

# Aphyllorphoroid fungi (Basidiomycota) in forests of the middle part of Luga River valley, Leningrad Oblast, Russia

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An annotated list of 119 aphyllorphoroid macromycetes is presented. The material was collected in different forests of the planned conservation area of Yashchera–Lemovzha in Luga and Volosovo Districts (Leningrad Oblast, Russia). The rare species *Odontium septocystidia* is recorded for the second time from Leningrad Oblast, and the findings of *Crustomyces subabruptus* and *Intextomyces contiguus* are the third ones; the two earlier records were made more than a decade earlier. Occurrences of indicator species of coniferous old-growth forests (*Amylocystis lapponica*, *Crustoderma dryinum*, *Dichostereum granulatum*, *Fomitopsis rosea*, *Junghuhnia collabens*, *Phellinus ferrugineofuscus*, *Phlebia centrifuga*, and *Pycnoporellus fulgens*) and deciduous forests (*Dentipellis fragilis*, *Gloeoporus pannocinctus*, *Granulobasidium vellereum*, *Junghuhnia pseudozilingiana*, *Hydnocristella himantia*, and *Rigidoporus crocatus*) confirm a high conservation value of the study area. Eight red-listed species for Leningrad Region were noted. All of them are new for the study area.

Key words: poroid fungi, corticioid fungi, biodiversity, threatened species, indicator species, Leningrad Oblast, Europe, Russia

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## Introduction

Aphyllorphoroid fungi form an artificial non-taxonomical group of macrofungi in Basidiomycota. It unites diverse morphological types of fungi, such as polypores, corticioids, hydroids and clavarioids. They play a very important role in forest ecosystems, being wood decayers (most of them), litter saprotrophs, ectomycorrhizal, parasitic and mycoparasites (Kotiranta et al. 2009, Kunttu et al. 2014). Wood decayers form the basis of the saprotrophic food web of forests

(Spirin et al. 2015). They, like other organisms, have ecological niches. Some polypores and corticioids, for instance, grow almost solely in old-growth forests. Such indicator species can show the conservational value of the forest. Forests with a high number of old-forest indicator fungi, normally harbor also other old-forest species from other kingdoms (Andersson et al. 2009).

The aim of the study was to take an inventory of the species diversity of aphyllorphoroid fungi and make an analysis of red-listed and indicator species occurring in the territory which

is planned to be a protected area (“Yashchera–Lemovzha”).

## Material and methods

The study area, “Yashchera–Lemovzha”, is in south-western part of Leningrad Oblast, and it includes the basin of the Luga River with its tributaries – the Yashchera River, the Kemka River, the Lemovzha River, and the Gubenka River. The area is 29 to 90 m a.s.l. The climate is intermediate between continental and maritime, with moderate warm summers and some rather cold winters. The average temperature in January is  $-8.1\text{ }^{\circ}\text{C}$  and  $+17.0\text{ }^{\circ}\text{C}$  in June. Winter temperature may go down to  $-42\text{ }^{\circ}\text{C}$ , while in summer it can reach up to  $+36\text{ }^{\circ}\text{C}$ . The annual precipitation is 660 mm, and two-thirds of it falls in summer (Anonymous 1988). The soils are podzolic and peaty-podzolic. The main types of vegetation are spruce-dominated forests (herb-rich types with *Populus tremula* and *Betula* spp., moist forests with *Oxalis acetosella*, grasses and ferns), pine-dominated forests (with *Vaccinium myrtillus*), floodplain deciduous forests (*Ulmus glabra*, *U. laevis*, *Quercus robur*, *Tilia cordata*, *Populus tremula*) and mixed forests, including boreal as well as nemoral features (Fig. 1.) Fungal specimens were collected by the authors on the 25<sup>th</sup> of June and from the 2<sup>nd</sup> to the 4<sup>th</sup> of October, 2015. Both uneven-aged former clear cut areas and old-growth forests were investigated.

In “Results” spruce stands for *Picea abies*, pine for *Pinus sylvestris*, maple for *Acer platanoides*, aspen for *Populus tremula*, elm for *Ulmus* spp. and lime tree for *Tilia cordata*, respectively. Abbreviations of localities studied are following: **Luga District:** **1** – vicinity of Natalyino village, N 58.9600, E 29.7707; **2** – vicinity of Natalyino village, on eastern side of Dubovyy Ruchey stream, N 58.9593, E 29.7577; **3** – in vicinity to Bezhany village, on eastern side of Bezhanka River, N 58.9692, E 29.7120; **4** – in vicinity to Kemka village, floodplain of Kemka River, N 58.9513, E 29.8145; **5** – in vicinity to Natalyino village, N 58.9587, E 29.7816; **6** – in vicinity to Kemka village, floodplain of Kemka River, N 58.9463, E 29.8119. **Volosovo District:** **7** – in vicinity to Mazanaya Gorka village, on northern side of Lemovzha River, N 59.1970, E 29.3678; **8** – in vicinity to Mazanaya Gorka village, on northern side of Lemovzha River, N 59.1987, E 29.3676; **9** – in vicinity to Koryacha village, on northern side of Luga River, N 59.1177, E 29.3150; **10** – in vicinity to Koryacha village, on northern side of Luga River, N 59.1192, E 29.3169.

The material collected was studied in laboratory with a LOMO Micmed 6 microscope (St. Petersburg, Russia) and standard set of chemicals (5% KOH, Melzer’s reagent, Cotton Blue) (Niemelä 2013). The nomenclature follows Bernicchia & Gorjón (2010) and Ryvarden & Melo (2014). Voucher specimens are deposited in the Mycological herbarium of the Komarov Botanical Institute of RAS, St. Petersburg (LE) or in the mycological collection of the Khitrovo Herbarium of the Turgenev Oryol State University (OHHI).

## Results

In all 119 species were revealed during this relatively short-time survey. An annotated checklist of species with data of substrates, habitats and voucher numbers is listed below. The taxa are arranged in alphabetical order.

*Alutaceodontia alutacea* (Fr.) Hjortstam & Ryvarden – 1, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and birches (LE 313738).

*Amphinema byssoides* (Pers.) J. Erikss. – 2, on fallen aspen log in herb-rich aspen forest with lime trees and elms (OHHI 1310); 3, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and ferns (LE 313751).

*Amylocystis lapponica* (Romell) Bondartsev & Singer – 1, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and birches (LE 313786).

*Antrodia serialis* (Fr.) Donk – 1, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and birches; 8, on fallen spruce trunk in moist spruce-dominated herb-rich forest (LE 313814).

*Antrodia sinuosa* (Fr.) P. Karst. – 7, on fallen spruce trunk in spruce-dominated forest with *Oxalis acetosella* (LE 313815).

*Antrodia xantha* (Fr.) Ryvarden – 9, on fallen branch of pine in pine-dominated herb-rich forest with spruces and birches (LE 313829).

*Antrodiella faginea* Vampola & Pouzar – 4, on fallen lime tree trunk in herb-rich elm forest with maples and lime trees (LE 313770).

*Antrodiella romellii* (Donk) Niemelä – 4, on fallen lime tree trunk in herb-rich elm forest with maples and lime trees (LE 313806).

*Aphanobasidium pseudotsugae* (Burt) Boidin & Gilles – 7, on fallen spruce trunk in moist spruce-dominated forest (LE 313734).

*Artomyces pyxidatus* (Pers.) Jülich – 1, on fallen aspen trunk in spruce-dominated herb-rich forest with aspens and birches.



Fig. 1. Typical pine-spruce forest of the study area. – Photo: O. Stepochkina.

*Athelia alnicola* (Bourdot & Galzin) Jülich – 2, on fallen aspen trunk in herb-rich aspen forest with lime trees and elms (LE 313737).

*Basidioradulum radula* (Fr.) Nobles – 3, on fallen lime tree branch in herb-rich lime tree forest with spruces; 4, on fallen lime tree trunk in herb-rich elm forest with maples and lime trees; 5, on fallen aspen trunk in spruce-dominated herb-rich forest with aspens and ferns (LE 313803).

*Bjerkandera fumosa* (Pers.) P. Karst. – 6, on standing dead elm in herb-rich elm forest with maples and lime trees.

*Botryobasidium conspersum* J. Erikss. – 8, on fallen spruce trunk in moist spruce-dominated herb-rich forest (LE 313760).

*Botryobasidium medium* J. Erikss. – 7, on fallen spruce trunk in moist spruce-dominated forest with aspens (LE 313787).

*Botryobasidium subcoronatum* (Höhn. & Litsch.) Donk – 3, on fallen pine trunk in pine-dominated forest with *Vaccinium vitis-idaea* (LE 313819); 8, on fallen spruce trunk in moist spruce-dominated herb-rich forest (LE 313820); 10, on fallen pine logs in pine-dominated herb-rich forest with spruces and birches (OHHI 1318).

*Botryobasidium vagum* (Berk. & M.A. Curtis) D.P. Rogers – 10, on fallen pine trunk in pine-dominated herb-rich forest with spruces and birches (LE 313826).

*Botryohypochnus isabellinus* (Fr.) J. Erikss. – 10, on fallen spruce trunk in pine-dominated herb-rich forest with spruces and birches (LE 313784).

*Byssomerulius corium* (Pers.) Parmasto – 6, on fallen elm branch in herb-rich elm forest with maples and lime trees.



*Ceriporiopsis aneirina* (Sommerf.) Domański – 2, on fallen aspen trunk in herb-rich aspen forest with lime trees and elms (LE 313739).

*Ceriporiopsis resinascens* (Romell) Domański – 3, on fallen aspen trunk in spruce-dominated herb-rich forest with aspens and ferns (LE 313805).

*Chondrostereum purpureum* (Pers.) Pouzar – 2, on fallen trunk of *Betula pubescens* in herb-rich aspen forest with lime trees and elms.

*Coniophora arida* (Fr.) P. Karst. – 8, on fallen spruce trunk in moist spruce-dominated herb-rich forest (LE 313741).

*Coniophora puteana* (Schumach.) P. Karst. – 3, on fallen lime tree trunk in herb-rich lime tree forest with spruces (LE 313799); 5, on fallen aspen trunk in spruce-dominated herb-rich forest with aspens and ferns (OHHI 1317).

*Crustoderma dryinum* (Berk. & M.A. Curtis) Parmasto – 7, on fallen spruce trunk in moist spruce-dominated forest (LE 313766).

– Fig. 2.

*Crustomyces subabruptus* (Bourdot & Galzin) Jülich – 6, on fallen elm trunk in herb-rich elm forest with maples and lime trees (LE 313817).

*Cylindrobasidium evolvens* (Fr.) Jülich – 2, on fallen aspen trunk in herb-rich aspen forest with lime trees and elms (LE 313769); 10, on fallen aspen logs in pine-dominated herb-rich forest with spruces and birches (OHHI 1320).

*Cytidia salicina* (Fr.) Burt – 3, on fallen branch of *Salix* sp. in spruce-dominated forest with birches and *Vaccinium vitis-idaea*.

*Daedaleopsis confragosa* (Bolton) J. Schröt. – 3, on fallen trunk of *Salix caprea* in spruce-dominated herb-rich forest with aspens and ferns.

*Datronia mollis* (Sommerf.) Donk – 3, on fallen aspen trunk in spruce-dominated herb-rich forest with aspens and ferns.

*Dendrothele alliacea* (Quél.) P.A. Lemke – 4, on bark of living elm in herb-rich elm forest with maples and lime trees (LE 313735).

*Dentipellis fragilis* (Pers.) Donk – 1, on fallen aspen trunk in spruce-dominated herb-rich forest with aspens and birches (LE 313773); 2, on fallen elm trunk in herb-rich aspen forest with lime trees and elms (LE 313775); 4, on fallen elm trunk of in herb-rich elm forest with maples and lime trees (LE 313774).

*Dichostereum effuscatum* (Cooke & Ellis) Boidin & Lanq. – 4, on fallen lime tree trunk in herb-rich elm forest with maples and lime trees (LE 313768).

*Dichostereum granulosum* (Pers.) Boidin & Lanq. – 1, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and birches (LE 313781).

*Exidia nigricans* (With.) P. Roberts – 8, on fallen branch of *Alnus incana* in moist spruce-dominated herb-rich forest (LE 313835).

*Exidiopsis calcea* (Pers.) K. Wells – 7, on fallen spruce trunk in spruce-dominated forest with *Oxalis acetosella* (OHHI 1319).

*Fomes fomentarius* (L.) Fr. – 3, on fallen trunk of *Salix caprea* in spruce-dominated herb-rich forest with aspens and ferns. 7, on standing dead *Betula pubescens* in moist spruce-dominated forest with aspens.

*Fomitopsis pinicola* (Sw.) P. Karst. – 8, on fallen spruce trunk in moist spruce-dominated herb-rich forest.

*Fomitopsis rosea* (Alb. & Schwein.) P. Karst. – 1, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and birches (LE 313807); 5, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and ferns.

*Gloeocystidiellum porosum* (Berk. & M.A. Curtis) Donk – 6, on fallen elm branch in herb-rich elm forest with maples and lime trees (LE 313796).

*Gloeopeniophorella convolvens* (P. Karst.) Boidin, Lanq. & Gilles – 2, on fallen lime tree trunk in herb-rich aspen forest with lime trees and elms (LE 313762).

*Gloeophyllum sepiarium* (Wulfen) P. Karst. – 8, on fallen spruce trunk in moist spruce-dominated herb-rich forest (LE 313812).

*Gloeoporus pannocinctus* (Romell) J. Erikss. – 5, on fallen aspen trunk in spruce-dominated herb-rich forest with aspens and ferns (LE 313793).

*Granulobasidium vellereum* (Ellis & Cragin) Jülich – 4, on fallen elm branch in herb-rich elm forest with maples and lime trees (LE 313827).

*Heterobasidion parviporum* Niemelä & Korhonen – 3, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and ferns (LE 313795).

*Hydnocristella himantia* (Schwein.) R.H. Petersen – 2, on fallen elm trunk in herb-rich aspen forest with lime trees and elms (LE 313782).

*Hymenochaete cinnamomea* (Pers.) Bres. – 4, on fallen elm trunk in herb-rich elm forest with lime trees and maples (LE 313755).

*Hymenochaete fuliginosa* (Pers.) Lév. – 3, on fallen branch of spruce in spruce-dominated herb-rich forest with aspens and ferns (LE 313777).

*Hymenochaete tabacina* (Sowerby) Lév. – 4, on erect dead *Salix* sp. in herb-rich elm forest with maples and lime trees; 10, on fallen branch of *Betula pubescens* in pine-dominated herb-rich forest with spruces and birches (LE 313822).

*Hyphoderma argillaceum* (Bres.) Donk – 9, on fallen pine branch in pine-dominated herb-rich forest with spruces and birches (LE 313740).

*Hyphoderma setigerum* (Fr.) Donk – 2, on fallen trunk of lime tree in herb-rich aspen forest with lime trees and elms.

*Hyphoderma transiens* (Bres.) Parmasto – 2, on fallen lime tree branch in herb-rich aspen forest with lime trees and elms (LE 313823).

*Hyphodontia pallidula* (Bres.) J. Erikss. – 7, on fallen spruce trunk in spruce-dominated forest with *Oxalis acetosella* (LE 313792).

*Hypochnicium bombycinum* (Sommerf.) J. Erikss. – 4, on standing dead *Salix* sp. in herb-rich elm forest with maples and lime trees (LE 313745).

*Inonotus obliquus* (Fr.) Pilát – 10, on standing dead *Betula pubescens* in pine-dominated herb-rich forest with spruces and birches.

*Intextomyces contiguus* (P. Karst.) J. Erikss. & Ryvarden – 2, on fallen elm trunk in herb-rich aspen forest with lime trees and elms (LE 313761).

*Junghuhnia collabens* (Fr.) Ryvarden – 1, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and birches (LE 313757).

*Junghuhnia nitida* (Pers.) Ryvarden – 2, on fallen aspen trunk in herb-rich aspen forest with lime trees and elms (LE 313789).

*Junghuhnia pseudozilingiana* (Parmasto) Ryvarden – 2, on living aspen infected by *Phellinus tremulae* in herb-rich aspen forest with lime trees and elms (LE 313798).

*Kneiffiella subalutacea* (P. Karst.) Jülich & Stalpers – 9, on fallen pine branch together with *Mucronella flava* in pine-dominated herb-rich forest with spruces and birches (LE 313818).

*Laetiporus sulphureus* (Bull.) Murrill – 2, on living *Quercus robur* in herb-rich aspen forest with oaks, lime trees and elms.

*Lagarobasidium detriticum* (Bourdot & Galzin) Jülich – 4, on fallen elm branch in herb-rich elm forest with maples and lime trees (LE 313765).

*Lyomyces sambuci* (Pers.) P. Karst. – 4, on fallen lime tree trunk in herb-rich elm forest with maples and lime trees (LE 313810).

*Mucronella flava* Corner – 8, on fallen branch of spruce in moist spruce-dominated herb-rich forest (LE 313772); 9, on fallen pine branch in pine-dominated herb-rich forest with spruces and birches (LE 313776).



Fig. 2. Basidiome of *Crustoderma dryinum* (LE 313766). – Photo: S. Volobuev.

*Odonticium septocystidia* (Burt) Zmitr. & Spirin – 2, on fallen aspen trunk in herb-rich aspen forest with lime trees and elms (LE 313813)

– Fig. 3.

*Oxyporus populinus* (Schumach.) Donk – 4, on fallen maple trunk in herb-rich elm forest with maples and lime trees.

*Peniophora incarnata* (Pers.) P. Karst. – 6, on fallen elm branch in herb-rich elm forest with maples and lime trees (LE 313783).

*Peniophorella praetermissa* (P. Karst.) K.H. Larss. – 2, on fallen aspen trunk in herb-rich aspen forest with lime trees and elms (LE 313831); 3, on standing dead *Corylus avellana* in pine-dominated forest with *Vaccinium vitis-idaea* (LE 313797); 4, on fallen elm branch in herb-rich elm forest with maples and lime trees

(LE 313830); 8, on fallen spruce trunk in moist spruce-dominated herb-rich forest (LE 313832).

*Phanerochaete sanguinea* (Fr.) Pouzar – 7, on fallen trunk of *Betula pubescens* in spruce-dominated forest with *Oxalis acetosella* (LE 313811).

*Phanerochaete velutina* (DC.) P. Karst. – 3, on fallen lime tree trunk in herb-rich lime tree forest with spruces (LE 313828).

*Phellinus conchatus* (Pers.) Quél. – 3, on fallen trunk of *Salix caprea* in spruce-dominated herb-rich forest with aspens and ferns; 7, on standing dead *Salix caprea* in moist spruce-dominated forest with aspens (LE 313758).

*Phellinus ferrugineofuscus* (P. Karst.) Bourdot & Galzin – 1, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and

birches (OHHI 1314); 3, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and ferns (LE 313771).

*Phellinus igniarius* (L.) Quél. – 7, on living *Salix* sp. in moist spruce-dominated forest with aspens.

*Phellinus laevigatus* (P. Karst.) Bourdot & Galzin – 3, on fallen trunk of *Betula pubescens* in spruce-dominated forest with birches and *Vaccinium vitis-idaea*.

*Phellinus nigricans* (Fr.) P. Karst. – 2, on living *Betula pubescens* in herb-rich aspen forest with lime trees and elms.

*Phellinus punctatus* (P. Karst.) Pilát – 4, on fallen lime tree trunk in herb-rich elm forest with maples and lime trees.

*Phellinus tremulae* (Bondartsev) Bondartsev & P. N. Borisov – 2, on living aspen in herb-rich aspen forest with lime trees and elms.

*Phlebia centrifuga* P. Karst. – 1, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and birches (LE 313754).

*Phlebia tremellosa* (Schrad.) Nakasone & Burds. – 6, on fallen elm branch in herb-rich elm forest with maples and lime trees.

*Phlebiella vaga* (Fr.) P. Karst. – 8, on fallen spruce trunk in moist spruce-dominated herb-rich forest (LE 313825).

*Phlebiopsis gigantea* (Fr.) Jülich – 1, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and birches; 7, on fallen spruce trunk in spruce-dominated forest with *Oxalis acetosella* (LE 313780).

*Plicatura nivea* (Fr.) P. Karst. – 4, on fallen elm trunk in herb-rich elm forest with maples and lime trees (LE 313790).

*Polyporus brumalis* (Pers.) Fr. – 4, on fallen lime tree trunk in herb-rich elm forest with maples and lime trees.

*Polyporus squamosus* (Huds.) Fr. – 6, on fallen elm trunk in herb-rich elm forest with maples and lime trees.

*Postia alni* Niemelä & Vampola – 5, on fallen aspen trunk in spruce-dominated herb-rich forest with aspens and ferns (LE 313736).

*Postia caesia* (Schrad.) P. Karst. – 3, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and ferns (OHHI 1311); 3, on fallen spruce trunk in herb-rich lime tree forest with spruces (LE 313752).

*Postia lactea* (Fr.) P. Karst. – 2, on fallen aspen trunk in herb-rich aspen forest with lime trees and elms (LE 313785); 5, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and ferns (OHHI 1316).

*Pseudohydnum gelatinosum* (Scop.) P. Karst. – 5, on spruce stump in spruce-dominated herb-rich forest with aspens and ferns (LE 313779).

*Pycnoporellus fulgens* (Fr.) Donk – 5, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and ferns.

*Radulomyces confluens* (Fr.) M. P. Christ. – 2, on fallen lime tree trunk in herb-rich aspen forest with lime trees and elms (LE 313759).

*Radulomyces molaris* (Chaillet ex Fr.) M. P. Christ. – 6, on fallen elm branch in herb-rich elm forest with maples and lime trees (LE 313788).

*Resinicium bicolor* (Alb. & Schwein.) Parmasto – 7, on fallen spruce trunk in moist spruce-dominated forest (LE 313744).

*Resinicium furfuraceum* (Bres.) Parmasto – 1, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and birches (LE 313778); 5, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and ferns (OHHI 1315).

*Rigidoporus crocatus* (Pat.) Ryvarden – 10, on fallen spruce trunk in pine-dominated herb-rich forest with spruces and birches (LE 313763).

*Schizopora paradoxa* (Schrad.) Donk – 7, on fallen trunk of *Betula pubescens* in spruce-dominated forest with *Oxalis acetosella* (LE 313794).

*Schizopora radula* (Pers.) Hallenb. – 2, on fallen aspen trunk in herb-rich aspen forest with lime trees and elms (LE 313802).



*Sistotrema oblongisporum* M. P. Christ. & Hauerslev – 3, on fallen trunk of *Betula pendula* in herb-rich lime tree forest with spruces and birches (LE 313791).

*Sistotrema octosporum* (J. Schröt. ex Höhn. & Litsch.) Hallenb. – 8, on fallen branch of spruce in moist spruce-dominated herb-rich forest (LE 313836).

*Sistotrema raduloides* (P. Karst.) Donk – 10, on fallen spruce trunk in pine-dominated herb-rich forest with spruces and birches (LE 313804).

*Skeletocutis amorpha* (Fr.) Kotl. & Pouzar – 3, on stump of spruce in spruce-dominated forest with birches and *Vaccinium vitis-idaea*.

*Steccherinum fimbriatum* (Pers.) J. Erikss. – 2, on fallen aspen trunk in herb-rich aspen forest with lime trees and elms.

*Steccherinum ochraceum* (Pers.) Gray – 3, on fallen trunk of *Betula pubescens* in spruce-dominated forest with birches and *Vaccinium vitis-idaea*.

*Stereum rugosum* Pers. – 7, on fallen aspen trunk in moist spruce-dominated forest with aspens (LE 313809). 2, on fallen lime tree branch in herb-rich aspen forest with lime trees and elms (LE 313808).

*Stereum subtomentosum* Pouzar – 7, on fallen trunk of *Betula pubescens* in spruce-dominated forest with *Oxalis acetosella* (LE 313821).

*Tomentella bryophila* (Pers.) M. J. Larsen – 2, on fallen lime tree trunk in herb-rich aspen forest with lime trees and elms (LE 313750).

*Tomentella radiosa* (Schumach.) P. Karst. – 4, on fallen elm trunk in herb-rich elm forest with maples and lime trees (LE 313800); 8, on fallen branch of spruce in moist spruce-dominated herb-rich forest (LE 313801).

*Tomentellopsis echinospora* (Ellis) Hjortstam – 2, on fallen aspen trunk in herb-rich aspen forest with lime trees and elms (LE 313767).

*Trametes ochracea* (Pers.) Gilb. & Ryvarden – 3, on fallen aspen trunk in spruce-dominated herb-rich forest with aspens and ferns.

*Trechispora candidissima* (Schwein.) Bondartsev & Singer – 7, on fallen spruce trunk in spruce-dominated forest with *Oxalis acetosella* (LE 313753).

*Trechispora farinacea* (Pers.) Liberta – 7, on fallen branch of spruce in spruce-dominated forest with *Oxalis acetosella* (LE 313833).

*Trechispora mollusca* (Pers.) Liberta – 7, on fallen spruce trunk in moist spruce-dominated forest with aspens (LE 313834).

*Trichaptum abietinum* (Dicks.) Ryvarden – 1, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and birches.

*Tubulicrinis borealis* J. Erikss. – 8, on fallen spruce trunk in moist spruce-dominated herb-rich forest (LE 313746).

*Vesiculomyces citrinus* (Pers.) E. Hagstr. – 1, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and birches (OHHI 1313); 1, on fallen aspen trunk in spruce-dominated herb-rich forest with aspens and birches (OHHI 1312); 3, on fallen spruce trunk in herb-rich lime tree forest with spruces (LE 313756).

*Xylodon asperus* (Fr.) Hjortstam & Ryvarden – 7, on fallen trunk of *Betula pubescens* in spruce-dominated forest with *Oxalis acetosella* (LE 313749). 3, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and ferns (LE 313742).

*Xylodon barba-jovis* (Bull.) Chevall. – 2, on fallen lime tree trunk in herb-rich aspen forest with lime trees and elms (LE 313743).

*Xylodon brevisetus* (P. Karst.) Hjortstam & Ryvarden – 7, on fallen spruce trunk in moist spruce-dominated forest with aspens (LE 313748). 1, on fallen spruce trunk in spruce-dominated herb-rich forest with aspens and birches (OHHI 1309); 2, on fallen aspen trunk in herb-rich aspen forest with lime trees and elms (LE 313747).



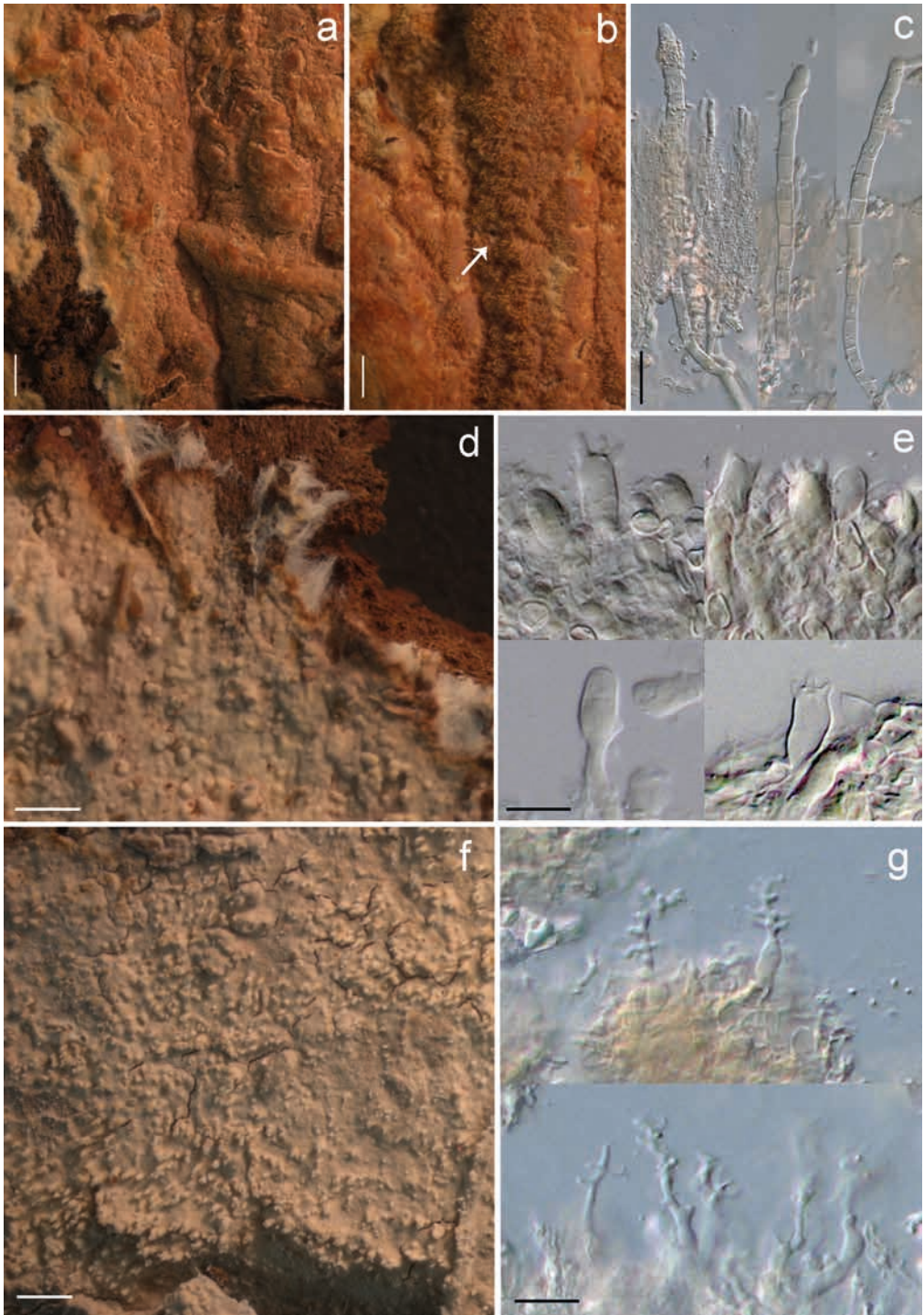


Fig. 3. *Odonticium septocystidia* (LE 313813). a) basidiome, b) cystidiate surface, c) cystidia. – *Intextomyces contiguus* (LE 313761). d) basidiome, e) basidia. – *Crustomyces subabruptus* (LE 313817). f) basidiome, g) dendrohyphidia. Scales: a, d, f = 1 mm; b = 0.5 mm; c = 25  $\mu$ m; e, g = 10  $\mu$ m. – Photos: S. Volobuev

*Xylodon crustosus* (Pers.) Chevall. – 6, on fallen elm branch in herb-rich elm forest with maples and lime trees (LE 313764).

*Xylodon spathulatus* (Schrad.) Kuntze – 2, on fallen aspen trunk in herb-rich aspen forest with lime trees and elms (LE 313816).

## Discussion

Our data provides new localities of some uncommon, rare and little collected species in the region. One of the most interesting findings is *Odontium septocystidia* which is the second record in Leningrad Oblast (Kotkova 2013). It is rare everywhere in European part of Russia and reported only from Nizhny Novgorod Oblast (Spirin 2004) and Oryol Oblast (Volobuev 2013). Apparently, this species prefers moist old-growth deciduous or mixed forests with minimal anthropogenic impact.

The collections of *Crustomyces subabruptus* and *Intextomyces contiguus* are the third in Leningrad Oblast. The previous records were made more than a decade ago (Bondartseva 1963, Zmitrovich 2003). Both of the new collections were associated with elm which has a restricted distribution in the region. *Intextomyces contiguus* grows on all kinds of deciduous trees, but *Salix caprea* is the most common substrate (e.g. Shiryaev & Kotiranta 2015, Kotiranta et al. 2016). Most of the species are naturally common in hemiboreal and southern boreal zones. However, there are species which indicate that the forests are of high conservational value (Andersson et al. 2009). Among the indicators of moist, spruce-dominated old-growth forests *Amylocystis lapponica*, *Crustoderma dryinum*, *Dichostereum granulatum*, *Fomitopsis rosea*, *Junghuhnia collabens*, *Phellinus ferrugineofuscus*, *Phlebia centrifuga*, and *Pycnoporellus fulgens* were recorded. The second group consists of indicators of broad-leaved old-growth forests (Andersson et al. 2009, Volobuev et al. 2015), namely *Dentipellis fragilis*, *Gloeoporus pannocinctus* (= *Ceriporiopsis pannocincta*), *Granulobasidium vellereum*, *Junghuhnia pseudozilingiana*, *Hydnocristella himantia*, and *Rigidoporus crocatus*.

Attention was paid also on the occurrences of red-listed species. New localities for eight red-listed species of Leningrad Region (Tzvelev

2000) were collected, namely *Ceriporiopsis aneirina*, *C. pannocincta*, *C. resinascens*, *Dentipellis fragilis*, *Junghuhnia collabens*, *J. pseudozilingiana*, *Pycnoporellus fulgens* and *Rigidoporus crocatus*. It is worth mentioning, that species like *Ceriporiopsis aneirina*, *C. pannocincta*, *C. resinascens*, and *Pycnoporellus fulgens* are occupying many localities in Leningrad Oblast, inhabiting various types of forest communities, and are expected to be excluded from the new edition of the regional Red Data Book. To compare the biological value of the study area with adjacent areas we analysed the presence of species in the Red Data List of Estonian Fungi (Red Data Book of Estonia 2008). In the Estonian red list there are six species common to our list: *Amylocystis lapponica* (Critically Endangered), *Dentipellis fragilis* (Endangered), *Fomitopsis rosea*, *Junghuhnia pseudozilingiana*, *Rigidoporus crocatus* (Vulnerable), and *Sistotrema raduloides* (Near Threatened).

The analysis of substrate preferences showed that the most occupied host was *Picea abies* (47 fungal species, 39.5%) followed by *Populus tremula* (27, 22.7%), *Ulmus* spp. (19, 16.0%) and *Tilia cordata* (16, 13.4%), respectively. This set of leading wood substrates reflects the distribution of particular trees in the structure of forest communities. Especially spruce which is the main forest-forming tree on the area studied was presented by uneven-aged trees including well-decayed trunks and stumps in decay stages 3 and 4.

As a conclusion based on the obtained data, including the red-listed species and indicators of old-growth forests, we recommend to protect the territory studied.

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## References

- Andersson, L., Alexeeva, N. & Kuznetsova, E. (eds.) 2009: Survey of biologically valuable forests in North-Western European Russia. Vol. 2. Identification manual of species to be used during survey at stand level. – Saint-Petersburg. 258 pp.
- Anonymous. 1988: Nauchno-prikladnoi spravochnik po klimatu SSSR. Seriya 3. Mnogoletniye dannye. Parts 1–6. Issue 3. Karelskaya ASSR, Leningradskaya, Novgorodskaya, Pskovskaya, Kalininskaya i Smolenskaya oblasti (in Russian). – Gidrometeoizdat, Leningrad. 692 pp.
- Bernicchia, A. & Gorjón, S.P. 2010: Corticiaceae s.l. – Fungi Europaei 12: 1–1008.
- Bondartseva, M.A. 1963: The review of the order Aphyllophorales in Leningrad Oblast: PhD thesis (in Russian). – Komarov Botanical Institute. Leningrad. 482 pp.
- Kotiranta, H., Saarenoksa, R. & Kytövuori, I. 2009: Aphyllophoroid fungi of Finland. A check-list with ecology, distribution, and threat categories. – *Norrinia* 19: 1–223.
- Kotiranta, H., Shiryaev, A.G. & Spirin, V. 2016: Aphyllophoroid fungi (Basidiomycota) of Tuva Republic, southern Siberia, Russia. – *Folia Cryptogamica Estonica* 53: 51–64.
- Kotkova, V.M. 2013: New data on aphyllophoraceous fungi of the protected areas of the Leningrad Region. VI. Planned regional complex sanctuary “Koltushskie heights” (in Russian, with English summary). – *Novosti Sistematiki Nizshikh Rasteniy* 47: 74–82.
- Kunttu, P., Pennanen, J., Kekki, T., Kulju, M. & Suominen, M. 2014: Noteworthy records of aphyllophoroid fungi in Finland (Basidiomycota) – *Acta Mycologica* 49: 221–235.
- Niemelä, T. 2013: Polypores of the Białowieża Forest – Białowieżski Park Narodowy: Białowieża. 135 pp.
- Red Data Book of Estonia. 2008: Commission for Nature Conservation of the Estonian Academy of Sciences. <http://elurikkus.ut.ee/prmt.php?lang=eng> (accessed 23.11.2016).
- Ryvarden, L. & Melo, I. 2014: Poroid fungi of Europe. – *Synopsis Fungorum* 31: 1–455.
- Shiryaev, A.G. & Kotiranta, H. 2015(2016): Aphyllophoroid fungi (Basidiomycota) of the middle part of Yenisei River basin, East Siberia, Russia. – *Karstenia* 55: 43–60.
- Spirin, V. 2004: Aphyllophoroid macromycetes of reserve “Panzelka Pond and the Pine Forests in its surroundings” (in Russian). – *Novosti Sistematiki Nizshikh Rasteniy* 37: 155–165.
- Spirin, V., Vlasák, J., Milakovsky, B. & Miettinen, O. 2015: Searching for indicator species of old-growth spruce forests: studies in the genus *Jahnoporus* (Polyporales, Basidiomycota). – *Cryptogamie, Mycologie* 36: 409–417.
- Tzvelev, N.N. (ed.) 2000: Red Data Book of Nature of the Leningrad Region. Vol. 2 – Plants and Fungi. – World & Family: St. Petersburg. 672 pp.
- Volobuev, S.V. 2013: Aphyllophoroid fungi of the Naryshkinskij Natural Park, Orel Region, Russia. – *Folia Cryptogamica Estonica* 50: 81–88.
- Volobuev, S., Logachev, A., Mushnikov, N. & Okun, M. 2015: New records of aphyllophoroid fungi (Agaricomycetes, Basidiomycota) from the Les na Vorskla area of the Belgor’ e Nature Reserve (Belgorod Region, Russia) – *Folia Cryptogamica Estonica* 52: 89–93.
- Zmitrovich, I.V. 2003: Tremelloid, aphyllophoroid and pleurotoid Basidiomycetes of Veps Plateau (North-west Russia). – *Karstenia* 43: 13–36.

