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Diversity and distribution of thelephoroid fungi (Basidiomycota, Thelephorales) in the Sverdlovsk region, Russia

Anton Shiryaev
Institute of Plant and Animal Ecology, Ural Division of Russian Academy of Science, 8 March str., 202 RUS-620144 Ekaterinburg, Russia.
E-mail: 26081978@mail.ru

Abstract: 63 species of the thelephoroid fungi (Basidiomycota) are reported from the Sverdlovsk region (Russia), including fifteen new species for the region. One of them, *Phellodon secretus* is reported for the first time from Russia. This study is based on 931 collections and observations, as well as on literature data. The most frequent species are *Hydnellum aurantiacum*, *H. ferrugineum*, *Sarcodon imbricatus*, *S. squamosus*, *Thelephora palmata*, *Th. terrestris*, *Tomentella bryophila*, *T. ellisii*, *T. ferruginea*, *T. radiosa*, *T. sublilacina*. These species comprise 52% of all observations, but only 17.5% of all species found in the region. Nine species (14.3%) were collected only once, seven species (11.1%) twice, and six species (9.5%) three times, respectively. Some rare species are also infreguently collected in other regions of Russia, viz. *Amaurodon cyaneus*, *A. mustialaensis*, *Hydnellum auratile*, *H. geogenium*, *H. peckii*, *Pseudotomentella flavovirens*, *P. nigra*, *Tomentella galzinii*, *T. viridula*. The highest richness of species was in the southernmost areas of the region, esp. in mixed or broad-leaved forests. Only 4.8% of the total number of the species has been recorded in all biogeographical provinces and 20.6% of species were found only in one province.

Kokkuvõte: Lehternahkiseliste seente (Basidiomycota, Thelephorales) mitmekesisus ja levik Venemaal Sverdlovski oblastis.

Venemaal Sverdlovski oblastis registreeriti 63 seente seltsi lehternahkiselised (Thelephorales) kuuluvat liiki. Liik *Phellodon secretus* on esmasleid Venemaalt. Uuring toetub ühtekokku 931 autori poolt tehtud vaatlusele või kogutud eksemplarile ning lisaks sellele kirjanduse andmetele. Kõige sagedamini esinevad liigid on *Hydnellum aurantiacum*, *H. ferrugineum*, *Sarcodon imbricatus*, *S. squamosus*, *Thelephora palmata*, *Th. terrestris*, *Tomentella bryophila*, *T. ellisii*, *T. ferruginea*, *T. radiosa* ja *T. sublilacina*. Nimetatud liigid moodustavad uuritud eksemplaridest 52%, aga 17,5% kõigist leitud liikidest. Üheksa liiki (14,3%) leiti üks kord, seitse liiki (11,1%) kaks korda ja kuus liiki (9,5%) kolm korda. Nii Sverdlovski oblastis kui ka kogu Venemaal esinevad harva liigid *Amaurodon cyaneus*, *A. mustialaensis*, *Hydnellum auratile*, *H. geogenium*, *H. peckii*, *Pseudotomentella flavovirens*, *P. nigra*, *Tomentella galzinii* ja *T. viridula*. Liigirikkamad olid oblasti lõunapoolsemad laialehised ja segametsad. Ainult 4,8% liikidest on leitud kõigis biogeograafilistes provintsides ja 20,6% liikidest on leitud vaid ühes.

INTRODUCTION

The first records of the thelephoroid fungi in the Sverdlovsk region were published by Stepanova-Kartavenko (1967), who listed 13 species for this region. Kõljalg (1996) studied the diversity of the resupinate thelephoroid fungi in temperate Eurasia including Sverdlovsk region. Also, some additional notes on thelephoroid fungi are included in the recent publications of Shiryaev (2007) and Shiryaev & Stavishenko (2008). In total, 48 species of thelephoroid fungi were known before this sudy.

The main aim of this study was to survey the diversity of thelephoroid fungi in the Sverdlovsk region (Ural, Russia), since no up-to-date lists of the species are available. Even if this list will probably not cover the whole species richness in the study area, it gives basic information for the check-list and red list of the thelephoroid fungi in the Sverdlovsk region. Without such a list it is impossible to make any evaluations of the potentially threatened species. The results of this study, however, are incomplete to make reliable conclusions on the distribution and host preferences of thelephoroid species.

MATERIAL AND METHODS

Sverdlovsk region, with its length of over 700 km from south to north (56°02'–62°01' N) is on the western and eastern slopes of Ural Mountain range which is a bounder between Europe and Asia (Fig. 1). South-western part of region is East-European hills with heights 300–450 m.a.s.l. (Gorchakovsky et al., 1994). The climate is subcontinental with annual precipitation about 600 mm. and mean temperature +1.8 °C. The vegetation is dominated by broad leaved forests (*Quercus robur*, *Tilia cordata*, *Acer platanoides*, *Ulmus laevis*, *U. scabrum*, *Corylus avellana*, *Euonymus verrucosa*) intermixed with conifers

(*Abies sibirica*, *Picea obovata*, *Pinus sylvestris*). Also forest-steppes with xerophilic vegetation on sandy and calcareous soils is found in this area. The Ural Mountains in the southern part of the region are comparatively low, being mostly 250–550 m.a.s.l., and the highest peaks are 600–800 m.a.s.l. The climate is continental, but both the climate and the vegetation are naturally highly dependent on the local relief (altitude, slope orientation). On the western slopes and foothills the precipitation is higher than on the eastern side of the mountains. The western side is covered predominantly with coniferous *Abies sibirica*, *Picea obovata* and few broad-leaved forests with *Tilia cordata*, *Acer platanoides* and the eastern sides are *Pinus sylvestris* dominated forests intermixed with *Larix sibirica*, *Betula* spp. and *Populus tremula*. Northern part is higher, mostly 600–1000 m.a.s.l. and the highest peaks up to 1650 m a.s.l. The climate is cooler and more continental than in southern part. Pine forests are dominated on foothills and spruce with siberian pine (*Pinus sibirica*) on the slopes. The peaks of mountains are covered with alpine vegetation including shrubs of *Juniperus sibirica*, *Pinus sibirica*, *Larix sibirica*, *Betula nana*. Above 1000 m.a.s.l. only mosses and lichens are found. The West Siberian plain in the territory of Sverdlovsk region is 150–300 m.a.s.l. and climate is continental. The area is mostly covered with pine and spruce-birch forests with few *Tilia cordata*, *Ulmus laevis* and *Calluna vulgaris*.

In each collection site all specimens were collected for the further studies except cases where identification was possible on site (species like *Hydnellum ferrugineum*, *Thelephora palmata*, *Th. terrestris*, etc.). However, many sites were visited only once and only in one year.

The list of species below is based mostly on author's collections. Taxa mentioned before this study are marked with citations. The material studied is preserved in the mycological herbarium of the Institute of Plant and Animal, Ural Division of Russian Academy of Science, Ekaterinburg (SVER). For the identifications following keys were used: Nikolaeva, 1961; Corner, 1968; Kõljalg, 1996; Hansen & Knudsen, 1997. The nomenclature of fungi follows *Index Fungorum* (http://www.indexfungorum.org/). Data for the vascular plants, climate and geography are according to Gorchakovsky et al. (1994). The authors of plant species names are found in that publication and are not repeated here. In this paper the epithets "spruce" and "*Picea*" refer to *Picea obovata*, "pine" and "*Pinus*" to *Pinus sylvestris*, "birch" to *Betula pendula* or *B. pubescens*, "aspen" or "*Populus*" to *Populus tremula*, "linden" or "*Tilia*" to *Tilia cordata*, "larch" or "*Larix*" to *Larix sibirica*, "oak" or "*Quercus*" to *Quercus robur*, "hazel" or "*Corylus*" to *Corylus avellana* and "fir" or "*Abies*" to *Abies sibirica*, respectively. New fungal species for the region are marked with asterisk (*).

The thelephoroid species are arranged alphabetically and according to the collecting site (biogeographical and administrative area, see fig.1). Rare and species new for Russia are described and illustrated.

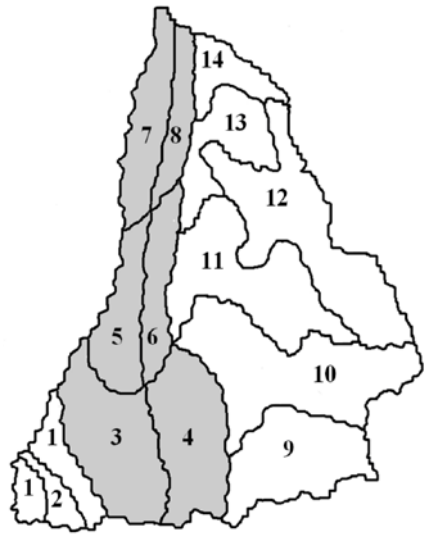

Fig. 1. Biogeographical provinces of Sverdlovsk region.
EAST-EUROPEN HILLS: 1 – P – Perm, 2 – KK – Kungur-Krasnoufimsk
URAL MOUNTAIN RANGE: 3 – Cl – Chusovoy low mountainous, 4 – Bp – Beloyarsk peneplen, 5 – Ks – Kachkanar submountainous, 6 – Nm – Nizhny Tagil middle mountainous, 7 – Kh – Konzhakov high mountainous, 8 – Is – Ivdel submountainous
WEST SIBERIAN PLAIN: 9 – PI – Pishma, 10 – NI – Nitsa, 11 – ST – Sosva-Tura, 12 – PT – Pelym-Tavda, 13 – OU – Ous, 14 – VP – Verch-Pelym
Acronyms (by Gorchakovsky et al., 1994) used in the text.

RESULTS

Altogether 931 collections and observations were made during this study. In addition more than 400 specimens collected by other collectors were studied as well. Based on these two sets of specimens and observations 63 species of thelephoroid fungi were detected from the Sverdlovsk region. Species found only once, counted 9 (14.3%), twice 9 (14.3%) and three times 17 (27%), respectively. The 35 rare species (1-3 observations) form 55.6% of all the species, whereas 11 most common species (over 10 observations), form 17.5% and the rest (4-9 observations) 26.4%, respectively. The 27 common species comprise 44.4% of all observations.

* Amaurodon cyaneus (Wakef.) Kõljalg & K.H. Larss.
P. Krasnoufimsk area, Sarana, Pudlingovsky, mixed forest: *Picea obovata*, *Pinus sylvestris*, *Acer platanoides*, *Ulmus scabrum*, *Tilia cordata*, *Corylus avellana* on branch of hazel, 11.IX.1977 *A.Sirko* (56°29'N, 57°33'E) SVER(F) 44062.

*Amaurodon mustialaensis (P. Karst.) Kõljalg & K.H. Larss.
P. Krasoufimsk area, "Nizhneirginsk Oak Forest", old grow mixed forest: *Pinus sylvestris, Quercus robur, Acer platanoides, Ulmus scabrum*, on block of oak wood, 15.IX.2000 *A. Shiryaev* (56°50'N, 57°24'E) SVER(F) 44826.

*Amaurodon viridis (Alb. & Schwein.) J. Schröt.
P. Krasnoufimsk area, Garevka, broadleaved forest, on trunk of linden, 10.VIII.2006 *A.Shiryaev* (56°08'N, 57°44'E) SVER(F) 44769; **Cl.** Prigorod area, Visim Nature Reserve, mixed forest: *Abies sibirica*, *Betula pendula*, *Sorbus aucuparia* on branch of fir, 28.VIII.1959 *N.T.Stepanova* (57°24'N, 59°36'E) SVER(F) 43894; Nizhneserginsk area, Nizhnie Sergi, town park, on decaying block of wood *Sorbus aucuparia*, 05.IX.1958 *N.T.Stepanova* (56°38'N, 59°17'E) SVER(F) 43951; **NI.** Alapaevsk area, Mahnevo, on decaying branch of *Populus nigra*, 07.IX.1949 *N.T.Stepanova* (58°26'N, 61°40'E) SVER(F) 43899.

Bankera fuligineoalba (J.C. Schmidt) Coker & Beers ex Pouzar
Wide spread species in the region. **P.** Krasnoufimsk; Achit areas. **KK.** Krasnoufimsk area. **Cl.** Nizhneserginsk; Nevyansk; Shalya; Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **Bp.** Ekaterinburg surrounds (Stepanova-Kartavenko, 1967); Polevskoi; Sisert areas. **Ks.** Kachkanar area. **Nm.** Verkh Salda. **Kh.** Severouralsk; Ivdel areas. **Is.** Ivdel area. **PI.** Tugulim area, Nature park "Pripishminsk Bory" (Shiryaev, 2007). **NI.** Irbit area. **ST.** Gari area. **OU.** Serov area.

Bankera violascens (Alb. & Schwein.) Pouzar
Cl. Prigorod areas, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **Bp.** Ekaterinburg, Nizhne-Isetsk, luxuriant mixed forest: *Picea obovata*, *Pinus sylvestris*, *Betula pendula*, *Populus tremula*, *Tilia cordata*, *Caragana arborescens*, on soil, 08.VIII.1960 *N.T.Stepanova* (56°44'N, 60°43'E) SVER(F) 43800; Sisert area, Dvurechensk, University Biostation, Karasie lake, pine heath forest with some birch bushes, on soil, 05.IX.2003 *A.Shiryaev* (56°33'N, 61°03'E) SVER(F) 44511; **Cl.** Shalya area, Sylva, Shigaevo, close to the brook, herb-rich spruce forest with some pines and hardwoods, on soil, 10.VIII.2007 *A.Shiryaev* (51°21'N, 58°40'E) SVER(F) 44795.

Boletopsis grisea (Peck) Bondartsev & Singer
Cl. Nevyansk area, Tavatui lake, south coast, fairy rich pine heath forest, on sand-stony soil, 02.IX.2003 *A.Shiryaev* (57°05'N, 60°11'E) SVER(F) 44291; Prigorod areas. Visim Natural Reserve (Shiryaev & Stavishenko, 2008). **PI.** Tugulim area, National Park "Pripishminsk Bory" (Shiryaev, 2007). **OU.** Serov area, Vorontsovka, dry pine heath forest, on sandy soil, 22.VIII.1955 *N.T.Stepanova* (59°38'N, 60°12'E) SVER(F) 43990.

Boletopsis leucomelaena (Pers.) Fayod
CI. Nevyansk area, Tavatui lake, eastern coast, spruce-pine heath forest with few *Juniperus communis*, *Tilia cordata*, on stony soil, 11.IX.1960 *N.T.Stepanova* (57°07'N, 60°13'E) SVER(F) 43275; Prigorod areas, Visim Natural Reserve (Shiryaev & Stavishenko, 2008); Nizhneserginsk area, Natural Park "Olenyi ruchyi", mixed forest: *Picea obovata*, *Abies sibirica*, *Betula pendula*, *Tilia cordata*, on calcareous soil, 04.IX.2004 *A.Shiryaev* (56°26'N, 59°20'E) SVER(F) 44294. **PI.** Tugulim area, National Park "Pripishminsk Bory" (Shiryaev, 2007).

Hydnellum aurantiacum (Batsch.) P. Karst.
Wide spread species in the region. **P.** Krasnoufimsk; Arti areas. **KK.** Krasnoufimsk area. **Cl.** Nizhneserginsk; Nevyansk; Shalya; Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **Bp.** Polevskoi; Sisert areas. **Ks.** Kachkanar area. **Nm.** Verkh Salda. **Kh.** Severouralsk; Ivdel areas. **Is.** Ivdel area. **PI.** Tugulim area (Stepanova-Kartavenko, 1967); Talica area, Nature park "Pripishminsk Bory" (Shiryaev, 2007). **NI.** Irbit area. **ST.** Verkhoturie area. **ST.** Gari area. **OU.** Serov area. **VP.** Ivdel area.

* Hydnellum auratile (Britzelm.) Maas Geest.
CI. Nizhneserginsk area, Nature Park "Olenyi ruchyi", mixed forest: *Pinus sylvestris*, *Juniperus communis*, *Tilia cordata*, *Betula pendula*, *Sorbus aucuparia*, on calcareous soil, 1.X.2000 *A.Shiryaev* (56°26'N, 59°20'E) SVER(F) 44563.

Hydnellum caeruleum (Hornem.) P. Karst.
Syn. *H. compactum* (Pers.) P. Karst.
Wide spread species in the region. **P.** Krasnoufimsk; Achit areas. **KK.** Krasnoufimsk area. **Cl.** Nizhneserginsk; Nevyansk; Shalya; Prigorod area, Visim Nature Reserve

(Shiryaev & Stavishenko, 2008). **Bp.** Polevskoi; Sisert areas. **Ks.** Kachkanar area. **Nm.** Verkh Salda. **Kh.** Severouralsk; Ivdel areas. **Is.** Ivdel area. **PI.** Tugulim area (Stepanova-Kartavenko, 1967), Talica area, Nature park "Pripishminsk Bory" (Shiryaev, 2007). **NI.** Alapaevsk area (Stepanova-Kartavenko, 1967). **ST.** Verkhoturie area. **OU.** Serov area.

Hydnellum concrescens (Pers.) Banker
Syn. *H. zonatum* (Batsch) P. Karst.
CI. Nizhneserginsk area, Natural park "Olenyi ruchyi", coniferous forest: *Pinus sylvestris*, *Picea obovata*, *Juniperus communis* with few *Tilia cordata*, *Sorbus aucuparia*, on soil, 1.X.2000 *A.Shiryaev* (56°26'N, 59°20'E) SVER(F) 44561; ibid. (Stepanova-Kartavenko, 1967); Shalya area, Sylva, Shigaevo, southern slope of the hill, coniferous forest: *Pinus sylvestris* with few *Betula pendula*, *Sorbus aucuparia*, on soil, 12.VIII.1966 *N.T.Stepanova* (51°21'N, 58°40'E) SVER (F) 43270; Nevyansk area (Stepanova-Kartavenko, 1967). **Bp.** Beloyarsk (Stepanova-Kartavenko, 1967); **PI.** Talica area, National park "Pripishminsk Bory" (Shiryaev, 2007).

Hydnellum ferrugineum (Fr.) P. Karst.
Wide spread species in the region. **P.** Arti area. **KK.** Krasnoufimsk area. **Cl.** Nizhneserginsk; Nevyansk; Shalya; Prigorod area, Visim Nature Reserve. **Bp.** Polevskoi; Sisert areas. **Ks.** Kachkanar area. **Nm.** Verkh Salda. **Kh.** Severouralsk; Ivdel areas. **Is.** Ivdel area (Stepanova-Kartavenko, 1967). **PI.** Tugulim area, Nature park "Pripishminsk Bory" (Shiryaev, 2007). **ST.** Verkhoturie area. **NI.** Alapaevsk area (Stepanova-Kartavenko, 1967). **PT.** Gari area. **OU.** Serov area.

*Hydnellum geogenium (Fr.) Banker
P. Krasnoufimsk area, Sarana, Petuhovka, mixed forest: *Abies sibirica*, *Pinus sylvestris*, *Acer platanoides*, *Corylus avellana*, on dry soil, 20.VIII.2006 *A.Shiryaev* (56°28'N, 57°37'E) SVER(F) 44381. **CI.** Nizhneserginsk area, Natural park "Olenyi ruchyi", on the open meadows, grass-herb *Picea obovata* forest with *Pinus sylvestris*, *Populus tremula*, *Tilia cordata*, somewhat calcareous ground, 01.IX.2001 *A.Shiryaev* (56°26'N, 59°20'E) SVER(F) 44476.

*Hydnellum peckii Banker
Syn. *H. diabolus* Banker
KK. Krasnoufimsk area, Kriulino, dry coniferous forest: *Pinus sylvestris*, *Picea obovata* with few *Betula pendula*, *Ulmus scabrum*, on sandy-stone soil, 15.IX.1973 *A.Sirko* (56°35'N 57°48'E) SVER (F) 43768. **CI.** Achit area, Korzunovka, mixed forest: *Abies sibirica*, *Picea obovata*, *Acer platanoides*, *Betula pendula*, on soil, 3.IX.2004 *A.Shiryaev* (56°55'N, 58°11'E) SVER(F) 44851. **PI.** Tugulim area, National park "Pripishmisk Bory", Bahmetskoe bog, dry pine heath forest with small eskers, on sandy soil, 30.09.2002 *A.Shiryaev* (57°18'N, 64°28'E) SVER(F) 44562).

Hydnellum scrobiculatum (Fr.) P. Karst.
P. Krasnoufimsk area, Ayaz, mixed forest: *Abies sibirica*, *Pinus sylvestris*, *Quercus robur*, on reach soil, 10.IX.1951 *N.T.Stepanova* (56°05'N, 57°34'E) SVER(F) 43117. **CI.** Shalya area, Sylva, Shigaevo, southern slope of the hill, coniferous forest: *Abies sibirica*, *Pinus sylvestris* with few *Betula pendula*, *Sorbus aucuparia*, on soil, 10.VIII.2007 *A.Shiryaev* (51°21'N, 58°40'E) SVER(F) 44847; Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008).

Hydnellum suaveolens (Scop.) P. Karst.
P. Krasnoufimsk area, Ust-Bugalish, mixed forest: *Picea obovata*, *Quercus robur*, *Populus tremula*, on reach soil, 21.VIII.1996 *A.Shiryaev* (56°16'N, 57°51'E) SVER(F) 44349. **Cl.** Revda area (Stepanova-Kartavenko, 1967); Prigorod areas, Visim Natural Reserve (Shiryaev & Stavishenko, 2008). **Kh.** Severouralsk area, Cumba Mnt., coniferous forest: *Picea obovata*, *Pinus sylvestris* with few *Betula pendula*, on stony soil, 25.VII.1946 *Z.Demidova* (60°09'N, 59°46'E) SVER(F) 43000. **PI.** Tugulim area (Stepanova-Kartavenko, 1967). **NI.** Tavda area, Oshmarka, spruce forest, on sandy soil, 27.08.1973 *N.T. Kartavenko* (58°11'N, 65°00'E) SVER(F) 43067.

Phellodon confluens (Pers.) Pouzar
P. Krasnoufimsk area, Nizhneirginsk oak forest, mixed forest: *Quercus robur*, *Pinus sylvestris*, *Acer platanoides*, on reach soil, 19.VIII.1996 *A.Shiryaev* (56°50'N, 57°24'E) SVER(F) 44682; **CI.** Nizhnesergi area, Natural park "Olenyi ruchi", mixed forest: *Abies sibirica*, *Pinus sylvestris*, *Tilia cordata*, *Acer platanoides*, on soil, 03.IX.1973 *A.Sirko* (56°26'N, 59°20'E) SVER(F) 43181; Prigorod areas, Visim Natural Reserve (Shiryaev & Stavishenko, 2008). **PI.** Tugulim area, National Park "Pripishmisk Bory" (Shiryaev, 2007).

Phellodon melaleucus (Sw. ex Fr.) P. Karst.
Syn. *P.connatus* (Schultz.: Fr.) P. Karst.
P. Krasnoufimsk area, Nizhneirginsk oak forest, mixed forest: *Quercus robur*, *Pinus sylvestris*, on reach soil, 19.VIII.1996 *A.Shiryaev* (56°50'N, 57°24'E) SVER(F) 44402. **KK.** Arti area, Petuhovka, mixed forest: *Pinus sylvestris*, *Abies sibirica*, *Populus tremula*, *Betula pendula*, *Acer platanoides*, on soil, 13.VIII.2002 *A.Shiryaev* (56°23'N, 58°18'E) SVER(F) 44627. **Cl.** Prigorod area, Visim Natural Reserve (Shiryaev & Stavishenko, 2008). **PI.** Kamensk area, Sipaevskoe, mixed *Pinus-Betula* forest-steep, on sandy soil, 29.VIII.1997 *A.Shiryaev* (56°15'N, 61°57'E) SVER(F) 44272; Tugulim area, National Park "Pripishmisk Bory" (Shiryaev, 2007).

Phellodon niger (Fr.) P. Karst.
Cl. Shalya area, Sylva, Shigaevo, mixed forest: *Picea obovata*, *Betula pendula*, *Tilia cordata*, *Sambucus sibirica*, on soil, 10.VIII.2007 *A.Shiryaev* (57°21'N, 58°40'E) SVER(F) 44197; Achit area, Korzunovka,

mixed forest: *Abies sibirica*, *Pinus sylvestris*, *Betula pendula*, *Tilia cordata*, *Ulmus scabrum*, on soil, 23.VIII.1965 *N.T.Stepanova* (56°54'N, 58°13'E) SVER(F) 43009; Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **Bp.** Sisert area, Dvurechensk, University Biostation, mixed forest: *Pinus sylvestris*, *Betula pendula*, *Populus tremula*, *Sorbus aucuparia*, on soil, 04.IX.2003 *A.Shiryaev* (56°35'N, 61°02'E) SVER(F) 44192.

* Phellodon secretus Niemelä & Kinnunen
New to Russia.
Fruitbodies up to 3.5 cm high and 4 cm in diam., small and fragile, color whitish-ash to mouse-grey, lower surface whitish-pale-gray. Context brownish-grey in KOH. Spines are sharp, regular to 1.2 mm long, pale-grey. Stipe irregular, fragile, very thin, 0.3–2.6 mm in diam. and 6–15 mm long, one or more stipes, mouse-black.

Hyphal system monomytic, CB+, KOH-. Context hyphae with few small amyloid granules, thin-walled, 2.8–4.4(–5.0) µm in diam., hyphae olivaceous in KOH. Stipe hyphae slightly thin-walled, brownish, 3.5–5.3(–5.8) µm in diam. Basidia clavate, 4-spored, without basal clamp, 25–38×5.0–5.8 µm; basidioles clavate, (18–)21–30×4.6–5.2(–5.5) µm. Spores globose, with distinct spines and apiculus, hyaline, thin-walled, guttulate, IKI–, KOH–, 3.0–3.4(–3.8) ×2.5–3.0(–3.4) µm, L=3.3 µm, W=2.9, Q=1.12 (SVER(F) 44622).

The Ural's specimens differ slightly from the description *P. secretus* of Niemelä et al. (2003). In the Finnish material the spore and hyphal size are slightly smaller, but that's showing a rule where mentioned bigger size of the northern and alpine Urals fungal specimens (Stepanova-Kartavenko, 1967) (Fig. 2). However, the differences are very small.

This is rare species, reported only from Finland (Niemelä et al., 2003), but perhaps not rare in the middle and northern boreal pine woodlands of Europe, since also collected from Archangelsk region, Russia (unpubl. data, SVER(F) 43891, *coll. A.Sirko*).

Is. Ivdel area, Ushma, eastern slope of the sandy hill with dry pine forest with few *Betula pendula* and *Juniperus communis*, on soil with needles and woody pieces, 01.IX.1949 *N.T.Stepanova* (61°20'N, 61°01'E) SVER(F) 43092. **OU.** Ivdel area, Ous, heath mixed forest: *Pinus sylvestris*, *P. sibirica*, *Picea obovata*, *Betula pendula*, *Alnus incana*, on soil in the space between fallen pine tree and ground, 15.IX.2000 *A.Shiryaev* (60°49'N, 61°29'E) SVER(F) 44622.

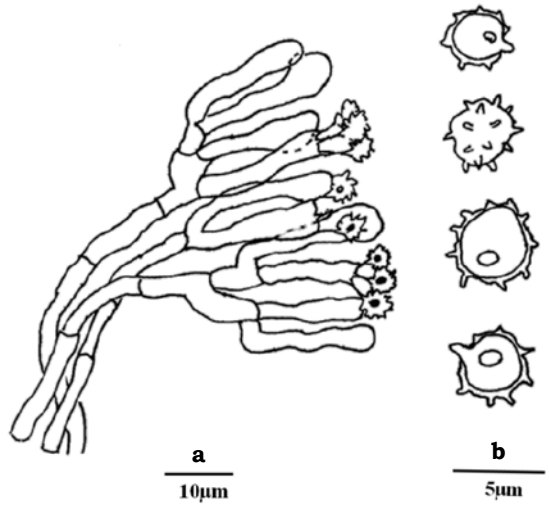

Fig. 2. Hymenial cells (a) with spores (b) of *Phellodon secretus* (SVER(F) 44622).

Phellodon tomentosus (L.) Baker
Cl. Shalya area, Sylva, Shigaevo, coniferous forest: *Pinus sylvestris*, *Abies sibirica*, on soil, 1.IX.1997 *A.Shiryaev* (57°21'N, 58°40'E) SVER(F) 44188; Prigorod area, Visim Natural Reserve (Shiryaev & Stavishenko, 2008). **Bp.** Sisert area (Stepanova-Kartavenko, 1967). **PI.** Tugulim area, Nature Park "Pripishmisk Bory" (Stepanova-Kartavenko, 1967; Shiryaev, 2007). **NI.** Tavda area, Pokrovka, dry pine forest, on sandy soil, 12.IX.1957 *N.T.Stepanova* (58°06'N, 65°27'E) SVER(F) 43241.

Pseudotomentella flavovirens (Höhn. & Litsch.) Svrček
Cl. Nizhneserginsk area, Nature Park "Olenyi ruchyi", mixed luxuriant forest: *Abies sibirica*, *Betula pendula*, *Tilia cordata*, *Sorbus aucuparia*, *Sambucus sibirica*, on birch wood, 3.IX.2004 *A.Shiryaev* (56°29'N, 59°18'E) SVER(F) 43928; Achit area, Korzunovka, mixed forest: *Abies sibirica*, *Pinus sylvestris*, *Betula pendula*, *Tilia cordata*, *Ulmus scabrum*, on fallen branch of pine, 23.VIII.1965 *N.T.Stepanova* (56°54'N, 58°13'E) SVER(F) 43007; Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008).

Pseudotomentella mucidula (P. Karst.) Svrček
P. Krasnoufimsk area, Sarana, mixed forest: *Abies sibirica*, *Populus tremula*, *Betula pendula*, *Ulmus scabrum*, *Tilia cordata*, on wood of fir, 15.VIII.1977 *N.T.Stepanova* (56°29'N, 57°41'E) SVER(F) 43561. **Cl.** Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **Kh.** Severouralsk area, southern slope of the Cumba Mnt., coniferous forest: *Picea obovata*, *Pinus sibirica*, on dead branch of spruce,

04.IX.1954 *A.Sirko* (60°08'N, 59°38'E) SVER(F) 43029.

*Pseudotomentella nigra (Höhn. & Litsch.) Svrček
Cl. Nevyansk area, southern cost of Tavatui lake, mixed forest: *Picea obovata*, *Pinus sylvestris*, *Betula pendula*, *Tilia cordata*, *Juniperus communis*, on decayed trunk of pine, 15.IX.2000 *A.Shiryaev* (57°05'N, 60°10'E) SVER(F) 44170.

Pseudotomentella tristis (P. Karst.) M. J. Larsen
Cl. Nevyansk area, southern coast of Tavatui lake, mixed forest: *Picea obovata*, *Pinus sylvestris*, *Betula pendula*, *Juniperus communis*, on decayed trunk of *Juniperus*, 12.IX.1972 *N.T.Stepanova* (57°05'N, 60°10'E) SVER(F) 43326; Prigorod areas, Visim Natural Reserve (Shiryaev & Stavishenko, 2008). **Bp.** Sisert area, Verkh Sisert, mixed moisture forest: *Pinus sylvestris*, *Betula pendula*, *Populus tremula*, *Sorbus aucuparia*, on aspen trunk, VII.1968 *N.T.Stepanova* (56°36'N, 61°03'E) SVER(F) 44102. **PI.** Tugulim area, National Park "Pripishmisk Bory" (Shiryaev, 2007).

Sarcodon fennicus (P. Karst.) P. Karst.
Cl. Achit area, Korzunovka, mixed forest: *Abies sibirica*, *Pinus sylvestris*, *Betula pendula*, *Tilia cordata*, *Ulmus scabrum*, on soil, 21.VIII.1965 *N.T.Stepanova* (56°54'N, 58°13'E) SVER(F) 43006; Prigorod areas, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **PI.** Tugulim area, National Park "Pripishmisk Bory" (Shiryaev, 2007).

Sarcodon imbricatus (L.) P. Karst.
P. Krasnoufimsk area, Chernaya rechka, mixed forest: *Picea obovata*, *Quercus robur*, *Acer platanoides*, *Corylus avellana*, on reach soil, 01.IX.1996 *A.Shiryaev* (56°32'N, 57°26'E) SVER(F) 44581. **Cl.** Achit area, Korzunovka, luxuriant mixed forest: *Abies sibirica*, *Picea obovata*, *Tilia cordata*, *Populus tremula*, *Ulmus scabrum*, on soil, 01.IX.2004 *A.Shiryaev* (56°54'N, 58°16'E) SVER(F) 44295; Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **Bp.** Sisert area, Dvurechensk, University Biostation, herb-reach mixed forest: *Betula pendula*, *Sorbus aucuparia*, *Pinus sylvestris*, *Populus tremula*, on soil, 17.VIII.1983 *I.Mezentseva* (56°35'N, 61°02'E) SVER(F) 43995. **Kh.** Ivdel area (Stepanova-Kartavenko, 1967). **PI.** Tugulim area, National park "Pripishminsk Bory" (Shiryaev, 2007)

Sarcodon leucopus (Pers.) Maas Geest. & Nannf.
Syn. *S. laevigatus* sensu auct.
P. Krasnoufimsk area, Chernaya rechka, herb-reach mixed forest: *Abies sibirica*, *Picea obovata*, *Pinus sylvestris*, *Ulmus laevis*, *Acer platanoides*, *Populus tremula*, on soil, 12.VIII.2006 *A.Shiryaev* (56°32'N, 57°26'E) SVER(F) 44674. **Cl.** Nevyansk area, southern cost of Tavatui lake, coniferous forest: *Pinus sylvestris*, *Juniperus communis*, on soil, 12.IX.1972 *N.T.Stepanova* (57°05'N, 60°10'E) SVER(F) 43328; ibid., eastern cost, coniferous forest: *Pinus sylvestris*, *Picea obovata*, *Juniperus communis*, on soil, 02.IX.1965 *N.T.Stepanova* (57°07'N, 60°13'E) SVER(F) 43330. **PI.** Tugulim area (Stepanova-Kartavenko, 1967); Tugulim area, National Park "Pripishminsk Bory" (Shiryaev, 2007). **NI.** Alapaevsk area (Stepanova-Kartavenko, 1967). **Is.** Ivdel area (Stepanova-Kartavenko, 1967).

*Sarcodon lundellii Maas Geest. & Nannf.
Syn. *Hydnum badium* Pers. ss. auct., *H. subsquamosum* Fr. ss. auct.
Cl. Verchnepishminsk area, Iset, Chertovo gorodishe, dry pine forest with *Betula*, on soil, 12.IX.1965 *L.Kazantseva* (56°56'N, 60°20'E) SVER(F) 43016; Nevyansk area, Tavatui lake, southern coast, herb-reach pine forest with *Juniperus communis*, on sand-stony soil, 28.VIII.1965 *A.Sirko* (57°05'N, 60°10'E) SVER(F) 43018; ibid., eastern coast, dry pine forest with *Vaccinium vitis-idaea*, sand-stony soil, 27.VIII.1965 *A.Sirko* (57°07'N, 60°13'E) SVER(F) 43019.

*Sarcodon scabripes (Peck) Banker
Cl. Prigorod area, Visim Natural Reserve, mixed forest: *Pinus sylvestris*, *Betula pendula*, *Tilia cordata*, *Sorbus aucuparia*, on soil, 09.IX.2000 *A.Shiryaev* (57°27'N, 59°33'E) SVER(F) 44015. **PI.** Tugulim area, National Park "Pripishminsk Bory", coniferous forest: *Pinus sylvestris*, *P. sibirica* with few *Betula pendula*, *Populus tremula*, *Sorbus sibirica*, on sand-stony soil, 29.IX.2002 *A.Shiryaev* (57°17'N, 64°30'E) SVER(F) 44027.

Sarcodon scabrosus (Fr.) P. Karst.
Cl. Nizhneserginsk area, National Park "Olenyi ruchyi", mixed forest: *Abies sibirica*, *Tilia cordata*, *Sorbus aucuparia*, on soil, 01.IX.2001 *A.Shiryaev* (56°32'N, 59°18'E) SVER(F) 44813; Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008).

Sarcodon squamosus (Schaeff.) Quel.
P. Krasnoufimsk area, Sarana, Petukhovka, dry grass-herb forest: *Picea obovata*, *Acer platanoides*, *Ulmus scabrum*, *Populus tremula*, *Corylus avellana*, on reach soil, 02.X.1966 *A.Sirko* (56°28'N, 57°35'E) SVER(F) 43822. **Cl.** Prigorod area, Visim Natural Reserve, herb-reach pine forest, on soil, 19.VIII.2000 *A.Shiryaev* (57°28'N, 59°31'E) SVER(F) 44069; Nizhneserginsk area, Nature Park "Olenyi ruchyi", half-open dry pine heath forest, on dry soil, 04.IX.2004 *A.Shiryaev* (56°29'N, 59°16'E) SVER(F) 44391; Nevyansk area, Tavatui lake, southern coast, dry pine forest with *Betula pendula*, *Juniperus communis*, on stony soil, 03.IX.1965 *A.Sirko* (57°28'N, 59°31'E) SVER(F) 44069. **Bp.** Polevskoy area, Kenchurka, dry pine woodland, rocky hilltop, on soil, *I.Kazantseva* 11.IX.1956 (56°16'N, 59°55'E) SVER(F) 44396. **PI.** Kamensk area, Okulovskoye, mixed forest-steep: *Pinus sylvestris*, *Betula pendula*, *Sorbus aucuparia*, *Ulmus minor*, on sandy soil, 10.IX.2007 *A.Shiryaev* (56°10'N,

61°58'E) SVER(F) 44832; Tugulim area, National Park "Pripishminsk Bory" (Shiryaev, 2007).

Sarcodon versipellis (Fr.) Nikol.
Cl. Nizhneserginsk area, National Park "Olenyi ruchyi", mixed forest: *Abies sibirica*, *Picea obovata*, *Tilia cordata*, *Betula pendula*, *Sorbus aucuparia*, on soil, 04.IX.2004 *A.Shiryaev* (56°21'N, 59°22'E) SVER(F) 44331; Shalya area, Sylva, Shigaevo, rich spruce grass-herb forest with *Ulmus scabrum*, *Tilia cordata*, on soil, 01.IX.1997 *A.Shiryaev* (57°21'N, 58°40'E) SVER(F) 44136. **PI.** Tugulim area, National park "Pripishminsk Bory" (Shiryaev, 2007).

Thelephora anthocephala (Bull.) Fr.
Cl. Prigorod area, Visim Nature reserve, reach-herb mixed forest: *Picea obovata*, *Betula pendula*, *Sorbus aucuparia*, *Tilia cordata*, on soil, 01.IX.1997 *A.Shiryaev* (57°21'N, 59°29'E) SVER(F) 44183. **Bp.** Ekaterinburg, Elmash city park, mixed forest: *Pinus sylvestris*, *Ulmus laevis*, *Padus maacki*, *Acer platanoides*, on soil, 19.VIII.1959 *N.T.Stepanova* (56°53'N, 60°40'E) SVER(F) 43368. **PI.** Talica area, National park "Pripishminsk Bory" (Shiryaev, 2007); Tugulim area, Fominskoye, Gurino lake, village's garden, on soil, *N.T.Stepanova* (57°15'N, 64°21'E) SVER(F) 43219.

Thelephora caryophyllea (Schaeff.) Pers.
Cl. Visim Nature Reserve in Prigorod areas (Shiryaev & Stavishenko, 2008). **Is.** Ivdel area, Pershino, heath pine forest, on sandy soil, 09.VIII.2007 *A.Shiryaev* (60°40'N, 60°31'E) SVER(F) 44542. **PI.** Talica area, National Park "Pripishminsk Bory" (Shiryaev, 2007). **NI.** Alapaevsk area, Machnevo, pine forest, on sandy soil and branches, 07.IX.1977 *N.T.Stepanova* (58°26'N, 61°52'E) SVER(F) 43973.

Thelephora palmata (Scop.) Fr.
Wide spread species in the region. **P.** Krasnoufimsk; Achit areas. **KK.** Krasnoufimsk area. **Cl.** Nizhneserginsk; Nevyansk; Shalya; Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **Bp.** Polevskoi; Sisert areas. **Ks.** Kachkanar area. **Nm.** Verkh Salda. **Kh.** Severouralsk; Ivdel areas. **Is.** Ivdel area. **PI.** Tugulim area (Stepanova-Kartavenko, 1967), Talica area, Nature park "Pripishminsk Bory" (Shiryaev, 2007). **NI.** Alapaevsk area (Stepanova-Kartavenko, 1967). **ST.** Verkhoturie area. **PT.** Garia area. **OU.** Serov area. **VP.** Ivdela area.

Thelephora penicillata (Pers.) Fr.
Syn. *T. mollissima* Pers.
P. Krasnoufimsk area, Ayaz, deciduous forest: *Betula pendula*, *Acer platanoides*, *Quercus robur*, *Tilia cordata*, *Populus tremula*, on twigs of oak, 20.VIII.1945 *N.T.Stepanova* (56°03'N, 57°37'E) SVER(F) 43001. **Bp.** Ekaterinburg, Botanical garden, on base of *Malus* sp., 28.VIII.1949 *N.T.Kartavenko* (56°47'N, 60°36'E) SVER(F) 43000. **PI.** Tugulim area, National Park "Pripishminsk Bory" (Shiryaev, 2007).

Thelephora terrestris Ehrn.
Wide spread species in the region. **P.** Krasnoufimsk; Arti areas. **KK.** Krasnoufimsk area. **Cl.** Nizhneserginsk; Shalya; Nevyansk (Stepanova-Kartavenko, 1967); Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **Bp.** Polevskoi; Sisert; Beloyarsk area (Stepanova-Kartavenko, 1967). **Ks.** Kachkanar area. **Nm.** Verkh Salda. **Kh.** Severouralsk; Ivdel areas. **Is.** Ivdel area. **PI.** Tugulim (Stepanova-Kartavenko, 1967), Talica area, Nature park "Pripishminsk Bory" (Shiryaev, 2007). **NI.** Alapaevsk area (Stepanova-Kartavenko, 1967). **ST.** Verkhoturie area. **PT.** Garia area. **OU.** Serov area. **VP.** Ivdel area.

Tomentella atramentaria Rostr.
P. Krasnoufimsk area, Sarana, mixed luxuriant forest: *Abies sibirica*, *Ulmus laevis*, *Tilia cordata*, *Populus tremula*, on rotted branch of fir, 03.IX.1945 *Z.Demidova* (56°30'N, 57°40'E) SVER(F) 43014. **Cl.** Pervouralsk, pine dominated forest, on trunk of birch, 19.VIII.1951 *N.T.Kartavenko* (56°55'N, 59°51'E) SVER(F) 43210; Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **OU.** Ivdel area, Ous, mixed forest: *Pinus sylvestris*, *Picea obovata*, *Betula pendula*, *Salix* sp., on decaying log of pine, 10.VIII.2007 *A.Shiryaev* (60°50'N, 61°28'E) SVER(F) 44038. **PI.** Kamensk area, Okulovskoye, *Betula-Populus* forest-steep, on rotted branch of *Cotoneaster melanocarpa*, 09.IX.1970 *A.Sirko* (56°08'N, 61°59'E) SVER(F) 43620; Tugulim area, National Park "Pripishminsk Bory" (Shiryaev, 2007); Talica area, "Pripishminsk Bory", coniferous forest: *Pinus sylvestris*, *Juniperus communis*, on trunk of pine, 16.IX.1952 *N.T.Kartavenko* (56°58'N, 63°43'E) SVER(F) 43286.

Tomentella badia (Link) Stalpers
Cl. Nizhneserginsk area, Natural park "Olenyi ruchyi", coniferous forest: *Abies sibirica*, *Pinus sylvestris*, on dead trunk of *Juniperus*, 10.IX.1957 *N.T.Kartavenko* (56°25'N, 59°19'E) SVER(F) 43389; Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **Bp.** Sisert area, Dvurechensk, Biostation of University, Carasye lake, mixed forest: *Pinus sylvestris*, *Betula pendula*, *Populus tremula*, *Salix* spp., on decaying branch of aspen, 29.VI.1994 *V.Mukhin* (56°32'N, 61°03'E) SVER(F) 44582. **PI.** Tugulim area, National Park "Pripishminsk Bory" (Shiryaev, 2007).

Tomentella bryophila (Pers.) M.J. Larsen
P. Krasnoufimsk area, Sarana, slope to Ufa river, broad-leaved forest: *Acer platanoides*, *Tilia cordata*, *Populus tremula*, *Corylus avellana*, on dead branch of hazel, 21.IX.1945 *F.Solovyev* (56°29'N, 57°41'E) SVER(F) 43022. **Cl.** Nizhneserginsk area, Natural park "Olenyi ruchyi", coniferous forest: *Abies sibirica*, *Pinus sylvestris*, on dead trunk of fir, 10.IX.1957 *N.T.Kartavenko* (56°25'N, 59°19'E) SVER(F) 43390; Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **Nm.** Verhnyaya Salda, slope to Isinsky water reservoir, on dead branch of *Sorbus*

aucuparia 22.IX.1969 *I.Kazantseva* (57°58'N, 60°30'E) SVER(F) 43743. **PI.** Tugulim area, National Park "Pripishminsk Bory" (Shiryaev, 2007).

Tomentella cinerascens (P. Karst.) Höhn. & Litsch.
P. Krasnoufimsk area, Nizhneirginsk oak forest, mixed forest: *Quercus robur*, *Pinus sylvestris*, *Tilia cordata*, *Betula pendula*, on rotted trunk of oak, 22.VIII.1960 *N.T.Stepanova* (56°50'N, 57°25'E) SVER(F) 43048. **Cl.** Shalya area, Sylva, Shigaevo, top of the hill, mixed luxuriant forest: *Abies sibirica*, *Betula pendula*, *Ulmus laevis*, *Tilia cordata*, *Sorbus aucuparia*, on dead branch of elm, 26.IX.2000 *A.Shiryaev* (57°22'N, 58°43'E) SVER(F) 44850; Prigorod areas, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **Bp.** Ekaterinburg (Stepanova-Kartavenko, 1967). **PI.** Tugulim area (Stepanova-Kartavenko, 1967), Talica area, National Park "Pripishminsk Bory" (Shiryaev, 2007).

Tomentella coerulea (Bres.) Höhn. & Litsch.
Cl. Nizhneserginsk area, Natural park „Olenyi ruchyi", mixed forest: *Abies sibirica*, *Pinus sylvestris*, *Tilia cordata*, *Populus tremula*, on dead trunk of pine, 10.IX.1957 *N.T.Kartavenko* (56°25'N, 59°19'E) SVER(F) 43387; Prigorod areas, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **Ks.** Kachkanar area, southern slope of Kachkanar mnt., *Picea* forest, on dead trunk of spruce, 26.VIII.1974 *A.Sirko* (58°46'N, 59°22'E) SVER(F) 43558.

*Tomentella crinalis (Fr.) M.J. Larsen
Cl. Shalya area, Sylva, foothill, mixed luxuriant forest: *Abies sibirica*, *Pinus sylvestris*, *Betula pendula*, *Ulmus laevis*, *Tilia cordata*, on dead branch of birch, 01.IX.1957 *Z.Demidova* (57°22'N, 58°43'E) SVER(F) 43047. **Nm.** Serov area, Shaytanka, mixed forest: *Picea obovata*, *Betula pendula*, on dead wood of aspen, IX.1944 *N.T.Kartavenko* (59°25'N, 60°00'E) SVER(F) 43726.

Tomentella ellisii (Sacc.) Jülich & Stalpers
Wide spread species in the region. **P.** Arti area. **KK.** Krasnoufimsk area. **Cl.** Nizhneserginsk; Shalya; Nevyansk; Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **Bp.** Sisert; Beloyarsk areas. **Ks.** Kachkanar area. **Nm.** Verkh Salda. **Kh.** Sverouralsk; Ivdel areas. **Is.** Ivdel area. **PI.** Tugulim area, Nature park "Pripishminsk Bory" (Shiryaev, 2007). **NI.** Alapaevsk area (Stepanova-Kartavenko, 1967). **ST.** Verkhoturie area. **OU.** Serov area.

Tomentella ferruginea (Pers.) Pat.
Syn. *T. fusca* (Pers.) J. Schröt.
Wide spread species in the region. **P.** Arti area. **KK.** Krasnoufimsk area. **Cl.** Shalya; Nizhneserginsk (Stepanova-Kartavenko, 1967); Nevyansk (Stepanova-Kartavenko, 1967); Prigorod area, Visim Nature Reserve (Stepanova-Kartavenko, 1967; Shiryaev & Stavishenko, 2008). **Bp.** Sisert; Beloyarsk areas. **Ks.** Kachkanar area. **Nm.** Verkh Salda. **Kh.** Severouralsk (Stepanova-Kartavenko, 1967); Ivdel areas. **Is.** Ivdel area. **PI.** Tugulim area, Nature park "Pripishminsk Bory" (Shiryaev, 2007). **NI.** Alapaevsk area (Stepanova-Kartavenko, 1967). **ST.** Verkhoturie area. **OU.** Serov area.

Tomentella fibrosa (Berk. & M.A. Curtis) Kõljalg
Cl. Shalya area, Natural park "Chusovaya River", 3 km north from Chusovoye, herb-reach mixed forest: *Picea abies*, *Betula pendula*, *Tilia cordata*, on rotted trunk of spruce, 10.VIII.2007 *A.Shiryaev* (57°21'N, 59°12'E) SVER(F) 44800; Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **PI.** Tugulim area, National Park "Pripishminsk Bory" (Shiryaev, 2007). **OU.** Ivdel area, Ous, slope to river, mixed forest: *Picea obovata*, *Pinus sibirica*, *Betula pendula*, *Sorbus sibirica*, on rotted petioles of *Sorbus*, 10.VIII.2006 *A.Shiryaev* (60°50'N, 61°28'E) SVER(F) 44717.

Tomentella fuscocinerea (Pers.) Donk
P. Besert area, Klenovsky, slope to Bisert river, on fallen branch of *Populus nigra*, IX.1944 *F.Solovyev* (56°50'N, 58°40'E) SVER(F) 43019. **Kh.** Karpinsk area, Konzhakovsky Kamen Mnt., eastern slope, coniferous forest: *Larix sibirica*, *Pinus sibirica*, *Picea obovata*, on dead trunk of larch, VIII. 1952 *N.T.Stepanova* (59°38'N, 59°19'E) SVER(F) 43258. **PI.** Tugulim area, National Park "Pripishminsk Bory" (Shiryaev, 2007).

*Tomentella galzinii Bourdot
Cl. Achit area, Korzunovka, herb-reach forest: *Abies sibirica*, *Tilia cordata*, *Populus tremula*, on fallen tree of fir, IX.1960 *N.T.Stepanova* (56°55'N, 58°15'E) SVER(F) 43451; Nizhneserginsk area, Natural Park "Olenyi ruchyi", mixed forest: *Pinus sylvestris*, *Tilia cordata*, *Betula pendula*, *Sorbus aucuparia*, on fallen trunk of aspen, 01.IX.1957 *N.T.Stepanova* (56°26'N, 59°20'E) SVER(F) 43593.

Tomentella lapida (Pers.) Stalpers
P. Krasnoufimsk area, Sarana, slope to Ufa river, broad-leaved forest: *Acer platanoides*, *Tilia cordata*, *Populus tremula*, *Corylus avellana*, on dead branch of hazel, 17.IX.1997 *A.Shiryaev* (56°29'N, 57°41'E) SVER(F) 43021. **Cl.** Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **Bp.** Sisert area, Dvurechensk, Biostation University, mixed forest: *Pinus sylvestris*, *Betula pendula*, *Populus tremula*, on decaying branch of birch, 25.VII.1998 *E.Brindina* (56°32'N, 61°03'E) SVER(F) 44581. **Kh.** Karpinsk area, Konzhakovsky Kamen Mnt., southern slope, coniferous forest: *Picea obovata*, *Pinus sibirica*, *Larix sibirica*, on decaying trunk of Siberian pine, VIII.1948, *N.T.Stepanova* (59°40'N, 59°23'E) SVER(F) 43271. **PI.** Tugulim area, National Park "Pripishminsk Bory" (Shiryaev, 2007).

Tomentella lateritia Pat.
P. Krasnoufimsk area, Nizhneirginsk oak forest, luxuriant herb-reach forest: *Pinus sylvestris*, *Quercus robur*, *Abies sibirica*, *Acer platanoides*, on dead brunch of hazel, 19.VIII.1996 *A.Shiryaev* (56°50'N, 57°24'E) SVER(F) 44403. **Cl.** Prigorod area, Visim Nature

Reserve (Shiryaev & Stavishenko, 2008). **Kh.** Karpinsk area (Kõljalg, 1996). **PI.** Tugulim area, National Park "Pripishminsk Bory" (Shiryaev, 2007).

Tomentella lilacinogrisea Wakef.
P. Krasnoufimsk area, Ust-Bugalish, mixed forest: *Picea obovata*, *Quercus robur*, *Populus tremula*, on branch of oak, 21.VIII.1996 *A.Shiryaev* (56°16'N, 57°51'E) SVER(F) 44348. **Cl.** Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **Kh.** Ivdel area, Vizhai, mixed forest: *Picea obovata*, *Pinus sylvestris*, *Betula pendula*, on dead branch of pine, VIII.1949 *N.T.Stepanova* (61°17'N, 59°42'E) SVER(F) 43562. **PI.** Tugulim area, National Park "Pripishminsk Bory" (Shiryaev, 2007). **PT.** Gari area (Kõljalg, 1996).

*Tomentella pilosa (Burt) Bourdot & Galzin
P. Krasnoufimsk area, Chernaya rechka, herb-reach luxuriant forest: *Abies sibirica*, *Quercus robur*, *Acer platanoides*, *Corylus avellana*, on decaying branch of hazel, 01.IX.1996 *A.Shiryaev* (56°32'N, 57°26'E) SVER(F) 44583. **Cl.** Nevyansk area, southern coast of Tavatui lake, mixed forest: *Pinus sylvestris*, *Betula pendula*, *Tilia cordata*, *Sorbus aucuparia*, on decayed trunk of linden, 12.IX.1972 *N.T.Stepanova* (57°05'N, 60°10'E) SVER(F) 43327.

*Tomentella punicea (Alb. & Schwein.) J. Schröt.
P. Krasnoufimsk area, Nizhneirginsk oak forest, herb-reach luxuriant forest: *Quercus robur*, *Pinus sylvestris*, *Populus tremula*, *Acer platanoides*, *Corylus avellana*, *Euonymus verrucosa*, on dead branch of hazel, 19.VIII.1996 *A.Shiryaev* (56°50'N, 57°24'E) SVER(F) 44403; ibid., Ayaz, mixed forest: *Abies sibirica*, *Quercus robur*, on decaying trunk of aspen, 10.VIII.1960 *N.T.Stepanova* (56°05'N, 57°34'E) SVER(F) 43118.

Tomentella radiosa (P. Karst.) Rick
Cl. Achit area, Korzunovka, mixed forest: *Abies sibirica*, *Picea obovata*, *Acer platanoides*, *Betula pendula*, on decaying trunk of spruce, 3.IX.2004 *A.Shiryaev* (56°55'N, 58°11'E) SVER(F) 44852. Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **Kh.** Severouralsk area, southern slope of the Cumba Mnt., coniferous forest: *Picea obovata*, *Pinus sibirica*, on dead branch of Siberian pine, 04.IX.1954 *A.Sirko* (60°08'N, 59°38'E) SVER(F) 43030; Karpinsk area (Kõljalg, 1996). **PI.** Tugulim area, National Park "Pripishminsk Bory" (Shiryaev, 2007).

Tomentella stuposa (Link) Stalpers
Syn. *T. bresadolae* (Brinkm.) Bourdot et Galzin
P. Krasnoufimsk area, Chernaya rechka, herb-reach luxuriant forest: *Abies sibirica*, *Quercus robur*, *Acer platanoides*, *Corylus avellana*, on decaying branch of fir, 01.IX.1996 *A.Shiryaev* (56°32'N, 57°26'E) SVER(F) 44585. **Cl.** Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **Bp.** Sysert area, Dvurechensk, Biostation University, slope to Sysert river, mixed forest: *Pinus sylvestris*, *Betula pendula*, *Populus tremula*, *Alnus incana*, on decaying branch of *Alnus*, 26.VII.1998 *E.Brindina* (56°32'N, 61°03'E) SVER(F) 44582. **PI.** Tugulim area (Stepanova-Kartavenko, 1967); Tugulim area, National Park "Pripishminsk Bory" (Shiryaev, 2007). **NI.** Tavda area, Pokrovka, dry pine forest, on trunk of pine, 13.IX.1957 *N.T.Stepanova* (58°06'N, 65°27'E) SVER(F) 43243.

*Tomentella subclavigera Litsch.
Cl. Shalya area, Sylva, Shigaevo, mixed forest: *Pinus sylvestris*, *Picea obovata*, *Betula pendula*, *Tilia cordata*, on dead branch of spruce, 1.IX.1997 *A.Shiryaev* (57°21'N, 58°40'E) SVER(F) 44191.

Tomentella sublilacina (Ellis & Holw.) Wakef.
P. Krasnoufimsk area, Sarana, mixed forest: *Abies sibirica*, *Populus tremula*, *Betula pendula*, *Ulmus scabrum*, *Tilia cordata*, on wood of fir, 15.VIII.1977 *N.T.Stepanova* (56°29'N, 57°41'E) SVER(F) 43559. **Cl.** Nizhneserginsk area, Natural Park "Olenyi ruchyi", mixed luxuriant forest: *Abies sibirica*, *Betula pendula*, *Tilia cordata*, *Populus tremula*, *Sambucus sibirica*, on aspen wood, 2.IX.2004 *A.Shiryaev* (56°29'N, 59°18'E) SVER(F) 43927; Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **Kh.** Karpinsk area (Kõljalg, 1996). **PI.** Tugulim area, National Park "Pripishminsk Bory" (Shiryaev, 2007).

*Tomentella subtestacea Bourdot et Galzin
Cl. Nevyansk area, southern cost of Tavatui lake, mixed forest: *Pinus sylvestris*, *Betula pendula*, *Tilia cordata*, *Populus tremula*, *Juniperus communis*, on decayed trunk of aspen, 15.IX.2000 *A.Shiryaev* (57°05'N, 60°10'E) SVER(F) 44171; Shalya area, Sylva, Shigaevo, mixed forest: *Abies sibirica*, *Populus tremula*, *Ulmus laevis*, *Sorbus aucuparia*, on decaying trunk of *Alnus incana*, 2.IX.1997 *A.Shiryaev* (57°21'N, 58°40'E) SVER(F) 44189.

Tomentella terrestris (Berk. & Broome) M.J. Larsen
Cl. Nizhneserginsk area, Natural Park "Olenyi ruchyi", mixed luxuriant forest: *Pinus sylvestris*, *Betula pendula*, *Populus tremula*, on pine wood, 3.IX.2004 *A.Shiryaev* (56°29'N, 59°18'E) SVER(F) 43929; Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **PI.** Tugulim area, National Park "Pripishminsk Bory" (Shiryaev, 2007).

*Tomentella viridula Bourdot & Galzin
P. Krasnoufimsk area, Ayaz, luxuriant deciduous forest: *Acer platanoides*, *Quercus robur*, *Tilia cordata*, *Populus tremula*, *Betula pendula*, on twigs of oak, 23.VIII.1998 *A.Shiryaev* (56°03'N, 57°37'E) SVER(F) 44396.

Tomentellopsis echinospora (Ellis) Hjortstam
P. Krasnoufimsk area, Nizhneirginsk oak forest, mixed forest: *Quercus robur*, *Pinus sylvestris*, *Populus tremula*, on brunch of hazel, 19.VIII.1996 *A.Shiryaev* (56°50'N, 57°24'E) SVER(F) 44407. **Cl.** Prigorod area,

Visim Nature Reserve (Shiryaev & Stavishenko, 2008). **Bp.** Ekaterinburg (Kõljalg, 1996). **PI.** Tugulim area, National Park "Pripishminsk Bory" (Shiryaev, 2007).

TOMENTELLOPSIS ZYGODESMOIDES (Ellis) Hjortstam
P. Krasnoufimsk area, Ust-Bugalish, mixed forest: *Picea obovata*, *Quercus robur*, *Populus tremula*, on decaying trunk of oak, 22.VIII.1996 *A.Shiryaev* (56°16'N, 57°51'E) SVER(F) 44351. **Cl.** Prigorod area, Visim Nature Reserve (Shiryaev & Stavishenko, 2008).

DISCUSSION

The number of species recorded in the 3 biogeographical divisions and 14 provinces of the Sverdlovsk region are presented in Table 1. It should be noted that a low number of provincial records, especially when compared with neighboring provinces, often indicates less intensive research activity and not actual adverse conditions for thelephoroid fungal growth.

About 80% of all species were found in the Ural Mountain Range Division and 15.9% of the species are recorded only here. However, no specimens have been collected in "mountainous" provinces. In the largest Division of the Sverdlovsk region - West Siberian plain - 63.5% of all species were found. This division has no specific species found only here. The East-European Hills Division, the smallest one, with 57% of species and some 8% of "endemic" species with 14.3% common species for both "european" provinces. 85.7% of species found in this division (47.7% of regional) were also recorded in Ural Mountain Range Division and only 48.1% of species were recorded (22.4% of regional) in West Siberian plain.

The southern provinces Perm, Chusovoy low mountainous, Beloyarsk peneplen and Pishma, with the highest number of recorded species – close or over 50% of the total – have been studied most intensively. Another reason of the high number of species is that these provinces have higher diversity of mycorrhizal host trees which probably also influence the diversity of thelephoroid species.

The Sverdlovsk region, with its length of over 700 km from south to north and high mountainous altitudes, provides a gradient of several boreal vegetation zones, ranging from the forest-steppe zone in the two southernmost provinces and hemiboreal zone in the one south-westernmost province to alpine areas prevailing in northern areas. Some general observations of the species ranges along this transection can be made, although the uneven collecting effort should be taken into consideration.

Only some 4.8% of the total number of the species has been recorded in all provinces, even if not in the same degree of abundance and frequency throughout the range. Such species include *Hydnellum ferrugineum*, *Thelephora palmata* and *T. terrestris* among others. Excluding two less studied provinces the percentage of widely occurring species is still low - 13%.

About 27% of the total numbers of the species are recorded only in the area comprising the three south-westernmost provinces Perm (P), Chusovoy low mountainous (Cl) and Kungur-Krasnoufimsk (KK). Species recorded in all of these three provinces include *Hydnellum geogenium*, *H. scrobiculatum*, *Tomentella pilosa*, *T. sublilacina*, *Tomentellopsis zygodesmoides*, for instance. The Kungur-Krasnoufimsk province is not well studied and this might be reason why it has no specific taxa found only here.

In comparison, the Chusovoy province (Cl) includes two times more specific species (*Hydnellum auratile*, *Pseudotomentella flavovirens*, *P. nigra*, *Sarcodon lundellii*, *S. scabrosus*, *Tomentella galzinii*, *T. subclavigera*, *T. subtestacea*) than the Perm (P) (*Amaurodon cyaneus*, *A. mustialaensis*, *Tomentella punicea*, *T. viridula*).

Table 1. The number of species in the biogeographical provinces of the Sverdlovsk region (A), their percentage of the total (B), and percentage of species recorded in this province only (C).

Province	A	B%	C%
1 P	35	55.6	6.3
2 KK	10	15.9	-
3 Cl	50	79.4	12.7
4 Bp	29	46.0	1.6
5 Ks	9	14.3	-
6 Nm	10	15.9	-
7 Kh	15	23.8	-
8 Is	12	19.0	-
9 PI	33	52.4	-
10 NI	14	22.2	-
11 ST	8	12.7	-
12 PT	4	6.4	-
13 OU	12	19.0	-
14 VP	3	4.8	-

The "southern" range includes also the Beloyarsk (Bp) and Pishma (PI) provinces. More than half of species (52.4%) specific to southern areas were found here too (*Bankera violascens*, *Hydnellum peckii*, *Phellodon confluens*, *P. connatus*, *Pseudotomentella tristis*, *Sarcodon fennicus*, *S. scabripes*, *S. versipellis*, *Thelephora anthocephala*, *T. penicillata*, *Tomentella cinerascens*, *T. terrestris*).

Perm province which belongs to the hemiboreal zone share 51% of its species with Ivdel (middle boreal zone), and 43% of its species with Konzhakov (mountainous northern boreal zone and alpine areas).

Four northernmost provinces Konzhakov, Ivdel, Ous and Verkh-Pelym have only one specific species, viz. *Phellodon secretus* which was recorded only from the middle boreal zone. No specific species for northern boreal or alpine areas have been recorded.

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