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Synopsis of the macrofungi (*Basidiomycota*) on wood of fruit trees in the Central Black Earth Region of Russia

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Abstract
Aim. To summarise and analyse data on the species diversity, distribution and substrate spectra of wood-inhabiting basidial macromycetes growing on fruit trees in the Belgorod, Voronezh, Kursk, Lipetsk, Oryol and Tambov Regions.
Material and Methods. The work involved a critical examination of literature sources, LE, OHHI, and VU herbaria. We undertook field researches in 2019–2020, identified specimens collected based on light microscopy techniques and isolated the basidial fungi in a pure culture.
Results. Data on 97 species of basidial macrofungi from 68 genera associated with *Malus*, *Pyrus* and *Prunus* wood in the Central Black Earth Region are summarised. *Antrodia serpens* and *Ceriporia torpida* are newly known to Russia. 65 new dikaryotic strains for 22 species of *Agaricomycetes* have been introduced into the LE-BIN. A total of 65 species are associated with *Malus*, 34 species with *Pyrus* and 29 species with *Prunus*. Five species (*Lyomyces crustosus*, *Stereum hirsutum*, *Trametes hirsuta*, *T. ochracea* and *T. versicolor*) grow on all three genera of host. These species specialise in fruit trees include *Sarcodontia crocea* and *Phellinus pomaceus*.
Conclusion. Pathogenic activity has been clearly observed for 32 species of fungi found on trunks and branches of living trees, causing necrosis and trunk rot. Furthermore, it is recommended that regular phytopathological monitoring of orchards should be carried out, taking the group of xylotrophic fungi into account.

Key Words
Agriculture, European Russia, fruit trees, fungal distribution, orchard, phytopathogens, wood-decaying fungi.

Обзор макромицетов (*Basidiomycota*), развивающихся на древесине плодовых деревьев в условиях Центрального Черноземья России

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Резюме
Цель. Обобщить и проанализировать сведения о видовом составе и субстратной приуроченности деревообитающих базидиальных макромицетов, развивающихся на древесине плодовых деревьев в условиях Белгородской, Воронежской, Курской, Липецкой, Орловской и Тамбовской областей.
Материал и методы. В ходе работы критически изучены литературные источники и коллекционные фонды LE, OHHI, VU. Проведены собственные полевые исследования в 2019-2020 гг., микроскопическая идентификация образцов, а также выделение базидиальных грибов в чистую культуру.
Результаты. Обобщены сведения о 97 видах базидиальных макромицетов из 68 родов, встречающихся на территории Центрального Черноземья на древесине яблони, груши и косточковых культур (*Prunus* spp.). Впервые для России зарегистрированы виды *Antrodia serpens* и *Ceriporia torpida*. В Коллекцию культур базидиомицетов БИН РАН (LE-BIN) введено 65 новых дикариотических штаммов для 22 видов агарикомицетов. В общей сложности 65 видов грибов связаны с древесиной *Malus*, 34 вида – с древесиной *Pyrus* и 29 видов – с древесиной *Prunus*. Пять видов макромицетов (*Lyomyces crustosus*, *Stereum hirsutum*, *Trametes hirsuta*, *T. ochracea* и *T. versicolor*) растут на всех трех родах плодовых деревьев. К видам, специализирующимся на фруктовых деревьях, относятся *Sarcodontia crocea* и *Phellinus pomaceus*.
Заключение. Патогенная активность достоверно отмечена для 32 видов базидиомицетов, обнаруженных на стволах и ветвях живых деревьев, вызывающих некроз и стволовую гниль. В дальнейшем необходимо проводить регулярный фитопатологический мониторинг садовых насаждений с учетом группы ксилотрофных грибов.

Ключевые слова
Сельское хозяйство, Европейская Россия, плодовые деревья, распространение грибов, фруктовые сады, фитопатогены, дереворазрушающие грибы.

INTRODUCTION

Wood-decaying basidial fungi are crucial components in forest ecosystems. These organisms also play an important role in agricultural lands, as they induce necrosis and rotten plant diseases that lead to weakening, withering, suppression of flowering or death of trees. As a result, there is a decrease in yields, which has a negative impact on orchard productivity and in extreme cases may require the re-establishment of fruit plantations. Orchards, as monoculture stands, are particularly threatened by fungal phytopathogens: this situation is currently intensified by increasing global plant trade and the effects of climate change [1].

Russian phytopathological studies on agricultural plants generally focus on diseases caused by micromycetes [2; 3], while among polypores which cause trunk rot only common or particularly dangerous species are mentioned [4-6]. A similar situation also exists in the foreign literature where there are many investigations related to microfungi – endophytes and phytopathogens, for instance, [7-9]. At the same time, only a few publications are known which study the species diversity of *Agaricomycetes* associated with the wood of fruit trees [10-12]. The species of basidiomycete macrofungi that develop on fruit trees are often listed in more general studies [13; 14].

The total number of basidial fungi species growing on the wood of fruit trees can be estimated as approximately 200. In particular, the monograph "Poroid fungi of Europe" [15] contains data on findings of 110 species on *Malus*, *Pyrus* and *Prunus* wood. On the scale of the former USSR, the most comprehensive list of fungi on fruit cultures (78 species of higher basidiomycetes) can be obtained from the monograph of I. S. Popushoy [4]. Special studies of corticioid fungi on the wood of fruit trees in Belarus were undertaken by E. O. Yurchenko, who identified 58 species developing on *Malus* [16; 17].

In Russia, targeted researches to reveal the species diversity of macrofungi on fruit trees were undertaken in Krasnodar Territory [18; 19], Belgorod [20], Ryazan [21], Orenburg Regions [22]. However, similar investigations have not been done for most regions of European Russia.

The Central Black Earth Region (CBER), also known as the Central Chernozem Region or Chernozemie (the literal meaning of chernozem is a black-coloured soil containing a high percentage of humus) is one of the most important Russian agricultural regions. Belgorod, Kursk, Lipetsk, Oryol, Tambov, and Voronezh Regions are considered to be sectors of the CBER. Orchard agrocoenoses are widely represented here, including both large horticultural plantations and numerous private homestead plots of seed and stone fruit trees and shrubs.

In the 1990s, large areas of orchards lost proper horticultural and phytosanitary care, which led to a significant deterioration of fruit trees and the spread of a special group of phytopathogenic fungi – wood-decaying, or xylotrophic, *Agaricomycetes*. The focus of phytopathologists is often omitted in the study of wood-destroying fungi which also cause pathogenesis in fruit trees. The development of xylotrophic fungi is a definitely more prolonged process, resulting in chronic trunk rots [23], mainly associated with the pathogenic activity of certain species of aphyllophoroid fungi.

At the same time, there are no detailed summaries for the CBER regions on xylotrophic species of basidial macrofungi on fruit trees, including the principal ones – *Malus domestica* Borkh., *Pyrus communis* L., *Prunus cerasus* L. and *P. domestica* L.

Special investigations of poroid fungi, including polypores in orchards, were carried out in the CBER at the beginning of the 20th century [24], which laid the basis for monitoring this group of phytopathogens. In subsequent years, data on the distribution of fungal pathogens in trunk and root rot of fruit trees have been extremely scattered in the literature, mainly as a result of studies of fungal species diversity in certain regions in different types of habitat [25-27].

The *aim* of this study was to summarise the available data and results of our own field research on basidial macrofungi on fruit trees in the CBER, to determine the species diversity and to reveal the key features of their distribution and ecology.

MATERIAL AND METHODS

This study focuses on members of the subdivision of *Agaricomycotina* (*Basidiomycota*), mainly polyporoid and corticioid fungi, as well as some of the agaricoid species that develop their basidiocarps on wood of seed and stone fruit trees.

Among these plant hosts, we consider the most widely distributed representatives – apple tree (*Malus domestica*, as well as *M. baccata* (L.) Borkh., *M. praecox* (Pall.) Borkh., *M.* × *prunifolia* (Willd.) Borkh., *M. sylvestris* (L.) Mill.), pear (*Pyrus communis*, as well as *P. pyraster* (L.) Burgsd.), apricot, wild cherry, cherry plum, cherry, plum, thorn (*Prunus armeniaca* L., *P. avium* L., *P. cerasifera* Ehrh., *P. cerasus*, *P. domestica* and *P. spinosa* L.).

Analysis of available data was carried out, including scientific publications by researchers of the last century [24; 28-34], as well as modern literature [20; 25; 26; 35-46] and collections of mycological herbaria of LE (Komarov Botanical Institute of RAS, St Petersburg, Russia), OHHI (Oryol State University named after I. S. Turgenev, Russia), VU (Galichya Gora Reserve, Voronezh State University, Russia).

In 2019-2020, we carried out field surveys of orchards and garden plantations of seed and stone fruit trees in the following localities: Belgorod Region (Korochansky District, vicinity of Popovka village; Shebekinsky District, vicinity of Titovka village), Kursk Region (Fatezhsky District, vicinity of Rzhava village; Zolotukhinsky District, vicinity of Oklino village), Lipetsk Region (Krasninsky District, vicinity of Znamenka village), Oryol Region (Glazunovsky District, vicinity of Lovchikovo village; Mtsensky District, vicinity of Volya village; Orlovsky District, vicinity of Zhilina village).

Ex situ isolation of basidial fungi was carried out by traditional methods of solid-phase culturing: by seeding of basidiospores or by placing small fragments of basidiocarps on an agarized AW media (4% ale-wort "Severnaya Pivovarnya", pH 5.8 and 2% w/v agar Difco), with the addition of kanamycin water solution (final concentration in the medium – 0.5 mg/ml) in order to prevent

bacterial contamination. Dikaryotic strains were deposited in the Komarov Botanical Institute Basidiomycetes Culture Collection (LE-BIN, St. Petersburg, Russia) [47] and are stored using the subculture method, the disk method (in distilled water at 4°C) and the cryopreservation method at −80°C [48]. Identification of fungi, as well as macro- and micromorphological features of isolates were characterized by cultural and morphological parameters using common method and terminology [49]. Notes were made for every species on AW media: the color, general aspect, growth rate and growth mode of the hyphae, the presence/absence of asexual reproduction structures, particular smell. The growth of strains was characterized by the radius of the colony (mm) by 7, 14, 21 and 28 days, estimating the growth rate by the rate of cup overgrowth: fast growth (F) – 1 week, medium (M) – 2-3 weeks and slow (S) – 4 weeks or more. Microscopic plates were analyzed with an Axio Imager A1 (Carl Zeiss, Germany) microscope.

RESULTS

An annotated list of basidial macrofungi species that develop on the wood of fruit trees in the CBER is presented below. The collection and identification of specimens was carried out by the authors, unless otherwise stated. Classification of taxa of above a genus level has been adopted in accordance with the current system of Basidiomycota [50].

AGARICOMYCETES

AGARICALES

Crepidotaceae

***Crepidotus calolepis* (Fr.) P. Karst.**

DISTRIBUTION: **Lipetsk Region,** Krasninsky District, Znamenka, *Malus domestica*, 12.08.2020, LE 305025, voucher for the strain LE-BIN 4430, OHHI 1401.

ECOLOGY: the species is a saprotroph on deciduous wood causing a white rot, and it is extremely rare that the species can be found on living trees. We collected the specimens of *C. calolepis* on fallen branches and on a living trunk of *Malus domestica*. In the CBER there known findings of this species on *Acer* spp. and *Populus tremula*.

Cyphellaceae

***Chondrostereum purpureum* (Pers.) Pouzar**

DISTRIBUTION: **Oryol Region**, Orlovsky District, Dobryi, *Malus domestica*, 05.05.2019, coll. T.A. Tsutsupa, LE 314794. **Tambov Region**, Tambovsky District, Krasnosvobodnoye, *Prunus domestica*, 28.07.1928, coll. V.N. Bondartseva-Monteverde, det. A.S. Bondartsev, LE 36853. **Voronezh Region**, Gribanovsky District, Tellermanovskoye Experimental Forestry, *P. domestica*, 13.08.1912 [30]. The species is common and widely distributed in the CBER.

ECOLOGY: *Ch. purpureum* is a pathogen of deciduous trees, continuing to grow as a saprotroph after the death of the host. It rarely grows on coniferous wood. The species infects living trees damaged by frost and develops a characteristic change in the leaf epidermis called «silver leaf» [3; 51]. It was recorded on living branches and trees of *Malus domestica* and *Prunus domestica*. In the CBER this species also occurs on *Acer negundo*, *Alnus glutinosa*, *Betula pendula*, *Populus tremula*, *Quercus robur*, *Salix* sp. and *Tilia cordata*.

Cystostereaceae

***Crustomyces expallens* (Bres.) Hjortstam**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area, *Malus* sp., 06.11.2015, LE 311616, LE 311624, *Pyrus* sp., 06.11.2015, OHHI 1326 [41].

ECOLOGY: the species is a saprotroph on deciduous wood or occasionally grows as a pathogen. According to our data, *C. expallens* occurs on dry and fallen branches of *Malus* sp., as well as on fallen branches of *Pyrus* sp. In the CBER this species also occurs on *Salix* sp. in Oryol Region.

Fistulinaceae

***Fistulina hepatica* (Schaeff.) With.**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area. **Kursk Region**, Gorshechensky District, Tsentralno-Chernozyomny Nature Reserve, Barkalovka area; Kursky District, Tsentralno-Chernozyomny Nature Reserve, Streletsky area; Manturovsky District, Tsentralno-Chernozyomny Nature Reserve, Bukreyevy Barmy area; Medvensky District, Tsentralno-Chernozyomny Nature Reserve, Kazatsky area [33]. The species is quite common and widely distributed in the CBER.

ECOLOGY: this species is a pathogen almost exclusively growing on *Quercus robur*. It causes a brown rot. In the CBER it also very rarely found on *Betula pendula*, *Frangula alnus*. According to Ryabova and Ignatenko [33] *F. hepatica* was recorded on dry stumps and trunks of *Malus* sp. and *Pyrus* sp.

Hymenogastraceae

***Flammula alnicola* (Fr.) P. Kumm.**

DISTRIBUTION: **Oryol Region**, Mtsensky District, Volya, *Malus domestica*, 22.08.2019, det. L.B. Kalinina, LE 314780, voucher for the strain LE-BIN 4362 [46].

STRAINS: LE-BIN 4362 (ex basidiocarp), *M. domestica*. – The aerial mycelium is yellow, becoming yellow-cream in colour with age. Reverse bleached. Growing colony edge is pressed. Mycelial mat has zonal development. The colony has floccose texture: small hyphal tufts, standing out from the agar. Without any special odor. Growth rate – M. The hyphal system is monomitic. The mycelium has thin-walled hyphae 1.5-2.5 µm in diameter. Branched generative hyphae, differentiated with septate and rare clamp connections, 3.5-4.8 µm in diameter. Arthroconidia sometimes were observed at the ends of the hyphae. Crystals were observed in pure culture.

ECOLOGY: *F. alnicola* was recorded on a dead crumbling stump of *Malus domestica*.

Lycoperdaceae

***Apioperdon pyriforme* (Schaeff.) Vizzini** (=*Lycoperdon pyriforme* Schaeff.)

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area. **Kursk Region**, Gorshechensky District, Tsentralno-Chernozyomny Nature Reserve, Barkalovka area; Kursky District, Tsentralno-Chernozyomny Nature Reserve, Streletsky area; Manturovsky District, Tsentralno-Chernozyomny Nature Reserve, Bukreyevy Barmy area; Medvensky District, Tsentralno-Chernozyomny Nature Reserve, Kazatsky area [33].

ECOLOGY: this species is a saprotroph on a wide range of deciduous wood. In particular, it was revealed on dry branches of *Malus* sp. and *Pyrus* sp. [33].

Lyophyllaceae

***Hypsizygus marmoreus* (Peck) H.E. Bigelow**

DISTRIBUTION: **Oryol Region**, Orlovsky District, Zhilina, *Malus domestica*, 23.08.2019, LE 314782, voucher for the strain LE-BIN 4379 [46].

STRAINS: LE-BIN 4379 (ex basidiocarp), *M. domestica*. – The aerial mycelium is white and downy. Reverse unchanged. Growing colony edge is raised. The colony has a cottony-woolly texture: rather long, single mycelial hyphae spreading in all directions. Has no special odour. Growth rate – M. Hyphal system monomitic. The mycelium consists of straight thin-walled hyphae d 1.8-2.8 µm. Rhombic crystals (1.5) 2.0 × 2.5 (3.5) µm were observed for the tested strain in pure cultures.

ECOLOGY: the species was recorded on a living trunk of *Malus domestica*.

Mycenaceae

***Mycena galericulata* (Scop.) Gray**

DISTRIBUTION: **Kursk Region**, Lgovsky District, Vereyki, *Pyrus* sp., 21.09.1998, LE 209371 [35].

ECOLOGY: the species was recorded on a rotten stump of *Pyrus* sp.

Physalacriaceae

***Armillaria mellea* (Vahl) P. Kumm.**

DISTRIBUTION: **Belgorod Region**, Borisovsky District, Belogorye Nature Reserve, Les na Vorskle area, *Prunus cerasus* [31].

ECOLOGY: the species was recorded on a rotten stump of *Prunus cerasus*.

Pluteaceae

***Pluteus inquilinus* Romagn.**

DISTRIBUTION: **Oryol Region**, Mtsensky District, Volya, *Malus domestica*, 22.08.2019, det. L.B. Kalinina, LE 314784 [46].

ECOLOGY: the species was recorded on fallen branches of *Malus domestica*.

***Volvariella bombycina* (Schaeff.) Singer**

DISTRIBUTION: **Lipetsk Region**, Yeletsky District, Yelets, *Malus domestica*, 23.07.1994, VOR 2946-A [25].

ECOLOGY: the species was recorded in a hollow of an old living *Malus domestica*.

Pterulaceae

***Radulomyces confluens* (Fr.) M.P. Christ.**

DISTRIBUTION: **Kursk Region**, Fatezhsky District, Rzhava, *Prunus domestica*, 15.08.2020, LE 305045. The species is a very common in the SBER.

ECOLOGY: *R. confluens* is a saprotroph on wood but occasionally it can grow on still living branches of trees and bushes. We found it on a dead dry standing tree of *Prunus domestica*. In the CBER *R. confluens* was also collected on *Acer* sp., *Alnus glutinosa*, *Betula pendula*, *Caragana arborescens*, *Corylus avellana*, *Euonymus* sp., *Fraxinus excelsior*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix* sp., *Ulmus* sp., as well as *Pinus sylvestris*.

Schizophyllaceae

***Schizophyllum commune* Fr.** (=*S. alneum* (L.) J. Schröt.)

DISTRIBUTION: **Belgorod Region**, Borisovsky District, Belogorye Nature Reserve, Les na Vorksle area, *Malus domestica* [31]. **Kursk Region**, Fatezhsky District, Fatezh, *M. domestica*, 01.09.1903 [28]. **Oryol Region**, Orlovsky District, Luzhki, *M. domestica*, 03.05.2008, coll. N. I. Grechikhina, OHHI 450 [26]. **Voronezh Region**, Voronezh, *M. domestica* and *Prunus domestica*, 20.07.1912, 19.08.1912 [30]. This species is abundant and widely distributed in the CBER.

ECOLOGY: the species is a saprotroph on wood or occasionally grows as a pathogen. According to our data, *S. commune* occurs on dead dry standing and fallen trunks of *Malus domestica* and *Prunus domestica*. In the CBER this species also ccurs on *Betula pendula*, *Corylus avellana*, *Fraxinus excelsior*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix* sp., *Tilia cordata*, *Ulmus* sp., as well as on *Pinus sylvestris*.

Psathyrellaceae

***Coprinopsis atramentaria* (Bull.) Redhead, Vilgalys & Moncalvo** (=*Coprinus atramentarius* (Bull.) Fr.)

DISTRIBUTION: **Kursk Region**, Lgovsky District, Lgov, *Malus domestica*, 23.10.1998, LE 209320 [35].

ECOLOGY: the species was recorded at the base of a trunk of *Malus domestica*.

***Psathyrella spadicea* (P. Kumm.) Singer**

DISTRIBUTION: **Lipetsk Region**, Zadonsky District, Galichya Gora Nature Reserve, Morozova Gora area, *Malus* sp., 19.10.2006, coll. and det. L.A. Sarycheva, VU 4081 [25; 42].

ECOLOGY: the species was recorded at the base of a trunk of *Malus* sp.

ATHELIALES

Atheliaceae

***Athelia alnicola* (Bourdot & Galzin) Jülich**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area, *Prunus spinosa*, 06.11.2015, LE 314718 [41].

ECOLOGY: the species is a saprotroph on deciduous and coniferous wood and debris. It was recorded on fallen trunks of *Prunus spinosa*.

***Athelia arachnoidea* (Berk.) Jülich**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area, *Prunus spinosa*, 06.11.2015, LE 314717 [41].

ECOLOGY: the species is a lichenicolous fungus, growing on the bark of a wide range of deciduous trees over the films of epiphytic algae and talli of different lichens. It was recorded on a fallen trunk of *Prunus spinosa*. In the CBER *A. arachnoidea* is also known only in Lipetsk Region on lichens on *Acer negundo*, *Acer platanoides* and *Quercus robur* [44].

BOLETALES

Coniophoraceae

***Coniophora puteana* (Schumach.) P. Karst.** – Fig. 1, D.

DISTRIBUTION: **Oryol Region**, Kolpnyansky District, Aleksandrovka, *Pyrus* sp., 05.10.2012, LE 292096 [37]; Orlovsky District, Zhilina, *Pyrus communis*, 23.08.2019, LE 305018.

ECOLOGY: *C. puteana* is a saprotroph on coniferous and deciduous wood, causing brown rot. Often grows as a house-rot fungus, causing damage in buildings. Occasionally it grows as a pathogen. It was recorded on dry standing *Pyrus* sp. and on a fallen trunk of *Pyrus com-*

munis. In the CBER the species is a common and occurs on *Acer platanoides*, *Alnus glutinosa*, *Betula pendula*, *Corylus avellana*, *Populus tremula*, *Quercus robur*, as well as on *Picea abies*, *Pinus sylvestris* and dead basidiocarps of *Fomes fomentarius*.

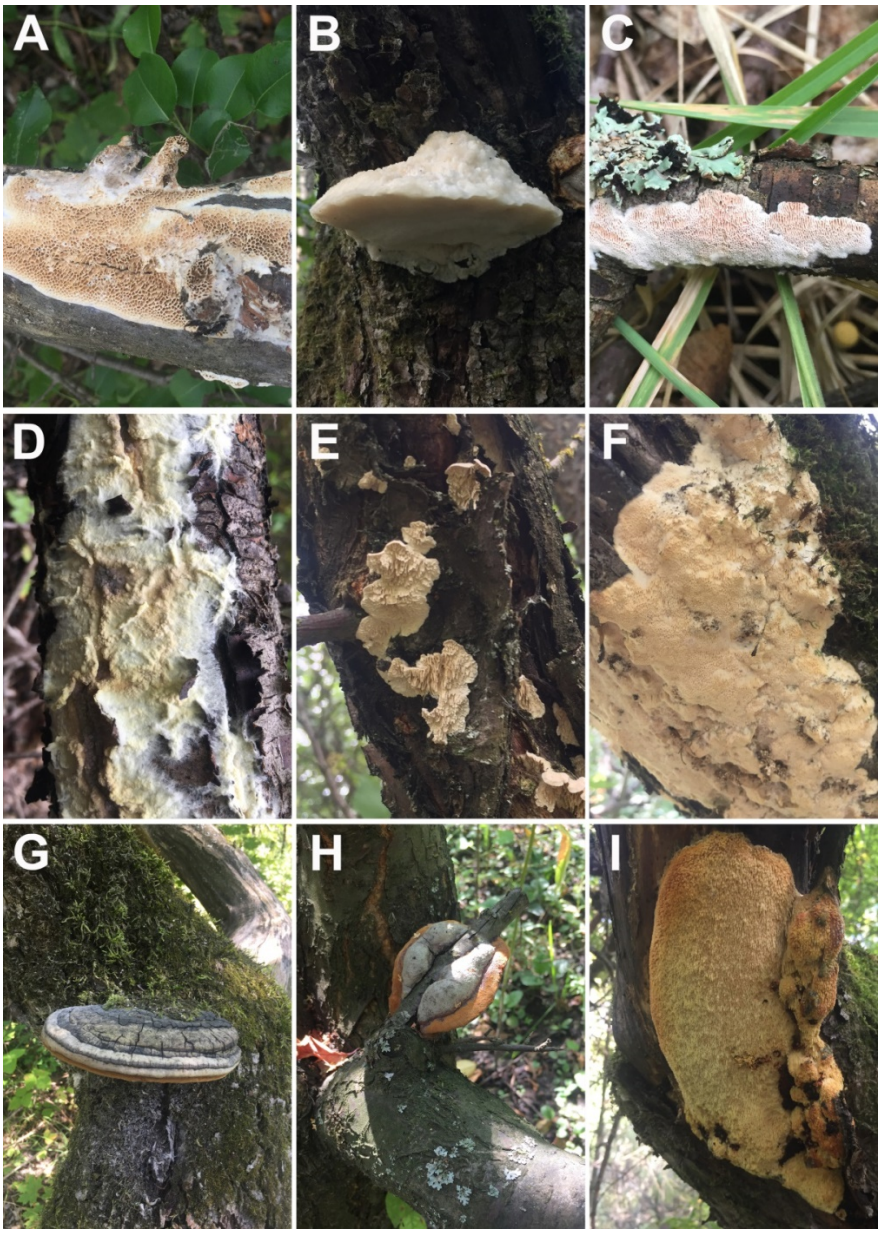

Figure 1. Basidiocarps of macrofungi associated with fruit trees: A – *Antrodia serpens*, B – *Aurantiporus fissilis*, C – *Ceriporia torpida*, D – *Coniophora puteana*, E – *Irpex lacteus*, F – *Oxyporus corticola*, G – *Phellinus alni*, H – *Ph. pomaceus*, I – *Sarcodontia crocea*

Рисунок 1. Базидиомы макромицетов, ассоциированных с древесиной плодовых пород: A – *Antrodia serpens*, B – *Aurantiporus fissilis*, C – *Ceriporia torpida*, D – *Coniophora puteana*, E – *Irpex lacteus*, F – *Oxyporus corticola*, G – *Phellinus alni*, H – *Ph. pomaceus*, I – *Sarcodontia crocea*

CANTHARELLALES

Hydnaceae

***Sistotrema brinkmannii* (Bres.) J. Erikss.**

DISTRIBUTION: **Belgorod Region**, Korochansky District, Popovka, *Malus domestica*, 19.08.2019, LE 314115 [20]. **Kursk Region**, Zolotukhinsky District, Oklino, *M. domestica*, 15.08.2020, LE 305049. The species is abundant and widely distributed in the CBER.

ECOLOGY: the species is a saprotroph on deciduous and coniferous wood. It was recorded on dry branches of *Malus domestica*. In the CBER it also occurs on *Acer platanoides*, *Alnus glutinosa*, *Betula pendula*, *Corylus avellana*, *Populus tremula*, *Quercus robur*, as well as on dead basidiocarps of *Datronia mollis* and *Fomes fomentarius*.

***Sistotrema oblongisporum* M.P. Christ. & Hauerslev**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area, *Prunus spinosa*, 06.11.2015, det. I.V. Zmitrovich, LE 314948 [41].

ECOLOGY: the species is a saprotroph on deciduous (rarely coniferous) wood. It was recorded on a fallen branch of *Prunus spinosa*. In the CBER it also occurs on *Betula pendula*, *Populus tremula* and *Prunus padus*.

GLOEOPHYLLALES

Gloeophyllaceae

***Gloeophyllum trabeum* (Pers.) Murrill**

DISTRIBUTION: **Belgorod Region**, Korochansky District, Popovka, *Pyrus communis*, 19.08.2019, LE 314114, voucher for the strain LE-BIN 4339 [20].

STRAINS: LE-BIN 4339 (ex basidiocarp), *P. communis*. – Colour of mycelium is white becoming ochre with age. Reverse does not change. Growing colony edge is raised. Mycelial mat is thick, felted, aerial mycelium woolly. It has no special odour. Growth rate – M. Hyphal system dimitic. Marginal hyphae 2.0-4.5 µm wide. Skeletal hyphae d 1.5-3.0 (6.0) µm.

ECOLOGY: *G. trabeum* is a saprotroph on a wide range of deciduous and coniferous wood. It is an important cause of damage in buildings. It causes a brown rot. It was recorded on a fallen trunk of *Pyrus communis*. In the CBER the species commonly grows on timber wood and *Pinus sylvestris*, *Populus tremula* and *Quercus robur*.

HYMENOCHAETALES

Hymenochaetaceae

***Fomitiporia punctata* (P. Karst.) Murrill**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area, *Malus* sp., 06.11.2015, LE 311651 [41]. The species is a common and widely distributed in CBER.

ECOLOGY: *F. punctata* is a pathogen on wide range of deciduous trees, causing a white rot. It was recorded on a dry branch of a living *Malus* sp. In the CBER the species occurs on *Acer negundo*, *Acer platanoides*, *Alnus glutinosa*, *Caragana arborescens*, *Corylus avellana*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix* sp., *Sambucus racemosa* and *Sorbus aucuparia*.

***Fuscoporia contigua* (Pers.) G. Cunn.**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area, *Pyrus* sp., 06.11.2015, LE 311660 [41].

ECOLOGY: *F. contigua* is a saprotroph on deciduous wood, causing a white rot. According to our data it was found on a fallen branch of a *Pyrus* sp. In the CBER this species also occurs on *Acer platanoides*, *Corylus avellana*, *Prunus padus*, *Quercus robur* and *Tilia cordata*.

***Hydnoporia tabacina* (Sowerby) Spirin, Miettinen & K.H. Larss.**

DISTRIBUTION: **Belgorod Region**, Shebekinsky District, Titovka, *Malus sylvestris*, 18.08.2019, LE 314157 [45]. **Oryol Region**, Orlovsky District, Zhilina, *Pyrus communis*, 15.08.2019, LE 305019.

ECOLOGY: *H. tabacina* is a saprotroph on deciduous wood, causing white rot. It was recorded on dry branches of *Malus sylvestris* and *Pyrus communis*. In the CBER this species mostly grows on *Corylus avellana* and also occurs on *Betula pendula*, *Populus tremula*, *Prunus padus* and *Quercus robur*.

***Inocutis rheades* (Pers.) Fiasson & Niemelä**

DISTRIBUTION: **Oryol Region**, Mtsensky District, Peredovik, *Prunus domestica*, 01.05.2008, OHHI 52 [36].

ECOLOGY: *I. rheades* is a saprotroph on deciduous wood or occasionally grows as a pathogen. It causes a white rot. It was recorded on living trees of *Prunus domestica*. In the CBER this species generally occurs on *Populus tremula* and is also recorded on *Alnus glutinosa* and *Quercus robur*.

***Inonotus hispidus* (Bull.) P. Karst.**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area, *Malus* sp., 06.11.2015, LE 311630 [41]; Korochansky District, Popovka, *Malus domestica*, 19.08.2019, LE 314118, voucher for the strain LE-BIN 4345 [20]. **Voronezh Region**, Gribanovsky District, Tellermanovskoye Experimental Forestry, *Malus* sp. [32].

STRAINS: LE-BIN 4345 (ex basidiocarp), *M. domestica*. – The aerial mycelium is ochre becoming yellowish-brown with age. Reverse darkened. Growing colony edge is raised and thick and dense. Mycelial mat is dense, tall, unclear-zoned, has a felty texture: cottony mycelium becomes matted. It has no special odour. Growth rate – F. Hyphal system monomitic. Marginal hyphae d 3.0-6.0 µm wide, often thick-walled. Much-branched short lateral hyphae absent. Pigmented hyphae were sometimes observed in the tested strain. Crystals were observed in pure cultures.

ECOLOGY: *I. hispidus* is a pathogen on deciduous trees, attacking sapwood. It causes a white rot. According to our data this species occurs on living *Malus domestica*. In the CBER this species is also recorded only on *Fraxinus excelsior* in Voronezh Region.

***Phellinus alni* (Bondartsev) Parmasto** – Fig. 1, G.

DISTRIBUTION: **Belgorod Region**, Korochansky District, Popovka, *Malus domestica*, 19.08.2019, LE 314117, voucher for the strain LE-BIN 4344 [20, as *Ph. pomaceus*]. **Kursk Region**, Fatezhsky District, Igino, *M. domestica*, 27.05.1906 [29, as *Fomes fulvus* (Scop.) Gillet]; Kursk, *M. domestica*, 01.06.1906 [28, as *Fomes igniarius* (L.) Fr.]; Zolotukhinsky District, Oklino, *M. domestica*, 15.08.2020, LE 314805, voucher for the strain LE-BIN 4412. **Oryol Region**, Mtsensky District, Spasskoye-Lutovinovo, *M. domestica*, 01.05.2008, OHHI 106 [36, as *Ph. tuberculosus*], Volya, *M. domestica*, 14.08.2019, LE 314796; Orlovsky District, Zhilina, *M. domestica*, 23.08.2019, LE 314795, voucher for the strain LE-BIN 4380. **Voronezh Region**, Rylsky District, Semenovskoye, *M. domestica*, 05.06.1915, coll. L.A. Lebedeva, det. A.S. Bondartsev as *Ph. pomaceus*, LE 30168.

STRAINS: LE-BIN 4344 (ex basidiocarp), *M. domestica*, LE-BIN 4380 (ex basidiocarp), *M. domestica*, LE-BIN 4412 (ex basidiocarp), *M. domestica*. – The central part of the colonies is coloured yellowish-brown; colony growth area remains white. Reverse dark brown but area under the centre of a colony's growth remains white. Growing colony edge is raised and is thick and dense, fringed, consisting of randomly growing hyphae. Outline colonies is wavy. Mycelial mat dense, tall, clear-zone, ragged, uneven, woolly, has a cotton-like texture. The colony has a crustose texture with age: hyphae forming a solid, hard dark brown crust. It has no special odour. Growth rate – S. Hyphal system monomitic. Aerial hyphae d 1.5-2.9 µm. Submerged hyphae up d 3.5 to 4.5 µm, sometimes with swellings.

ECOLOGY: *Ph. alni* is a pathogen on deciduous trees. It causes a white rot. According to our data, this species

occurs on living *Malus domestica*. In the CBER this species is recorded only on *Alnus glutinosa.*

All specimens of *Ph. pomaceus* collected from *Malus domestica* were reidentified as *Ph. alni* according to Tomšovský et al. [52] and our data of molecular study (unpubl.).

***Phellinus pomaceus* (Pers.) Maire** (=*Ph. tuberculosus* Niemelä) – Fig. 1, H.

DISTRIBUTION: **Belgorod Region**, Borisovsky District, Belogorye Nature Reserve, Les na Vorskle area, *Prunus cerasus*, *P. domestica*, 31.07.1939, *P. insititia*, *P. spinosa*, 08.08.1939 [31, as *Polyporus fulvus* (Scop.) Fr.]; Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area, *P. spinosa*, 06.11.2015, LE 311635 [41], unspecified locality – [Kursk Governorate, Belgorodsky, Korochansky, Novooskolsky, Starooskolsky Uyezds], *P. cerasus*, *P. domestica*, 06-07.1906 [29, as *Fomes igniarius* (L.) Fr.]; Korochansky District, Popovka, *P. cerasus*, 19.08.2019, LE 314797, voucher for the strain LE-BIN 4340. **Kursk Region**, Fatezhsky District, Fatezh, *P. cerasus, P. domestica*, 27.05.1906, Igino, *P. domestica*, 27.05.1906 [29, as *Fomes igniarius* (L.) Fr.], Rzhava, *P. domestica*, 15.08.2020, LE 314801, voucher for the strain LE-BIN 4409, LE 314802, voucher for the strain LE-BIN 4410; Kursky District, Bolshoye Lukino, *P. cerasus*, *P. domestica*, 06.1906 [29, as *Fomes igniarius* (L.) Fr.], Tsentralno-Chernozyomny Nature Reserve, Streletsky area, *P. spinosa*, 22-23.05.1999 [34]; Oboyansky District, Tsentralno-Chernozyomny Nature Reserve, Zorinsky area, *P. spinosa*, 14.09.1999 [34]; Oktyabrsky District, Bol'shoye Umrikhino, Starkovo, *P. cerasus*, *P. domestica*, 06.1906 [29]; Shchigrovsky District, Nizhny Terebuzh, *P. cerasus*, *P. domestica*, 13.06.1906 [29]; Kursk, *P. cerasus*, *P. domestica*, *M. domestica*, 01.05.1905, 06.1906 [28, as *Polyporus igniarius* (L.) Fr.], *P. spinosa*, 01.07.1902, 01.05.1904, LE 30140, LE 30104 [24], *P. domestica*, 28.07.1908, LE 30151, all coll. and det. A.S. Bondartsev. **Lipetsk Region**, Usmansky District, Voronozhsky Nature Reserve, *P. spinosa*, 27.07.2016 [43]; Zadonsky District, Galichya Gora Nature Reserve, Galichya Gora area, *P. spinosa*, 03.07.1996, VU 3108 [25], Morozova Gora area, *P. cerasifera*, 21.07.2020, coll. and det. L.A. Sarycheva, VU 4954. **Oryol Region**, Mtsensky District, Peredovik, *P. domestica*, 02.05.2008, OHHI 110 [36]; Orlovsky District, Luzhki, *P. domestica*, 08.06.2008, OHHI 104, 03.05.2009, OHHI 447, all coll. N.I. Grechikhina [26], Zhilina, *P. armeniaca*, 15.08.2019, LE 314804, *P. avium*, 23.08.2019, LE 314798, voucher for the strain LE-BIN 4372, *P. cerasus*, 13.08.2019, LE 314803, *P. domestica*, 15.08.2019, OHHI 1459, 23.08.2019, LE 305042, voucher for the strain LE-BIN 4373, LE 305043, voucher for the strain LE-BIN 4375, LE 314799, voucher for the strain LE-BIN 4374, LE 314800, voucher for the strain LE-BIN 4376. **Voronezh Region**, Gribanovsky District, Tellermanovskoye Experimental Forestry, *P. cerasus*, 13.08.1912 [30, as *Fomes igniarius* (L.) Fr.].

STRAINS: LE-BIN 4340 (ex basidiocarp), *P. cerasus*, LE-BIN 4372 (ex basidiocarp), *P. avium*, LE-BIN 4373 (ex basidiocarp), *P. domestica*, LE-BIN 4374 (ex basidiocarp), *P. domestica*, LE-BIN 4375 (ex basidiocarp), *P. domestica*, LE-BIN 4376 (ex basidiocarp), *P. domestica*, LE-BIN 4409 (ex basidiocarp), *P. domestica*, LE-BIN 4410 (ex basidiocarp), *P. domestica*. – The central part of the colonies is coloured yellowish-brown, colony growth area remains white. Reverse unchanged (in some strains reverse dark brown under the centre of the colonies). Growing edges of colonies range from flat, thin and transparent to raised, thick and dense, fringed, consisting of feathery hyphae. Mycelial mat dense, tall, unclear-zone, ragged, uneven, woolly, has a cotton-like or woolly texture. It has no special odour. Growth rate – M. Hyphal system monomitic. The mycelium consists of straight, smooth, sometimes tortuous, hyphae 2.6-6.1 µm in diameter with widely spaced septa, and thin hyphae d (1.2) 2.2-4.0 µm wide, straight and curved, occasionally anastomosing. Some hyphae are thickened with pigmented pale yellow to ochre rusty walls.

ECOLOGY: *Ph. pomaceus* is a common pathogen of *Prunus* trees, causing a white rot. According to our data this species occurs on living and dry standing *Prunus armeniaca*, *P. cerasifera*, *P. cerasus*, *P. domestica*, *P. insititia* and *P. spinosa* mostly at the base of branches. In CBER the species also occurs on *Prunus padus* [34].

Also, this species occurs on living trees of *Malus domestica*. According to Tomšovský *et al*. [52] these findings should be attributed to *Ph. alni*. Our investigations (this study, see above) confirm this idea.

Oxyporaceae

***Oxyporus corticola* (Fr.) Ryvarden** – Fig. 1, F.

DISTRIBUTION: **Oryol Region**, Mtsensky District, Volya, *Malus domestica*, 22.08.2019, LE 314806, voucher for the strain LE-BIN 4360.

STRAINS: LE-BIN 4360 (ex basidiospores), *M. domestica*. – The aerial mycelium is white becoming cream coloured with age. Reverse unchanged. Growing colony edge is raised to appressed, hyphae distant. The colony has a cottony texture: rather long, single mycelial hyphae spreading in all directions. It has no special odour. Growth rate – M. Hyphal system monomitic. The mycelium consists of well branching hyphae d 1.5-5.0 with frequent partitions. Hyphal swellings and anastomosis were observed for the tested strain.

ECOLOGY: *O. corticola* is a saprotroph on deciduous wood or occasionally grows as a pathogen. It causes a white rot. It was recorded on living *Malus domestica*. In the CBER the species also occurs on *Acer negundo*, *A. platanoides*, *Alnus glutinosa*, *Betula pendula*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix fragilis* and *Sorbus aucuparia*, as well as on *Picea abies* and dead basidiocarps of *Phellinus tremulae*.

***Oxyporus obducens* (Pers.) Donk**

DISTRIBUTION: **Oryol Region**, Mtsensky District, Spasskoye-Lutvinovo, *Malus domestica*, 29.09.2010, LE 284580 [36].

ECOLOGY: *O. obducens* is a saprotroph on deciduous wood or occasionally grows as a pathogen. It causes a white rot. It was found on living *Malus domestica*. In the CBER the species is also registered on *Acer platanoides*, *Frangula alnus*, *Populus tremula*, *Quercus robur*, *Salix* sp. and *Sambucus racemosa*.

***Oxyporus populinus* (Schumach.) Donk**

DISTRIBUTION: **Lipetsk Region**, Krasninsky District, Znamenka, *Malus domestica*, 12.08.2020, LE 305037. **Oryol Region**, Glazunovsky District, Lovchikovo, *M. domestica*, 21.08.2019, LE 314807, voucher for the strain LE-BIN 4352; Mtsensky District, Volya, *M. domestica*, 22.08.2019, LE 314816; Orlovsky District, Zhilina, *M. domestica*, 15.08.2019. The species is one of the most common and widely distributed in CBER.

STRAINS: LE-BIN 4352 (ex basidiocarp), *M. domestica*. – The aerial mycelium is white. Reverse unchanged. Growing colony edge is from raised to appressed, hyphae distant. The colony has a cottony texture: rather long, single hyphae spreading in all directions. It has no special odour. Growth rate – M. Hyphal system monomitic. The mycelium consists of straight, smooth, rarely branching hyphae – d 1.5-4.5 µm, often arranged with partitions, with thickened walls.

ECOLOGY: *O. populinus* is a pathogen of wide range of deciduous trees, causing a white rot. According to our data it was recorded on living *Malus domestica*. In the CBER the species occurs on wide range of hosts such as *Acer negundo*, *A. platanoides*, *Alnus glutinosa*, *Betula pendula*, *Caragana arborescens*, *Corylus avellana*, *Fraxinus excelsior*, *Populus nigra*, *P. tremula*, *Prunus padus*, *Quercus robur*, *Salix* sp., *Sorbus aucuparia* and *Ulmus* sp.

Rickenellaceae

***Peniophorella praetermissa* (P. Karst.) K.H. Larss.**

DISTRIBUTION: **Lipetsk Region**, Krasninsky District, Znamenka, *Malus domestica,* 12.08.2020, LE 314808. **Oryol Region**, Dolzhansky District, Malinovka, *Malus* sp., 04.10.2012, LE 292046 [37]; Glazunovsky District, Lovchikovo, *M. domestica*, 21.08.2019, LE 305040. The species is common in the CBER.

ECOLOGY: *P. praetermissa* is a saprotroph on deciduous and coniferous wood. It occurs on dry branches of *Malus domestica*. In the CBER the species also recorded on *Betula pendula*, *Corylus avellana*, *Fraxinus excelsior*, *Quercus robur*, *Populus tremula* and *Tilia cordata*, as well as on *Larix decidua* and *Pinus sylvestris*.

***Peniophorella pubera* (Fr.) P. Karst.**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area, *Prunus spinosa*, 06.11.2015, LE 311619 [41]. **Oryol Region**, Glazunovsky District, Lovchikovo, *Malus domestica*, 21.08.2019, LE 305041. The species is common in the CBER.

ECOLOGY: *P. pubera* is a saprotroph on deciduous, less often on coniferous wood. It was found on a fallen trunk of *Prunus spinosa* and on a dry dead standing tree of *Malus domestica*. In CBER the species also occurs on *Acer platanoides*, *Alnus glutinosa*, *Betula pendula*, *Corylus avellana*, *Populus tremula*, *Quercus robur*, *Salix* sp. and *Tilia cordata*, as well as on *Picea abies* and *Pinus sylvestris*, as well as on dead basidiocarps of *Fomes fomentarius*.

Schizoporaceae

***Basidioradulum radula* (Fr.) Nobles**

DISTRIBUTION: **Oryol Region**, Znamensky District, Orlovskoye Polesye National Park, Yelyonka, *Malus* sp., 17.10.2012, LE 298482 [38].

ECOLOGY: *B. radula* is a saprotroph on deciduous, less often on coniferous, wood or occasionally grows as a pathogen. Usually it grows on erect and hanging branches and young trunks. In the CBER the species was recorded only on dry standing *Malus* sp.

***Lyomyces crustosus* (Pers.) P. Karst.**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area, *Malus* sp., *Pyrus* sp., *Prunus spinosa*, 06.11.2015, LE 311657, OHHI 1325 [41]. **Oryol Region**, Kolpnyansky District, Aleksandrovka, *Pyrus* sp., 05.10.2012, OHHI 727 [37]; Mtsensky District, Volya, *Malus domestica*, 22.08.2019, LE 305036; Orlovsky District, Zhilina, *Pyrus communis*, 15.08.2019, LE 305035; Oryol, regional natural monument, Balka Neprets, *Malus* sp., 16.08.2012, LE 298999 [26]. The species is common and widely distributed in the CBER.

ECOLOGY: *L. crustosus* is a saprotroph on deciduous wood or occasionally grows as a pathogen. It rarely develops on coniferous wood. According to our data the species occurs on fallen branches and trunks of *Malus domestica*, on dry branches in living trees and dry standing trees of *Pyrus communis* and on fallen branches and trunks of *Prunus spinosa*. Usually it grows on dead dry branches still hanging or fallen to the ground. In the CBER this species occurs on wide range of hosts, such as *Acer negundo*, *A. platanoides*, *Alnus glutinosa*, *Betula pendula*, *Caragana arborescens*, *Corylus avellana*, *Crataegus* sp., *Euonymus verrucosus*, *Fraxinus excelsior*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix* sp., *Tilia cordata* and *Ulmus* sp., as well as on *Larix decidua* and *Pinus sylvestris.*

***Lyomyces erastii* (Saaren. & Kotir.) Hjortstam & Ryvarden**

DISTRIBUTION: **Oryol Region**, Mtsensky District, Volya, *Malus domestica*, 14.08.2019, LE 305034.

ECOLOGY: the species is a saprotroph on deciduous and coniferous wood. It was recorded on dry branches of *Malus domestica*. In CBER it also revealed on *Acer negundo*, *Alnus glutinosa*, *Betula pendula*, *Fraxinus excelsior*, *Populus tremula*, *Ulmus* sp.

***Xylodon rimosissimus* (Peck) Hjortstam & Ryvarden**

DISTRIBUTION: **Oryol Region**, Glazunovsky District, Lovchikovo, *Malus domestica*, 21.08.2019, LE 305054.

ECOLOGY: the species is a saprotroph on deciduous wood and rarely on conifers. Basidiocarps of *X. rimosissimus* were collected on fallen branches of *Malus domestica*. In the CBER this species was only known on *Picea abies* and *Quercus robur*.

Hymenochaetales genera incertae sedis

***Fibricium rude* (P. Karst.) Jülich**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area, *Malus* sp., *Prunus spinosa*, 06.11.2015, LE 311626, OHHI 1334 [41].

ECOLOGY: *F. rude* is a saprotroph on coniferous and deciduous wood. It was found on fallen trunks of *Malus* sp. and *Prunus spinosa.* In the CBER the species also occurs on *Acer platanoides*, *Crataegus* sp. and *Quercus robur*.

***Trichaptum biforme* (Fr.) Ryvarden**

DISTRIBUTION: **Lipetsk Region**, Krasninsky District, Znamenka, *Malus domestica*, 12.08.2020, LE 314809, voucher for the strain LE-BIN 4405.

STRAINS: LE-BIN 4405 (ex basidiospores), *M. domestica*. – The aerial mycelium is white and downy. Reverse unchanged. Growing colony edge is raised. Outline of colonies is wavy. A colony has a cottony-woolly texture: rather long, single mycelial hyphae spreading in all directions. It has no special odour. Growth rate – M. The mycelium has thin-walled hyphae d 1.0-2.5 µm with rare sprouting clamps 3.0-4.0 µm in diameter.

ECOLOGY: *T. biforme* is a saprotroph on poorly decayed deciduous wood or occasionally grows as a pathogen. It was found on a fallen trunk of *Malus domestica* infected by *Sarcodontia crocea*. This species alao occurs on *Acer platanoides*, *Alnus glutinosa*, *Betula pendula*, *Corylus avellana*, *Populus tremula*, *Prunus padus*, *Quercus robur* and *Sorbus aucuparia*, as well as on dead basidiocarps of *Fomes fomentarius*.

POLYPORALES

Dacryobolaceae

***Postia balsamea* (Peck) Jülich**

DISTRIBUTION: **Lipetsk Region**, Yeletsky District, Galichya Gora Nature Reserve, Vorgolskoye area, *Pyrus* sp., 01.10.2016, LE 313918 [44].

ECOLOGY: *P. balsamea* is a saprotroph on coniferous or more rarely on deciduous wood. It causes a brown rot. It was found on a fallen log of *Pyrus* sp. In the CBER this species is also recorded only on *Quercus robur* in Oryol Region [37].

***Postia lactea* (Fr.) P. Karst.**

DISTRIBUTION: **Lipetsk Region**, Krasninsky District, Znamenka, *Malus domestica*, 12.08.2020, LE 314815. **Oryol Region**, Mtsensky District, Volya, *M. domestica*, 22.08.2019, LE 314810, voucher for the strain LE-BIN 4394, LE 305044.

STRAINS: LE-BIN 4394 (ex basidiospores), *M. domestica*. – The aerial mycelium is cream. Reverse unchanged. Growing colony edge is pressed. Outline colonies fringed. Mycelial mat has an approximately zonal development. The colony has a mealy, powdery aspect. It has no special odour. Growth rate – M. Hyphal system monomitic. The mycelium consists of straight, smooth, rarely branching hyphae 1.9-5.3 µm in diameter.

ECOLOGY: *P. lactea* is a saprotroph with weak pathogenic activity on deciduous or coniferous wood. It causes a brown rot. It was found on fallen braches and dry standing trees of *Malus domestica,* as well as on living apple trees. In the CBER this species also occurs on *Acer platanoides*, *Betula pendula*, *Corylus avellana*, *Euonymus* sp., *Fraxinus excelsior*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix* sp., *Sorbus aucuparia* and *Ulmus* sp., as well as on *Picea abies* and *Pinus sylvestris*.

***Postia subcaesia* (A. David) Jülich**

DISTRIBUTION: **Kursk Region**, Kursky District, Tsentralno-Chernozyomny Nature Reserve, Streletsky area, *Pyrus communis*, 12.09.1999 [34].

ECOLOGY: *P. subcaesia* is a saprotroph on deciduous wood. It causes a brown rot. It was found on *Pyrus communis*. In the CBER this species also occurs on *Acer negundo*, *A. platanoides*, *Alnus glutinosa*, *Corylus avellana*, *Prunus padus*, *Quercus robur* and *Salix* sp.

Fomitopsidaceae

***Antrodia serpens* (Fr.) P. Karst.** – Fig. 1, A.

DISTRIBUTION: **Oryol Region**, Mtsensky District, Volya, *Malus domestica*, 22.08.2019, LE 314811, voucher for the strain LE-BIN 4364.

STRAINS: LE-BIN 4364 (ex basidiospores), *M. domestica*. – The aerial mycelium is white, becoming a creamy gray colour with age. Reverse unchanged. Growing colony edge is pressed. Outline colonies fringed. The colony has plumose texture: mycelial tufts with long groups of hyphae radiating from the central axis. It has no special odour. Growth rate – M. The mycelium has thin-walled hyphae d (1.5) 1.7-2.5 (2.7) µm. Branched generative hyphae, differentiated with septate and rare clamp connections, 3.5-4.8 µm in diameter. Arthroconidia sometimes were observed at the ends of the hyphae.

ECOLOGY: *A. serpens* is a saprotroph on deciduous wood. It causes a brown rot. It was found on the dry dead branch of a living tree of *Malus domestica*.

***Fomitopsis pinicola* (Sw.) P. Karst.**

DISTRIBUTION: **Oryol Region**, Mtsensky District, Volya, *Malus domestica*, 22.08.2019, LE 314812, voucher for the strain LE-BIN 4361; Orlovsky District, Dobryi, *Prunus domestica*, 05.05.2019, coll. T.A. Tsutsupa; Zhilina, *Prunus avium*, 23.08.2019, LE 314813, voucher for the strain LE-BIN 4370. The species is abundant and widely distributed in the CBER.

STRAINS: LE-BIN 4361 (ex basidiocarp), *M. domestica*, LE-BIN 4370 (ex basidiocarp), *P. avium*. – The aerial mycelium is white and downy. Reverse unchanged. Growing colony edge is raised. The colony has a cottony-woolly texture: rather long, single mycelial hyphae spreading in all directions. It has no special odour. Growth rate – M. The hyphal system trimitic. The aerial mycelium has branched generative hyphae (d (1.5) 2.0-3.0 (4.0) µm) with septa and clamp connections (3.5) 5.0-5.8 (6.5) µm in diameter and thick-walled skeletal and binding hyphae (d 2.5-3.5 (4.5) µm), while the submerged mycelium consists of hyaline and branched hyphae (d (1.2) 1.5-2.5 (3.0) µm).

ECOLOGY: *F. pinicola* is a saprotroph on deciduous and coniferous wood or occasionally grows as a pathogen. It causes a brown rot. We recorded it on living trees of *Prunus avium* and *P. domestica*, as well as on a fallen trunk of *Malus domestica*. In the CBER this species is also revelaled on *Alnus glutinosa*, *Betula pendula*, *Corylus avellana*, *Fraxinus excelsior*, *Populus tremula*, *Quercus robur* and *Tilia cordata*, as well as *Picea abies* and *Pinus sylvestris*.

Hyphodermataceae

***Hyphoderma mutatum* (Peck) Donk**

DISTRIBUTION: **Lipetsk Region**, Krasninsky District, Znamenka, *Malus domestica*, 12.08.2020, LE 314817, voucher for the strain LE-BIN 4401. **Oryol Region**, Glazunovsky District, Lovchikovo, *M. domestica*, 21.08.2019, LE 305033; Orlovsky District, Zhilina, *M. domestica*, 23.08.2019, LE 305032.

STRAINS: LE-BIN 4401 (ex basidiospores), *M. domestica*. – The aerial mycelium is white, becoming a creamy colour with age. Reverse bleached. Growing colony edge is pressed. Outline colonies fringed. The colony has a plumose texture: mycelial tufts with long groups of hyphae radiating from the central axis. It has no special odour. Growth rate – M. Hyphal system monomitic. The mycelium has thin-walled hyphae d 1.5-3.0 µm with rare sprouting clamps 3.5-5.5 µm in diameter. Crystals were observed in pure cultures.

ECOLOGY: *H. mutatum* is a saprotroph on deciduous wood. It was recorded on fallen branches and dry dead branches of a living tree of *Malus domestica* infected by *Sarcodontia crocea*. In CBER this species also occurs on *Acer platanoides*, *Alnus glutinosa*, *Corylus avellana*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix* sp., *Sorbus aucuparia* and *Tilia cordata*.

Irpicaceae

***Byssomerulius corium* (Pers.) Parmasto**

DISTRIBUTION: **Belgorod Region**, Shebekinsky District, Titovka, *Malus sylvestris*, 18.08.2019, LE 314147 [45]. **Oryol Region**, Orlovsky District, Luzhki, *M. domestica*, 31.05.2009, coll. N.I. Grechikhina, OHHI 445 [26]. The species is common in the CBER.

ECOLOGY: *B. corium* is a saprotroph on deciduous wood and occasionally grows as a pathogen. It was found on living trees of *Malus domestica* and on dry branches of

M. sylvestris. In the CBER this species also occurs on *Acer negundo*, *A. platanoides*, *Alnus glutinosa*, *Corylus avellana*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix* sp., *Sorbus aucuparia*, *Tilia cordata*, *Ulmus glabra* and *U. laevis*.

***Candelabrochaete septocystidia* (Burt) Burds.**

DISTRIBUTION: **Oryol Region**, Mtsensky District, Volya, *Malus domestica*, 22.08.2019, LE 305027.

ECOLOGY: the species is a saprotroph on deciduous wood. It was recorded on a dry standing tree of *Malus domestica*. In CBER it also revealed only on *Quercus robur* [26].

***Ceriporia purpurea* (Fr.) Donk**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area, *Malus* sp., 06.11.2015, LE 311633 [41]. **Oryol Region**, Mtsensky District, Peredovik, *Pyrus communis*, 14.06.2009, LE 284602 [36].

ECOLOGY: *C. purpurea* is a saprotroph on deciduous wood. It causes a white rot. We found it on a fallen branch of *Malus* sp. and on dry standing *Pyrus communis*. In the CBER this species is also recorded on *Acer platanoides*, *Populus tremula*, *Quercus robur* and *Salix* sp.

***Ceriporia torpida* Spirin & Miettinen** – Fig. 1, C.

DISTRIBUTION: **Lipetsk Region**, Krasninsky District, Znamenka, *Malus domestica*, 12.08.2020, LE 314819, voucher for the strain LE-BIN 4403, LE 314820, voucher for the strain LE-BIN 4407. **Oryol Region**, Glazunovsky District, Lovchikovo, *M. domestica*, 21.08.2019, LE 305028, LE 314818, voucher for the strain LE-BIN 4356.

STRAINS: LE-BIN 4356 (ex basidiospores), *M. domestica*, LE-BIN 4403 (ex basidiospores), *M. domestica*, LE-BIN 4407 (ex basidiospores) and *M. domestica*. – The aerial mycelium is white (becomes a greyish-cream colour with age). Reverse unchanged. Growing colony edge is immersed. The colony has a cottony texture: rather long, single mycelial hyphae spreading all directions. It has no special odour. Growth rate – M. Hyphal system monomitic. The mycelium has thin-walled and branched hyphae d 2.2-4.8 µm forming frequent curling. Lateral branching hyphae d 0.6-1.3 µm were observed for the tested strain.

ECOLOGY: *C. torpida* is a saprotroph on deciduous wood. It causes a white rot. We found it on dry standing trees and dry dead branches of living trees of *Malus domestica* attacked by *Sarcodontia crocea*.

***Ceriporia viridans* (Berk. & Broome) Donk**

DISTRIBUTION: **Oryol Region**, Mtsensky District, Volya, *Malus domestica*, 22.08.2019, LE 305030; Orlovsky District, Zhilina, *M. domestica*, 15.08.2019, LE 305029.

ECOLOGY: the species is a saprotroph on deciduous and coniferous wood. It causes a white rot. It was recorded on dry branches and on a dry standing tree of *Malus domestica*. In CBER it also revealed on *Acer platanoides*, *Populus tremula* and *Quercus robur*.

***Irpex lacteus* (Fr.) Fr.** – Fig. 1, E.

DISTRIBUTION: **Belgorod Region**, Korochansky District, Popovka, *Prunus cerasus*, 19.08.2019, LE 314822, voucher for the strain LE-BIN 4341. **Oryol Region**, Glazunovsky District, Lovchikovo, *Malus domestica*, 01.08.2011, LE 298965 [26]; Orlovsky District, Zhilina, *Prunus armeniaca*, 15.08.2019, OHHI 1406, *P. avium*, 15.08.2019, OHHI 1414, *P. cerasus*, 13.08.2019, LE 314821; Oryol, regional natural monument, Balka Neprets, *M. domestica*, 16.08.2012, LE 298998 [26]. The species is common and widely disributed in the CBER.

STRAINS: LE-BIN 4341 (ex basidiospores), *P. cerasus*. – The aerial mycelium is white. Reverse bleached. Growing edge of the colonies is high. Mycelial mat is cottony woolly: rather long, small hyphal tufts, standing out from the agar in all directions. It has no special odour. Growth rate – F. Hyphal system monomitic. Aerial hyphae of 1.5-4.0 µm wide, thin-walled. Interlocking hyphae sometimes present, never abundant.

ECOLOGY: *I. lacteus* is predominantly a saprotroph on deciduous wood but occasionally grows as a pathogen. It causes a white rot. According to our data this species occurs on living branches and fallen trunks of *Malus domestica* and on living branches and trunks of *Prunus armeniaca*, *P. avium* and *P. cerasus*. In the CBER this species is also recorded on *Acer platanoides*, *Betula pendula*, *Corylus avellana*, *Fraxinus excelsior*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix* sp., *Sorbus aucuparia*, *Tilia cordata* and *Ulmus* sp.

***Raduliporus aneirinus* (Sommerf.) Spirin & Zmitr.**

DISTRIBUTION: **Lipetsk Region**, Krasninsky District, Znamenka, *Malus domestica*, 12.08.2020, LE 314823, voucher for the strain LE-BIN 4404.

ECOLOGY: *R. aneirinus* is a saprotroph on deciduous wood. It causes a white rot. We collected basidiocarps of this species on dry branches of living trees of *Malus domestica*. In the CBER this species also recorded on *Populus tremula*.

Laetiporaceae

***Laetiporus sulphureus* (Bull.) Murrill**

DISTRIBUTION: **Kursk Region**, Kursk, *Pyrus communis*, 15.09.1906 [29], 20.09.1906, LE 26870, 01.07.1911, LE 26852, all coll. and det. A.S. Bondartsev. **Oryol Region**, Oryol, *Malus domestica*, 24.05.2020.

ECOLOGY: *L. sulphureus* is a saprotroph on deciduous wood or occasionally grows as a pathogen. Causes a brown rot. It was found on living *Pyrus communis* as well as on stumps of *Malus domestica*. In the CBER this species also occurs on *Acer platanoides*, *Betula pendula*, *Fraxinus excelsior*, *Populus tremula*, *Quercus robur* and *Salix* sp.

Meruliaceae

***Aurantiporus fissilis* (Berk. & M.A. Curtis) H. Jahn ex Ryvarden** – Fig. 1, B.

DISTRIBUTION: **Kursk Region**, Kursk, *Malus domestica*, 05.07.1906, LE 27362, 20.07.1907, LE 27349, LE 27379 [29, as *Polyporus spumeus* (Sowerby) Fr.] (redet. in [24]), 20.09.1927, LE 27376, 16.08.1950, coll. Shumakova, LE 27352 [24]. **Oryol Region**, Mtsensky District, Volya, *M. domestica*, 22.08.2019, LE 305026; Znamensky District, Orlovskoye Polesye National Park, Yelyonka, *M. domestica*, 17.07.2011, LE 298528 [38].

ECOLOGY: *A. fissilis* is a pathogen and saprotroph on deciduous wood, causing a white rot. According to our data, it occurs on living and dry standing trees of *Malus domestica*. In the CBER this species is usually associated with *Populus tremula* and is also recorded on *Fraxinus excelsior* and *Salix* sp. *M. domestica*, in our opinion, is the second most preferred substrate.

***Phlebia rufa* (Pers.) M.P. Christ.**

DISTRIBUTION: **Lipetsk Region**, Krasninsky District, Znamenka, *Malus domestica*, 12.08.2020, LE 314825. **Oryol Region**, Mtsensky District, Volya, *M. domestica*,

14.08.2019, LE 314824. The species is common in the CBER.

ECOLOGY: *Ph. rufa* is a saprotroph on deciduous, more rarely on coniferous wood, or occasionally grows as a pathogen. It was recorded on the living trunks and dry dead branches of *Malus domestica*. In the CBER this species also occurs on *Acer platanoides*, *Betula pendula*, *Corylus avellana*, *Fraxinus excelsior*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix* sp. and *Tilia cordata*, as well as on *Picea abies* and *Pinus sylvestris*.

***Phlebia tremellosa* (Schrad.) Nakasone & Burds.**

DISTRIBUTION: **Oryol Region**, Glazunovsky District, Lovchikovo, *Malus domestica*, 21.08.2019, LE 314826; Mtsensky District, Volya, *M. domestica*, 22.08.2019, OHHI 1460.

ECOLOGY: *Ph. tremellosa* is a saprotroph on deciduous, less often on coniferous wood, or occasionally grows as a pathogen. We recorded it at the base of living trunks and on living trees of *Malus domestica*. In the CBER this species is also revealed in *Betula pendula*, *Juglans* sp., *Populus tremula*, *Quercus robur*, *Salix* sp. and *Sorbus aucuparia*.

***Sarcodontia crocea* (Schwein.) Kotl.** (=*Hydnum schiedermayeri* Heufl.; *Sarcodontia setosa* (Pers.) Donk) – Fig. 1, I.

DISTRIBUTION: **Belgorod Region**, Borisovsky District, Belogorye Nature Reserve, Les na Vorskle area, *Malus domestica*, 13-14.08.1940 [31], *Pyrus communis*, 18.08.2011, LE 302180 [39]; Korochansky District, Popovka, *M. domestica*, 19.08.2019, LE 314119, voucher for the strain LE-BIN 4343, LE 314120, voucher for the strain LE-BIN 4346, LE 314827, voucher for the strain LE-BIN 4342 [20; 53]. **Kursk Region**, Fatezhsky District, Fatezh, *M. domestica*, 15.07.1903 [28]; Kursk, *M. domestica*, 10.08.1903 [28]; Zolotukhinsky District, Oklino, *M. domestica*, 15.08.2020, LE 305010, voucher for the strain LE-BIN 4411. **Lipetsk Region**, unspecified locality – [Tambov Governorate, Romanovskoye forestry], *M. domestica*, 10.11.1919, coll. and det. S.I. Vanin, LE 23643; Krasninsky District, Znamenka, *M. domestica*, 12.08.2020, LE 305011, voucher for the strain LE-BIN 4398, LE 305012, voucher for the strain LE-BIN 4399, LE 305013, voucher for the strain LE-BIN 4400, LE 305014, voucher for the strain LE-BIN 4402, LE 305015, voucher for the strain LE-BIN 4408, LE 305046, voucher for the strain LE-BIN 4406, LE 305047, voucher for the strain LE-BIN 4414. **Oryol Region**, Glazunovsky District, Lovchikovo, *M. domestica*, 10.08.2011, LE 298955 [26], 21.08.2019, LE 314828, voucher for the strain LE-BIN 4347, LE 314829, voucher for the strain LE-BIN 4348, LE 314830, voucher for the strain LE-BIN 4349, LE 314831, voucher for the strain LE-BIN 4350 [53], LE 314832, voucher for the strain LE-BIN 4351, LE 314833, voucher for the strain LE-BIN 4353, LE 314834, voucher for the strain LE-BIN 4355 [53], LE 314835, voucher for the strain LE-BIN 4357, LE 314836, voucher for the strain LE-BIN 4396; Mtsensky District, Spasskoye-Lutovinovo, *M. domestica*, 22.07.2013, LE 299010 [26], Volya, *M. domestica*, 22.08.2019, LE 305000, voucher for the strain LE-BIN 4358, LE 305001, voucher for the strain LE-BIN 4359, LE 305002, voucher for the strain LE-BIN 4363, LE 305003, voucher for the strain LE-BIN 4365 [53], LE 305004, voucher for the strain LE-BIN 4367 [53], LE 305005, voucher for the strain LE-BIN 4395; Orlovsky District, Zhilina, *M. domestica*, 23.08.2019, LE 305006, voucher for the strain LE-BIN 4378 [53], LE 305007, voucher for the strain LE-BIN 4382, LE 305008, voucher for the strain LE-BIN 4383, LE 305009, voucher for the strain LE-BIN 4393; Verkhovsky District, Turovka, *M. domestica*, 12.08.2012, LE 298790 [54]; unspecified locality – [Oryol Governorate], *M. domestica*, 17.08.1916, coll. A.S. Bondartsev, det. T.L. Nikolajeva, LE 23644. **Voronezh Region**, Nizhnedevitsky District, Goncharovka, *M. domestica*, 01.08.1912; Ostrogozhsky District, Sinelnikovo, *M. domestica*, 13.07.1912; Semiluksky District, Zemlyansk, *M. domestica*, 28.07.1912 [30]. The species is abundant and widely distributed in orchards in the CBER.

STRAINS: ex basidiospores – LE-BIN 4342, 4343, 4346, 4348, 4349, 4351, 4353, 4357, 4359, 4363, 4365, 4378, 4382, 4383, 4393, 4396, ex basidiocarps – LE-BIN 4347, 4350, 4355, 4358, 4367, 4395, 4398, 4399, 4400, 4402, 4406, 4408, 4411, 4414, all strains from *M. domestica*. – The aerial mycelium is white or creamy (with age can become from dark-creamy to lemon-yellow and pink orange). Reverse unchanged (less often bleached). Growing colony edge pressed. Outline of colonies ranges from fringed (sometimes broken) to wavy and occasionally smooth. Mycelial mat most commonly has an approximately zonal (sometimes immersed) development. The colony most often has a floccose or floccose-cottony texture with small hyphal tufts, standing out from the agar (less often plumose texture). Odour is very intense; strong, sweetish-fruity. Growth rate – S (less often M). Hyphal system monomitic. The mycelium most commonly has thin-walled and branched hyphae (d – 1.5 (4.0)-2.7 (6.0) µm) sometimes forming anastomosis. Branched generative hyphae, differentiated with septate and clamp connections, 3.5 (6.5)-4.5 (9.5) µm in diameter. Occasionally there were observed chlamydospores broadly ellipsoid (width – 4.0 (5.0)-5.5 (6.6) µm, length – 10.0 (15.0)-17.0 (24.0) µm) or globose chlamydospores (10.0-16.0 µm in diameter). Detailed descriptions of some strains are presented in Shakhova and Volobuev [53].

ECOLOGY: *S. crocea* is the most abundant pathogen of *Malus* trees. It was found on living and dry standing trees of *Malus domestica*. We also found it once on dry standing *Pyrus communis* [39]. In the CBER this species is also recorded only on *Acer platanoides* in Oryol Region [55].

***Scopuloides rimosa* (Cooke) Jülich**

DISTRIBUTION: **Oryol Region**, Mtsensky District, Volya, *Malus domestica*, 22.08.2019, LE 305048.

ECOLOGY: the species is a saprotroph on wood of deciduous trees, rarely on coniferous wood. It was recorded on fallen branches of *Malus domestica*. In the CBER *S. rimosa* is also registered on *Acer platanoides*, *Alnus glutinosa*, *Betula pendula*, *Populus tremula*, and on dead basidiocarps of *Phylloporia ribis*.

Phanerochaetaceae

***Bjerkandera adusta* (Willd.) P. Karst.**

DISTRIBUTION: **Belgorod Region**, Korochansky District, Korocha, *Pyrus* sp, 06.08.1915, coll. L.A. Lebedeva, det. A.S. Bondartsev, LE 26208 [20]. **Oryol Region**, Orlovsky District, Luzhki, *Malus* sp., 03.05.2009, coll. N.I. Grechikhina, OHHI 449 [26]. The species is abundant and widely distributed in the CBER.

ECOLOGY: *B. adusta* is a saprotroph on mostly deciduous wood or occasionally grows as a pathogen. It causes a white rot. It occurs on fallen, dry standing and living trunks of *Malus* sp. and *Pyrus* sp. In the CBER this species also occurs on a wide range of deciduous hosts – on *Acer negundo*, *A. platanoides*, *Alnus glutinosa*, *Betula pendula*, *Corylus avellana*, *Fraxinus excelsior*, *Populus nigra*, *P. tremula*, *Prunus padus*, *Quercus robur*, *Salix* sp., *Tilia cordata* and *Ulmus* sp., as well as on *Pinus sylvestris* and timber wood.

***Bjerkandera fumosa* (Pers.) P. Karst.**

DISTRIBUTION: **Kursk Region**, Oboyansky District, Tsentralno-Chernozyomny Nature Reserve, Zorinsky area, *Pyrus communis*, 14.09.1999 [34]. **Lipetsk Region**, *Malus* sp. [25; 42]. The species is common in the CBER.

ECOLOGY: *B. fumosa* is a saprotroph on deciduous wood or occasionally grows as a pathogen. It causes a white rot. It was recorded on stumps of *Pyrus communis* and on the wood of *Malus* sp. In the CBER this species is also found on *Acer negundo*, *A. platanoides*, *Betula pendula*, *Corylus avellana*, *Fraxinus excelsior*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix* sp., *Tilia cordata* and *Ulmus* sp.

***Hapalopilus rutilans* (Pers.) Murrill** (=*H. nidulans* (Fr.) P. Karst.)

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area. **Kursk Region**, Gorshechensky District, Tsentralno-Chernozyomny Nature Reserve, Barkalovka area; Kursky District, Tsentralno-Chernozyomny Nature Reserve, Streletsky area; Manturovsky District, Tsentralno-Chernozyomny Nature Reserve, Bukreyevy Barmy area Medvensky District, Tsentralno-Chernozyomny Nature Reserve, Kazatsky area [33].

ECOLOGY: *H. rutilans* is a saprotroph on deciduous wood, causing a white rot. It was found on trunks and stumps of *Pyrus* sp. and *Malus* sp. In the CBER the species was found on *Betula pendula*, *B. pubescens*, *Caragana arborescens*, *Corylus avellana*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix* sp., *Sorbus aucuparia* and *Tilia cordata*.

***Phanerochaete calotricha* (P. Karst.) J. Erikss. & Ryvarden**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area, *Prunus spinosa*, 06.11.2015, LE 311656 [41].

ECOLOGY: *Ph. calotricha* is a saprotroph on deciduous or coniferous wood. It was recorded on a fallen branch of *Prunus spinosa*. In the CBER this species is also recorded on *Corylus avellana*, *Prunus padus* and *Rosa* sp.

***Phanerochaete galactites* (Bourdot & Galzin) J. Erikss. & Ryvarden**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area, *Prunus spinosa*, 06.11.2015, LE 314947 [41].

ECOLOGY: *Ph. galactites* is a saprotroph on deciduous or coniferous wood. It was found on a fallen trunk of *Prunus spinosa*. In the CBER this species also occurs on *Acer platanoides*, *Betula pendula*, *Prunus padus* and *Quercus robur*.

***Phanerochaete jose-ferreirae* (D.A. Reid) D.A. Reid**

DISTRIBUTION: **Oryol Region**, Verkhovsky District, Turovka, *Malus* sp., 12.08.2012, LE 298800 [54].

ECOLOGY: *Ph. jose-ferreirae* is a saprotroph on deciduous wood. It was found on dry branches of *Malus* sp. In CBER this species also occurs on *Quercus robur*, *Prunus padus* and *Salix* sp.

***Phanerochaete livescens* (P. Karst.) Volobuev & Spirin**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area, *Malus* sp., 06.11.2015, LE 311628 [41]. **Lipetsk Region**, Krasninsky District, Znamenka, *M. domestica*, 12.08.2020, LE 305016.

ECOLOGY: *Ph. livescens* is a saprotroph on deciduous wood. It was found on fallen branches of *Malus* sp. and on dry dead standing *Malus domestica*. In the CBER this species also occurs on *Acer platanoides*, *Corylus avellana* and *Quercus robur*.

***Phanerochaete velutina* (DC.) P. Karst.**

DISTRIBUTION: **Oryol Region**, Verkhovsky District, Turovka, *Pyrus* sp., 11.08.2012, LE 298834 [54].

ECOLOGY: *Ph. velutina* is a saprotroph on deciduous and coniferous wood. It was found on the bark of living *Pyrus* sp. In the CBER this species occurs on *Alnus glutinosa*, *Betula pendula*, *Populus tremula*, *Prunus padus*, *Quercus robur* and *Tilia cordata*, as well as *Picea abies* and *Pinus sylvestris*.

***Porostereum spadiceum* (Pers.) Hjortstam & Ryvarden**

DISTRIBUTION: **Lipetsk Region**, Krasninsky District, Znamenka, *Malus domestica*, 12.08.2020, LE 305022.

ECOLOGY: *P. spadiceum* is a saprotroph on deciduous wood. It was recorded on dry branches of *Malus domestica*. In the CBER this species also occurs on *Acer negundo*, *Fraxinus excelsior*, *Populus tremula*, *Quercus robur* and *Tilia cordata*.

Polyporaceae

***Cerioporus leptocephalus* (Jacq.) Zmitr.** (=*Polyporus varius* (Pers.) Fr.)

DISTRIBUTION: **Belgorod Region**, Borisovsky District, Belogorye Nature Reserve, Les na Vorskle area, *Pyrus communis*, 19.08.2011 [39].

ECOLOGY: *C. leptocephalus* is a saprotroph on deciduous wood, causing a white rot. It was recorded on dry branches of *Pyrus communis*. In the CBER this species occurs on *Betula pendula*, *Corylus avellana*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix* sp. and *Tilia cordata*, as well as on *Picea abies*.

***Cerioporus squamosus* (Huds.) Quél.**

DISTRIBUTION: **Lipetsk Region**, Zadonsky District, Galichya Gora Nature Reserve, Morozova Gora area, *Malus* sp., 02.08.2007, coll. and det. L.A. Sarycheva, VU 4110 [25; 42].

ECOLOGY: *C. squamosus* is a saprotroph on deciduous wood or occasionally grows as a pathogen. It causes a white rot. It was found at the base of a living *Malus* sp. trunk. In CBER this species also occurs on *Acer platanoides*, *Betula pendula*, *Fraxinus excelsior*, *Populus tremula*, *Quercus robur*, *Salix* sp., *Tilia cordata*, *Ulmus glabra* and *U. laevis*.

***Dichomitus campestris* (Quél.) Domański & Orlicz**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogor'ye Nature Reserve, Yamskaya Steppe area, *Malus* sp., 06.11.2015, LE 311617 [41]. **Kursk Region**, Fatezhsky District, Rzhava, *Pyrus communis*, 15.08.2020, LE 305031.

ECOLOGY: *D. campestris* is a saprotroph on deciduous wood or occasionally grows as a pathogen. It causes a white rot. It was recorded on dry branches of living *Malus* sp. and *Pyrus communis*. In the CBER this species also occurs on *Corylus avellana*, *Prunus padus* and *Quercus robur*.

***Fomes fomentarius* (L.) Fr.**

DISTRIBUTION: **Kursk Region**, Kursk, *Prunus domestica*, 01.06.1905 [29]. The species is abundant and widely distributed in CBER.

ECOLOGY: *F. fomentarius* is a pathogen and saprotroph on deciduous wood or more rarely on coniferous wood. It causes a white rot. It was recorded on stumps of *Prunus domestica*. In the CBER this species occurs on *Acer platanoides*, *Alnus glutinosa*, *Betula pendula*, *Fraxinus excelsior*, *Populus tremula*, *Quercus robur*, *Robinia pseudoacacia*, *Salix caprea*, *Tilia cordata* and *Ulmus* sp., as well as *Pinus sylvestris*.

***Funalia trogii* (Berk.) Bondartsev & Singer**

DISTRIBUTION: **Oryol Region,** Orlovsky District, Dobryi, *Prunus armeniaca*, 05.05.2019, coll. T.A. Tsutsupa, LE 305051. The species is a widespread in CBER.

ECOLOGY: *F. trogii* is a saprotroph on deciduous wood or occasionally grows as a pathogen. It causes a white rot. The species was collected on a living tree of *Prunus armeniaca*. In the CBER it also known on *Acer negundo*, *A. platanoides*, *Alnus* sp., *Corylus avellana*, *Fraxinus excelsior*, *Populus nigra*, *P. tremula*, *Quercus robur*, *Salix* sp.

***Ganoderma applanatum* (Pers.) Pat.**

DISTRIBUTION: **Lipetsk Region**, Yeletsky District, Galichya Gora Nature Reserve, Vorgolskoye area, *Malus* sp., 29.08.2020, coll. and det. L.A. Sarycheva, VU 4953. The species is a common and widespread in CBER.

ECOLOGY: *G. applanatum* is a saprotroph on deciduous wood or occasionally grows as a pathogen. It was recorded on stumps of *Malus* sp. In the CBER this species occurs on *Acer platanoides*, *Alnus glutinosa*, *Betula pendula*, *Fraxinus excelsior*, *Populus* sp., *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix* sp., *Tilia cordata*, *Ulmus* sp., *Ulmus campestris* and *Ulmus glabra*.

***Ganoderma lucidum* (Curtis) P. Karst.**

DISTRIBUTION: **Lipetsk Region**, *Malus* sp. [25].

ECOLOGY: *G. lucidum* is a saprotroph on coniferous and deciduous wood. It causes a white rot. It was recorded on stumps of *Malus* sp. In the CBER this species also occurs on *Alnus glutinosa*, *Quercus robur* and *Larix decidua*.

***Lentinus substrictus* (Bolton) Zmitr. & Kovalenko** (= *Polyporus ciliatus* Fr.)

DISTRIBUTION: **Kursk Region**, Kursky District, Tsentralno-Chernozyomny Nature Reserve, Streletsky area, *Pyrus communis*, 26.05.2001, coll. T.N. Barsukova, LE 303253 [40]. **Lipetsk Region**, Zadonsky District, Galichya Gora Nature Reserve, Morozova Gora area, *Prunus cerasus,* 21.10.2002, coll. and det. L.A. Sarycheva, VU 3730 [25].

ECOLOGY: *L. substrictus* is a saprotroph on deciduous or rarely on coniferous wood. Causes a white rot. It was recorded on fallen *Pyrus communis* and on stumps of *Prunus cerasus*. In the CBER this species occurs on *Betula pendula*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix* sp., *Sorbus aucuparia*, *Tilia cordata* and on timber wood.

***Polyporus tuberaster* (Jacq. ex Pers.) Fr.**

DISTRIBUTION: **Kursk Region**, Oboyansky District, Tsentralno-Chernozyomny Nature Reserve, Zorinsky area, *Pyrus communis*, 15.09.1999 [34].

ECOLOGY: *P. tuberaster* is a saprotroph on deciduous wood. It causes a white rot. It was recorded on fallen branches of *Pyrus communis*. In the CBER this species also occurs on *Acer negundo*, *Corylus avellana*, *Quercus robur* and *Salix* sp.

***Trametes hirsuta* (Wulfen) Lloyd**

DISTRIBUTION: **Belgorod Region**, Borisovsky District, Belogorye Nature Reserve, Les na Vorskle area, *Malus domestica*, 18.08.2011, LE 302193 [39]; Korochansky District, Popovka, *M. domestica*, 19.08.2019, LE 314116 [20]. **Kursk Region**, Kursky District, Tsentralno-Chernozyomny Nature Reserve, Streletsky area, *Pyrus communis*, 12.09.1999 [34]; Shchigrovsky District, Shchigry, *M. domestica*, 15.08.1911, LE 19155. **Oryol Region**, Mtsensky District, Spasskoye-Lutovinovo, *Malus* sp., 01.05.2008, OHHI 180 [36]; Orlovsky District, Dobryi, *M. domestica*, 19.05.2019, LE 314814, Zhilina, *Pyrus communis*, 13.08.2019, LE 305017, *Prunus armeniaca*, *P. avium*, *P. cerasus*, 15.08.2019. The species is abundant and widely distributed in CBER.

ECOLOGY: *T. hirsuta* is a saprotroph on deciduous or more rarely on coniferous wood or occasionally grows as a pathogen. It causes a white rot. It was revealed on living and dry standing trunks of *Malus domestica* and *Prunus avium*, on living trees of *Pyrus communis* and *Prunus armeniaca* and on dry branches of living *Prunus cerasus*. In the CBER this species also occurs on *Acer negundo*, *A. platanoides*, *Betula pendula*, *Corylus avellana*, *Fraxinus excelsior*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix* sp., *Sorbus aucuparia*, *Tilia cordata*, *Viburnum opulus* and on timber wood.

***Trametes ochracea* (Pers.) Gilb. & Ryvarden**

DISTRIBUTION: **Kursk Region**, Oboyansky District, Tsentralno-Chernozyomny Nature Reserve, Zorinsky area, *Pyrus communis*, 27.10.1999 [34]. **Oryol Region**, Glazunovsky District, Lovchikovo, *Malus domestica*, 21.08.2019, strain LE-BIN 4354; Mtsensky District, Peredovik, *Malus* sp., 31.07.2008, OHHI 173 [36]; Orlovsky District, Dobryi, *M. domestica*, 05.05.2019, OHHI 1462, Luzhki, *Pyrus* sp., 05.10.2008, coll. N.I. Grechikhina, OHHI 437 [26], Zhilina, *Prunus armeniaca*, 23.08.2019, LE 305020, voucher for the strain LE-BIN 4377, *P. cerasus*, 15.08.2019. The species is abundant and widely distributed in the CBER.

STRAINS: LE-BIN 4354 (ex basidiospores), *M. domestica*, LE-BIN 4377 (ex basidiospores), *P. armeniaca*. – The aerial mycelium is white. Reverse bleached. Growing colony edge is appressed to raised, hyphae rather distant. Outline of colonies from smooth to wavy. The colony has a felty-farinaceous texture with cottony, which has become packed. Odour is very intense, mushroom-like (some strains are without any special odour). Growth rate – (M) F. Hyphal system dimitic. Generative hyphae (1.3) 1.5-3.5 (6.0) µm wide. Generative hyphae, differentiated with rare clamp connections, (4.5) 5.0-6.5 (9.5) µm in diameter. Skeletal hyphae 1.5-4.5 µm wide, rarely branched.

ECOLOGY: *T. ochracea* is a saprotroph on deciduous or very rarely on coniferous wood or occasionally grows as a pathogen. It causes a white rot. It was found on stumps of *Malus* sp., on branch and dry standing trunks of *Pyrus communis* and on living trees of *Malus domestica*, *Prunus armeniaca* and *P. cerasus*. In the CBER this species occurs on *Acer negundo*, *A. platanoides*, *Betula pendula*, *Corylus avellana*, *Fraxinus excelsior*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix* sp., *Salix caprea* and *Ulmus* sp., as well as *Picea abies*.

***Trametes pubescens* (Schumach.) Pilát**

DISTRIBUTION: **Oryol Region**, Orlovsky District, Luzhki, *Prunus domestica*, 30.03.2007, coll. V.A. Nikolaev, OHHI 170 [26].

ECOLOGY: *T. pubescens* is a saprotroph on deciduous wood. It causes a white rot. It was recorded on a saw-cutted trunk of *Prunus domestica*. In the CBER this species also occurs on *Acer platanoides*, *Betula pendula*, *B. pubescens*, *Corylus avellana*, *Populus tremula*, *Prunus padus* and *Quercus robur*.

***Trametes versicolor* (L.) Lloyd**

DISTRIBUTION: **Belgorod Region**, Borisovsky District, Belogorye Nature Reserve, Les na Vorskle area, *Pyrus communis*, 28.04.1938 [31]. **Oryol Region**, Glazunovsky District, Lovchikovo, *Malus domestica*, 21.08.2019; Mtsensky District, Volya, *Malus domestica*, 22.08.2019, strain LE-BIN 4366; Orlovsky District, Zhilina, *Prunus avium*, 13.08.2019, *P. cerasus*, 23.08.2019, strain LE-BIN 4371.

STRAINS: LE-BIN 4366 (ex basidiocarp), *M. domestica*, LE-BIN 4371 (ex basidiospores), *Prunus cerasus*. The aerial mycelium is white. Reverse unchanged (some strains have bleached reverse). Growing colony edge is appressed, hyphae rather distant. Outline colonies from smooth to fringed. The colony has a cottony-felty texture: wooly mycelium, which becomes matted. Some strains have a zonate texture. It has no special odour. Growth rate – F. Hyphal system monomitic. The mycelium consists of generative hyphae 2.3-4.5 (6.5) µm in diameter. Generative hyphae, differentiated with rare clamp connections, (3.3) 5.0-9.5 µm in diameter. Encrusted hyphae sometimes were observed in the tested strain in pure cultures.

ECOLOGY: *T. versicolor* is a saprotroph on deciduous or rarely on coniferous wood or occasionally grows as a pathogen. It causes a white rot. It was recorded on the living trunks of *Malus domestica*, on rotten fallen trunks of *Pyrus communis* and on living trunks of *Prunus avium* and *P. cerasus*. In the CBER this species also occurs on *Acer platanoides*, *Alnus glutinosa*, *Betula pendula*, *Corylus avellana*, *Fraxinus excelsior*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix caprea*, *Sorbus aucuparia*, *Tilia cordata* and *Ulmus laevis*.

***Tyromyces chioneus* (Fr.) P. Karst. (=*Tyromyces albellus* (Peck) Bondartsev & Singer)**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area. **Kursk Region**, Gorshechensky District, Tsentralno-Chernozyomny Nature Reserve, Barkalovka area; Kursky District, Tsentralno-Chernozyomny Nature Reserve, Streletsky area; Manturovsky District, Tsentralno-Chernozyomny Nature Reserve, Bukreyevy Barmy area Medvensky District, Tsentralno-Chernozyomny Nature Reserve, Kazatsky area [33].

ECOLOGY: *T. chioneus* is a saprotroph on deciduous or more rarely on coniferous wood. It causes a white rot. It was recorded on *Malus* sp. and *Pyrus* sp. In the CBER this species is also found on *Acer platanoides*, *Betula pendula*, *Corylus avellana*, *Populus tremula*, *Quercus robur* and *Salix* sp.

Steccherinaceae

***Steccherinum fimbriatum* (Pers.) J. Erikss.**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area, *Malus* sp., *Prunus spinosa*, 06.11.2015, LE 311659 [41].

ECOLOGY: *S. fimbriatum* is a saprotroph on deciduous and less often on coniferous wood. It was found on fallen branches of *Malus* sp. and on fallen branches of *Prunus spinosa*. In the CBER this species alsonoccurs on *Acer platanoides*, *Betula pendula*, *Corylus avellana*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix* sp. and *Tilia cordata*, as well as on *Picea abies* and *Pinus sylvestris*.

***Steccherinum ochraceum* (Pers. ex J.F. Gmel.) Gray**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area, *Prunus spinosa*, 06.11.2015, OHHI 1330 [41].

ECOLOGY: *S. ochraceum* is a saprotroph on deciduous and rarely on coniferous wood. It was recorded on fallen branches and trunks of *Prunus spinosa*. In the CBER this species alsooccurs on *Acer platanoides*, *Alnus glutinosa*, *Betula pendula*, *Corylus avellana*, *Fraxinus excelsior*, *Populus tremula*, *Prunus padus*, *Quercus robur* and *Salix* sp., as well as on *Pinus sylvestris* and on dead basidiocarps of *Fomes fomentarius*.

Polyporales genera incertae sedis

***Spongipellis spumea* (Sowerby) Pat.**

DISTRIBUTION: **Lipetsk Region**, Krasninsky District, Galichya Gora Nature Reserve, Plyushchan' area, *Malus* sp., 29.09.2016, coll. and det. L.A. Sarycheva, VU 4720 [42]. Unspecified locality – [Tambov Governorate], *Malus* sp., 28.07.1915, LE 26929.

ECOLOGY: *S. spumea* is a pathogen and saprotroph on deciduous wood. It causes a white rot. It was found on living *Malus* sp. In the CBER this species also occurs on *Acer platanoides*, *Fraxinus excelsior*, *Populus tremula*, *Quercus robur*, *Tilia cordata* and *Ulmus* sp.

A.S. Bondartsev noted [24] that he had previously misidentified *Aurantiporus fissilis* from fruit trees in the Kursk Governorate as *S. spumea*. In our opinion, the above references of *S. spumea* actually refer to *A. fissilis* but unfortunately there was no possibility to study the specimens.

RUSSULALES

Peniophoraceae

***Peniophora cinerea* (Pers.) Cooke**

DISTRIBUTION: **Belgorod Region**, Shebekinsky District, Titovka, *Pyrus communis*, 18.08.2019, LE 314156, voucher for the strain LE-BIN 4336 [45]. **Kursk Region**, Fatezhsky District, Rzhava, *Pyrus communis*, 15.08.2020, LE 305038; Kursky District, Kursk, *Pyrus* sp., 25.05.1908, coll. and det. A.S. Bondartsev, LE 35326. **Oryol Region**, Orlovsky District, Zhilina, *Pyrus communis*, 13.08.2019, LE 305039; Verkhovsky District, Turovka, *Malus* sp., 12.08.2012, LE 298786 [54]. The species is abundant and widely distributed in the CBER.

STRAINS: LE-BIN 4336 (ex basidiospores), *P. communis*. – The aerial mycelium is white becoming creamy-beige with age. Reverse unchanged. Growing colony edge is pressed. Mycelial mat is felty: wooly mycelium, which has become matted. It has no special odour. Growth rate – F. Hyphal system monomitic. Aerial hyphae of 1.5-3.0 µm wide, thin-walled. Submerged hyphae from 2.5 to 4.5 µm wide. Crystals were observed for the tested strain in pure cultures. Generative hyphae, differentiated with rare clamp connections, d 3.5-6.0 µm.

ECOLOGY: *P. cinerea* is a saprotroph on a wide range of deciduous wood, occasionally growing as a pathogen. It was recorded on dry standing trees of *Malus* sp. and on dry branches of *Pyrus communis*. Usually grows on still hanging or dead branches recently fallen to the ground. In

the CBER this species also occurs on *Acer campestre*, *A. platanoides*, *Betula pendula*, *Corylus avellana*, *Frangula alnus*, *Fraxinus excelsior*, *Juglans* sp., *Lonicera xylosteum*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix* sp., *Tilia cordata* and *Ulmus campestris*.

***Peniophora incarnata* (Pers.) P. Karst.**

DISTRIBUTION: **Belgorod Region**, Shebekinsky District, Titovka, *Prunus armeniaca*, 18.08.2019, LE 314158, voucher for the strain LE-BIN 4337 [45]. **Oryol Region**, Kolpnyansky District, Aleksandrovka, *Pyrus* sp., 05.10.2012, LE 292082 [37]. The species is common and widely distributed in the CBER.

STRAINS: LE-BIN 4337 (ex basidiospores), *P. armeniaca*. – The aerial mycelium is white becoming is orange or red to reddish-brown with age. Reverse unchanged. Growing colony edge is pressed. Mycelial mat is floccose: small hyphal tufts, standing out from the agar or from the aerial mycelium. It has no special odor. Growth rate – F. Hyphal system monomitic. Aerial hyphae of 1.5-4.0 µm wide, thin-walled. Crystals were observed in the tested strain in pure cultures. Generative hyphae, differentiated with rare clamp connections, d 5.0-7.5 µm.

ECOLOGY: *P. incarnata* is a saprotroph on wide range of deciduous wood, occasionally growing as a pathogen. It was recorded on fallen *Pyrus* sp., and on dry branches of *Prunus armeniaca*. Usually it grows on still attached branches. In the CBER this species also occurs on *Acer platanoides*, *Amelanchier* sp., *Betula pendula*, *Corylus avellana*, *Fraxinus excelsior*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Sorbus aucuparia* and *Ulmus* sp.

***Peniophora nuda* (Fr.) Bres.**

DISTRIBUTION: **Belgorod Region**, Korochansky District, Popovka, *Pyrus communis*, 19.08.2019, LE 314113 [20].

ECOLOGY: *P. nuda* is a saprotroph on deciduous wood, occasionally growing as a pathogen. It was recorded on dry branches of *Pyrus communis*. Usually it grows on still attached branches. In the CBER this species also occurs on *Acer platanoides*, *Fraxinus excelsior*, *Populus tremula*, *Prunus padus*, *Quercus robur* and *Ulmus* sp.

***Peniophora violaceolivida* (Sommerf.) Massee**

DISTRIBUTION: **Oryol Region**, Kolpnyansky District, Aleksandrovka, *Pyrus* sp., 05.10.2012, LE 292113 [37].

ECOLOGY: *P. violaceolivida* is a saprotroph on deciduous wood. It was recorded on fallen *Pyrus* sp. In the CBER this species also occurs on *Acer negundo*, *A. platanoides*, *Betula pendula*, *Caragana arborescens* and *Fraxinus excelsior*.

Stereaceae

***Acanthophysellum minor* (Pilát) Sheng H. Wu, Boidin & C.Y. Chien**

DISTRIBUTION: **Lipetsk Region**, Yeletsky District, Galichya Gora Nature Reserve, Voronov Kamen' area, *Pyrus* sp., 01.10.2016, LE 313964 [44]. This record is the only known in Russia.

ECOLOGY: *A. minor* is a saprotroph on deciduous wood. It was recorded on a hanging dead trunk of *Pyrus* sp.

***Stereum hirsutum* (Willd.) Pers.**

DISTRIBUTION: **Belgorod Region**, Borisovsky District, Belogorye Nature Reserve, Les na Vorskle area, *Prunus cerasus*, 13.05.1938, *P. domestica*, 31.10.1938, *P. insititia*, 08.08.1939 [31]; Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area, *Malus domestica*, *Pyrus communis* [33]. **Kursk Region**, Fatezhsky District, Rzhava, *Prunus domestica*, 15.08.2020, LE 305053; Gorshechensky District, Tsentralno-Chernozyomny Nature Reserve, Barkalovka area; Kursky District, Tsentralno-Chernozyomny Nature Reserve, Streletsky area; Manturovsky District, Tsentralno-Chernozyomny Nature Reserve, Bukreyevy Barmy area Medvensky District, Tsentralno-Chernozyomny Nature Reserve, Kazatsky area, *Malus domestica*, *Pyrus communis* [33]. **Oryol Region**, Glazunovsky District, Lovchikovo, *Malus domestica*, 21.08.2019, OHHI 1461; Orlovsky District, Dobryi, *Prunus domestica*, 05.05.2019, LE 305021, coll. T.A. Tsutsupa, Zhilina, *P. cerasus*, 13.08.2019, *P. domestica*, 15.08.2019, LE 305052. **Voronezh Region**, Gribanovsky District, Tellermanovskoye Experimental Forestry, *P. cerasus*, *P. domestica*, 13.08.1912; Khokholsky District, Gremyachye, *P. cerasus*, *P. domestica*, 04.08.1912; Ostrogozhsky District, Uryv-Pokrovka, *P. cerasus*, *P. domestica*, 12.08.1912; Ramonsky District, Bolshaya Vereyka, *P. cerasus*, *P. domestica*, 30.07.1912 [30]. The species is abundant and widely distributed in the CBER.

ECOLOGY: *S. hirsutum* is a saprotroph on deciduous wood or occasionally grows as a pathogen. It was found on dry standing trunks of *Malus domestica*, *Prunus cerasus* and *Pyrus communis*, on living trunks and dry branches and trunks of *Prunus domestica* and on dry branches of *P. insititia*. In the CBER this species also occurs on *Acer platanoides*, *Alnus glutinosa*, *Betula pendula*, *Corylus avellana*, *Frangula alnus*, *Fraxinus excelsior*, *Populus tremula*, *Prunus padus*, *Quercus robur*, *Salix caprea*, *Tilia cordata* and *Ulmus campestris*.

***Stereum rugosum* Pers.**

DISTRIBUTION: **Lipetsk Region**, *Pyrus* sp. [25; 42].

ECOLOGY: *S. rugosum* is a saprotroph on deciduous wood or occasionally grows as a pathogen. It was recorded on dry dead standing and fallen trunks of *Pyrus* sp. In the CBER this species is also occurs on *Alnus glutinosa*, *Betula pendula*, *Quercus robur* and *Sambucus racemosa*.

***Stereum subtomentosum* Pouzar**

DISTRIBUTION: **Kursk Oblast**, Kursk, *Prunus* sp., 01.05.1905 [28, as *Stereum ochroleucum* (Fr.) Quél.]. The species is abundant and widely distributed in the CBER.

ECOLOGY: *S. subtomentosum* is a saprotroph on deciduous wood. It was recorded on *Prunus* sp. In the CBER this species also occurs on *Acer platanoides*, *Alnus glutinosa*, *Betula pendula*, *Corylus avellana*, *Fraxinus excelsior*, *Populus tremula*, *Quercus robur*, *Salix* sp. and *Tilia cordata*.

THELEPHORALES

Thelephoraceae

***Tomentellopsis echinospora* (Ellis) Hjortstam**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area, *Malus* sp., 06.11.2015, LE 311631 [41]. The species is known from the CBER only by this record.

ECOLOGY: *T. echinospora* is an ectomycorrhizal fungus developing basidiocarps on deciduous and coniferous wood. It was recorded on a fallen branch of *Malus* sp.

***Tomentellopsis pulchella* Kõljalg & Bernicchia**

DISTRIBUTION: **Belgorod Region**, Gubkinsky District, Belogorye Nature Reserve, Yamskaya Steppe area, *Prunus spinosa*, 06.11.2015, LE 311620 [41]. This record is the only known in Russia.

ECOLOGY: *T. pulchella* forms ectomycorrhizae as well as develops basidiocarps on surface of woody substrate. It was recorded on a fallen trunk of *Prunus spinosa*.

TRECHISPORALES
Hydnodontaceae
***Subulicystidium perlongisporum* Boidin & Gilles**

DISTRIBUTION: **Oryol Region**, Mtsensky District, Volya, *Malus domestica*, 22.08.2019, LE 305050.

ECOLOGY: the species is a saprotroph on deciduous wood. It was collected on bark of a living *Malus domestica*. The species is registered in the CBER for the first time.

DACRYMYCETES
DACRYMYCETALES
Dacrymycetaceae
***Calocera cornea* (Batsch) Fr.**

DISTRIBUTION: **Lipetsk Region**, Zadonsky District, Galichya Gora Nature Reserve, *Pyrus communis*, 23.07.2020, coll. and det. L.A. Sarycheva, VU 4955.

ECOLOGY: *C. cornea* is a saprotroph on deciduous wood. It was recorded on living trunks of *Pyrus communis*. In the CBER this species also occurs on *Acer negundo*, *A. platanoides*, *Betula pendula*, *Prunus padus*, *Quercus robur* and *Salix* sp.

***Dacrymyces stillatus* Nees**

DISTRIBUTION: **Lipetsk Region**, Zadonsky District, Galichya Gora Nature Reserve, Morozova Gora area, *Malus sylvestris*, 30.05.1994, VU 2908 [25, as *Dacrymyces deliquescens* (Bull.) Duby].

ECOLOGY: *D. stillatus* is a saprotroph on coniferous and deciduous wood. It was recorded on fallen branches of *Malus sylvestris*. In the CBER this species also occurs on *Betula pendula*, *Pinus sylvestris*, *Quercus robur*, *Salix* sp. and *Sorbus aucuparia*.

DISCUSSION

As a result of the analysis of available data, we obtained information on 97 species of basidial macrofungi from 68 genera associated with *Malus*, *Pyrus* and *Prunus* wood in the CBER. Thirty-two species were known before our own research started in 2008 [26]. Two species – *Antrodia serpens* and *Ceriporia torpida* – have been registered for the first time in Russia.

The first verifiable find of *A. serpens* from Oryol Region clarifies the eastern limits of the species distribution range in the European part of Russia. According to the recent research based on type material and using molecular tecnhiques [56], this species has for a long time been confused with close species of *A. albida* [15] – the latter is now synonymous with *A. heteromorpha*. The earlier records of *A. serpens sensu* Bondartsev [24] do not correspond to a modern understanding of the taxon and need to be revised for herbarium materials.

Ceriporia torpida is new to Russia and significantly extends the boundaries of the previously established range away to the south-east. Until the present study this species was only known from Finland (holotype, on dead *Trametes* sp. on *Salix caprea*) and the Czech Republic (fallen branch of *Fagus sylvatica*). The species has been described as a result of the taxonomic study of the *Ceriporia purpurea* group [57] and therefore the existing records of *C. purpurea* in the CBER need to be revised.

The maximum number of macrofungi species associated with the wood of fruit trees is known for Oryol Region – 47 species, followed by Belgorod Region – 40, Lipetsk Region – 26, Kursk Region– 24, Voronezh Region – 7, and Tambov Region – 2 species.

The largest number of fungal species (65) inhabits *Malus* woods, 34 species *Pyrus* woods and 29 species *Prunus* woods. The distribution among representatives of the genus *Prunus* is as follows: six species (*Funalia trogii*, *Irpex lacteus*, *Peniophora incarnata*, *Phellinus pomaceus*, *Trametes hirsuta*, *T. ochracea*) were registered on *P. armeniaca*, five species (*Fomitopsis pinicola*, *Irpex lacteus*, *Phellinus pomaceus*, *Trametes hirsuta*, *T. versicolor*) on *P. avium*, one species (*Phellinus pomaceus*) on *P. cerasifera*, eight species on *P. cerasus*, nine species on *P. domestica* and twelve species on *P. spinosa*.

Table 1. Distribution of macrofungi species associated with the wood of fruit species by CBER regions
Таблица 1. Распределение видов макромицетов, ассоциированных с древесиной плодовых пород по регионам Центрального Черноземья

Region	All trees	On *Malus* spp.	On *Pyrus* spp.	On *Prunus* spp.
Total	97	65	34	29
Belgorod Region	40	21	14	16
Kursk Region	24	11	14	5
Lipetsk Region	26	20	4	2
Oryol Region	47	37	10	10
Tambov Region	2	1	0	1
Voronezh Region	7	4	0	4

Only two species were revealed in five regions (with the exception of Tambov Region) – *Phellinus pomaceus* and *Sarcodontia crocea*, the regularly occurring and the most important pathogens of *Prunus* spp. and *Malus* spp. respectively. Another four species were recorded in three-four regions: *Phellinus alni*, *Schizophyllum commune* and *Stereum hirsutum* – in four regions (except for Lipetsk and Tambov Regions), *Peniophora cinerea* and *Trametes hirsuta* – in three regions (except for Voronezh, Lipetsk and Tambov Regions). The proportion of species common to four of the most studied regions is shown in Fig. 2.

Five species of macrofungi grow on all three genera of fruit trees – *Lyomyces crustosus*, *Stereum hirsutum*, *Trametes hirsuta*, *T. ochracea* and *T. versicolor*. These are common, widespread species that are regularly found on the wood of different tree species in the CBER. The proportion of species common to the three discussed genera of fruit trees is shown in Fig. 3.

Based on an analysis of the literature data that we could verify, among the fungi found during the studies *Antrodia serpens*, *Candelabrochaete septocystidia*, *Ceriporia torpida*, *Hyphoderma mutatum*, *Phlebia rufa*, *Ph. tremellosa*, *Subulicystidium perlongisporum* and *Trichaptum biforme* were noted for fruit trees for the first time in the European part of Russia. At the same time *Candelabrochaete septocystidia* and *Subulicystidium perlongisporum* are little-known and rare species revealed in very few regions.

Most of the species registered are able to develop in a wide range of predominantly deciduous trees. The species that specialize in fruit trees include *Sarcodontia crocea* and *Phellinus pomaceus*.

Sarcodontia crocea is in most cases strictly associated with *Malus*, much less with *Pyrus*, and was only once recorded on *Acer platanoides*. The species was recorded in all the horticultural plantations we surveyed on live, drying and dry *Malus* trees, affecting up to 100% of all trees within an orchard: this makes it one of the highly dangerous pathogens causing significant yield losses to fruit trees due to drying and death.

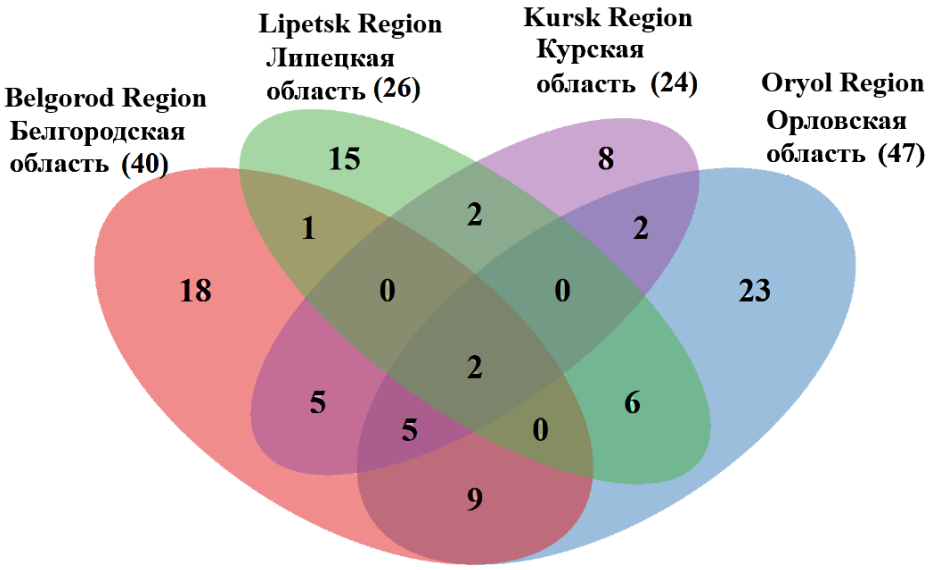

Figure 2. The share of macrofungi species associated with fruit trees, common to different regions of the CBER
Рисунок 2. Доля видов макромицетов, ассоциированных с древесиной плодовых пород, общих для различных регионов Центрального Черноземья

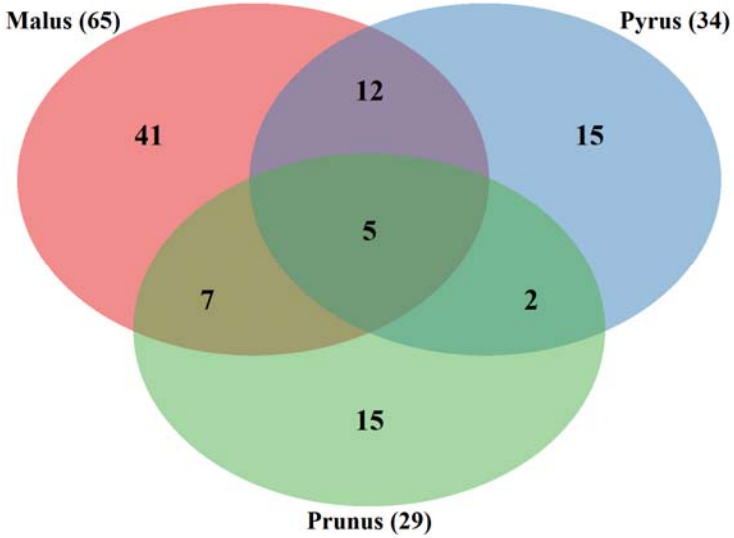

Figure 3. The share of macrofungi species associated with fruit trees, common to different plant genera
Рисунок 3. Доля видов макромицетов, ассоциированных с древесиной плодовых пород, общих для различных родов плодовых пород

Phellinus pomaceus is regularly recorded on living and dying plants of *Prunus* species, suggesting a narrow ecological niche. However, according to the literature, this species is also associated with other fruit trees from the genera *Malus* and *Pyrus* [58], or even a wider range of host plants – up to 20 genera [15]. Available results of molecu-

lar studies [52] of the *Phellinus igniarius* s. l. species complex, to which this species belongs, also indicate the growth of *Ph. alni* and a single find of *Ph. igniarius* s. str. on *Malus* wood and the strict association of *Ph. pomaceus* with the genus *Prunus*. The results of the present study, which was carried out using molecular methods and ITS nrDNA analysis (unpublished data), confirm that in the CBER *Ph. pomaceus* develops exclusively on *Prunus* spp. trees, while *Ph. alni* grows on *Malus* spp.

The interesting finding published in the literature [33] is the discovery of *Fistulina hepatica*, which develops almost exclusively on *Quercus robur*, on *Malus* and *Pyrus*, although for this fungus it is known that in very rare cases it has also been found on other deciduous trees [15]. Unfortunately, we are not aware of the presence of specimens for this indication.

Pathogenic activity has been clearly marked for 32 species of fungi found on trunks and branches of living trees, causing necrosis and trunk rot. Five species were recorded on living branches and 31 species were registered on living trunks. The distribution of hosts is as follows: 22 pathogenic species – on *Malus*, 6 – on *Pyrus*, 11 – on *Prunus*. Of all the pathogens, only 14 have been observed exclusively on living trees: *Calocera cornea* (on *Pyrus communis*), *Cerioporus squamosus* (on *Malus* sp.), *Funalia trogii* (on *Prunus armeniaca*), *Hypsizygus marmoreus* (on *Malus domestica*), *Inocutis rheades* (on *Prunus domestica*), *Inonotus hispidus* (on *Malus* spp.), *Laetiporus sulphureus* (on *Pyrus communis*), *Oxyporus obducens* (on *Malus* sp.), *O. populinus* (on *Malus domestica*), *Phanerochaete velutina* (on *Pyrus* sp.), *Phellinus alni* (on *Malus* spp.), *Psathyrella spadicea* (on *Malus* sp.), *Subulicystidium perlongisporum* (on *Malus domestica*), *Volvariella bombycina* (on *Malus domestica*).

Forty-two species were recorded on dry dead wood, including 29 species were recorded on dry branches in the crowns of living trees and 23 species on dry standing trunks. Only 18 species have been revealed exclusively on this type of substrate: *Antrodia serpens* (on *Malus domestica*), *Apioperdon pyriforme* (on *Malus* sp., *Pyrus* sp.), *Basidioradulum radula* (on *Malus* sp.), *Candelabrochaete septocystidia* (on *Malus domestica*), *Cerioporus leptocephalus* (on *Pyrus communis*), *Ceriporia viridans* (on *Malus domestica*), *Dichomitus campestris* (on *Malus* sp., *Pyrus communis*), *Fomitiporia punctata* (on *Malus* sp.), *Hydnoporia tabacina* (on *Malus sylvestris*, *Pyrus communis*), *Hyphoderma mutatum* (on *Malus domestica*), *Lyomyces erastii* (on *Malus domestica*), *Peniophora nuda* (on *Pyrus communis*), *Peniophorella praetermissa* (on *Malus* spp.), *Phanerochaete jose-ferreirae* (on *Malus* sp.), *Porostereum spadiceum* (on *Malus domestica*), *Raduliporus aneirinus* (on *Malus domestica*), *Radulomyces confluens* (on *Prunus domestica*), *Sistotrema brinkmannii* (on *Malus domestica*).

A total of 48 species develop on dead wood (dead fallen branches, fallen trunks, stumps), of which 31 species develop exclusively on this type of substrate.

Most of the species revealed cause a white rot. At least nine species (*Antrodia serpens*, *Coniophora puteana*, *Fistulina hepatica*, *Fomitopsis pinicola*, *Gloeophyllum trabeum*, *Laetiporus sulphureus*, *Postia balsamea*, *P. lactea*, and *P. subcaesia*) belong to fungi causing a brown rot.

On fallen trunks and branches, species that are not saprotrophs have also been found by chance – the ectomycorrhizal *Tomentellopsis echinospora* (on *Malus* sp.) and *Tomentellopsis pulchella* (on *Prunus spinosa*) as well as the lichenicolous *Athelia alnicola* (on *Prunus spinosa*).

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AUTHOR CONTRIBUTIONS

Sergey V. Volobuev conceived the idea, participated in the collection and processing of all type studied materials. Sergej Yu. Bolshakov participated in processing the herbaria and literature data. Natalia V. Shakhova obtained and characterized pure basidiomycete cultures. All authors wrote and revised the manuscript before its submission. All authors are equally responsible for plagiarism, self-plagiarism and other ethical transgressions.

КРИТЕРИИ АВТОРСТВА

Сергей В. Волобуев, автор идеи, сбор и обработка всех типов исследованных материалов. Сергей Ю. Большаков, обработка гербарных и литературных данных. Наталия В. Шахова, получение и характеристика чистых культур базидиомицетов. Все авторы участвовали в написании и корректировке текста рукописи до его подачи в редакцию. Авторы в равной степени несут ответственность при обнаружении плагиата и других неэтических проблем.

NO CONFLICT OF INTEREST DECLARATION

The authors declare no conflict of interest.

КОНФЛИКТ ИНТЕРЕСОВ

Авторы заявляют об отсутствии конфликта интересов.

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