM (Diederich) Millanes & Wedin – 3: on thallus of *Physcia aipolia* (Ehrh. ex Humb.) Fűrnr. growing on bark of *Populus tremula*. Unreported from neighbouring territories. New to CFD. The nearest locality in European Russia is known in VFD from Republic of Mordovia (Urbanavichus & Urbanavichene, 2014). This is a common lichenicolous heterobasidiomycete with subcosmopolitan distribution that grows on members of Physciaceae.

HYPOGYMNIA INCURVOIDES Rass. – 1: on bark of *Abies sibirica*; 4: on bark of *Betula* sp. Unreported from neighbouring territories. New to CFD. The nearest localities in European Russia are known in NWFD from Archangelsk Region (Rassadina, 1967) and in VFD from Republic of Mordovia (Urbanavichus & Urbanavichene, 2015). Elsewhere in the world it is known from Northern Europe (Sweden and Norway), the coast of eastern North America (Canada and

U.S.A.), Greenland (Hansen & McCune, 2010), and northeastern China (Divakar et al., 2019). *H. incurvoides* is most similar to *H. physodes* (L.) Nyl., but is readily distinguished from that species by the presence of holes in the lobe tips and axils, black-margined lobes forming a regular lattice, and the absence of 3-hydroxyphysodic acid. This substance gives a K⁺ reddish-brown reaction in the medulla, which is consistently seen in *H. physodes* but not in *H. incurvoides* (McCune et al., 2007).

LECANIA CROATICA (Zahlbr.) Kotlov – 1: on bark of *Prunus padus* L.; 4: on bark of young *Picea* sp. Unreported from neighbouring territories. New to CFD. The nearest locality in European Russia is known in VFD from Republic of Mordovia (Urbanavichene & Urbanavichus, 2015). It is an inconspicuous, easily overlooked, corticolous lichen with a sorediate thallus lacking lichen metabolites, with small pale apothecia and 0–1-septate ascospores. It is morphologically very similar to *Mycobilimbia epixanthoides* (Nyl.) Vitik. et al. ex Hafellner & Türk: both taxa are sorediate, lack lichen substances, and produce pale biatorine apothecia. In the sterile state they may be separated on the basis of substrate preference: *L. croatica* grows exclusively on the bark of trees while *M. epixanthoides* prefers bryophytes and is rarely corticolous (Hafellner et al., 2005; Harris & Lendemer, 2010; Kukwa et al., 2012).

LECANORA THYSANOPHORA R.C. Harris – 2: on bark of *Tilia cordata*. Unreported from neighbouring territories. In CFD previously known from Tver Region (Notov et al., 2011), Bryansk Region (Muchnik et al., 2017), Oryol Region (Muchnik, 2013a) and Voronezh Region (Muchnik, 2013b). This sorediate species is distinctive mainly by its arachnoid prothallus and chemistry. In the field it may resemble *Haematomma ochroleucum* (Neck.) J. R. Laundon, *Lecanora expallens* Ach. or *Loxospora elatina* (Ach.) A. Massal. *Lecanora thysanophora* can be easily separated by TLC as it produces atranorin, usnic acid, zeorin and specific terpenoids called “thysanophora-unknowns” (Harris et al., 2000; Kukwa, 2005).

LEPRA MULTIPUNCTA (Turner) Hafellner (= *Peretusaria multipuncta* (Turner) Nyl.) – 2: on bark of *Fraxinus excelsior*. Unreported from neighbouring territories. New to CFD. The species is known in European Russia only from the Kaliningrad

region (Dedkov et al., 2007). *L. multipuncta* can be mistaken for the morphologically similar *L. ophthalmiza* (Nyl.) Hafellner. Both species produce similar soralium-like apothecia, but they can be easily separated by spot test reaction PD and thin layer chromatography: *L. multipuncta* reacts PD⁺ orange-red, KOH⁺ yellow and contains physodalic acid, often together with protocetraric acid, and *L. ophthalmiza* is PD[–] and has fatty acids (Oset & Kukwa, 2010).

LEPTOGIUM BURNETIAE C. W. Dodge – 1: on bark of *Populus tremula*. Unreported from neighbouring territories. In CFD previously known from Tver Region (Notov et al., 2011). *L. burnetiae* may in certain forms be difficult to separate from *L. saturninum* (Dicks.) Nyl. It is, however, a thinner, bluer species with more coralloid isidia, that often forming patchy clusters on the surface (Jørgensen & Nash, 2004). A red-listed species in the Russian Federation (Red Data Book of Russian Federation, 2008).

LEPTOGIUM CYANESCENS (Rabenh.) Körb. – 1: on mossy fallen decaying tree of *Populus tremula*. Distribution in neighbouring territories: Kirov Region (Andreev, 1999), Nizhniy Novgorod Region (Urbanavichene & Urbanavichus, 2001). In CFD previously known from Tver Region (Notov et al., 2011), Ryazan Region (Zhdanov & Volosnova, 2008). *L. cyanescens* is an indicator species of biologically important old-growth forests in the southern taiga of North-Western European Russia (Andersson et al., 2009).

LOXOSPORA CISMONICA (Beltr.) Hafellner – 1 and 5: on bark of *Abies sibirica*. Distribution in neighbouring territories: Nizhniy Novgorod Region (Presnyakova, 2001). New to CFD. In VFD known from Republic of Mari El (Bogdanov, 2015). This is the third record for Russia. Known only from Central Europe and North America, but absent from Northern Europe, this very rare species is only found in extremely humid, cool and undisturbed forest stands. It is mostly found on old *Abies* in spruce-fir and fir-beech forests (Printzen et al., 2002). Within the area (Kostroma and Nizhniy Novgorod Regions, Republic of Mari El), the species is confined to old-growth spruce-fir forests in the protected nature territories – Kologriv and Bolshaya Kokshaga Reserves, sanctuary “Klenovik” and nature park “The spruce-fir forests on Shade and Agrafenka Rivers” (Presnyakova, 2001; Bogdanov, 2015). Due

to its special habitat requirements, it is classified here as an indicator of old-growth spruce-fir forests in the southern taiga of European Russia.

MENEGAZZIA TEREBRATA (Hoffm.) A. Massal. – 2: on bark of *Tilia cordata*. Distribution in neighbouring territories: Nizhniy Novgorod Region (Sharapova, 2001; Urbanavichene & Urbanavichus, 2001). In CFD, currently known from Tver Region (Notov et al., 2011) and Smolensk Region (Muchnik et al., 2018a). Specialized species of biologically valuable old-growth forests in North-Western European Russia (Andersson et al., 2009). A red-listed species in the Russian Federation (Red Data Book of Russian Federation, 2008).

MICAREA HEDLUNDII Coppins – 2: on bark of *Picea* sp.; 3: on lignum of *Pinus silvestris* stump. Unreported from neighbouring territories. In CFD previously known from Tver Region (Notov et al., 2011). The nearest locality in European Russia is known in VFD from Republic of Mordovia (Urbanavichus & Urbanavichene, 2015). This species has been described from Norway and is currently known from several localities in Europe (e.g., Austria, Germany, Lithuania, Norway, Poland, Sweden, Ukraine, etc.). It has also been reported from Africa (Rwanda), North America (Canada, USA) and South America (Chile) (Czarnota, 2007).

MYRIONORA ALBIDULA (Willey) R. C. Harris – 1: on bark of *Salix* sp. Distribution in neighbouring territories: not reported. New to CFD. Formerly known in European Russia only from the Southern Ural Mts. (Urbanavichene et al., 2013). In Russia known from the Southern Siberia and Far East (Palice et al., 2013). Elsewhere in the world it is known from North and Central Europe (Sweden, Norway, Germany), and the eastern and western coasts of North America (U.S.A.) (Palice et al., 2013). *M. albidula* is rare, but widespread throughout the northern temperate zone. It has been widely overlooked but may turn out to be locally frequent; it forms very small thalli with minute apothecia, which, even if detected, may be mistaken for juvenile or stunted apothecia of other crustose lichens with biatorine apothecia (Palice et al., 2013).

PELTIGERA NEOPOLYDACTYLA (Gyeln.) Gyeln. – 1: on mossy trunk base of *Populus tremula*; 2: on mossy trunk base of *Salix* sp. Distribution

in neighbouring territories: Yaroslavl Region (Muchnik et al., 2018b) and Nizhniy Novgorod Region (Presnyakova, 2001).

#PLECTOCARPON LICHENUM (Sommerf.) D. Hawksw. – 3: on thallus of *Lobaria pulmonaria* growing on *Populus tremula*. Unreported from neighbouring territories. In CFD previously known only from Tver Region (Notov & Himelbrant, 2013).

RAMALINA THRAUSTA (Ach.) Nyl. – 1: on branches of *Picea* sp.; 5: on branches and bark of *Abies sibirica*. Distribution in neighbouring territories: Yaroslavl Region (Muchnik et al., 2007), Vologda Region (Czhobadze & Philippov, 2015) and Nizhniy Novgorod Region (Urbanavichene & Urbanavichus, 2001). *R. thrausta* is exclusively confined to old-growth undisturbed wet spruce forests in North-Western European Russia (Andersson et al., 2009).

RINODINA SUBPARIATA (Nyl.) Zahlbr. (= *Rinodina degeliana* Coppins) – 1: on bark of *Alnus incana*. Unreported from neighbouring territories. In CFD previously known from Tver Region (Notov et al., 2014). The nearest localities in European Russia are known in VFD from Republic of Mari El (Bogdanov, 2015) and Republic of Mordovia (Urbanavichene & Urbanavichus, 2015). It is widespread in Europe from Fennoscandia to Mediterranean and from British Islands to Carpathian Mts., in Asia and North America (Czarnota et al., 2018).

ROSTANIA OCCULTATA (Bagl.) Otálora, P. M. Jørg. & Wedin – 2: on bark of old *Salix* sp. Unreported from neighbouring territories. New to CFD. The nearest locality in European Russia is known in NWFD from Novgorod Region (Tagirdzhanova et al., 2014). Specialized species of biologically valuable old-growth forests in the southern taiga of North-Western European Russia (Andersson et al., 2009).

SCLEROPHORA CONIOPHAEA (Norman) Mattsson & Middelb. – 1: on bark of old *Picea* sp. Unreported from neighbouring territories. In CFD previously known from Tver Region (Notov et al., 2011). The nearest localities in European Russia are known in VFD from Republic of Mari El (Bogdanov, 2015) and Republic of Mordovia (Urbanavichene & Urbanavichus, 2015). Specialized species of biologically valuable old-growth forests in North-Western European Russia (Andersson et al., 2009).

+STENOCYBE MAJOR Nyl. ex Körb. – 1: on bark of *Abies sibirica*. Unreported from neighbouring territories. New to CFD. The nearest locality in European Russia is known in NWFD from southern part of Komi Republic (Pystina, 2003).

TRAPELIA CORTICOLA Coppins & P. James – 5: on decaying wood of *Picea* sp. Unreported from neighbouring territories. New to CFD. The nearest locality in European Russia is known in NWFD from Leningrad Region (Himelbrant et al., 2018). This usually sterile, sorediate species is characterized by its effuse, ± immersed, green to greenish brown thallus consisting of scattered areoles; soralia are greenish, usually punctiform and markedly convex (Czarnota & Kukwa, 2009). TLC: gyrophoric (major) and lecanoric acids, a trace of 5-O-methylhiascic acid.

TUCKERMANNOPSIS CILIARIS (Ach.) Gyeln. – 1: on bark of *Betula* sp. Distribution in neighbouring territories: Vologda Region (Czhobadze & Philipov, 2015). New to CFD. Kologriv Forest Reserve is the southernmost locality of this species in European Russia.

DISCUSSION

The above list contains 29 species of lichen-forming, 3 non-lichenized calicioid and 3 lichenicolous fungi (altogether 35 species) which are new to the Kostroma region and Kologriv Forest Reserve. Most species are rarely reported or unreported from the neighbouring regions. They are probably overlooked owing to their small size and inconspicuous thalli. 15 species are recorded for the first time for the Central Federal District: *Biatora mendax*, *Bryoria kuemmerleana*, *Cheiromycina petri*, *Dactylospora lobariella*, *Dictyocatenuolata alba*, *Heterocephalacria physciacearum*, *Hypogymnia incurvoides*, *Lecania croatica*, *Lepra multipuncta*, *Loxospora cismonica*, *Myrionora albidula*, *Rostania occultata*, *Stenocybe major*, *Trapelia corticola* and *Tuckermannopsis ciliaris*, of which *Biatora mendax* is new to European Russia. *Myrionora albidula* is a rare species with scattered distribution, previously recorded only once in European Russia from the Southern Urals Mts. The most important discoveries are confined to old-growth coniferous *Picea* sp. and *Abies sibirica* forests in the Kologriv Forest Nature Reserve.

The territory of the Reserve has been significantly disturbed by intensive logging and clear-cutting, but still includes a few remnants of small native forest sites (less 10% of the total area of the Reserve). Therefore, we can not expect to find here a large number of indicator or specialized species of biologically valuable and old-growth forests of southern taiga. However, the importance of even small remaining sites of old-growth forests for the maintenance of biodiversity is clearly illustrated by the results of this field-study. Of the 35 listed species, 14 are indicators (*Chaenothecopsis pusiola*, *Leptogium cyanescens*, *Loxospora cismonica*) or habitat specialists (*Biatora mendax*, *Chaenotheca chlorella*, *C. gracillima*, *C. subroscida*, *Chaenothecopsis viridireagens*, *Cheiromycina petri*, *Evernia divaricata*, *Menegazzia terebrata*, *Ramalina thrausta*, *Rostania occultata*, *Sclerophora coniophaea*) of biologically valuable and old-growth forests in southern taiga of European Russia (Andersson et al., 2009). Ten of them were collected from bark or wood of *Abies sibirica* and *Picea* sp. Two species, *Leptogium burnetiae* and *Menegazzia terebrata*, are red-listed and protected in the Russian Federation (Red Data Book of Russian Federation, 2008). In consequence of this work, the lichen flora of the Kologriv Nature Reserve comprises 130 species and the Kostroma Region 225 species (Elenkin, 1906, 1907, 1911; Ladyzhenskaya, 1931; Kuznetsova & Skazina, 2010; Himelbrant et al., 2018). It is also evident that the lichen flora of old-growth spruce and mixed forests of Kostroma Region is in need of more intensive studies.

ACKNOWLEDGEMENTS

We are grateful to Sergei Chistyakov for organizing the expedition to the Kologriv Forest Reserve. We express our gratitude to Prof. Mark Seaward who kindly corrected the English. We are grateful to anonymous reviewer and Tiina Randlane for valuable corrections and comments. The work of Irina Urbanavichene was carried out within the framework of the research program of the Komarov Botanical Institute of the Russian Academy of Sciences (no. AAAA-A19-119020690077-4).

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