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БИОРАЗНООБРАЗИЕ, СИСТЕМАТИКА, ЭКОЛОГИЯ

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NEW SPECIES OF FUNGI FOR SVERDLOVSK REGION (THE MIDDLE URALS, RUSSIA) ON ALIEN AND ABORIGINE WOODY PLANTS

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The paper continues a series of publications devoted to the new finds of fungi (*Ascomycota*, *Basidiomycota*) in Sverdlovsk Region (the Middle Urals, Russia). Totally, 75 species of macro- and microfungi reported on alien and aborigine woody plants for the first time in the region. The most numerous group are alien plant pathogenic fungi (71%) developing on cultivated fruit trees in gardens and parks, as well as on many common species of trees and shrubs in urban greening.

Keywords: Ascomycota, alien species, *Basidiomycota*, biodiversity, fungal distribution, invasion, plant pathogen, Russia

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INTRODUCTION

The paper is a seventh in the series of publications devoted to the new finds of fungi in Sverdlovsk Region on alien and invasive woody plants (Shiryaev et al., 2021; 2022a, 2022b; 2023; Bulgakov, Shiryaev, 2021, 2022). Each annotated record provides details about specimen ecology and collection information: locality, substrate, date of collecting and specimen herbarium numbers.

MATERIALS AND METHODS

Specimens were collected by A.G. Shiryaev, T.S. Bulgakov, O.S. Shiryaeva and A.S. Budimirov within Ekaterinburg city territory in 2000–2023. The collected specimens were processed in the mycological collections of Institute of Plant and Animal Ecology of Ural Branch of the Russian Academy of Sciences (Ekaterinburg, SVER), in the Department of Plant Protection of the Federal Research Center "Subtropical Scientific Center of the Russian Academy of Sciences" (Sochi), and in the Komarov Botanical Institute (Saint Petersburg, LE).

The identification of the fungal species was carried out by light microscopy of temporary preparations according to standard methods (Blagoveshchenskaya, 2015); special keys books and monographs were used to determinate the fungal species (Kuprevich, Ulyanishchev, 1975; Ulyanishchev, 1978; Sutton, 1980; Butin, 1989; Braun, Melnik, 1997; Ellis and Ellis, 1997; Braun, 1998; Karatygin, 2002; Braun, Cook, 2012; Knudsen, Vesterholt, 2012; Ryvarden, Melo, 2014; Blagoveshchenskaya, 2015), as well as some additional publications devoted to the study and taxonomical revision of the some particular fungal taxa and new species descriptions (Chethana et al., 2015; Daranagama et al., 2016; Norphanphoun et al., 2017; Vohlmayr et al., 2017; Hyde et al., 2018; Jaklitsch et al., 2018; Crous et al., 2020) and open global data base "Fungal Databases: U.S. National Fungus Collections" (Farr, Rossman, 2023). The names of fungal species are given according to the open database "MycoBank" (MycoBank, 2023).

The host plant species were identified by the keybook "Keys to the trees and shrubs species of the Urals" (Mamaev, 2000); the plant species are given according to the open nomenclatural database "Plant of the World Online" (POWO, 2023). Some introduced exotic plant species in the collections of the Botanical garden were determined according to the personal data

of researchers of the Botanical Garden of the Ural Branch of the Russian Academy of Sciences.

The following abbreviations are used in the list: BG UrB RAS – Botanical Garden of Ural Branch of the Russia Academy of Sciences; Pat – pathogenic; Sap – saprobic.

Before each fungal species, the "alien" status is indicated (see Discussion part):

*invasive alien species;
!co-introduced alien species;
#conditional alien species;
*!invasive alien fungal species on conditional for Sverdlovsk Region alien plant species.

Empty space denotes a local fungal species.

RESULTS

An annotated species list

Ascomycota

Pezizomycotina

Dothideomycetes

Dothideales

Dothideaceae

#*Dothidea berberidis* (Wahlenb.) De Not. [≡ *Dothidella berberidis* (Wahlenb.) Theiss. et Syd.] – on dead branches of *Berberis vulgaris* L. (*Berberidaceae*): BG UrB RAS, 09.08.2022, SVER(F) 96780. Pat.

Botryosphaeriales

Botryosphaeriaceae

*!*Diplodia sapinea* (Fr.) Fuckel [≡ *Sphaeropsis sapinea* (Fr.) Dyko et B. Sutton] – on live and dying needles and twigs of *Pinus mugo* Turra (*Pinaceae*): the territory of the residential complex "Nagorny", 23.10.2022, SVER(F) 96781. Pat.

!*Phaeobotryon negundinis* Daranag., Bulgakov et K.D. Hyde – on dying branches of *Acer negundo* L. (*Sapindaceae*), BG UrB RAS, 22.07.2022, SVER(F) 96782. Pat.

Phyllostictaceae

!*Phyllosticta paviae* Desm. (= *Ph. sphaeropsoidea* Ellis et Everh.) – on living leaves of *Aesculus hippocastanum* L. (*Sapindaceae*): BG UrB RAS, 27.07.2022, SVER(F) 96783. Pat.

Mycosphaerellales

Mycosphaerellaceae

!*Acervuloseptoria fraxini* Crous et Bulgakov – on living leaves of *Fraxinus pennsylvanica* Marshall (*Oleaceae*): BG UrB RAS, 09.08.2022, SVER(F) 96784. Pat.

!*Neophloeospora maculans* (Bérenger) Videira et Crous [≡ *Cylindrosporium maculans* (Bérenger) Jacz. ≡ *Phloeospora maculans* (Bérenger) Allesch.] – on living leaves of *Morus alba* L. (*Moraceae*): BG UrB RAS, 27.07.2022, SVER(F) 96785. Pat.

!*Passalora fraxini* (DC.) Arx [≡ *Cercospora fraxini* (DC.) Sacc.] – on living leaves of *Fraxinus* (*Oleaceae*): *F. excelsior* L. – Arboretum on Pervomayskaya street, 29.07.2022, SVER(F) 96786; *F. pennsylvanica* Marshall – *ibid.*, 05.08.2021, SVER(F) 96793. Pat.

#*Pruniphilomyces circumscissus* (Sacc.) Crous et Bulgakov (≡ *Cercospora circumscissa* Sacc.) – on living leaves of *Prunus* (*Rosaceae*): *P. pumila* L. – BG UrB RAS, 27.07.2022, SVER(F) 96787; *P. tenella* Batsch – *ibid.*, 19.07.2021, SVER(F) 96794. Pat.

!*Pseudocercospora lilacis* (Desm.) Deighton (≡ *Cercospora lilacis* Desm.) – on living leaves of *Syringa vulgaris* L. (*Oleaceae*): BG UrB RAS, 27.07.2022, SVER(F) 96863; Arboretum on Pervomayskaya str., 29.07.2022, SVER(F) 96788. Pat.

!*Pseudocercosporella leptosperma* (Peck) U. Braun – on living leaves of *Eleutherococcus* sp. (*Araliaceae*): BG UrB RAS, 27.07.2022, SVER(F) 96789. Pat.

!*Ragnhildiana ampelopsidis* (Peck) U. Braun, C. Nakash., Videira et Crous (≡ *Cercospora ampelopsidis* Peck) – on living leaves of *Parthenocissus quinquefolia* (L.) Planch. (*Vitaceae*): BG UrB RAS, 27.07.2022, SVER(F) 96790. Pat.

Rosisphaerella rosicola (Pass.) U. Braun, C. Nakash., Videira et Crous [≡ *Cercospora rosicola* Pass. ≡ *Passalora rosicola* (Pass.) U. Braun] – on living leaves of *Rosa* (*Rosaceae*): *R. acicularis* L. – BG UrB RAS, 27.07.2022, SVER(F) 96791; *R. chinensis* Jacq. – *ibid.*, 30.07.2021, SVER(F) 96792. Pat.

!*Septoria pyricola* (Desm.) Desm. [= *Mycosphaerella pyri* (Auersw.) Boerema] – on living leaves of *Pyrus communis* L. (*Rosaceae*), BG UrB RAS, 28.07.2022, SVER(F) 96792. Pat.

#*Sphaerulina aceris* (Lib.) Verkley, Quaedvlieg et Crous (≡ *Ascochyta aceris* Lib.) – on living leaves of *Acer platanoides* L. (*Sapindaceae*): Arboretum on Pervomayskaya street, 29.07.2022, SVER(F) 96795. Pat.

!*Sphaerulina berberidis* (Niessl) Quaedvlieg, Verkley et Crous (≡ *Septoria berberidis* Niessl) – on living leaves of *Berberis vulgaris* (*Rosaceae*): BG UrB RAS, 28.07.2022, SVER(F) 96796. Pat.

#*S. quercicola* (Desm.) Quaedvl., Verkley et Crous [≡ *Septoria quercicola* (Desm.) Sacc.] – on living leaves of *Quercus robur* L. (*Fagaceae*): BG UrB RAS, 28.09.2022, SVER(F) 96797. Pat.

S. rehmiana Jaap (= *S. rosarum* Westend.) – on living leaves of *Rosa* (*Rosaceae*): *R. chinensis* Jacq. – BG UrB RAS, 28.07.2022, SVER(F) 96798; *R. maximowicziana* Regel – BG UrB RAS, 28.07.2022, SVER(F) 96799. Pat.

Myriangiales

Elsinoaceae

!*Sphaceloma symphoricarpi* Barrus et Horsfall – on living leaves of *Symphoricarpos albus* (L.) S.F. Blake (*Caprifoliaceae*): BG UrB RAS, 05.10.2022, SVER(F) 96800. Pat.

Pleosporales

Dothidotthiaceae

**Thyrostroma tiliae* Senwanna, Wanas., Bulgakov, Phookamsak et K.D. Hyde [= *Thyrostroma compactum* (Sacc.) Höhn. var. *tiliae* (Sacc.) Höhn.] – on dying twigs and branches of *Tilia cordata* Mill. (*Malvaceae*): South Park, 28.07.2022, SVER(F) 96801. Pat.

!*Thyrostroma ulmicola* Senwanna, Wanas., Bulgakov, Phookamsak et K.D. Hyde – on dying twigs and branches of *Ulmus pumila* L. (*Ulmaceae*): South Park, 28.07.2022, SVER(F) 96802; BG UrB RAS, 06.08.2022, SVER(F) 96803. Pat.

Cucurbitariaceae

#*Cucurbitaria berberidis* (Pers.) Gray [= *Pyrenochaeta berberidis* (Sacc.) Brunaud] – on dying twigs and branches of *Berberis vulgaris* (*Berberidaceae*): BG UrB RAS, 22.07.2022, SVER(F) 96803. Pat.

#*Neocucurbitaria rhamni* (Nees) Jaklitsch et Voglmayr (= *Cucurbitaria rhamni* (Nees) Fuckel) – on dying branches of *Rhamnus cathartica* L. (*Rhamnaceae*): BG UrB RAS, 22.07.2022, SVER(F) 96804. Pat.

Didymellaceae

!*Ascochyta philadelphi* Sacc. et Speg. – on living leaves of *Philadelphus coronarius* L. (*Hydrangeaceae*): BG UrB RAS, 22.07.2022, SVER(F) 96805. Pat.

!*Neodidymelliopsis negundinis* Manawasinghe, Bulgakov et K.D. Hyde – on dying twigs and branches of *Acer negundo* (*Sapindaceae*): BG UrB RAS, 22.07.2022, SVER(F) 96806; on dead twigs of *Euonymus europaeus* L. (*Celastraceae*), *ibid.*, 22.07.2022, SVER(F) 96862. Pat.

Leptosphaeriaceae

!*Longiseptatispora curvata* Crous et Bulgakov – on dying twigs of *Lonicera tatarica* L. (*Caprifolioliaceae*): BG UrB RAS, 22.07.2022, SVER(F) 96807; urban district "Botanichesky", 30.07.2022, SVER(F) 96806. Pat. Perhaps, this new species (Crous et al., 2020) is identical to the previously recorded *Rhabdospora lonicerae* (Cooke et Ellis) Sacc. (Naumov, 1915).

Massarinaceae

Helminthosporium tiliae (Link) Fr. (≡ *Exosporium tiliae* Link) – on ascomata of *Hercospora tiliae* and dead twigs and branches of *Tilia cordata* (*Malvaceae*): South Park, 22.07.2022, SVER(F) 96807. Sap.

!*Pseudosplanchnonema phorcioides* (I. Miyake) Chethana, Camporesi et K.D. Hyde [≡ *Splanchnonema phorcioides* (I. Miyake) P. Leroy, L. Gauthier et M.E. Barr] – on dying twigs of *Morus alba* (*Moraceae*): BG UrB RAS, 22.07.2022, SVER(F) 96808. Pat.

Venturiales

Venturiaceae

#*Venturia tremulae* Aderh. var. *populi-albae* M. Morelet [= *Fusicladium radiosum* var. *populi-albae* (M. Morelet) Ritschel et U. Braun] – on living leaves of *Populus alba* L. (*Salicaceae*): BG UrB RAS, 22.07.2022, SVER(F) 96809. Pat.

Dothideomycetes incertae sedis

#*Asteromella mali* (Briard) Boerema (≡ *Phyllosticta mali* Briard) – on living leaves of *Malus domestica* (Suckow) Borkh. (*Rosaceae*): BG UrB RAS, 28.07.2022, SVER(F) 96810. Pat.

Leotiomycetes

Helotiales

Dermateaceae

#*Dermea acerina* (Peck) Rehm – on living leaves of *Acer platanoides* (*Sapindaceae*): BG UrB RAS, 28.07.2022, SVER(F) 96811. Pat.

#*Drepanopeziza castagnei* (Desm. et Mont.) Rossman et W.C. Allen [= *Marssonina castagnei* (Desm. et Mont.) Magnus] – on living leaves of *Populus alba* (*Salicaceae*): BG UrB RAS, 28.07.2022, SVER(F) 96812. Pat.

Erysiphaceae

*!*Erysiphe azaleae* (U. Braun) U. Braun et S. Takam. – on living leaves of *Rhododendron luteum* L. (*Ericaceae*): BG UrB RAS, 10.10.2022, SVER(F) 96813. Pat.

*!*E. euonymicola* U. Braun (= *E. euonymi-japonici* U. Braun et S. Takam.) – on living leaves of *Euonymus japonicus* Thunb. (*Celastraceae*): BG UrB RAS, greenhouse, 19.09.2022, SVER(F) 96814. Pat.

*!*E. flexuosa* (Peck) U. Braun et S. Takam. (≡ *Uncinula flexuosa* Peck) – on living leaves of *Aesculus hippocastanum* L. (*Sapindaceae*): Arboretum on 8 March street, 28.09.2022, SVER(F) 96815. Pat.

#*E. friesii* (Lév.) U. Braun et S. Takam. [≡ *Microsphaera friesii* (Lév.) Sacc.] – on living leaves of *Rhamnus cathartica* (*Rhamnaceae*): BG UrB RAS, 26.08.2022, SVER(F) 96816. Pat.

*!*E. salmonii* (Syd. et P. Syd.) U. Braun et S. Takam. – on living leaves of *Fraxinus mandshurica* Rupr. (*Oleaceae*): BG UrB RAS, 05.10.2022, SVER(F) 96860. Pat.

!*Phyllactinia fraxini* (DC.) Fuss – on living leaves of *Fraxinus excelsior* (*Oleaceae*): Arboretum on 8 March street, 06.10.2022, SVER(F) 96817. Pat.

Sclerotiniaceae

#*Monilinia fructigena* (Pers.) Honey [≡ *Monilia fructigena* (Pers.) Pers.] – on rotten fruits of *Rosaceae* woody plants: *Malus baccata* (L.) Borkh. – BG UrB RAS, 20.10.2020, SVER(F) 96818; *M. domestica* – Elizavet gardens, 12.09.2021, SVER(F) 96819; *Prunus cerasus* – private garden "Seven Fontains", 25.08.2021, SVER(F) 96820; *P. domestica* – *ibid.*, 01.08.2021, SVER(F) 96822; *Pyrus communis* – *ibid.*, 05.08.2021, SVER(F) 96821; *P. ussuriensis* Maxim. – BG UrO RAS, 22.08.2021, SVER(F) 96857. Pat.

#*M. laxa* (Aderh. et Ruhland) Honey (= *Monilia cinerea* Bonord.) – on growing shots, flowers and fruits of *Prunus cerasus* (*Rosaceae*): private garden "Seven Fontains", 23.08.2021, SVER(F) 96823. Pat.

Rhytismatales

Rhytismataceae

#*Colpoma quercinum* (Pers.) Wallr. [= *Conostroma didymum* (Fautrey et Roum.) Moesz] – on dying and dead branches of *Quercus robur* (*Fagaceae*): Arboretum at 8 March str., 28.07.2022, SVER(F) 96824. Pat.

Marthamycetaceae

!*Cyclaneusma minus* (Butin) DiCosmo, Peredo et Minter (≡ *Naemocyclus minor* Butin) – on living and dying needles of *Pinus mugo* (*Pinaceae*): the territory of the residential complex "Nagorny", 12.10.2022, SVER(F) 96825. Pat.

Rhytismataceae

#*Rhytisma acerinum* (Pers.) Fr. (= *Melasmia acerina* Lév.) – on living leaves of *Acer* (*Sapindaceae*): *A. campestre* – Arboretum on Pervomayskaya, 28.08.2020, SVER(F)

96858; *A. platanoides* – the territory of the residential complex "Nagorny", 12.10.2022, SVER(F) 96826. Pat.

Sordariomycetes

Amphisphaeriales

Pestalotiopsidaceae

!*Pestalotiopsis sydowiana* (Bres.) B. Sutton (≡ *Pestalotia sydowiana* Bres.) – on living leaves of *Rhododendron* (*Ericaceae*): *R. brachycarpum* D. Don ex G. Don subsp. *fauriei* (Franch.) D.F. Chamb. – BG UrB RAS, 14.08.2021, SVER(F) 96859; *Rh. caucasicum* Pall. – *ibid.*, 20.20.2021, SVER(F) 96827; *Rh. dauricum* L. – *ibid.*, 14.10.2020, SVER(F) 96828; *Rh. smirnowii* Trautv. ex Regel – *ibid.*, 03.06.2021; SVER(F) 96829. Pat.

Diaporthales

Coryneaceae

#*Coryneum depressum* J.C. Schmidt [= *Pseudovalsa umbonata* (Tul. et C. Tul.) Sacc.] – on dying and dead branches of *Quercus robur* (*Fagaceae*): BG UrB RAS, 27.07.2022, SVER(F) 96830. Pat.

#*Coryneum umbonatum* Nees [= *Pseudovalsa longipes* (Tul.) Sacc.] – on dead branches of *Quercus* (*Fagaceae*): *Q. mongolica* Fisch. ex Ledeb. – BG UrB RAS, 28.07.2022, SVER(F) 96831; *Q. robur* – BG UrB RAS, 10.07.2021, SVER(F) 96832. Pat.

Cytosporaceae

#*Cytospora ceratosperma* (Tode) G.C. Adams et Rossman – on dying twigs and branches of *Acer* (*Sapindaceae*): *A. platanoides* – BG UrB RAS, 28.07.2022, SVER(F) 96833 и *A. tataricum* – BG UrB RAS, 09.07.2020, SVER(F) 96834. Pat.

!*Cytospora parasitica* Norphanph., Bulgakov et K.D. Hyde – on dying twigs and branches of *Malus* (*Rosaceae*): *M. baccata* (L.) Borkh. – South Park, 27.07.2022, SVER(F) 96835; *M. domestica* – BG UrB RAS, 28.07.2022, SVER(F) 96836. Pat.

Diaporthaceae

!*Juglanconis oblonga* (Berk.) Voglmayr et Jaklitsch (≡ *Melanconium oblongum* Berk.) – on dying twigs and branches of *Juglans mandshurica* (*Juglandaceae*) – BG UrB RAS, 03.07.2020, SVER(F) 96837. Pat.

Gnomoniaceae

Amphicytostroma tiliae (Sacc.) Petr. (≡ *Cytospora tiliae* Sacc.) – on dead twigs of *Tilia cordata* (*Malvaceae*): BG UrB RAS, 27.07.2022, SVER(F) 96838. Pat/Sap.

#*Apiognomonia errabunda* (Roberge ex Desm.) Höhn. [= *Apiognomonia quercina* (Kleb.) Höhn. = *Gloeosporium tiliae* Oudem.] – on living leaves of *Quercus* (*Fagaceae*): *Q. mongolica* – BG UrB RAS, 27.07.2022, SVER(F) 96839; *Q. robur* – BG UrB RAS, 27.07.2022, SVER(F) 96840. Pat.

!*Ophiognomonia leptostyla* (Fr.) Sogonov [= *Marssonina juglandis* (Lib.) Magnus] – on living leaves and fruits of *Juglans mandshurica* (*Juglandaceae*): BG UrB RAS, 05.09.2020, SVER(F) 96841. Pat.

Lamproconiaceae

Hercospora tiliae (Pers.) Tul. et C. Tul. [≡ *Rabenhorstia tiliae* (Pers.) Fr.] – on dying twigs and branches of *Tilia platyphyllos* Scop. (*Malvaceae*): BG UrB RAS, 09.08.2022, SVER(F) 96843. Pat/Sap.

Ophiostomatales

Ophiostomataceae

**Ophiostoma novo-ulmi* Brasier – in wood of *Ulmus* (*Ulmaceae*): *U. glabra* Huds. – BG UrB RAS, 15.09.2021, SVER(F) 96844; *U. laevis* Pall. – *ibid.*, 28.07.2022, SVER(F) 96845; *U. pumila* L. – *ibid.*, 08.07.2020, SVER(F) 96846. Pat.

Xylariales

Diatrypaceae

#*Diatrypella quercina* (Pers.) Cooke – on dying and dead branches of *Quercus* (*Fagaceae*): *Q. robur* – BG UrB RAS, 27.07.2022, SVER(F) 96842; *Q. rubra* L. – *ibid.*, 09.09.2022, SVER(F) 96864. Pat.

Basidiomycota

Agaricomycotina

Agaricomycetes

Auriculariomycetidae

Auriculariales

Auriculariaceae

**Auricularia nigricans* (Sw.) Birkebak, Looney et Sánchez-García – on dead stem of *Juglans mandshurica* (*Juglandaceae*): BG UrB RAS, 26.08.2019, SVER(F)96868. Sap.

Sebacinales

Sebacinaceae

#*Sebacina grisea* Bres. – on fallen trunk of *Picea glauca* (Moench) Voss (*Pinaceae*): BG UrB RAS, 05.09.1998, SVER(F)96865. Myc/Sap.

Agaricales

Pluteaceae

Pluteus phlebophorus (Ditmar) P. Kumm. – on stumps of *Acer negundo* (*Sapindaceae*): BG UrB RAS, 20.06.2022, SVER 910240. Sap. *Pluteus phlebophorus* is also known from the vicinity of Sargaya village (Krasnoufimsk District), where it is found on trunk of *Querqus robur* in mixed forest, 11.09.1960, SVER 910108 (the specimen has not been previously published). The species is poorly resolved taxonomically, and it is in need of a critical revision utilizing molecular techniques, but the absence of type specimens complicate revision (Funga.., 2012; Malysheva et al., 2016). Therefore, studied collections are considered as *Pluteus phlebophorus* in morphological concept proposed by Vellinga (1990).

Psathyrellaceae

Coprinellus truncorum (Scop.) Redhead, Vilgalys et Moncalvo – on or around trunks or stumps of deciduous trees, mainly on *Populus*: BG UrB RAS, 01.08.2012, SVER 745145; Hohryakova str., on the base of trunk of *P. balsamifera* L. (*Salicaceae*), 17.06.2023, SVER 910237; Stepana Razina str., on and around trunk of *P. balsamifera*,

03.07.2023, SVER 910236; Sakko and Vanzetti str., on the base of trunk of *P. balsamifera*, 8.07.2023, SVER 910238; XXII Partsyezd Park, on stump of *P. balsamifera*, 08.07.2023, SVER 910239. Sap/Par.

Atheliales

Byssocorticiaceae

**Leptosporomyces raunkiaeri* (M.P. Christ.) Jülich – at the base and dead roots of *Chamaerops humilis* L. (*Arecaceae*): BG UrB RAS, subtropical glasshouse, 14.06.2018, SVER(F) 96866.; *ibid.*, on fallen trunk of *Alnus glutinosa* (L.) Gaertn. (*Betulaceae*): Mednyi surrounds, edge of the bog, 02.09.2022, SVER(F) 96870. Sap.

Corticiales

Corticiaceae

**Dendrothele griseocana* (Bres.) Bourdot et Galzin – on bark of living *Salix alba* L. (*Salicaceae*): Arboretum at Pervomayskaya street, 18.08.2017, SVER(F) 96867. Sap.

#*Kurtia macedonica* (Litsch.) Karasiński – on dead part of *Quercus robur* (*Fagaceae*): Central city park, 30.09.2006, SVER(F) 96871. Sap.

**Vuilleminia cystidiata* Parmasto – on branch of *Acer negundo* (*Sapindaceae*): "Botanical" city district, 02.09.2021, SVER(F) 96872. Pat/Sap.

Hymenochaetales

Hymenochaetaceae

#*Hymenochaete pilatii* Corfixen et Parmasto – on dead stem of *Sorbaria sorbifolia* L. (*Rosaceae*): BG UrB RAS, 27.09.2006, SVER(F) 96874 [as *Hymenochaete tabacina* (Sowerby) Lév.]. Sap.

Oxyporaceae

#*Oxyporus phellodendri* Bondartsev et Lj.N. Vassiljeva – on dead stem of *Phellodendron amurense* Rupr. (*Rutaceae*): BG UrB RAS, 20.08.2005, SVER(R) 96873. Sap.

Polyporales

Meruliaceae

#*Cabalodontia queletii* (Bourdot et Galzin) Piątek – of dead part of *Juglans mandshurica* (*Juglandaceae*): Arboretum at 8 march street, 08.09.2006, SVER(F) 96876. Sap.

#*Hypochnicium cymosum* (D.P. Rogers et H.S. Jacks) K.H. Larss. et Hjortstam – on dead part of *Picea glauca* (*Pinaceae*): Arboretum at Pervomayskaya street, 28.09.2017, SVER(F) 96875. Sap.

Trechisporales

Hydnodontaceae

#*Subulicystidium perlongisporum* Boidin et Gilles – on dead trunk of *Malus baccata* (*Rosaceae*): Arboretum at Pervomayskaya str., 03.10.2021, SVER(F) 96877. Sap.

Pucciniomycotina

Pucciniomycetes

Pucciniales

Pucciniastraceae

Naohidemyces vacciniorum (J. Schröt.) Spooner (= *Pucciniastrum vaccinii* Jørst.) – on living leaves and fruits of *Vaccinium* sp. (*Ericaceae*): Ayatskoy Lake, pine-dominated managed forest, 09.08.2007, SVER(F) 96847. Pat.

Pucciniaceae

!*Puccinia vincae* (DC.) Berk. – on living leaves of *Vinca major* L. (*Apocynaceae*): Chkalov city district, private garden, 13.07.2023, SVER(F) 96848. Pat.

!*Uromyces caraganae* (Thüm.) Magnus – on living leaves of *Caragana arborescens* Lam. (*Fabaceae*): City center, street shrubs, 16.08.2021, SVER(F) 96849. Pat.

Tranzscheliaceae

!*Tranzschelia discolor* (Fuckel) Tranzschel et M.A. Litv. – on living leaves of *Prunus* (*Rosaceae*): *P. domestica* – BG UrB RAS, 20.09.2021, SVER(F) 96850; *P. insititia* L. – private garden "Seven fountains", 16.08.2020, SVER(F) 96851. Pat.

Ustilaginomycotina

Exobasidiomycetes

Exobasidiales

Exobasidiaceae

#*Exobasidium cassiopes* Peck – on living leaves of *Cassiope tetragona* (L.) D. Don (*Ericaceae*): Denezkin Kamen Mt., 25.07.1949, SVER(F) 96853. Pat.

!*E. miyabei* Nagao, Akimoto et Kishi – on living leaves of *Rhododendron dauricum* (*Ericaceae*): BG UrB RAS, 26.07.2022, SVER(F) 96854. Pat.

!*E. rhododendri* (Fuckel) C.E. Cramer – on living leaves of *Rhododendron hirsutum* L. (*Ericaceae*): BG UrB RAS, 25.08.2022, SVER(F) 96855. Pat.

Graphiolaceae

!*Graphiola phoenicis* (Moug. ex Fr.) Poit. – on living leaves of *Phoenix canariensis* H. Wildpret (*Arecaceae*): BG UrB RAS, subtropical glasshouse, 30.06.2005, SVER(F) 96856. Pat.

DISCUSSION

Previously, 20 species of exobasidioid fungi were known in Sverdlovsk Region (Shiryaev et al., 2010; Shiryaev, Stavishenko, 2011). As a result of this study, four new species were identified. Consequently, 24 species of exobasidioid fungi are recorded in the region now. This group of fungi was previously found only in the natural habitats of the region, and now four species have been identified on alien plants in the Botanical Garden of the Ural Branch of the Russian Academy of Sciences (BG UrB RAS): *Exobasidium miyabei* and *E. rhododendrii* were found on living leaves of several East Asian *Rhododendron* species in open ground, and one species was found on living leaves of the host plants

in greenhouses: *Graphiola phoenicis* – on *Phoenix canariensis*. One new species, *Exobasidium cassiopes*, parasitizes the leaves of *Cassiope tetragona* in natural conditions.

Previously, 29 species of powdery mildew fungi were recorded on woody plants in Sverdlovsk Region (Bulgakov, Shiryaev, 2022). Currently, this list has increased (up to 35 species totally) by six species, which were found on alien species of trees and shrubs, including one exotic species – *Erysiphe euonymicola* – was found on the leaves of *Euonymus japonica* in the greenhouses of BG UrB RAS.

There were 12 species of rust fungi previously recorded in Sverdlovsk Region on trees and shrubs (Bulgakov, Shiryaev, 2021). This number has been increased (up to 16 species) by four new found species.

All identified alien fungi can be divided into three main groups due to the origins of fungi and host plant species: 1) invasive; 2) co-introduced; 3) conditional alien species.

The invasive fungal species have spread in Ekaterinburg city as parasites of native plants. Such species are most numerous among powdery mildew fungi (genus *Erysiphe*). Their appearance in the territory of Ekaterinburg is a consequence of their wide-scale invasions in Europe or the temperate climate zone of whole Eurasia. A striking example of such species is *Ophiostoma novo-ulmi*, causing Dutch elm disease; this fungus has become a common pathogen in the natural range of *Ulmus* species 1970s (Desprez-Loustau, 2009). The other potentially dangerous pathogens of pines would be *Cyclaneusma minus* and *Diplodia sapinea*, if they will get the ability to infect the native pine species *Pinus sylvestris* (Desprez-Loustau, 2009).

Co-introduced alien species form the second (and the largest) group represented mostly by specialized plant pathogens that "follow" their host plants. The appearance of these species in Ekaterinburg is a consequence of co-introduction (coupled introduction) of fungi and their host plants in the region (or invasion of host plants). Many of such species have spread thousands of kilometers within the secondary range of their host plants, often from one to another continent, or from one part of the world to another one (Desprez-Loustau, 2009). Those are fungi associated with plants originating in North America: *Acervuloseptoria fraxini* on *Fraxinus pennsylvanica* and *Ragnhildiana ampelopsidis* on *Parthenocissus quinquefolia*, as well as the Central, East and South Asian species: *Cytospora parasitica* on *Malus baccata*, *Neophloeospora maculans* on *Morus alba*, *Juglanconis oblonga* and *Ophiognomonia leptostyla* on *Juglans mandshurica*. However, many introduced alien plant and fungal species were removed within Eurasia continent from its west (Europe, Caucasus), central (Central Asia) or east parts (Eastern Asia).

Conditional alien fungi are usually associated with woody plants of genera having edge of their natural ranges in the Middle Urals: *Acer platanoides*, *Corylus avellana*, *Malus sylvestris*, *Populus alba*, *Quercus robur*, *Rhamnus cathartica*, and some other plants (Gorchakovsky et al., 1994). The appearance of fungal species associated with such plants in Ekaterinburg can be considered as a "step beyond the natural range" following the introduction of host plants. However, a part of this group also can be treated as invasive species (in Europe at general), for example, *Erysiphe alphitoides* and *E. corylacearum* (Desprez-Loustau, 2009; Braun, Cooke, 2012).

An interesting case is the two species found on *Acer negundo*, *Phaebotryon negundinis* and *Neodidymelliopsis negundinis*; the latter species was found not only on the ash-leaved maple *Acer negundo*, but also on the European spindle tree *Euonymus europaeus* (Hyde et al., 2018). Thus, it may be an invasive fungal species introduced from North America, or poor-known Eurasian species infecting many plants. The origin of the *Thyrostroma* species (*Thyrostroma tiliae* and *T. ulmicola*) is still unclear, too; most likely, they are Central Asian species (Senwanna et al., 2017).

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Новые для Свердловской области (Средний Урал, Россия) виды грибов на чужеродных и местных видах древесных растений

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Впервые для Свердловской обл. приводится и информация о находках 75 видов грибов из отделов *Ascomycota* и *Basidiomycota*, которые формируют плодовые тела на чужеродных и местных видах древесных растений. Фитопатогенами являются 71% изученных видов.

Ключевые слова: биоразнообразие, инвазия, патогены растений, распространение грибов, Россия, чужеродные виды, *Ascomycota*, *Basidiomycota*