ЭКСПЕРИМЕНТАЛЬНЫЕ РАБОТЫ

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FLESHY FUNGI FORAYS IN THE VICINITIES OF THE YSU MUKHRINO FIELD STATION (WESTERN SIBERIA)

Filippova N.V.[1)], ***Bulyonkova T.M.***[2)], ***Lapshina E.D.***[1)]

[1)] *Yugra State University, Khanty-Mansiysk*
[2)] *A.P. Ershov Institute of Informatics Systems Russian Academy of Sciences, Novosibirsk*

n_filippova@ugrasu.ru, ressaure@gmail.com

The article sums up the results of studying the fleshy fungi biota in the vicinities of the Yugra State University Mukhrino Field Station (Khanty-Mansiysk, boreal zone of Western Siberia). Collections were made between 2008-2014 during forays in forest, floodplain and bog ecosystems. A total of approximately 600 specimens were studied using the standard methods and identified based on up-to-date monographs and floras. Dried specimens and metadata are stored in the YSU Fungarium. The species richness of the identified fleshy fungi mycobiota is made up of 324 taxa from 108 genera, 42 families and 10 orders. The majority of species (40%) are mycorrhizal with trees, the rest are saprobic on wood (25%), soil (20%) and other substrates. Fleshy fungi being an important food source, edibility of the finds was analyzed: 23% (71 taxa) are edible, including 30 species which are considered edible and good; 5% are poisonous, including several deadly poisonous species; 14% are edible with caution; information on the rest (57%) is not available in literature. Seven of the discovered species are currently redlisted in the Khanty-Mansi Autonomous Okrug (Yugra); information on the locations and state of populations is provided. The comparison of the list of the discovered taxa with the combined list of taxa from previously published works on Yugra fleshy fungi shows a high degree of novelty: only a third of the species were registered previously, and the rest (198 taxa) are new finds for the territory. The annotated checklist provides information on dates, locations, abundance, trophic groups and edibility of all discovered taxa.

Key words: larger fungi, macromycetes, mycology, mycota, funga, biodiversity, conservation, Western Siberia, Russia

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INTRODUCTION

Fleshy fungi (=macrofungi, =larger fungi, = macromycetes) are an artificial grouping of fungi with large spore-producing structures [Kirk, 2008, p. 396]. This includes the basidiomycetes (except the rusts, smuts, and yeasts), with a few larger ascomycetes (Pezizales), and, optionally, myxomycetes [Watling, 1995]. Together they comprise about 10% of the total fungal diversity [Rossman, 1994]. Generally, macrofungi are divided into groups based on gross morphology of their fruitbodies: e.g. mushrooms (toadstools), brackets, crusts, clubs, spindle and coral fungi, earth fans, jellies, puffballs, false truffles and truffles, cup and nest fungi, morels and false morels, saddle fungi, stinkhorns, etc. [Phillips, 2006; Mueller et al., 2007; Kirk, 2008]. They can be easily spotted with a naked eye in the natural settings and thus can be studied by direct observation, not involving special cultivation techniques [Lodge et al., 2004]. As Macromycetes do not form natural phylogenetic unit, the number of included groups usually depend of the

purpose of a particular study or on the experience of the researcher. Eef Arnolds [1992, p. 12-15] recommends to list the target groups in the introduction to a paper on macromycetes, as he does in his own study on Larger fungi of grasslands. In our study, we included mainly mushrooms with a fraction of other groups but omitted brackets, crusts and jellies.

Macrofungi are the oldest research target in mycology, and an inventory of fungal diversity in a particular area generally begins from this group as the most accessible for beginners and amateurs [Lodge et al., 2004]. Because of the interest to this group from both amateur and professional mycologists a wealth of works focused on macrofungi regionally or globally (see list of regional publications worldwide in Kirk [2008, p. 396-398]) is readily available. Most of the published mycological texts about our area of interest – the boreal zone of Western Siberia – are devoted to macromycetes (we know only one review of mycological literature in Western Siberia [Mukhin, 2008]). The following: Mukhin [1993] on Aphyllophoroid fungi of Western Siberia (345 species); Shiryaev et al. [2010] on Aphyllophoroid fungi of Sverdlovsk region (908 species); Stavishenko and Mukhin [2002] on lignicolous macromycetes of Yuganskiy Nature Reserve (141 species); Palamarchuk [2012] on Agaricoid basidiomycetes of North Ural mountains (383 species); Marina [2006] on Agaricoid basidiomycetes of Middle Ural Mountains (635 species); Perova and Gorbunova [2001] on macromycetes of South part of Western Siberia (870 species); Perova and Gorbunova [2007] on larger fungi of Salair Mountains (443 species); Banaev et al. [2014] on macromycetes of Central Siberian Botanical Garden, Novosibirsk (424 species). The compiled list of macrofungi only within the administrative boundaries of Khanty-Mansiyskiy Autonomous Okrug, which includes middle and north taiga vegetation zones, lists about 800 species [Filippova, 2010]. Aphyllophoroid and clavarioid fungi were studied more vigorously [Arefyev, 2008; Mukhin, 1993; Stavishenko, 2003; Stavishenko, 2007; Stavishenko and Mukhin, 2002; Stavishenko and Zalesov, 2008; Shiryaev, 2002]. Agaricoid macromycetes were inventorized in limited number of locations and vegetation types [Zvyagina et al., 2007; Zvyagina, 2015; Filippova and Bulyonkova, 2013; Filippova and Thormann, 2014]. The Agaricoid macromycete diversity of the vicinities of Khanty-Mansiysk has not been formally surveyed until the present work. The first survey was performed by Yury Gordeev, an amateur mycologist working in the city area as an ecologist, who described and photographed fleshy fungi. His work was first published in an educational program on local macrofungi after his death [Filippova et al., 2010].

The total number of macrofungi worldwide has been estimated to be between 53.000 and 110.000 species [Mueller et al., 2007]. This estimate was derived from a compiled list of 21.000 presently known species of macromycetes, i.e. only 16-41% of macrofungi have been described to date globally. Most macrofungi are saprotrophs and mycorrhizal symbionts [Mueller et al., 2007], playing important roles in ecosystem dynamics. As saprotrophs, macromycetes have the ability to utilize complex polymer compounds, which are the dominant part of biomass in forested landscapes [Lindahl and Boberg, 2007]. Forming ecto-mycorrhizal associations with trees, macromycetes create additional carbon flux, which feeds the belowground food chain in soil community. These functions of macromycetes alone point to the importance of inventorizing of this group not only per se, but for ecosystem cycles modeling and their possible shifts under future climate change [Büntgen et al, 2012]. Other possible economic, educational, and scientific products provided by fungal inventories were listed by Rossman [1998, p. 9-12]. From this list most related to macrofungi are: 1) cultivation of new, edible mushrooms, 2) sustainable usage of edible forest fungi, 3) development of products for food processing, delignification, and other biotechnological fields 4) improved plant nutrition in afforestation through mycorrhizal species, 5) basic education on edible and poisonous species, 6) basic education on the ecological role and general biology of fungi; and others [Rossman, 1998, p. 9-12].

Bearing in mind the importance of macrofungi in ecosystems, the aim of the present publication was to show their species composition and ecological structure in the vicinities of Mukhrino field station of YSU based on several years of irregular forays. We believe this information will prove to be of use in complex ecosystem studies around Mukhrino and for the regional inventory of mycota in the boreal zone of West Siberia.

METHODS

Description of the area

The studied area is located in the middle taiga zone of Western Siberia. The climate is continental subarctic or boreal, according to Köppen climate classification. The average annual temperature is –1.3 °C, the mean temperature of the coldest month (January) –19.8 °C, the warmest month is July with its average of 18 °C [Bulatov, 2007]. Vegetation of the middle taiga zone of Western Siberia is characterized by dark coniferous and pine forests and their derivates. The forests are made up of spruce (*Picea obovata*), siberian stone pine (*Pinus sibirica*) and fir (*Abies sibirica*) tree canopy and the undergrowth of various small herbs, ericoid shrubs and feather mosses. Several herbaceous species dominate: *Mianthemum bifolium*, *Gymnocarpium dryopteris*, *Orthilia secunda*, *Trientalis europaea*. The dark coniferous forests are replaced by their derivate communities from *Pinus sylvestri*s, *Betula* spp., and *Populus tremula*. The middle taiga of Western Siberia is a highly bogged region, with peatlands covering up to 50% of its area. The transition between forests and bogs is represented by pine-birch and pine-dwarfshrub forests [Ilyina et al., 1985, p. 13-14].

Our field trips were arranged in the vicinities of Mukhrino field station of Yugra State University, 20 km SW of the city of Khanty-Mansiysk (60.88905N, 68.70294E). The station was founded in 2009 for long-term ecological field research in local forest and peatland ecosystems [Egler et al., 2012; Lapshina et al., 2015]. The area is located on the left terrace of the Irtysh river, and covers several major vegetation and landscape types, including the floodplain of the Irtysh river and its tributaries, valleys of small streams, forest on drained locations, and peatlands. The collection areas can be classified as follows (see Fig. 1): 1) Irtysh floodplain meadow – *Salix* spp. vegetation alongside the Baybalak baoyou, 2) Valley vegetation of small rivers: the Mukhrina river, Kabaniy stream, and Zhivoy stream, 3) Coniferous forests, their after-cut derivates and bogging stages which form the belt about 1-2 km wide along Baybalak channel and Mukhrina river. We omitted raised bogs, which occupy large areas in SW of the territory, since the research on macromycetes was done there before [Filippova and Thormann, 2014].

The detailed vegetation description of the studied localities was not targeted by this inventory. Therefore, we asked the colleagues for their accomplished (not published) botanical relevès.

Description of the collection method

No studies of macrofungi were accomplished in the area before. Therefore, we chose basic opportunistic collection method to reveal the core list of species. The method involved simple random walking through studied area to collect large conspicuous specimens. This approach does not allow for rigorous comparisons of different sites or vegetation types, since no quantitative information could be obtained [O'Dell et al., 2004]. More vigorous quantitative approaches to studying macrofungal communities which require necessity to establish a transect and/or permanent plots are described elsewhere [Vasilyeva, 1959; Rossman et al., 1998; Mueller et al., 2004]. Nevertheless, the random collection method creates a basic species list which could be considered as a first step for further research.

Our collection trips were spontaneous enough, but most intensive collection periods coincided with the presumably maximum period of macromycetes fructification in the studied territory (Table 3). The first 10-days foray was accomplished on 5-15 September 2010, where about 500 samples were collected. The second short (5 days) trip was in June 2011, where about 100 samples of early summer mycota were made. Unfortunately, the herbarium specimens from these two trips were lost in local fire before they were fully identified, and only well recognizable taxa were extractable (all provided with good illustrations so that identification could be made reliable) for further analysis. The third intensive mushroom foray was accomplished on 8-13 September 2014, which also coincided with the peak of late summer fruiting, with 300 samples collected and stored. The forays were accomplished by both of the authors. Besides, the first author made additional random collections over the few years, but they were not extensive due to involvement in another study on bog fungal communities.

We also took into account the observations made by the participants of the 2010 Mycoschool foray (organized by the YSU and the Commission for the Study of Macromycetes of the Russian Botanical Society), however, specimens from that event were lost in a fire, with a only few duplicates surviving in private collections, e.g. gasteromycetes collected by Dr. Yuri Rebriev).

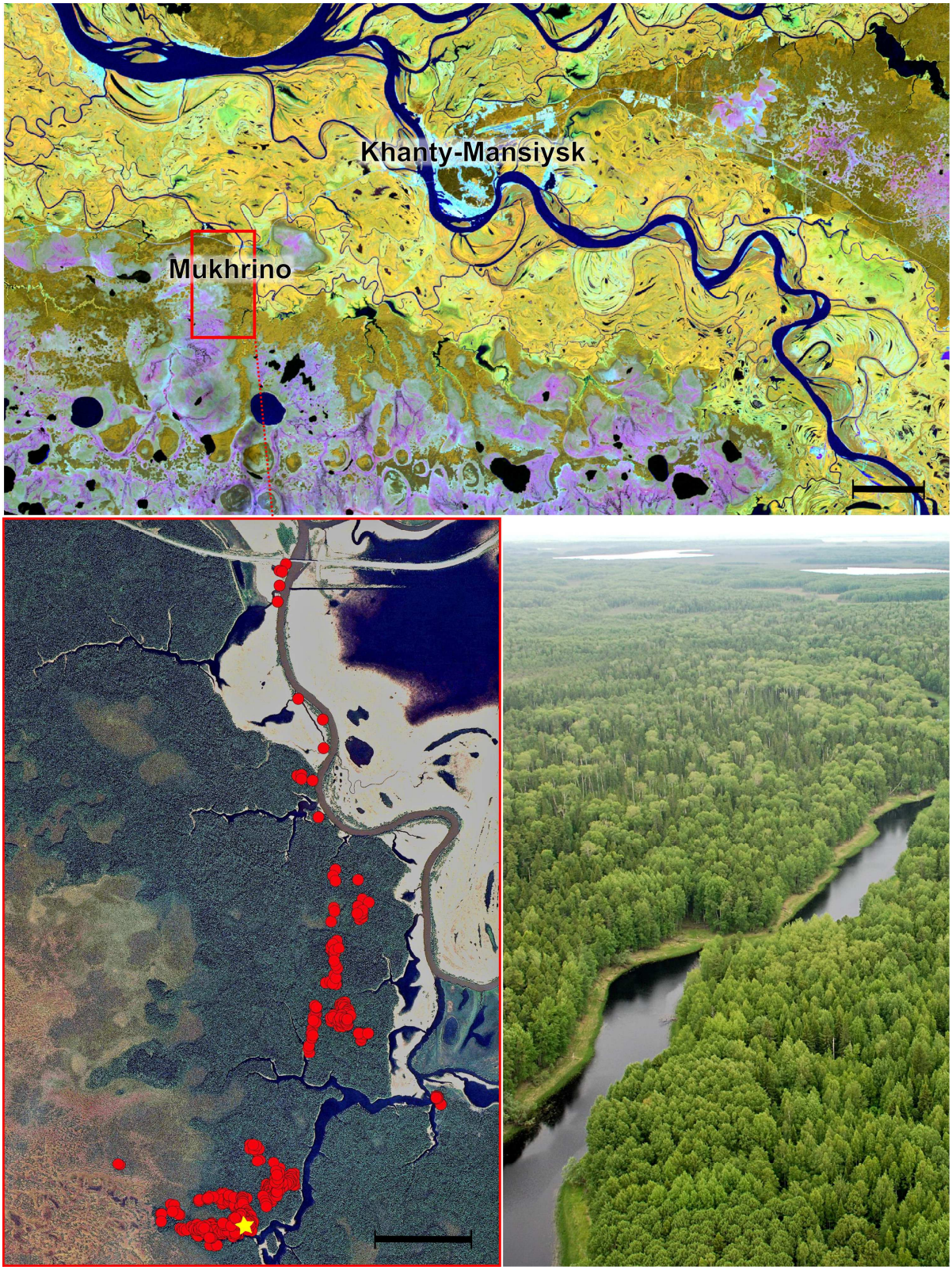

Fig. 1. Map of the studied area. Upper inset: Landsat satellite image on Khanty-Mansiysk and Mukhrino vicinities, bar = 5 km. In lower left inset: Quickbird satellite image of area between Nyagan road and Mukhrino field station (marked with star), red circles mark coordinates of specimens collected, bar = 1 km. Lower right inset: aerial view of Mukhrina river and forested area along its banks.

The total number of specimens analyzed in the present publication amounted to ~650 (290 herbarium specimens and 359 photographic registrations), collected over 2008–2014 (Table 2). The total number of collections by months for the whole collection period is shown in Table 3. The forays totaled 70 days, with 1 to 62 specimens collected daily: 1 collection per day on 1/2 of the days and less than 10 a day on 2/3 of the days. It is difficult to estimate the total route length, but rough calculations put it at ~130 km (3 km per day per person, only 21 days of intensive collection taken into account). If we consider the observation coverage area is a 2 m wide band, the total area of observation amounts to 260.000 m^2. It makes up a 1/100 part of the relevant area, shown in the picture (Figure 1, bottom left inset).

Table 2. Number of analyzed collections by year of collection

Year	2008	2009	2010	2011	2012	2013	2014	**Total number**
Number of collections	39	32	293	34	32	1	247	**649**

Table 3. Number of collections by months

Month	May	June	July	August	September	October
Number of collections	3	52	25	56	501	12

Collection effort (as defined by number of collections sampled) differed between major vegetation types: forests on drained positions were studied most intensively (a total of 599 collections), followed by floodplain vegetation (31), with a small number of collections from transitional areas between forest and raised bogs (12) and from valleys of small streams (7 collections). A detailed overview of the collection effort by major vegetation types is shown in Table 4.

Table 4. Number of collections by major vegetation types

Vegetation type	**Number of collections**
Mixed coniferous-deciduous forest (*P. sibirica*, *A. sibirica*, *P. obovata*, *B. pubescens*, *P. tremula*)	558
Disturbed location near the station' house	16
Bogged forest with *Sphagnum* (*P. sibirica*, *B. pubescens* with other conifers in admixture)	25
Transition between forest and treed bog (*P. sylvestris*, ericoid dwarfshrubs, *S. fuscum*)	12
After-fire predominantly aspen forest (*P. tremula*, *B. pubescens*, *Salix* sp., *Sorbus sibirica*, *Rosa* sp., coniferous trees in admixture)	10
Floodplain meadow vegetation with *Salix* spp.	15
Regularly flooded aspen-birch forest with admixture of conifers	13

We used a common procedure of collecting, describing and preserving specimens recommended for inventories of macrofungi [Lodge et al., 2004; Perevedenzeva, 2007; Rossman et al., 1998; Vassiliyeva, 1959]. The environmental parameters of findings were described in the field: vegetation type, micro-niche, substrate, abundance, date, and coordinate reference taken with a geopositioning system device (GPS). Sporocarps were photographed *in situ* (and later indoors on a portable photo studio table) (see examples of *in situ* photos in Fig. 2). Afterwards, sporocarps were carefully extracted, labeled and wrapped in aluminium foil for transportation to the laboratory and processing on the day of collection. Macro-morphological features of sporocarps were described according to a scheme required for each systematic group (e.g. specimens of the genus *Hebeloma* were described according to Vesterholt [2005], *Tricholoma* – to Christensen and Heilman-Clausen [2013], and *Russula* – to Kibby [2012]). Color descriptions were made more or less systematically with use of the color charts [OAC, 2004; Kornerup and Wanscher, 1978];

otherwise in general descriptive terms. Macro-chemical reactions were tested when necessary for a specific systematic group, e.g. KOH (20%) in *Cortinarius* and *Lactarius*, or ammonia and $FeSO_4$ in *Russula*. Spore prints were obtained when the number of sporocarps was sufficient enough. Sporocarps were dried after processing in a drying oven under 50 °C, to store as dry specimens.

All accessory information was entered and stored in Microsoft Office Access 2007 DBMS, and the corresponding photographs were catalogued and stored offline. A significant part of the photos were later uploaded online in private photo albums and/or mycological websites, such as MushroomObserver.org, to exchange information with the public.

Microscopical characters were studied using a Zeiss Stemi-2000C stereomicroscope (magnification from 6 to 50), and Zeiss Axiostar transmitted light microscope (from 50 to 1000) with Achromat 5/0.12, 10/0.25, 40/0.65 (dry) and Achromat 100/1.25 (oil immersion) lenses. Microphotographs were obtained under transmitted microscopes using AxioCam ERc5c digital camera and processed with AxioVision software. Measurements were made using AxioVision software, where 20 or more dimensions for each character were obtained and mean, minimum and maximum values calculated. The preparations were made from dried specimens soaked in tap water, ammonia, or KOH (10%), with dyes when necessary (Melzer solution and Congo red) [Clemençon, 2009].

The majority of finds were identified using a contemporary guide for macrofungi in Northern Europe – Funga Nordica [Knudsen and Vesterholt, 2008] and its previous edition [Hansen and Knudsen, 2000; Hansen et al., 1992; Hansen and Knudsen, 1997]. Monographs on particular genera or taxonomic groups were used for detailed species descriptions and color illustrations, including, but not limited to the following: [Antonin and Noordeloos, 1993; Brandrud et al., 1990; Candusso, 1997; Christensen and Heilmann-Clausen, 2013; Heilmann-Clausen et al., 1998; Kibby, 2007; Noordeloos, 1992; Noordeloos, 2004; Robich, 2007; Riva, 2003; Vesterholt, 2005]. Additional information on species identification was obtained from various mycological websites and through online consultations with specialists and amateur mycologists. Finally, collections of some taxa were sent to taxonomists of particular groups for detailed analysis (for example, some specimens of the genus *Pluteus* were processed in publication of [Justo et al., 2014]). Taxa with difficult systematics (e.g. *Cortinarius*, *Gymnopus*) were identified only to a degree of certainty and will need closer examination and additional collections in the future. Fungal authorities are named according to Index Fungorum, and the classification of the fungal taxa at various taxonomic ranks follows Index Fungorum (on September 1, 2015) and Kirk et al. [2008].

RESULTS AND DISCUSSIONS

Taxonomic and ecological structure of revealed mycota

The total number of macrofungi from forays in the vicinities of Mukhrino field station amounted to 324 taxa, including species with definite identification and 23 questionable identifications (7 %). Most of the under-indentified taxa belong to *Cortinarius* and *Gymnopus*, with a few species from other genera, and require further study in future.

Taxonomically, the list contains 110 genera, 43 families, and 10 orders. Basidiomycota include most of species (307) while Ascomycota presented by 19 species. The ten most abundant genera (42% species) are *Cortinarius* (51 species), *Lactarius* (12), *Russula* (12), *Tricholoma* (12), *Mycena* (10), *Pholiota* (10), *Pluteus* (10), *Amanita* (7), *Galerina* (7), and *Gymnopus* (7) (Fig. 3, A). Ten most abundant families (65% species) are the Cortinariaceae (66 species), Tricholomataceae (25), Russulaceae (24), Strophariaceae (24), Psathyrellaceae (15), Mycenaceae (14), Agaricaceae (13), Omphalotaceae (11), Boletaceae (10), and Inocybaceae (10) (Fig. 3, B). 75% of the species belong to the order Agaricales (243 species), followed by Russulales (28), Boletales (19), Pezizales (17) and others in minority (Fig. 3, C).

Fig. 2. Upper left inset: a hunting path through mixed coniferous-deciduous forest; upper right: *Hygrocybe conica*; lower inset: *Pholiota limonella*.

The trophic structure of the list was analyzed using literature data on the feeding mode of the species and the field observations of the substrates on which sporocarps were found. Two major trophic groups are ectomycorrhizal species (40%) and saprotrophs. According to the substrate the latter can be split into saprotrophs of wood (27%), on soil (humus) (18%) and burnt ground – carbotrophs (2%), on leaf, needle or mixed litter (7%), on dead parts of mosses, including *Sphagnum* – bryotrophs (3%), with a small fraction of species represented by saprotrophs on fruitbodies of other fungi – mycotrophs, and on dung – coprotrophs. Ectomycorrhizal species can be classified based on their mycorrhizal partner as forming mycorrhiza strictly with conifers (16%), deciduous trees (16%) or both (7%) (Fig. 3, D).

This classification is not strictly unequivocal as some species could be parasitic in earlier stage of their life cycle and saprotrophic later (e.g. *Asterophora lycoperdoides*, *Armillaria borealis*, *A. cepistipes*, *Collybia cirrhata*, *Collybia cookei*, *Hericium cirrhatum*, *Hemipholiota populnea*, *Hypsizygus ulmarius*, *Pholiota squarrosa*, *P. cerifera*, *Pleurotus calyptratus*, *P. pulmonarius*, *P. dryinus*, *P. ostreatus*) (Marina, 2006; Knudsen and Vesterholt, 2008). Some species could be both saprotrophic and mycorrhizal (*Gyromitra esculenta*, *G. infula*, *Morchella esculenta*, *M. tomentosa*, *Laccaria laccata*, *L. bicolor*, *Ramaria flava*, *R. pallida*, *Thelephora terrestris*) (Knudsen and Vesterholt, 2008). The plant partner of mycorrhizal species is often difficult to establish.

Most of the collections (77%) were made in September, with 8% collected both in June and August, and only a few collections in May, July and October (Fig. 3, E). It is not possible yet to draw conclusions about the seasonal dynamics of fruiting, since our forays were spontaneous by time frequency and no quantitative estimation of abundance was done. Still, notes on the time of fruiting of a particular species supplement the general picture of its ecological behavior in the area.

The preferred vegetation of some fungal species was roughly estimated by high frequency of collections from a certain vegetation type relative to other types (Table 5). To illustrate, eight carbonicolous species were collected from burnt forest and were absent in other contexts. Bogged forest with *Sphagnum* differed from other vegetation types by the presence of 6 species, some of them peat-inhabiting, and others (*Leccinum holopus*, *Cortinarius glandicolor*, *C. huronensis*) mycorrhizal. Eight species can be considered ruderal as they were only collected directly near the station house on disturbed soil mixed with wood chips or other litter. Only four species were characteristic for floodplain vegetation, where *Cortinarius uliginosus* forms mycorrhiza with *Salix* spp. and other species are saprotrophs. The remaining majority of species were registered in different types of coniferous-deciduous forests and were absent from locations with other major vegetation types. It goes without questioning that in order to draw reliable conclusions about the preferred plant community, a quantitative study on permanent plots of similar size is required.

Species abundance

Precise abundance evaluation of fungal species in the study area was not among the primary aims, however, we were able to draw some rough estimates. We did not use any direct methods, such as plot count or other quantitative methods; instead, the abundance was estimated based on the number of collections/registrations in the database. Understandably, not all encountered sporocarps were collected (frequently encountered species usually were omitted), thus the estimation is only approximate. We applied a 3-grade scale to classify species abundance, where "*Single collections*" were applied for species with only 1 collection; "*Regular collections*" – for species with 2-5 collections; "*Commonly collected*" – for species with 6 and more collections/registrations in the database. 181 species (56 %) were registered only once and thus can be suspected to be rare in the area, 134 species (41%) were regularly collected; and only 9 species (3%) can be considered common in the area.

Table 5. Species abundance by major vegetation types, showing groups of species characteristic for a certain type; for forests, only species with 5 or more collections are included; species without preferences for certain vegetation type were omitted

Species / Major vegetation type	After fire forest	Bogged forest with *Sphagnum*	Disturbed location	Floodplain vegetation	Mixed coniferous-deciduous forest
Total number of collections	**10**	**13**	**16**	**8**	**525**
Pholiota highlandensis	2				
Coprinellus domesticus	1		1		
Coprinellus xanthothrix	1				
Morchella tomentosa	1				
Peziza tenacella	1				
Plicaria endocarpoides	1				
Psathyrella pennata	1		1		
Rhodotarzetta rosea	1				
Leccinum holopus		4			1
Hypholoma elongatum		4			1
Cortinarius glandicolor		2			1
Cortinarius huronensis		2			
Galerina paludosa		2			
Hypholoma udum		2			
Conocybe semiglobata			4		
Tubaria furfuracea			2		
Agrocybe praecox			1		
Coprinellus angulatus			1		
Lacrymaria glareosa			1		
Morchella esculenta			1		
Myxomphalia maura			1		
Peziza badia			1		
Bovista limosa				1	
Conocybe mesospora				1	
Cortinarius uliginosus				2	
Hypholoma ericaeoides				1	
Galerina marginata				1	9
Cystoderma amianthinum					9
Hypholoma capnoides					9
Peziza silvestris			1	1	8
Rhodocollybia butyracea					8
Cortinarius cf. *armeniacus*					6
Cortinarius raphanoides					6
Mycena haematopus					6
Xeromphalina campanella					6

Edibility

Many macromycetes are edible, and some are commonly harvested by the general public and for commercial purposes. For this reason, a survey on macromycetes has a direct practical value. We analyzed the edibility of the discovered species in the vicinities of Mukhrino field station based on literature references [Ammarati et al., 1985; Arora, 1986; Phillips, 2006]. All species were classified into 8 groups as follows:

1) lethally poisonous; 2) poisonous; 3) of unknown edibility, including species referred to as "inedible", but without implications as for their poisonous effect; 4) not poisonous, but too small to be of value; 5) not poisonous, but could be confused with poisonous species; 6) not poisonous, but tastes bad or has tough consistency; 7) edible, but of poor quality; 8) edible and good.

From the total list of 324 species, 73 (23%) are edible, including 30 species of good quality (Fig. 3, F). Poisonous species represent 5% of the list, including 6 deadly poisonous. 14% of the species are not poisonous, but are either worthless or difficult to identify safely in the field. Edibility of the majority of the species (57%) is unknown.

Other uses

A number of macromycete species are commonly used for purposes other than culinary: of the species recorded around Mukhrino, many have medicinal uses; others can be cultivated and used for a variety of applied and experimental purposes; some yield valuable (and currently trendy) natural dyes for wool and textiles.

The detailed analysis of medicinal properties of the finds is a separate goal which we didn't pursue in the present publication. L. Perevedentseva points out 128 medicinal fungi for the adjacent Perm' region [Perevedentseva, 2011]. 41 of the medicinal macrofungi listed in this publication were recorded around Mukhrino, which represents about 12% of the total list. These species can be used in traditional medicine or harvested as raw sources of bioactive substances for the production of pharmaceuticals; and, as well as other species, be introduced in culture for experimental studies and controlled production of targeted substances.

Many species of macromycetes are successfully cultivated worldwide and are as such of substantial economical importance. Hence, studies of particular regional mycota for their potential for cultivation are an important challenge, as this could expand the variety of cultivated taxa, including those well adapted to local climates. This could also provide additional knowledge about the environmental requirements of the species in the wild, which would make possible the use of native substrates for the cultivation processes (Stamets, 2000). Eight of the species recorded around Mukhrino are successfully cultivated and the possibility of their cultivation in the region can be studied in the first place. These species are: *Agrocybe praecox*, *Flammulina velutipes*, *Hericium coralloides*, *Hypholoma capnoides*, *Hypsizygus ulmarius*, *Morchella tomentosa*, *Pleurotus ostreatus*, *Pleurotus pulmonarius* (Cotter, 2014; Stamets, 2000).

Many species of *Cortinarius* (notably sect. Dermocybe) are a source of bright yellow, orange, red, purple, brown and green dyes: *Cortinarius violaceus*, *C. sanguineus*, *C. semisanguineus*, *C. croceus*, *C. cinnamomeus*, *C. norvegicus*, *C. gentilis* (Bessette and Bessette, 2001).

Protection status

Seven species from the list of macromycetes in the vicinities of Mukhrino field station are protected by the Red list of Khanty-Mansiysk region in different status. Below we provide descriptive characteristics of their populations in the studied area.

Bovista limosa Rostr.(in Appendix to the Red list) – a single sporocarp, 18.8.2010 the Irtysh river floodplain on a roadside (sandy soil).

Cortinarius violaceus (L.) Gray (3 category) – three locations registered on 7–21.09.2014 in coniferous-deciduous mixed forests, in groups up to 10 fruitbodies.

Gomphus clavatus (Pers.) Gray (3) – several locations registered in 7–14.09.2010, sporocarps growing in groups under dark coniferous canopy, among needle litter.

Hericium cirrhatum (Pers.) Nikol.(3) – a single fruitbody found 20.08.2009 on standing-dead trunk of *Betula pubescens* in mixed coniferous-deciduous forest.

Limacella illinita var. *rubescens* H.V. Sm. (3) – two finds, 13.09.2010 and 12.9.2014 on soil in mixed coniferous-deciduous (predominantly spruce and Siberian pine) forest.

Omphalina discorosea (Pilát) Herink et Kotl. (3) – several collections (18.7.08, 13.9.10) on large fallen trunks of *Populus tremula* in mixed forests.

Sarcosoma globosum (Schmidel) Casp. (3) – a single location registered in 2010, five fruitbodies growing in mixed coniferous-deciduous forest on soil among feather mosses about 100 m from the station house.

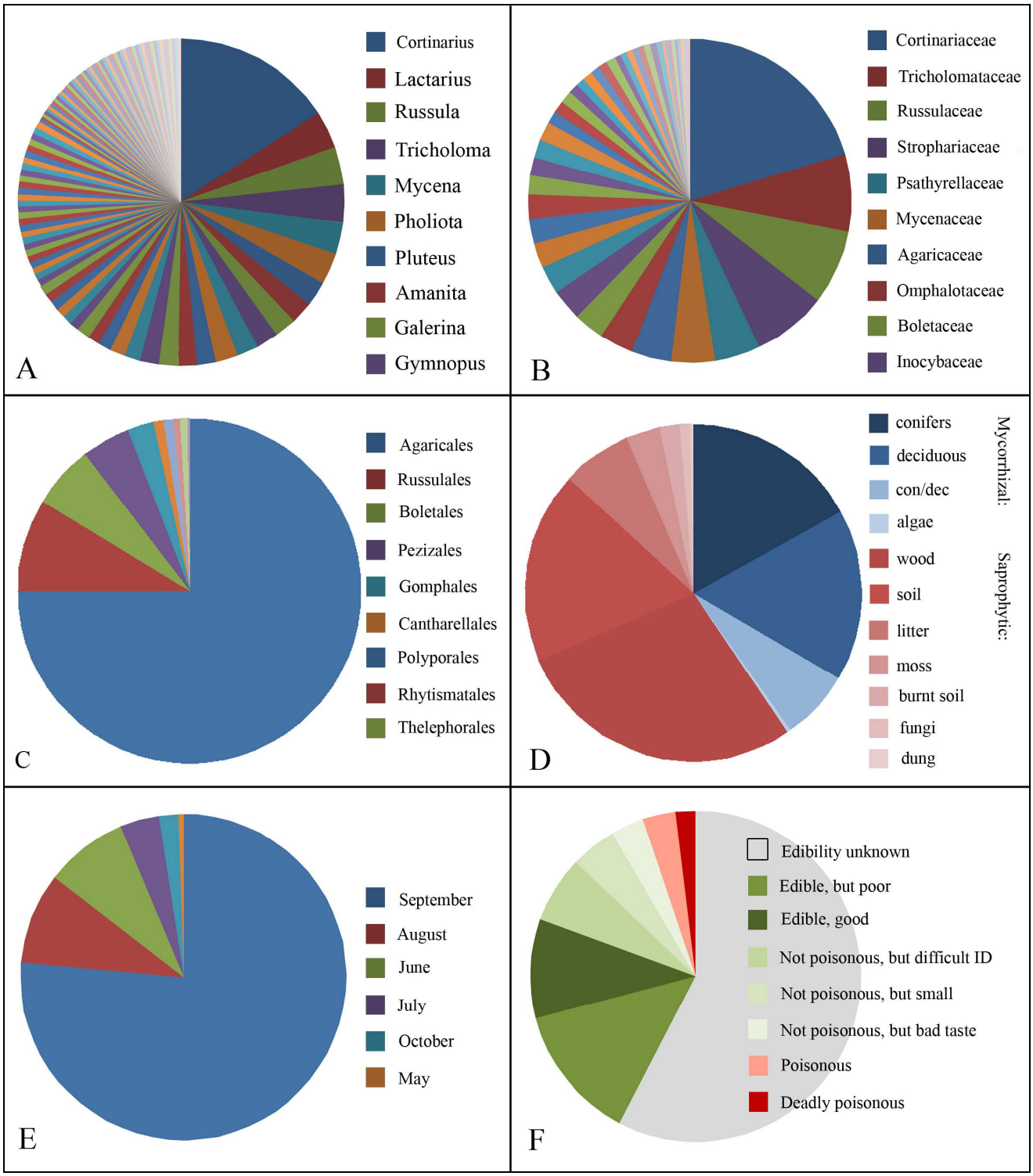

Fig. 3. Taxonomical and ecological structure of the revealed mycota (A-E) and edibility (F). **A**. the percentage of species within genera, ten most abundant genera showed in the legend; **B**. the percentage of species within families, ten most abundant showed in the legend; **C**. the percentage of species within orders; **D**. trophic status, number of species by trophic groups; **E**. phenological structure, number of collections by months; **F**. edibility, number of species classified by groups according to their edible qualities.

Comparison of the registered mycota with the existing checklists of adjacent areas

The resulting list of macromycetes from the vicinities of Mukhrino field station totaling 324 species was compared with the ompiled checklist for the Khanty-Mansiysk autonomous okrug (KhMAO) [Filippova, 2010]. The checklist was compiled on the basis of published works on mycota of KhMAO from the very early studies in the 1990's and up to present. A total of only about 50 publications appeared over this period, covering 834 taxa; of these over 50% taxa are Aphyllophoroid fungi (437); with 290 Agaricoid fungi and fewer Myxomycota and Ascomycota (87 and 13, respectively).

Approximately a third of the species from the vicinities of Mukhrino previously appeared in checklists for KhMAO; 201 species are new. Thus, the results of this study considerably improve our knowledge of the mycota of the region. This raises the total number of fungal species recorded in the region to about a thousand (834 previously reported + 324 from present study – 117 shared = 1041).

While it's still early to draw definitive conclusions about the taxonomic structure of the mycota around Mukhrino, the high richness of the top three families (Tricholomataceae, Cortinariaceae, Russulaceae), typical for the forest mycobiota of Holarctic (Marina, 2006), is well reflected in our results. The comparison of the species richness of the top genera in our list with the list of geographically close area of the Visimskiy Nature Reserve (Marina, 2006) is shown in Table 6. It points towards insufficient collection and identification of several rich genera, notably *Cortinarius*, *Russula*, *Mycena*, *Lactarius*, and some smaller genera. The relative proportion of the number of species of the top genera also differs (Table 6): most notably we have increased proportion of species of *Cortinarius*, *Galerina*, *Gymnopus*, but lower proportion of *Russula* and *Mycena* compare to that in Marina [2006]. The proportion of number of species in the top genera also differs, being higher in our study. Perhaps this is due to incomplete collection of small poorly known genera in our study.

Table 6. Comparison of species richness of top genera in our list and in list of Visimskiy natural reserve

Genus	Our list		Marina, 2006	
	Number of species	In % to total number (309)	Number of species	In % to total number (800)
Cortinarius	51	17	81	10
Lactarius	12	4	30	4
Russula	12	4	45	6
Tricholoma	12	4	11	1
Mycena	10	3	44	6
Pholiota	10	3	12	2
Pluteus	8	3	10	1
Amanita	7	2	13	2
Galerina	7	2	17	2
Gymnopus	7	2	15	2
Hebeloma	7	2	10	1
Psathyrella	7	2	19	2
Entoloma	6	2	26	3
Hypholoma	6	2	9	1
Leccinum	6	2	8	1
Suillus	6	2	9	1

The total richness of the mycota (Agaricoid basidiomycetes) of Visimskiy Nature Reserve is reported to be about 800 species (including 635 species presently known with an expected 20% increase of the number in future) (Marina, 2006)[1]. Therefore, the mycota in vicinities of Mukhrino could be 2-3 times larger than presently described.

[1] Visimskiy Nature Reserve located in Sverdlovsk region, on the East slope of middle Ural mountains, in the boundaries of south taiga belt (low altitudes), 57°20'-57°31'N and 59°30'-59°50'E, where protected area = 300 km^2.

The ratio of plant species to macrofungi species is considered to be a valuable coefficient in global biodiversity assessments. This ratio supposedly ranges from low in temperate (2:1) to high in tropical (5:1) regions (Mueller et al., 2007). Tedersoo et al. [2014] showed that the ratio of plant species to fungi decreases exponentially towards northern latitudes. It should also be considered that the ratio also depends on the scale of study as the sizes of the geographical ranges of plants and fungi differ [Tedersoo et al., 2014]. The number of vascular plants in the vicinities Mukhrino field station is estimated to be around 170 species (Elena Lapshina, unpublished data; based on 150 botanical relevès performed in forest, floodplain and bog ecosystems). Thus, based on the present knowledge of the flora of vascular plants and macromycetes around Mukhrino, the ratio would be 1:2.

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APPENDIX

Species list with annotations

The species list presents brief information on collection data, abundance, ecology and edibility of the identified taxa. Information is presented in the following order: **taxon name**, accession number in the Fungarium of Yugra State University, date of collection, abundance according to three-grade scale (see description in Results: Species abundance), vegetation type and substrate of collection, trophic status and ecology of species according to literature, and edible qualities according to literature. The taxa are arranged in systematical order, and alphabetically within groups. The list is available as an .xls file in the Electonic Appendix.

ASCOMYCOTA: PEZIZALES

DISCINACEAE. ***Gyromitra esculenta*** (Pers.) Fr. Kh-0169, 31.5.08; Kh-3133, 21.6.10; Kh-3328, 15.6.11. Regularly collected, mixed predominantly coniferous forest, on soil. Saprotrophic and mycorrhizal, on sandy soil in coniferous forest [Hansen and Knudsen, 2000]. Poisonous, deadly poisonous when raw, but cooking in two fresh waters also results in occasional poisoning, should be avoided [Phillips, 2006; Arora, 1986]. ***Gyromitra infula*** (Schaeff.) Quél. Kh-2743, 16.9.10; Kh-2934, 19.9.10; Kh-3034, 22.9.10; Kh-4566, 8.9.14. Regularly collected, mixed predominantly coniferous forest, on soil. Saprotrophic and mycorrhizal [Hansen and Knudsen, 2000]. Poisonous, deadly poisonous when raw, it contains a toxin monomethylhydrazine (MMH), which is also carcinogenic [Arora, 1986]. **HELVELLACEAE.** ***Helvella macropus*** (Pers.) P. Karst. Kh-4628, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among litter and mosses and on mossy logs. Saprotrophic on debris and wood [Hansen, 2000]. Not edible [Phillips, 2006] or edibility unknown [Arora, 1986]. **MORCHELLACEAE.** ***Morchella esculenta*** (L.) Pers. Kh-3124, 13.6.10. Regularly collected, disturbed location near the station house, on soil among different litter. Mycorrhizal and Saprotrophic in deciduous forests, parks [Hansen, 2000]. Edible and good quality [Arora, 1986; Phillips, 2006]. ***Morchella tomentosa*** M. Kuo. Kh-3352, 15.6.11. Single collection, abundantly on after-fire place in floodplain aspen-birch mixed forest, bank of Baybalak channel, on soil among litter and grasses. Mycorrhizal and Saprotrophic in after-fires coniferous forests, often in years following forest fires [Kuo, 2008]. Edible. **PEZIZACEAE.** ***Peziza badia*** Pers. Kh-3157, 22.9.07. Single collection, mixed predominantly coniferous forest, on bare soil. Saprotrophic, in coniferous forests [Hansen and Knudsen, 2000]. Poisonous unless thoroughly cooked [Phillips, 2006]. ***Peziza fimeti*** (Fuckel) E.C. Hansen. Kh-2997, 20.9.10. Single collection, on bird dung (*Tetrao urogallus*). Saprotrophic on dung [Hansen and Knudsen, 2000]. Edibility unknown, too small. ***Peziza phyllogena*** Cooke. Kh-4695, 10.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among litter and on decayed wood. Saprotrophic, especially on trunks [Hansen and Knudsen, 2000]. Edibility unknown, too small. ***Peziza silvestris*** (Boud.) Sacc. & Traverso. Kh-0150, 14.9.10; Kh-0151, 14.9.10; Kh-2375, 21.8.10; Kh-2376, 21.8.10; Kh-2646, 14.9.10; 20.9.10; Kh-3298, 14.6.11; Kh-3299, 14.6.11; Kh-3327, 15.6.11; Kh-4768, 12.9.14; Kh-4814, 13.9.14. Regularly collected, mixed predominantly coniferous forest, on aspen wood, or on soil among different litter. Saprotrophic, on rich soil [Hansen and Knudsen, 2000]. Edibility unknown [Arora, 1986]. ***Peziza tenacella*** W. Phillips. Kh-0403, 16.6.11. Single collection, after-fire forest in floodplain, bank of Baybalak channel, on soil mixed with charcoal and litter. Saprotrophic on burnt ground [Hansen and Knudsen, 2000]. Edibility unknown. ***Plicaria endocarpoides*** (Berk.) Rifai. Kh-3388, 16.06.11. Single collection, after-fire floodplain mixed forest at the bank of Baybalak channel, on soil mixed with charcoal and litter. Saprotrophic on soil, on burnt sites [Hansen and Knudsen, 2000]. Not edible [Phillips, 2006]. **PYRONEMATACEAE.** ***Humaria hemisphaerica*** (F.H. Wigg.) Fuckel. Kh-4551, 8.9.14; Kh-4649, 9.9.14.

Regularly collected, mixed predominantly coniferous forest, on soil among litter or on mossy logs. Saprotrophic on reach soil and litter [Hansen, 1997]. Edibility unknown, too small in size to be worthwhile [Arora, 1986]. ***Otidea caligata*** (Nyl.) Sacc. Kh-1776, 29.8.08. Single collection, mixed predominantly coniferous forest, among needle litter. Saprotrophic, on disturbed soil in coniferous forests [Hansen, 2000]. Not edible [Phillips, 2006]; edibility unknown, but a study about *O. onotica* revealed presence of a toxin monomethylhydrazine, better to avoid [Arora, 1986]. ***Otidea leporina*** (Batsch) Fuckel. Kh-4627, 9.9.14, 11.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among litter and moss. Saprotrophic, on disturbed soil in deciduous forests [Hansen, 2000]. Not edible [Phillips, 2006]; as above [Arora, 1986]. ***Pyropyxis rubra (Peck) Egger***. Kh-3353, 15.6.11. Single collection, after-fire floodplain mixed forest on the bank of Baybalak channel, on burned soil and litter. Saprotrophic on burnt soil [Hansen, 2000]. Edibility unknown. **SARCOSCYPHACEAE.** ***Microstoma protractum*** (Fr.) Kanouse. Kh-4166, 1.6.13. Single collection, on the border between forest and floodplain, in aspen-birch periodically flooded forest. Saprotrophic on buried sticks or twigs of deciduous trees [Hansen and Knudsen, 2000]. Not edible. ***Plectania melastoma*** (Sowerby) Fuckel. Kh-2382, 20.8.10; Kh-2898, 18.9.10. Regularly collected, mixed predominantly coniferous forest, on mossy wood and on soil covered by moss and litter. Saprotrophic on coniferous litter or on soil, among mosses [Hansen, 2000]. Edibility unknown [Arora, 1986]. ***Sarcosoma globosum*** (Schmidel: Fr.) Casp. Visual registration, 25.05.10. Single registration of group from 5 apothecia, in coniferous-deciduous mixed forest on soil among feather moss. Saprotrophic and probably mycorrhizal [Zvyagina, 2015]. Edible (Internet sources) and having medicinal properties [Perevedentseva, 2013].

RHYTISMATALES

CUDONIACEAE. ***Cudonia circinans*** (Pers.) Fr. Kh-1443, 29.8.08; Kh-2380, 21.8.10; Kh-4701, 10.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among mosses. Saprotrophic on litter in coniferous forests [Hansen, 2000]. Poisonous, at least raw [Arora, 1986], containing high concentrations of a toxin monomethylhydrazine (MMH). The toxin is removed by cooking or drying but consumption is not advised at all. Symptoms range from acute poisoning to even death, MMH also carcinogenic [Arora, 1986]. ***Spathularia flavida*** Pers. Kh-0092, 29.8.08; Kh-2379, 21.8.10; Kh-2993, 20.9.10; Kh-4606, 8.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among moss and litter. Saprotrophic on litter, in mixed forests among moss and debris [Hansen and Knudsen, 2000]. Edible but tough [Arora, 1986].

BASIDIOMYCOTA: AGARICALES

AGARICACEAE. ***Agaricus sylvaticus*** Schaeff. Kh-4662, 9.9.14. Single collection, mixed predominantly coniferous forest, on soil among feather mosses and forest litter. Saprotrophic on needle litter in coniferous and deciduous forests [Knudsen and Vesterholt, 2008]. Edible, good quality [Phillips, 2006] and having medicinal properties [Fortes and Novaes, 2011; Valadares et al., 2013], but can cause gastrointestinal upset in some people [Ammirati et al., 1985]. ***Agaricus sylvicola*** (Vittad.). Kh-1126, 28.9.09; Kh-1135, 25.7.09; Kh-2551, 13.9.10; Kh-2864, 17.9.10; Kh-4621, 9.9.14. Regularly collected, mixed predominantly coniferous forest and its aspen secondary formations, on soil among moss and forest litter. Saprotrophic on soil and compost, in forests and open habitats [Knudsen et al., 2008]. Edible, good quality [Phillips, 2006] but could be mixed up with *A. xanthodermus*, a toxic species, and *Amanita* spp., therefore not recommended for the beginners [Ammirati et al., 1985]. Also causing gastrointestinal upset in some people [Ammirati et al., 1985]. ***Bovista limosa*** Rostr. RE-2231 (Yuryi Rebriev, personal collection), 18.8.10. Single collection, floodplain of Baybalak channel, sandy soil among grasses. Saprotrophic on calcareous soil, in open sites, along roads [Hansen, 1997]. Edible when young [Phillips, 2006], but could have bitter taste [Arora, 1985]. ***Cystoderma amianthinum*** (Scop.) Fayod. Kh-1590, 29.8.08; Kh-2861, 17.9.10; Kh-2948, 19.9.10; Kh-2949, 19.9.10; Kh-2950, 19.9.10; Kh-3018, 22.9.10; Kh-3019, 22.9.10; Kh-3092, 1.10.10; Kh-4696, 10.9.14. Regularly collected in mixed predominantly coniferous forest, on soil among mosses. Saprotrophic on soil and litter, in heathlands and deciduous forests, grasslands [Knudsen and Vesterholt, 2008]. Edible but not worthwhile [Phillips, 2006]; should be taken with caution, because could be confused with poisonous species (e.g. *Lepiota castanea*) [Arora, 1986]. ***Cystodermella cinnabarina*** (Alb. & Schwein.) Harmaja. Kh-2862, 17.9.10; Kh-4611, 8.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among mosses. Saprotrophic on soil and litter [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Cystodermella granulosa*** (Batsch) Harmaja. Kh-2906, 18.9.10; Kh-2947, 19.9.10; Kh-4651, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among mosses. Saprotrophic on soil and litter, in forests [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Lepiota clypeolaria*** (Bull.) P. Kumm. Kh-2879, 18.9.10; Kh-4567, 8.9.14. Regularly collected, mixed predominantly coniferous forest, on leaf and mixed litter. Saprotrophic on soil, in deciduous and coniferous forests [Knudsen and Vesterholt, 2008]. Poisonous [Phillips, 2006; Arora, 1986]. ***Lepiota magnispora*** Murill. Kh-2907, 18.9.10; Kh-2975, 19.9.10. Regularly collected, mixed predominantly coniferous forest, on leaf and mixed litter. Saprotrophic on soil, in deciduous and coniferous forests [Knudsen and Vesterholt, 2008]. Edibility unknown, better to avoid [Arora, 1986]. ***Lycoperdon molle*** Pers. RE-2230 (Yuryi Rebriev, personal collection), 18.8.10. Single collection, mixed predominantly coniferous forest, on mossy trunk. Saprotrophic on soil or rotten wood, in coniferous and deciduous forests [Hansen, 1997]. ***Lycoperdon nigrescens*** Pers. RE-2228 (Yuryi Rebriev, personal collection), 18.8.10. Single collection, mixed predominantly coniferous forest, on mossy trunk. Saprotrophic on soil or rotten wood, in coniferous and deciduous forests [Hansen, 1997]. ***Lycoperdon perlatum*** Pers. Kh-1159, 13.8.09; Kh-4594, 8.9.14. Regularly collected, mixed predominantly coniferous forest, on mossy trunks, on soil among litter and moss. Saprotrophic on soil or rotten wood, in coniferous and deciduous forests, pastures [Hansen, 1997]. Edible, when young [Phillips, 2006]; could have bitter taste [Arora, 1986]. ***Lycoperdon pyriforme*** Schaeff. RE-2229 (Yuryi Rebriev, personal collection), 18.8.10. Regularly collected, mixed predominantly coniferous forest, on mossy trunks, on soil among litter and moss. Saprotrophic on deciduous rotten wood, rarely on coniferous wood or soil [Hansen, 1997]. Edible, when young [Phillips, 2006], but could have bitter taste [Arora, 1986]. **AMANITACEAE.** ***Amanita fulva*** Fr. Kh-4558, 8.9.14. Single collection, mixed predominantly coniferous

forest, on soil. Mycorrhizal, mainly under *Betula* and *Quercus* [Knudsen and Vesterholt, 2008]. Edible [Phillips, 2006], correct identification is necessary as other *Amanita*'s are poisonous [Arora, 1986]. ***Amanita islandica*** Melot. Kh-4526, 7.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal, with Salix, Betula or Picea [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Amanita muscaria*** (L.) Lam. Kh-0057, 14.9.10; Kh-0318, 18.9.10, Kh-4722, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal, under coniferous and deciduous trees [Knudsen and Vesterholt, 2008]. Poisonous and hallucinogenic [Arora, 1986]. ***Amanita porphyria*** Alb. & Schwein. Kh-0114, 15.9.10; Kh-0421, 20.9.10; Kh-4555, 8.9.14. Regularly collected, mixed predominantly coniferous forest, also rarely in bogs with *Betula*, on soil (among *Sphagnum* in bogs). Mycorrhizal, under conifers, less often deciduous trees [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]. ***Amanita regalis*** (Fr.) Michael. Kh-4525, 7.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal, in coniferous and mixed forests [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Amanita umbrinolutea*** (Secr. ex Gillet) Bataille. Kh-4598, 8.9.14, Kh-4519, 7.9.14. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal. Edibility unknown. ***Amanita vaginata* f. *alba*** (Sacc.) Romagn. Kh-4527, 7.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal, under deciduous or conifers [Knudsen and Vesterholt, 2008]. Edible, but best avoided due to possible confusion with poisonous *Amanita*'s [Phillips, 2006; Arora, 1986]. ***Limacella delicata*** var. ***glioderma*** (Fr.) Gminder. Kh-4774, 12.9.14. Single collection, mixed predominantly coniferous forest, on soil among moss and litter. Saprotrophic on soil, in coniferous forests [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006], unknown [Arora, 1986]. ***Limacella illinita*** var. ***rubescens*** H.V. Sm. Kh-0027, 13.9.10. Single collection, mixed predominantly coniferous forest, on soil among moss and litter. Saprotrophic on soil, under *Picea* or *Pinus*, often on calcareous soil [Knudsen and Vesterholt, 2008]. Edibility unknown [Phillips, 2006], too slimy [Aroram, 1986]. **BOLBITIACEAE.** ***Bolbitius reticulatus*** (Pers.) Ricken. Kh-3477, 22.9.10. Single collection, bogged birch forest in spring valley, on peaty soil among tussocks. Saprotrophic on very decayed deciduous wood [Knudsen and Vesterholt, 2008]. Edibility unknown [Phillips, 2006], or worthless as food [Arora, 1986]. ***Conocybe macrospora*** (G.F. Atk.) Hauskn. Kh-2741, 16.9.10. Single collection, on a spring slope, mixed coniferous-deciduous forest, on soil among forest litter. Saprotrophic on soil and among leaf- and needle litter, in nitrogenous rich grasslands, in pastures, on dung [Knudsen and Vesterholt, 2008]. Edibility of most species unknown, but they are small to create substantial meal. One species, *C. filaris* is known to contain amatoxins [Arora, 1986], and some species (*C. cyanopus*, *C. smithii*) are hallucinogenic [Ammirati, 1985]. ***Conocybe mesospora*** Kühner. Kh-2586, 13.9.10. Single collection, floodplain vegetation, near Baybalak channel, on soil among grass litter. Saprotrophic on soil and among litter, in forests, in grasslands and fields [Knudsen and Vesterholt, 2008]. Edibility unknown, see previous species. ***Conocybe semiglobata*** Kühner & Watling. Kh-2612, 14.9.10; Kh-3397, 17.6.11; Kh-4560, 8.9.14; Kh-4705, 10.9.14. Regularly collected, disturbed vegetation near the field station house, on soil among moss and litter. Saprotrophic on soil and among litter, in dry grassland, pastures and lawns [Knudsen and Vesterholt, 2008]. Edibility, as above. **CLAVARIACEAE.** ***Clavulinopsis laeticolor*** (Berk. & M.A. Curtis) R.H. Petersen. Kh-4743, 11.9.14. Single collection, mixed predominantly coniferous forest, on soil among needle and leaf litter. Saprotrophic, on rich soil in forests and dry meadows [Hansen and Knudsen, 1997]. Not edible due to small size [Arora, 1986]. ***Ramariopsis crocea*** (Pers.) Corner. Kh-4529, 7.9.14, 9.9.14, 13.9.14; Kh-4770, 12.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among needle and leaf litter. Saprotrophic, on clayey or rarely sandy soils in deciduous forests or in dunes [Hansen, 1997]. Edibility unknown. ***Ramariopsis subtilis*** (Pers.) R.H. Petersen. Kh-4744, 11.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among needle and leaf litter. Saprotrophic, on rich soil in dry meadows and forests [Hansen, 1997]. Edibility unknown. **CORTINARIACEAE.** ***Cortinarius alboviolaceus*** (Pers.) Fr. Kh-0101, 15.9.10; Kh-0202, 16.9.10; Kh-4600, 8.9.14; Kh-4604, 8.9.14; Kh-4605, 8.9.14. Regularly collected species, mixed predominantly coniferous forest, on soil. Mycorrhizal in deciduous and coniferous forests [Knudsen and Vesterholt, 2008]. Not edible: in view of large number of difficult-to-identify species some of which are deadly poisonous it is not recommended for the beginners [Arora, 1986]. ***Cortinarius anomalus*** (Fr.) Fr. Kh-2818, 17.9.10; Kh-4672, 9.9.14; Kh-4779, 12.9.14. Regularly collected species, in mixed predominantly coniferous forest, on soil. Mycorrhizal with broad-leaved trees, possibly also with conifers [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius argutus*** Fr. Kh-0269, 17.9.10; Kh-0358, 18.9.10; Kh-2555, 17.9.10; Kh-4661, 9.9.14. Regularly collected, mixed forest with *Aspen* and *Birch*, on soil. Mycorrhizal with *Populus* [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius*** cf. ***armeniacus*** (Schaeff.) Fr. / ***obtusus*** (Fr.) Fr. (additional collections and deep work with Cortinaria's systematics required in future; here and below previously indentified species marked with "cf."). Kh-0203, 16.9.10; Kh-0437, 20.09.10; Kh-4669, 9.9.14; Kh-4675, 9.9.14; Kh-4684, 9.9.14; Kh-4692, 10.9.14. Regularly collected, mixed predominantly coniferous forest and at the transition forest/treed bog, on soil among mosses. Mycorrhizal with *Pinus* and *Picea*, typically in sandy *Pinus* heath forests [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius armillatus*** (Fr.) Fr. Kh-1152, 13.8.09; Kh-2893, 18.9.10; Kh-4543, 8.9.14. Common species, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Betula*, in deciduous and mixed forests, usually on oligotrophic soil [Knudsen and Vesterholt, 2008]. Not edible, considered by some authors as edible, but should be avoided since all *Cortinarius* species contain toxins [Phillips, 2006]. ***Cortinarius*** cf. ***balteatus*** (Fr.) Fr. Kh-0050, 13.9.10. Single collection, in aspen-birch forest on the bank of Baybalak channel, in floodplain, on soil. Mycorrhizal, in dry coniferous forests [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius bataillei*** J. Favre. Kh-0015, 13.9.10; Kh-0276, 16.9.10. Regularly collected, bogged forest on transition forest/treed bog, among *Sphagnum* spp. Mycorrhizal with *Picea*, *Pinus* or *Betula*, often among *Sphagnum* on moist soil [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius brunneus*** (Pers.) Fr. Kh-0416, 20.9.10; Kh-1151, 13.8.09; Kh-1376, 31.8.08. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Picea*, in mesic forests [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius caesiobrunneus*** Kytöv., Niskanen & Liimat. Kh-4667, 9.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Picea*, in mesic forests [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius camphoratus*** (Fr.) Fr. Kh-4540, 8.9.14; Kh-4707, 10.9.14. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal, in *Picea* and mixed *Pinus-Betula* forests (Knudsen and Vesterholt, 2008). Not edible. ***Cortinarius caperatus***

(Pers.) Fr. Kh-2769, 16.9.10; Kh-4534, 7.9.14. Regularly collected, mixed predominantly coniferous forest, on soil, rarely collected in treed bogs, among *Sphagnum* spp. Mycorrhizal with coniferous and deciduous trees, in coniferous or deciduous forests [Knudsen and Vesterholt, 2008]. Edible, good quality [Arora, 1986; Phillips, 2006; Boa, 2004]. ***Cortinarius cinnamomeus*** (L.) Fr. Kh-052, 14.9.10; Kh-177, 16.9.10; Kh-243, 19.9.10; Kh-4681, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Picea*, *Pinus* or *Betula*, on sandy soil, humus, in forests, heathlands, or along roadsides [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius*** cf. ***collinitus***(Pers.) Fr. Kh-0129, 15.9.10; Kh-4588, 8.9.14. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Picea* [Knudsen and Vesterholt, 2008]. Edibility unknown [Phillips, 2006]. ***Cortinarius comptulus*** M.M. Moser. Kh-4710, 11.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Pinus* and *Picea* [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius croceocoeruleus*** (Pers.) Fr. Kh-2967, 20.9.10. Single collection, mixed predominantly coniferous forest with aspen and birch, on soil among mosses. Mycorrhizal with deciduous trees, especially with *Fagus*, on calcareous soil [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius decipiens*** (Pers.) Fr. Kh-0016, 13.9.10; Kh-4565, 8.9.14; Kh-4592, 8.9.14; Kh-4678, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal with deciduous trees and bushes, often on moist soil [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius delibutus*** Fr. Kh-4683, 9.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal with coniferous and deciduous trees, in wide range of habitats (Knudsen and Vesterholt, 2008). Edibility unknown [Phillips, 2006]. ***Cortinarius diasemospermus*** Lamoure. Kh-0436, 20.9.10; Kh-4673, 9.9.14; Kh-4676, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal with deciduous trees (*Betula*, *Quercus*, *Fagus*, *Salix*), on nutrient rich soil [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius disjungendus*** P. Karst. Kh-1375, 29.08.2008. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Betula*, in deciduous and mixed forests [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius dolabratus*** Fr. Kh-4601, 8.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Pinus* or *Picea*, mostly in dry *Pinus* forest on sandy soil [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius flexipes*** var. ***inolens*** H. Lindstr. Kh-4610, 8.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Picea* and *Pinus* in nutrient poor forests [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius*** glandicolor (Fr.) Fr. Kh-0369, 19.9.10; Kh-2759, 16.9.10; Kh-4706, 10.9.14. Regularly collected, bogged forest and treed bogs, among *Sphagnum* spp. Mycorrhizal with *Picea* and *Pinus*, often among *Sphagnum* [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius*** cf. ***fulvescens*** Fr. Kh-0209, 16.9.10; Kh-0409, 19.9.10. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Picea*, in mesic forests [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius gentilis*** (Fr.) Fr. Kh-0313, 15.9.10; Kh-1377, 29.8.08; Kh-4549, 8.9.14. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal, in dry to mesic coniferous forests [Knudsen and Vesterholt, 2008]. Deadly poisonous, containing toxins which destroy the kidneys and the liver [Arora, 1986; Ammirati, 1985] with fatality for about 15 %. ***Cortinarius glaucopus*** (Schaeff.) Fr. Kh-0330, 18.9.10; Kh-2992, 20.9.10. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal with conifers, rarely with deciduous trees, nutrient rich to calcareous soils [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius*** cf. ***hemitrichus*** (Pers.) Fr. (another close species *C. pilatii* Svrček). Kh-0087, 14.9.10; Kh-0208, 16.9.10. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Betula*, usually in dry habitats [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius huronensis*** Ammirati & A.H. Sm. Kh-0275, 16.9.10; Kh-0367, 19.9.10. Regularly collected, bogged forests and transition between forest/treed bog (common in the last habitat). Micorrhizal with *Pinus*, more seldom with *Picea* or *Betula*, among *Sphagnum* [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius laniger*** Fr. Kh-4689, 10.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal with conifers, in mesic *Picea* forests and *Pinus* heathlands [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius*** cf. ***lepidopus*** Cooke. Kh-1381, 29.8.08; Kh-3008, 22.9.10; Kh-4674, 9.9.14; Kh-4687, 10.9.14. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal, usually with *Betula* on acid, poor soils [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius*** cf. ***lustratus*** Fr. (another close species – ***C. leucophanes*** P. Karst.). Kh-4520, 7.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Picea* [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius*** cf. ***mucosus*** (Bull.) J. Kickx. Kh-0080, 14.9.10; Kh-0317, 18.9.10; Kh-4522, 7.9.14; Kh-4685, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Pinus*, in poor, lichen-dominated forests [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius*** cf. ***multiformis*** Fr. Kh-4708, 01.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal, in coniferous forests [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius*** cf. ***paragaudis*** Fr. Kh-4711, 10.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal with conifers, in mesic to damp forests [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius pholideus*** (Lilj.) Fr. Kh-0326, 18.9.6; Kh-0414, 20.9.10; Kh-2917, 19.9.10. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Betula*, often on acid soil [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius*** cf. ***populinus*** Brandrud. Kh-4602, 8.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Populus*, *Betula*, *Tilia*, in forests on rich to calcareous soil [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius porphyropus*** (Alb. & Schwein.) Fr. Kh-2553, 13.9.10 Kh-4782, 12.9.14. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Betula* on mesotrophic, often moist soil [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius praestigiosus*** (Fr.) M.M. Moser. Kh-4670, 9.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Salix*, *Betula*, *Fagus*, often in moderately wet habitats [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius raphanoides*** (Pers.) Fr. Kh-0425, 20.9.10; Kh-4559, 8.9.14; Kh-4603, 8.9.14; Kh-4679, 9.9.14; Kh-4790, 12.9.14; Kh-4680, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Betula*, in deciduous forests [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius semisanguineus*** (Fr.) Gillet. Kh-0102, 15.9.10; Kh-0366, 19.9.10; Kh-4682, 9.9.14. Regularly collected, mixed predominantly coniferous forest, treed bogs, on soil and among *Sphagnum* spp. Mycorrhizal with *Pinus*, on poor soil, rarely with *Picea*, *Betula* or *Fagus* [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius solis-occasus*** Melot. Kh-2755, 16.9.10; Kh-4535, 7.9.14. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Picea*, in mesic *Picea* forests or in *Pinus* heathlands

[Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius*** cf. ***spilomeus*** (Fr.) Fr. Kh-4591, 8.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Picea*, but also with *Larix* and *Pinus*, in coniferous or mixed forests [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius tortuosus*** (Fr.) Fr. Kh-4712, 10.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Picea*, in mesic to damp *Picea* forests, often among *Sphagnum* [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius triumphans*** Fr. Kh-0079, 14.9.10. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Betula*, on rich to calcareous soil [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius*** cf. ***trivialis*** J.E. Lange. Kh-0418, 20.9.10. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Salix*, *Populus*, or *Betula*, *Quercus*, *Fagus*, on poor to rich soil [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius*** cf. ***trossingenensis*** Melot. Kh-4718, 10.9.14. Single collection in mixed predominantly coniferous forest, on soil. Mycorrhizal with *Picea*, in mesic forests [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius*** cf. ***tubarius*** Ammirati & A.H. Sm. Kh-2767, 16.9.10. Single collection, bogged forest near treed bog edge, among *Sphagnum* spp. Mycorrhizal with *Betula*, seldom with *Picea*, *Pinus*, in fens, bogs or swamp forests among *Sphagnum* [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius uliginosus*** Berk. Kh-008, 13.9.10; Kh-0284, 17.9.10. Single collection, floodplain forest near Baybalak channel, under *Salix* spp., on soil among grasses and litter. Mycorrhizal with *Salix*, also with *Alnus* or *Fagus*, on moist soil in rich forests, on river-banks [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius umbrinolens*** P.D. Orton. Kh-0204, 16.9.10; Kh-1369, 29.8.8; Kh-2953, 19.9.10; Kh-4714, 10.9.14. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Betula*, *Fagus* [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius venustus*** P. Karst. Kh-0179, 16.9.10; Kh-1374, 29.8.08; Kh-2796, 17.9.10; Kh-2895, 18.9.10; Kh-4667, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Picea*, in mesic forests [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius vibratilis*** (Fr.) Fr. Kh-0263, 17.9.10; Kh-4668, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Picea*, in mesic forests [Knudsen and Vesterholt, 2008]. Not edible. ***Cortinarius violaceus*** (L.) Gray. Kh-4521, 7.9.14, 9.9.14, 21.9.14. Three populations registered in 2014, mixed predominantly coniferous forest, on soil. Mycorrhizal with deciduous trees, e.g. *Populus*, *Betula*, *Fagus* [Knudsen and Vesterholt, 2008]. Not edible, considered by some authors as edible, but not advised [Phillips, 2006]. ***Galerina atkinsoniana*** A.H. Sm. Kh-4698, 10.9.14. Single collection, mixed predominantly coniferous forest, on mossy trunk. Saprotrophic, on bryophytes, *Polytrichum*, *Dicranum*, occasionally *Sphagnum*, in acid forests, heathlands, grasslands, bogs [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Galerina hypnorum*** (Schrank) Kühner. Kh-3290, 14.6.11; Kh-3342, 15.6.11. Regularly collected, mixed predominantly coniferous forest, mossy trunk. Saprotrophic, on various mosses, on the ground and on moss-covered stumps [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Galerina marginata*** (Batsch) Kühner. Kh-0010, 13.9.10; Kh-0475, 22.9.10; Kh-0524, 28.9.10; Kh-2561, 13.9.10; Kh-2675, 15.9.10; Kh-3087, 1.10.10; Kh-3088, 1.10.10; Kh-3100, 2.10.10; Kh-3381, 16.6.11; Kh-4765, 12.9.14. Regularly collected, mixed predominantly coniferous forest, on stumps and fallen logs of coniferous trees, among mosses. Saprotrophic on coniferous and deciduous wood, but also on soil on non-lignicolous substrates [Knudsen and Vesterholt, 2008]. Poisonous, the species contains amatoxins [Ammirati, 1985]. ***Galerina mniophila*** (Lasch) Kühner. Kh-4809, 12.9.14. Regularly collected, transition between bog and forest, on peaty soil among *Pleurozium schreberi*. Saprotrophic, on bryophytes, *Dicranum*, *Hylocomium*, *Polytrichum* [Knudsen and Vesterholt, 2008]. Edibility unknown [Phillips, 2006]. ***Galerina paludosa*** (Fr.) Kühner. Kh-3278, 14.6.11; Kh-3291, 14.6.11. Regularly collected, bogged forests with *Sphagnum* spp. and treed bogs. Saprotrophic, on *Sphagnum*, in bogs, mires and swampy forests [Knudsen and Vesterholt, 2008]. Edibility unknown [Arora, 1985]. ***Galerina sphagnorum*** (Pers.) Kühner. Kh-2932, 19.9.10. Single collection, bogged forests with *Sphagnum* spp., also common in treed bogs. Edibility unknown. ***Galerina vittiformis*** (Fr.) Singer. Kh-1155, 13.9.09; Kh-1324, 29.8.08. Regularly collected, mixed predominantly coniferous forest, on soil among feather mosses and litter. Saprotrophic, on bryophytes, in forests, grasslands, dunes, fens [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Hebeloma helodes*** J. Favre. Kh-2848, 17.9.10. Single collection, creek valley, nearby *Salix* sp., on soil among plant litter. Mycorrhizal, on moist ground with *Salix*, *Populus* [Vesterholt, 2005]. Not edible since difficulty of identification and several *Hebeloma*'s are poisonous [Arora, 1986]. ***Hebeloma hiemale*** Bres. Kh-4780, 12.9.14. Single collection, mixed predominantly coniferous forest, on soil among moss and litter. Mycorrhizal with *Salix*, *Populus*, *Quercus* and other hosts [Vesterholt, 2005]. Not edible since difficulty of identification and several *Hebeloma*'s are poisonous [Arora, 1986]. ***Hebeloma incarnatulum*** A.H. Sm. Kh-4539, 8.9.14. Single collection, mixed predominantly coniferous forest, on soil among moss and litter, also one of commonest species in treed bogs. Mycorrhizal with *Picea* or *Pinus*, among mosses, sometimes *Sphagnum* [Vesterholt, 2005]. Not edible since difficulty of identification and several *Hebeloma*'s are poisonous [Arora, 1986]. ***Hebeloma mesophaeum*** (Pers.) Quél. Kh-2757, 16.9.10. Single collection, mixed predominantly coniferous forest, on soil among moss and litter. Mycorrhizal with coniferous or deciduous trees [Vesterholt, 2005]. Edibility unknown, best avoided [Phillips, 2006]. ***Hebeloma monticola*** Vesterh. Kh-4781, 12.9.14. Single collection, mixed predominantly coniferous forest, on soil among moss and litter. Mycorrhizal with *Salix*, *Betula* [Vesterholt, 2005]. Not edible since difficulty of identification and several *Hebeloma*'s are poisonous [Arora, 1986]. ***Hebeloma sordescens*** Vesterh. Kh-4760, 11.9.14. Single collection, mixed predominantly coniferous forest, on soil among moss and litter. Mycorrhizal with deciduous trees, on rather moist ground [Vesterholt, 2005]. Not edible since difficulty of identification and several *Hebeloma*'s are poisonous [Arora, 1986]. ***Hebeloma velutipes*** Bruchet. Kh-4735, 11.9.14, 13.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among moss and litter. Mycorrhizal with deciduous or coniferous trees [Vesterholt, 2005]. Not edible since difficulty of identification and several *Hebeloma*'s are poisonous [Arora, 1986]. ***Phaeogalera stagnina*** (Fr.) Pegler & T.W.K. Young. Kh-0403, 19.9.10. Single collection, bogged forest, among *Sphagnum* spp. Saprotrophic on *Sphagnum*, other mosses and peat, in damp areas [Knudsen and Vesterholt, 2008]. Edibility unknown. **ENTOLOMATACEAE. *Clitopilus prunulus*** (Scop.) P. Kumm. Kh-2578, 14.9.10.Single collection, mixed predominantly coniferous forest, on soil among moss and forest litter. Saprotrophic on soil, deciduous and coniferous forests and ruderal areas, often on rich soils [Knudsen and Vesterholt, 2008]. Edible, but could be confused with poisonous *Clitocybe dealbata* and therefore not recommended for the beginners [Arora, 1986; Phillips, 2006]. ***Entoloma***

cetratum (Fr.) M.M. Moser. Kh-1121, 3.10.09; Kh-2573, 13.9.10; Kh-2978, 20.9.10. Regularly collected, mixed predominantly coniferous forest, on soil among litter and mosses. Saprotrophic, coniferous forests, on forest litter and acid soil, also in peaty areas [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]. ***Entoloma conferendum*** (Britzelm.) Noordel. Kh-2568, 13.9.10. Regularly collected, mixed predominantly coniferous forest, on soil among litter and mosses. Saprotrophic, in grasslands, pastures, peat bogs, and forests, on soil [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]. ***Entoloma hebes*** (Romagn.) Trimbach. Kh-2849, 17.9.10. Single collection, spring valley, on soil among leaf litter and grasses. Saprotrophic, on humus, often in nitrogenous-rich places in deciduous forests [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]. ***Entoloma infula*** (Fr.) Noordel. Kh-2608, 14.9.10; Kh-2694, 14.9.10. Regularly collected, bogged forest, among *Sphagnum* spp. and litter. Saprotrophic, in deciduous forests, grasslands and parks [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Entoloma lanuginosipes*** Noordel. Kh-3137, 21.6.10; Kh-3326, 15.6.11. Regularly collected, mixed predominantly coniferous forest, on soil among mosses. Saprotrophic, in coniferous forests [Knudsen and Vesterholt, 2008]. Edibility unknown, but all *Entoloma*'s should be avoided, because several species are poisonous and they are difficult to recognize for a beginner [Arora, 1986]. ***Entoloma rhodopolium*** (Fr.) P. Kumm. Kh-2574, 13.9.10. Single collection, mixed predominantly coniferous forest, on decayed mossy log. Saprotrophic, in deciduous and mixed, rarely coniferous forests [Knudsen and Vesterholt, 2008]. Poisonous, causes gastric upsets [Phillips, 2006]; causing vomiting, diarrhea, that may require hospitalization [Arora, 1986]. ***Rhodocybe caelata*** (Fr.) Maire. Kh-4729, 11.9.14. Single collection, mixed predominantly coniferous forest, on soil among leaf and needle litter. Saprotrophic, in coniferous forests on sandy soil [Knudsen and Vesterholt, 2008]. Edibility unknown. **HYDNANGIACEAE.** ***Laccaria bicolor*** (Maire) P.D. Orton. Kh-4623, 9.9.14. Single collection, mixed predominantly coniferous forest, on soil among litter and mosses. Mycorrhizal and Saprotrophic, in coniferous forests on neutral to acidic soil [Knudsen and Vesterholt, 2008]. Edible but not worthwhile [Phillips, 2006]; edible and good [Arora, 1986]. ***Laccaria laccata*** (Scop.) Cooke. Kh-2641, 14.9.10; Kh-2835, 17.9.10; Kh-4758, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among litter and mosses. Edible and of good choice, especially when seasoned [Arora, 1986]. **HYGROPHORACEAE.** ***Ampulloclitocybe clavipes*** (Pers.) Redhead, Lutzoni, Moncalvo & Vilgalys. Kh-1586, 29.8.08; Kh-2617, 14.9.10; Kh-2926, 19.9.10. Regularly collected, mixed predominantly coniferous forest and its aspen secondary formations, on soil among moss and forest litter. Saprotrophic on litter in coniferous and deciduous forests, along tracks etc. [Knudsen and Vesterhold, 2008]. Not edible, unpleasant [Phillips, 2006]; or edible, but not recommended since probability of misidentification [Arora, 1986]. The species contains aldehyde dehydrogenase inhibitors [Kawagishi et al., 2002] and cause alcohol-related poisoning [Arora, 1986; Ammirati et al., 1985]. ***Hygrocybe conica*** var. ***conica*** (Schaeff.) P. Kumm. Kh-4736, 11.9.14. Single collection, mixed predominantly coniferous forest, on soil among litter and moss. Saprotrophic on soil in grasslands, lawns, deciduous forests [Knudsen and Vesterholt, 2008]. Not edible, probably poisonous or hallucinogenic [Arora, 1986]; edible according to another source [Phillips, 2006]. ***Hygrocybe insipida*** (J.E. Lange) M.M. Moser. Kh-4800, 13.9.14. Single collection, mixed predominantly coniferous forest, on soil among leaf litter. Saprotrophic, on soil in seminatural areas, and in deciduous scrubs and dunes [Knudsen and Vesterholt, 2008]. Edibility unknown, none of *Hygrocybe* species are thought to be poisonous, but they are small and bland to be of value [Arora, 1986]. ***Hygrophorus agathosmus*** (Fr.) Fr. Kh-4666, 9.9.14; Kh-4737, 11.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among litter and moss. Mycorrhizal, under conifers [Hansen, 1992]. Edible, but bland [Arora, 1986]. ***Hygrophorus*** cf. ***mesotephrus*** Berk. & Broome. Kh-4554, 8.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among litter and moss. Mycorrhizal, in deciduous forests [Hansen, 1992]. Not edible [Phillips, 2006]. ***Hygrophorus olivaceoalbus*** (Fr.) Fr. Kh-1583, 29.8.08; Kh-2928, 19.9.10; Kh-2964, 20.9.10; Kh-4694, 10.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among litter and moss. Mycorrhizal, under conifers [Hansen, 1992]. Edible, but slimy and bland [Arora, 1986]. ***Hygrophorus piceae*** Kühner. Kh-1123, 3.9.10; Kh-1584, 29.8.08; Kh-2819, 17.9.10; Kh-2938, 19.9.10; Kh-2963, 20.9.10. Regularly collected, mixed predominantly coniferous forest, on soil among litter and moss. Mycorrhizal, under conifers [Hansen, 1992]. Edible, but too slimy [Phillips, 2006; Arora, 1986]. ***Lichenomphalia umbellifera*** (L.) Redhead, Lutzoni, Moncalvo & Vilgalys. Kh-3139, 21.06.10. Regularly collected, mixed predominantly coniferous forest, on mossy trunks, also in bogs on peat. Biotrophic, lichenized, on peaty soil, decayed wood or among mosses [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006], too small to be edible [Arora, 1986]. **INC. SED.** ***Plicaturopsis crispa*** (Pers.) D.A. Reid. Kh-4937, 16.9.10; Kh-4749, 11.9.14. Regularly collected, mixed predominantly coniferous forest, on fallen branches of *Betula* sp. Saprotrophic, on trunks, branches of deciduous trees [Knudsen and Vesterholt, 2008]. Edibility unknown, but too small to be of value. **INOCYBACEAE.** ***Crepidotus applanatus*** (Pers.) P. Kumm. Kh-1596, 29.8.08. Single collection, mixed predominantly coniferous forest, on fallen aspen (*P. tremula*) log. Saprotrophic on very rotted deciduous and coniferous wood [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006], worthless as food [Arora, 1986]. ***Crepidotus mollis*** (Schaeff.) Staude. Kh-3131, 13.6.10. Single collection, mixed predominantly coniferous forest, on fallen aspen (*P. tremula*) log. Saprotrophic on coarse wood, sometimes on living trees [Knudsen and Vesterholt, 2008]. Edibility unknown, worthless as food [Phillips, 2006; Arora, 1986]. ***Crepidotus versutus*** Peck. Kh-1115, 3.9.10; Kh-2867, 17.9.10; Kh-2986, 20.9.10. Regularly collected, mixed predominantly coniferous forest, on birch wood or on soil mixed with wood chips. Saprotrophic on deciduous wood of *Betula*, *Alnus*, also on debris and naked soil [Knudsen and Vesterholt, 2008]. Edibility unknown or worthless as food [Phillips, 2006; Arora, 1986]. ***Flammulaster carpophilus*** (Fr.) Earle ex Vellinga. Kh-2976, 20.9.10; Kh-3268, 13.6.11; Kh-3325, 15.6.11; Kh-4702, 10.9.14. Regularly collected, mixed predominantly coniferous forest, on leaf litter. Saprotrophic on leaf litter [Knudsen and Vesterholt, 2008]. Not edible ([Phillips, 2006], about *F. granulosus*). ***Flammulaster muricatus*** (Fr.) Watling. Kh-4739, 11.9.14. Single collection, mixed predominantly coniferous forest, on fallen branches of *Populus tremula*. Saprotrophic on deciduous wood [Knudsen and Vesterholt, 2008]. Not edible ([Phillips, 2006], about *F. granulosus*). ***Flammulaster rhombosporus*** (G.F. Atk.) Watling. Kh-2613, 14.9.10. Single collection, bogged forest with birch, on leaf litter among *Sphagnum* spp. Saprotrophic on deciduous leaves and twigs, in damp habitats, also on leaves of *Carex* [Knudsen and Vesterholt, 2008]. Not edible ([Phillips, 2006], about *F. granulosus*). ***Inocybe geophylla*** (Bull.) P. Kumm. Kh-0132, 14.9.10;

Kh-0464, 22.9.10; Kh-4538, 8.9.14; Kh-4767, 12.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among litter and mosses. Saprotrophic on nutrient-rich soil, in deciduous and coniferous forests, in lawns or on roadsides [Knudsen and Vesterholt, 2008]. Poisonous, contains muscarine [Arora, 1986; Phillips, 2006]. ***Inocybe lanuginosa*** (Bull.) P. Kumm. Kh-4595, 8.9.14. Single collection, mixed predominantly coniferous forest, on soil among litter and mosses. Saprotrophic on soil in coniferous and deciduous forests, sometimes on rotten wood [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]; edibility unknown but no recommended since many of the *Inocybe* spp. are poisonous, the genus probably contains the largest percentage of poisonous fungi among macromycetes [Arora, 1986]. ***Phaeomarasmius erinaceus*** (Fr.) Scherff. ex Romagn. Kh-1138, 25.7.09. Single collection, mixed predominantly coniferous forest, on wood. Saprotrophic on branches of deciduous trees [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Simocybe centunculus*** (Fr.) P. Karst. Kh-1603, 15.7.08; Kh-1813, 18.7.08. Regularly collected, mixed predominantly coniferous forest, on birch wood. Saprotrophic on deciduous wood, rarely on *Pinus* [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]. **LYOPHYLLACEAE.** ***Asterophora lycoperdoides*** (Bull.) Ditmar. Kh-0460, 20.8.10. Single collection, mixed predominantly coniferous forest, on old basidiomas of *Russula acrifolia*. Parasitic on fruitbodies of *Russula* [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006] or edibility unknown (different Internet sources). ***Hypsizygus ulmarius*** (Bull.) Redhead. Kh-2604, 14.9.10; Kh-4616, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on fallen aspen log. Parasitic or Saprotrophic on deciduous trees (*Betula*, *Populus*, *Ulmus*) [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Lyophyllum fumosum*** (Pers.) P.D. Orton. Kh-4530, 7.9.14. Single collection, mixed predominantly coniferous forest, on old mossy stump. Saprotrophic, in deciduous and coniferous forests and parks [Knudsen and Vesterholt, 2008]. Edible, good [Phillips, 2006]; confusion with some poisonous species (e.g. *Clitocybe dilatata*) is possible and some varieties could cause mild poisoning [Arora, 1986]. ***Ossicaulis lignatilis*** (Pers.) Redhead & Ginns. Kh-4622, 9.9.14. Single collection, mixed predominantly coniferous forest, on fallen trunk of *Populus tremula*. Saprotrophic on deciduous (*Betula*, *Fagus*, *Populus*), rarely coniferous (*Picea*) wood [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Tephrocybe rancida*** (Fr.) Donk. Kh-2614, 14.9.10; Kh-2712, 16.9.10; Kh-2737, 16.9.10; 4576, 8.9.14. Regularly collected, mixed predominantly coniferous forest, on forest litter. Saprotrophic on soil, in coniferous and deciduous forests [Knudsen and Vesterholt, 2008]. Not edible due to rancid taste [Phillips, 2006]. **MARASMIACEAE.** ***Marasmius epiphyllus*** (Pers.) Fr. Kh-0082, 14.9.10; Kh-2239, 21.8.10; Kh-2713, 16.9.10; Kh-2838, 17.9.10; Kh-4798, 13.9.14. Regularly collected, mixed forest, on leaf (*Populus tremula*) and mixed litter. Saprotrophic on leaf litter of *Populus* and *Fraxinus* and on mixed litter [Knudsen and Vesterholt, 2008]. Not edible, too small [Phillips, 2006]. ***Marasmius siccus*** (Schwein.) Fr. Kh-2842, 17.9.10; Kh-4703, 10.9.14. Regularly collected, mixed forest, on leaf (*Populus tremula*) and mixed litter. Saprotrophic on litter in deciduous forests [Knudsen and Vesterholt, 2008]. Edibility unknown [Phillips, 2006]. ***Marasmius wynneae*** Berk. & Broome. Kh-1145, 13.8.09; Kh-2791, 17.9.10; Kh-2944, 19.9.10; Kh-3132, 13.6.10; Kh-3324, 15.6.11. Regularly collected, mixed predominantly coniferous forest, on rotten trunks and logs. Saprotrophic on rich or calcareous soil [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]. ***Mycena citrinomarginata*** Gillet. Kh-4751, 11.9.14. Single collection, mixed predominantly coniferous forest, on litter. Saprotrophic on debris and humus in meadows and forests [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Mycena epipterygia*** (Scop.) Gray. Kh-1142, 13.8.09; Kh-1144, 13.8.09; Kh-1331, 18.7.08; Kh-4574, 8.9.14. Regularly collected, mixed predominantly coniferous forest, on mossy wood and on litter. Saprotrophic on wood and litter [Knudsen and Vesterholt, 2008]. Edible, but not worthwhile [Phillips, 2006]; edibility unknown [Arora, 1986]. ***Mycena galericulata*** (Scop.) Gray. Kh-4792, 12.9.14. Single collection, mixed predominantly coniferous forest, on wood of a deciduous tree. Saprotrophic on wood [Knudsen and Vesterholt, 2008]. Edible, but not worthwhile [Phillips, 2006]; not recommended since possibility of misidentification and many of close species have not been tested [Arora, 1986]. ***Mycena haematopus*** (Pers.) P. Kumm. Kh-0463, 19.8.10; Kh-1147, 13.8.09; Kh-2671, 15.9.10; Kh-2721, 16.9.10; Kh-2738, 16.9.10; Kh-4788, 12.9.14. Regularly collected, mixed predominantly coniferous forest, on mossy wood and on litter. Saprotrophic on wood [Knudsen and Vesterholt, 2008]. Edible [Phillips, 2006]; too small to be of value [Arora, 1986]. ***Mycena laevigata*** (Lasch) Gillet. Kh-4635, 9.9.14. Single collection, mixed predominantly coniferous forest, on litter among feather mosses. Saprotrophic, on decaying large conifer trunks [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Mycena leptocephala*** (Pers.) Gillet. Kh-4785, 9.9.14. Single collection, mixed predominantly coniferous forest, among needle and leaf litter. Saprotrophic, on litter and soil or on trunks, in forests and other landscapes [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Mycena megaspora*** Kauffman. Kh-0009, 13.9.10; Kh-2633, 14.9.10; Kh-2770, 16.9.10. Regularly collected, bogged forest, on litter among *Sphagnum* spp., also in bogs. Saprotrophic on soil, *Sphagnum*, in forests, heathlands and on burnt sites [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]. ***Mycena polygramma*** (Bull.: Fr.) Gray. Kh-4750, 11.9.14. Single collection, mixed forest, among leaf litter. Saprotrophic, on woody debris of broad leaved trees. Not edible [Phillips, 2006]. ***Mycena pura*** (Pers.) P. Kumm. Kh-1146, 13.8.09; Kh-2618, 14.9.10; Kh-2883, 18.9.10; Kh-3110, 2.10.10; Kh-4556, 8.9.14. Regularly collected, mixed predominantly coniferous forest, on litter. Saprotrophic on litter, in forests and in open areas [Knudsen and Vesterholt, 2008]. Edible [Phillips, 2006]; according to some sources contains muscarine and not recommended [Arora, 1986]. ***Mycena speirea*** (Fr.) Gillet. Kh-1325, 29.8.08. Single collection, mixed predominantly coniferous forest, on litter. Saprotrophic on woody debris, also on bark [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]. ***Panellus stipticus*** (Bull.) P. Karst. Kh-2698, 14.9.10; Kh-3308, 14.6.11; Kh-4614, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on birch wood. Saprotrophic on deciduous wood, often on cut surfaces [Knudsen and Vesterholt, 2008]. Not edible, used as styptic to coagulate blood [Phillips, 2006]. ***Sarcomyxa serotina*** (Pers.) P. Karst. Kh-2697, 14.9.10. Single collection, mixed predominantly coniferous forest, on birch wood. Saprotrophic on deciduous wood: *Fagus*, *Quercus*, *Betula*, *Alnus*, rarely on conifers [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Xeromphalina campanella*** (Batsch) Kühner & Maire. Kh-2673, 15.9.10; Kh-2768, 16.9.10; Kh-3140, 21.6.10; Kh-3142, 21.6.10; Kh-3267, 13.6.11; Kh-4690, 10.9.14. Regularly collected, mixed predominantly coniferous forest, on mixed litter or wood. Saprotrophic on coniferous wood, rare on deciduous [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]. ***Xeromphalina picta*** A.H.Sm. Kh-4575, 8.9.14. Single collection, mixed predominantly coniferous forest, on mossy trunk among *Peltigera* and

liverworts. Saprotrophic on woody debris or coniferous and hardwood trees [Knudsen and Vesterholt, 2008]. Edibility unknown. **OMPHALOTACEAE.** ***Gymnopus*** cf. ***alpinus*** (Vilgalys & O.K. Mill.) Antonín & Noordel. (additional collection and detailed work on identification required in future, here and with other previously identified *Gymnopus* cf. spp.). Kh-4465, 15.6.14. Regularly collected, among *Sphagnum fuscum* or on mixed litter laying among *Sphagnum*, in treed bogs. Saprotrophic, on humus and coarse litter in coniferous forests, heathlands and acid ericaceous heathlands [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Gymnopus androsaceus*** (L.) J.L. Mata & R.H. Petersen. Kh-3274, 14.6.11. Regularly collected, mixed predominantly coniferous forest, on needle and mixed litter, also in treed bogs on different litter. Saprotrophic on litter (sticks, needles, leaves of grasses and sedges) in oligotrophic localities [Knudsen and Vesterholt, 2008]. Not edible, too small [Phillips, 2006]. ***Gymnopus confluens*** (Pers.) Antonín, Halling & Noordel. Kh-4805, 13.9.14. Single collection, mixed predominantly coniferous forest, on soil among forest litter. Saprotrophic on leaf litter, deciduous and coniferous forests [Knudsen and Vesterholt, 2008]. Edible, but not recommended since close morphologically species were not tested [Phillips, 2006; Arora, 1986]. ***Gymnopus foetidus*** (Sowerby) P.M. Kirk. Kh-4686, 10.9.14. Single collection, mixed predominantly coniferous forest, among forest litter. Saprotrophic on deciduous wood or on rich clay or calcareous soil [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]. ***Gymnopus*** cf. ***moseri*** Antonín & Noordel. Kh-4934, 13.9.14. Single collection, mixed predominantly deciduous forest, among forest litter. Saprotrophic, on humus in deciduous forests [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Gymnopus*** cf. ***peronatus*** (Bolton) Gray. Kh-4719, 10.9.14. Single collection, mixed predominantly coniferous forest, among forest litter. Saprotrophic, on deciduous or coniferous leaf litter [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Gymnopus*** cf. ***putillus*** (Fr.) Antonín, Halling & Noordel. Kh-4935, 24.8.13. Single collection, on mixed litter laying among *Sphagnum* spp., in treed bogs. Saprotrophic, on litter in coniferous, especially *Pinus* forests [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Mycetinis scorodonius*** (Fr.) A.W. Wilson & Desjardin. Kh-1582, 15.7.08. Single collection, mixed predominantly coniferous forest, on litter. Saprotrophic on debris and sticks, in heathlands, dunes, dry grasslands, in clearings in forests [Knudsen and Vesterholt, 2008]. Edible [Phillips, 2006]. ***Rhodocollybia butyracea*** (Bull.) Lennox. Kh-2615, 14.9.10; Kh-2708, 16.9.10; Kh-2807, 17.9.10; Kh-3012, 22.9.10; Kh-4547, 8.9.14; Kh-4740, 11.9.14; Kh-4741, 11.9.14; Kh-4791, 12.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among moss and litter. Saprotrophic on soil and litter in deciduous and coniferous forests [Knudsen and Vesterholt, 2008]. Edible, but not good [Phillips, 2006]; edible but should not be mistaken with *Collybia dryophila* to which some people are sensitive [Arora, 1986]. ***Rhodocollybia maculata*** (Alb. & Schwein.) Singer. Kh-1128, 3.10.09; Kh-4740, 11.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among moss and litter. Saprotrophic, on raw humus in deciduous and coniferous forests, in heathlands on sandy soil [Knudsen and Vesterholt, 2008]. Not edible, due to tough consistence and bitter taste [Phillips, 2006; Arora, 1986]. **PHYSALACRIACEAE.** ***Armillaria cepistipes*** Velen. Kh-2888, 18.9.10; Kh-4572, 8.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among mosses and forest litter, probably on submerged wood. Saprotrophic on coniferous and deciduous wood, in forests [Knudsen and Vesterholt, 2008]. Edible, but may cause stomach upsets if consumed in large quantities [Phillips, 2006]. ***Armillaria borealis*** Marxm. & Korhonen. Kh-0041, 13.9.10. Singular collection, mixed predominantly coniferous forest, on fallen log and trunks of *Populus tremula*. Saprotrophic on coniferous and deciduous wood, in forests [Knudsen and Vesterholt, 2008]. Edible, can cause gastrointestinal upsets when under-cooked, some strains could be more toxic than others, probably relating to the tree host on which fruitbodies grow [Ammirati et al., 1985; Arora, 1985]. ***Flammulina velutipes*** (Curtis) Singer. Kh-1765, 12.7.09; Kh-2601, 14.9.10; Kh-4590, 8.9.14; Kh-2601, 14.9.10; Kh-4642, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on stumps and fallen logs of aspen (*P. tremula*), birch (*B. pubescens*). Saprotrophic on deciduous (rarely coniferous) wood, or on living trees [Knudsen and Vesterholt, 2008]. Edible, the sticky cover of the cap should be removed before cooking [Arora, 1986]. ***Strobilurus esculentus*** (Wulfen) Singer. Kh-1697, 16.5.09; Kh-2774, 16.9.10; Kh-3039, 23.9.10. Regularly collected, mixed predominantly coniferous forest with pine, on cones of *P. sylvestris*. Saprotrophic on buried *Pine* cones [Knudsen and Vesterholt, 2008]. Not edible, too small [Phillips, 2006]. **PLEUROTACEAE.** ***Pleurotus calyptratus*** (Lindblad ex Fr.) Sacc. Kh-1789, 11.6.08. Single collection, mixed predominantly coniferous forest, on standing trunk of *Populus tremula*. Saprotrophic or weakly parasitic on living and dead aspen (*P. tremula*, *P. alba*) [Knudsen and Vesterholt, 2008]. Edible, but tough. ***Pleurotus dryinus*** (Pers.) P. Kumm. Kh-2812, 17.7.10. Single collection, mixed predominantly coniferous forest, on birch wood. Saprotrophic or weakly parasitic on living and dead deciduous (rarely coniferous) trees [Knudsen and Vesterholt, 2008]. Edible, but rather tough [Arora,1986]. ***Pleurotus ostreatus*** (Jacq.) P. Kumm. Kh-4647, 9.9.14. Single collection, mixed predominantly coniferous forest, on fallen trunk of *Populus tremula*. Saprotrophic or weakly parasitic on living and dead deciduous (rarely coniferous) trees [Knudsen and Vesterholt, 2008]. Edible [Phillips, 2006]. ***Pleurotus pulmonarius*** (Fr.) Quél. Kh-1611, 18.7.08; Kh-1137, 20.7.09. Regularly collected, mixed predominantly coniferous forest, on wood of *P. tremula*, *B. pubescens*, fallen trunks. Saprotrophic or weakly parasitic on living and dead deciduous trees [Knudsen and Vesterholt, 2008]. Edible, popular in cultivation [Phillips, 2006]. **PLUTEACEAE.** ***Pluteus hongoi*** Singer. Kh-0117, 15.9.10 (=LE 289403); Kh-0231, 17.9.10 (=LE 289415); Kh-4733, 11.9.14. Regular collections, mixed predominantly coniferous forest, on decayed wood. Saprotrophic, on well decayed deciduous wood or on humus [Justo et al., 2014]. Edibility unknown. ***Pluteus leoninus*** (Schaeff.) P. Kumm. Kh-4636, 9.9.14. Single collection, mixed forest, on decayed wood of *Betula* sp. Saprotrophic, on rotten deciduous wood or woodchips [Knudsen and Vesterholt, 2008]. Edibility unknown [Phillips, 2006]. ***Pluteus leucoborealis*** Justo, E.F. Malysheva, Bulyonkova & Minnis. Kh-1132, 25.7.09 (=LE 289408). Single collection, mixed predominantly coniferous forest, on laying log of *Betula* sp. Edibility unknown. ***Pluteus phlebophorus*** (Ditmar) P. Kumm. Kh-4641, 9.9.14. Single collection, mixed forest, on decayed wood of *Betula* sp. Saprotrophic, on decayed wood of *Betula*, more rarely *Alnus* [Justo et al., 2014]. Not edible [Phillips, 2006]. ***Pluteus plautus*** (Weinm.) Gillet. Kh-4797, 13.9.14. Single collection, mixed forest, on decayed wood of *Populus tremula*. Saprotrophic, on deciduous or coniferous wood [Knudsen and Vesterholt, 2008]. Edibility unknown [Phillips, 2006]. ***Pluteus rangifer*** Justo, E.F. Malysheva & Bulyonkova. Kh-0349, 18.9.10 (=LE 289406); Kh-4597, 8.9.14. Regular collections, on decayed wood. Saprotrophic,

on well-decayed deciduous wood [Justo et al., 2014]. Edibility unknown. ***Pluteus romellii*** (Britzelm.) Sacc. Kh-4546, 8.9.14; Kh-0128, 15.9.10; Kh-0384, 19.9.10. Regular collections, mixed forest, on decayed wood of *Populus tremula*. Saprotrophic, on deciduous wood, wood chips and sawdust [Knudsen and Vesterholt, 2008]. Edible [Phillips, 2006]. ***Pluteus umbrosus*** (Pers.) P. Kumm. Kh-4655, 9.9.14; Kh-0039, 13.9.10. Regular collections, mixed forest, on decayed wood of *Betula* sp. Saprotrophic, on rotten wood of deciduous treed [Knudsen and Vesterholt, 2008]. Edible [Phillips, 2006]. **PSATHYRELLACEAE.** ***Coprinellus angulatus*** (Peck) Redhead, Vilgalys & Moncalvo. Kh-3400, 17.6.11. Single collection, disturbed vegetation near the field station house, on soil among moss near the trunk. Saprotrophic on burnt ground or burnt wood [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Coprinellus domesticus*** (Bolton) Vilgalys, Hopple & Jacq. Johnson. Kh-3370, 16.6.11; Kh-4811, 13.9.14. Regularly collected, on burnt soil, after-fire forest community in floodplain near Baybalak channel, and on disturbed site near the station house. Saprotrophic, on and around the trunks of deciduous trees, less common on soil with wood debris [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006], some authors consider it edible and good but not recommended due to possible misidentification [Arora, 1986]. ***Coprinellus micaceus*** (Bull.) Vilgalys, Hopple & Jacq. Johnson. Kh-4725, 11.9.14. Single collection, mixed predominantly coniferous forest, near the base of birch trunk, among forest litter. Saprotrophic on deciduous wood [Knudsen and Vesterholt, 2008]. Edible, but thin-fleshed and watery [Arora, 1986], do not contain coprine (absence of alcohol-related reactions) [Ammirati, 1985]. ***Coprinellus xanthothrix*** (Romagn.) Vilgalys, Hopple & Jacq. Johnson. Kh-3399, 16.6.11. Single collection, on burnt soil, after-fire forest community in floodplain near Baybalak channel. Saprotrophic, on branches of deciduous trees [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Coprinopsis atramentaria*** (Bull.) Redhead, Vilgalys & Moncalvo. Kh-2837, 17.9.10. Single collection, floodplain vegetation in stream valley, on bare soil covered by mosses and on grass litter. Saprotrophic on wood [Knudsen and Vesterholt, 2008]. Edible but causing alcohol-related reactions when consumed with alcohol (palpitations, nausea) [Phillips, 2006; Ammirati, 1985; Arora, 1986], also used for ink preparation [Phillips, 2006]. ***Coprinopsis lagopus*** (Fr.) Redhead, Vilgalys & Moncalvo. Kh-0183, 16.9.10. Single collection, slope to the spring valley, mixed forest, on soil and forest litter. Saprotrophic on soil, wood chips, in compost or rarely on burnt ground [Knudsen and Vesterholt, 2008]. Edible but not worthy (thin-fleshed, flavorless) [Arora, 1986; Phillips, 2006]. ***Lacrymaria glareosa*** (J. Favre) Watling. Kh-0510, 26.9.10. Single collection, disturbed location near the station house, on soil among litter and mosses. Saprotrophic on soil in open areas, rarely in forests [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Lacrymaria lacrymabunda*** (Bull.) Pat. Kh-2905, 18.9.10. Single collection, on the slope to the spring valley, mixed predominantly coniferous forest, on soil among litter and mosses. Saprotrophic on soil in deciduous forests, along roads, in gardens [Knudsen and Vesterholt, 2008]. Edible but bitter [Phillips, 2006], edible but not recommended [Arora, 1986]. ***Psathyrella ammophila*** (Durieu & Lév.) P.D. Orton. Kh-1758, 17.6.08. Single collection, bank of Baybalak channel, floodplain vegetation, on bare sandy soil. Saprotrophic on soil, in sand dunes [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Psathyrella cernua*** (Vahl) G. Hirsch. Kh-3116, 2.10.10. Single collection, mixed predominantly coniferous forest, on mossy trunk. Saprotrophic, on or around stumps or bases of living deciduous trees [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Psathyrella gossypina*** (Bull.) A. Pearson & Dennis. Kh-3380, 16.6.11. Single collection, mixed predominantly coniferous forest, on soil among litter. Saprotrophic, on logs, twigs, wood chips and fireplaces, in coniferous and deciduous forests [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Psathyrella multipedata*** (Peck) A.H. Sm. Kh-2572, 13.9.10; Kh-4728, 11.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among different litter. Saprotrophic on wood, often buried in soil, deciduous and coniferous [Knudsen and Vesterholt, 2008]. Edibility unknown [Phillips, 2006]. ***Psathyrella pennata*** (Fr.) A. Pearson & Dennis. Kh-3379, 16.6.11; Kh-4810, 13.9.14. Regularly collected, after-fired floodplain mixed forest, at the bank of Baybalak channel, and near the house on disturbed partly burnt site, on burnt soil and litter. Saprotrophic on burnt soil, in coniferous and deciduous forests [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Psathyrella pygmaea*** (Bull.) Singer. Kh-2900, 18.9.10. Regularly collected, mixed predominantly coniferous forest, on soil among litter. Saprotrophic on deciduous wood, stumps or twigs or directly on soil [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Psathyrella squamosa*** (P. Karst.) A.H. Sm. Kh-2749, 16.9.10; Kh-4570, 8.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among moss litter. Saprotrophic, on rich soil and rotten wood in deciduous forests [Knudsen and Vesterholt, 2008]. Edibility unknown. **SCHIZOPHYLLACEAE.** ***Schizophyllum amplum*** (Lév.) Nakasone. Kh-1794, 13.6.08; Kh-3272, 14.6.11. Regularly collected, mixed predominantly coniferous forest, on fallen aspen branches. Saprotrophic, on deciduous wood, mainly on *Populus* spp. [Knudsen and Vesterholt, 2008]. Edibility unknown, too small to be of value. **STROPHARIACEAE.** ***Agrocybe praecox*** (Pers.) Fayod (s.l., the species reported to be a complex of four biological species [Knudsen and Vesterholt, 2008]). Kh-3395, 17.6.11. Single collection, on cleared place near the house, on soil among wood chips. Saprotrophic on soil and wood chips in deciduous woods, gardens [Knudsen and Vesterhold, 2008]. Edible, but poor quality [Phillips, 2006]. ***Gymnopilus penetrans*** (Fr.) Murrill. Kh-1605, 15.7.08; Kh-1549, 18.7.08; Kh-4583, 8.9.14. Regularly collected, mixed predominantly coniferous forest, on coniferous stumps and logs. Saprotrophic on coniferous, less often on deciduous wood [Knudsen and Vesterholt, 2008]. Edibility unknown, some other species of the genus are hallucinogenic [Arora,1986]. ***Hemipholiota populnea*** (Pers.) Bon. Kh-2627, 14.9.10; Kh-4608, 8.9.14, 13.9.14. Single collections, mixed predominantly coniferous forest, on aspen (*P. tremula*) trunk. Parasitic on living or Saprotrophic on recently fallen wood of *Populus* species [Knudsen and Vesterholt, 2008]. Edible, but tough and poorly-flavored [Arora, 1986], for *Pholiota destruens*. ***Hypholoma capnoides*** (Fr.) P. Kumm. Kh-0500, 25.9.10; Kh-1587, 29.8.08; Kh-1793, 4.6.08; Kh-2731, 16.9.10; Kh-2777, 17.9.10; Kh-3020, 22.9.10; Kh-3122, 12.6.10; Kh-3141, 21.6.10; Kh-4607, 8.9.14. Regularly collected, mixed predominantly coniferous forest, on fallen logs and stumps. Saprotrophic on wood of *Pinus*, *Picea* [Knudsen and Vesterholt, 2008]. Edible, but not particularly tasty and thin-fleshed [Arora, 1986]. ***Hypholoma elongatum*** (Pers.) Ricken. Kh-2153, 9.9.10; Kh-2154, 9.9.10; Kh-2920, 19.9.10; Kh-2690, 14.9.10; Kh-2826, 16.9.10. Regularly collected, bogged forests, among *Sphagnum* spp., also in bogs. Saprotrophic on *Sphagnum* and other mosses or on peaty soil [Knudsen and Vesterholt, 2008]. Edibility unknown [Phillips, 2006]. ***Hypholoma ericaeoides*** P.D. Orton. Kh-2569, 13.9.10. Single collection, birch forest in spring valley, on soil among grass and herb litter. Saprotrophic, on sandy or peaty soil, in forests and

grasslands [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Hypholoma fasciculare*** (Huds.) P. Kumm. Kh-2650, 15.9.10; Kh-3377, 16.6.11; Kh-4789, 12.9.14. Regularly collected, mixed predominantly coniferous forest, on fallen logs and stumps. Saprotrophic on deciduous, rarely on coniferous wood [Knudsen and Vesterholt, 2008]. Poisonous, causing gastric upsets or even death [Arora, 1986]. ***Hypholoma myosotis*** (Fr.) M. Lange. Kh-2825, 16.9.10. Regularly collected, bogged forests, among *Sphagnum* spp., also in transitional bogs. Saprotrophic on *Sphagnum* or peaty soil, in bogs, acid grasslands and woodlands [Knudsen and Vesterholt, 2008]. Edibility unknown [Phillips, 2006]. ***Hypholoma udum*** (Pers.) Quél. Kh-0926, 11.8.09; Kh-0970, 28.8.09. Regularly collected, bogged forests, among *Sphagnum* spp., also in bogs. Saprotrophic on peaty soil, rarely in *Sphagnum* [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Kuehneromyces lignicola*** (Peck) Redhead. Kh-1770, 12.7.09. Single collection, mixed predominantly coniferous forest, on mossy fallen log. Saprotrophic, on old logs and stumps of conifers [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Kuehneromyces mutabilis*** (Schaeff.) Singer & A.H. Sm. Kh-1566, 18.7.08; Kh-2556, 13.9.10; Kh-2710, 16.9.10; Kh-3121, 12.6.10. Regularly collected, mixed predominantly coniferous forest, on fallen logs and trunks of *Populus tremula*. Saprotrophic on deciduous, rarely coniferous wood [Knudsen and Vesterholt, 2008]. Edible, good [Phillips, 2006]; not recommended for the beginners as could be confused with *Galerina marginatum* (deadly poisonous) [Arora, 1986]. ***Pholiota alnicola*** (Fr.) Singer. Kh-0006, 13.9.10; Kh-1124, 26.9.10; Kh-2739, 16.9.10; Kh-2800, 17.9.10; Kh-4620, 9.9.14. Regularly collected, mixed forest, on birch and aspen wood. Saprotrophic on deciduous (exceptionally coniferous) wood, sometimes on living trees [Knudsen and Vesterholt, 2008]. Edible but not worthwhile [Phillips, 2006]. ***Pholiota astragalina*** (Fr.) Singer. Kh-1344, 6.8.08. Single collections, mixed predominantly coniferous forest, on fallen trunk. Saprotrophic, on decayed wood of conifers [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]; inedible because of the bitter taste [Arora, 1986]. ***Pholiota cerifera*** (P. Karst.) P. Karst. Kh-4936, 24.8.07. Single collection, floodplain of Irtysh river, nearby Baybalak channel, on standing dead trunk of *Salix* sp. Saprotrophic, on living or dead wood, often on banks of rivers and lakes [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]; said to be edible by some people but not recommended as could cause gastric upsets [Arora, 1986]. ***Pholiota conissans*** (Fr.) M.M. Moser. Kh-3095, 1.10.10. Single collection, floodplain vegetation, among *Salix* spp. and weed vegetation, on soil. Saprotrophic, on decaying wood of *Salix* or roots of graminoids, in wetlands [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Pholiota flammans*** (Batsch) P. Kumm. Kh-4619, 9.9.14. Single collection, mixed predominantly coniferous forest, on wood of fallen trunk. Saprotrophic, on coniferous, sometimes deciduous wood [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]; said to be edible by some people but not recommended as could cause gastric upsets [Arora, 1986]. ***Pholiota highlandensis*** (Peck) Singer. Kh-2999, 20.9.10; Kh-3383, 16.6.11. Regularly collected, after-fire forest in floodplain, bank of Baybalak channel, on soil mixed with charcoal and litter. Saprotrophic on burnt wood and soil, usually less than 3 years after fire [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]. ***Pholiota limonella*** (Peck) Sacc. Kh-3117, 2.10.10; Kh-4631, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on birch wood. Saprotrophic on deciduous (rarely coniferous) wood [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Pholiota lubrica*** (Pers.) Singer. Kh-2624, 14.9.10; Kh-2722, 16.9.10; Kh-2940, 19.9.10; Kh-4579, 8.9.14; Kh-4716, 10.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among litter. Saprotrophic on deciduous and coniferous wood [Knudsen and Vesterholt, 2008]. Edibility unknown [Arora, 1986]. ***Pholiota*** cf. ***mixta*** (Fr.) Kuyper & Tjall.-Beuk. Kh-2688, 14.9.10. Single collection, bogged forest at the edge of bog, on soil among *Sphagnum* sp. Saprotrophic, on sandy and acid soils, in coniferous or mixed forests [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Pholiota squarrosa*** (Vahl) P. Kumm. Kh-0110, 14.9.10; Kh-1815,18.7.08; Kh-2877, 18.9.10; Kh-4578, 8.9.14; Kh-4589, 8.9.14. Regularly collected, mixed predominantly coniferous forest, on aspen and birch wood. Saprotrophic on deciduous wood (but also on *Picea*), on living or recently dead trees [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]; not recommended, cause severe stomach upsets in some people [Arora, 1986]. ***Psilocybe rhombispora*** (Britzelm.) Sacc. Kh-3280, 14.6.11; Kh-3396, 17.6.11. Regularly collected, in spring valley and in disturbed location near the house, on soil among litter. Saprotrophic on deciduous and coniferous wood, on wood remnants including sawdust, or on dump ground [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Stropharia caerulea*** Kreisel. Kh-3023, 22.9.10. Single collection, mixed predominantly coniferous forest, on soil among moss and litter. Saprotrophic on litter in forests, on rotten wood, on soil in pastures, in gardens on compost [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]. ***Stropharia hornemannii*** (Fr.) S. Lundell & Nannf. Kh-1122, 3.9.10; Kh-2896, 18.9.10. Regularly collected, mixed predominantly coniferous forest, on soil among moss and litter. Saprotrophic on litter, on wood, in mossy coniferous forests [Knudsen and Vesterholt, 2008]. Not edible, possibly poisonous [Phillips, 2006; Arora, 1986]. **TRICHOLOMATACEAE.** ***Arrhenia discorosea*** (Pilát) Zvyagina, Alexandrova & Bulyonkova. Kh-1564, 18.7.08; Kh-2593, 13.9.10. Regularly collected, mixed predominantly coniferous forest, on wood of *Populus tremula*. Saprotrophic on wood. Edibility unknown. ***Arrhenia epichysium*** (Pers.) Redhead, Lutzoni, Moncalvo & Vilgalys. Kh-2899, 18.9.10. Single collection, mixed predominantly coniferous forest, on forest litter. Saprotrophic on coniferous wood, strongly decayed stumps and logs, in forests [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Cantharellula umbonata***(J.F. Gmel.) Singer. Kh-2824, 16.9.10; Kh-2937, 19.9.10; Kh-3929, 1.9.12; Kh-4503, 9.8.14. Regularly collected, mixed predominantly coniferous forest and treed raised bogs (rarely), on soil among moss, forest litter and among *Sphagnum* spp. Saprotrophic on litter among mosses, in coniferous forests and heathlands [Knudsen and Vesterholt, 2008]. Edibility unknown [Phillips, 2006]. ***Clitocybe nebularis*** (Batsch) P. Kumm. Kh-2634, 14.9.10; Kh-2808, 17.9.10; Kh-4730, 11.9.14. Regularly collected and growing in large aggregations, in mixed predominantly coniferous forest, on soil among moss and forest litter. Saprotrophic on soil in deciduous and coniferous forests, and ruderal areas [Knudsen and Vesterholt, 2008]. Edible, but known to cause gastric upsets in many people [Phillips, 2006], poor quality and needs to be thoroughly cooked [Arora, 1986]. ***Collybia cirrhata*** (Schumach.) Quél. Kh-3794, 21.8.12; Kh-3863, 25.8.12; Kh-4415, 5.9.14. Regularly collected, in forests and in treed bogs, on old basidioma of Agaricales. Saprotrophic (probably parasitic) on mummified remnants of mushrooms, in various vegetation types but common in open, nutrient poor areas [Knudsen and Vesterholt, 2008]. Not edible due to its small size ([Arora, 1986], for *C. tuberosa*). ***Collybia cookei*** (Bres.) J.D. Arnold. Kh-4548, 8.9.14. Single collection, mixed predominantly coniferous forest, on old basidioma of

Agaricales. Not edible due to its small size ([Arora, 1986] for *C. tuberosa*]). ***Melanoleuca friesii*** (Bres.) Bon. Kh-4755, 11.9.14. Single collection, transition between forest and spring valley, birch forest, on soil near the sedge tussock. Saprotrophic, on soil in open places in forests, also in dry grassland and dunes [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Melanoleuca strictipes*** (P. Karst.) Jul. Schäff. Kh-1565, 18.7.08. Single collection, mixed predominantly coniferous forest, on litter. Saprotrophic on soil and litter in grasslands, deciduous and mixed forests, gardens [Knudsen and Vesterholt, 2008]. Edible, but to rare to pick [Phillips, 2006]. ***Myxomphalia maura*** (Fr.) H.E. Bigelow. Kh-4812, 13.9.14. Single collection, disturbed location near the station house, on soil among herbs, probably previously burned. Saprotrophic on soil, usually on burn sites, also in wet places [Knudsen and Vesterholt, 2008]. Edibility unknown [Arora, 1986; Phillips, 2006]. ***Omphalina pyxidata*** (Bull.) Quél. Kh-2584, 13.9.10. Single collection, bank of Irtysh channel, on sandy soil covered by feather mosses among *Salix* sp. thickets. Saprotrophic on soil, in dry sandy habitats or along running water on calcareous soil [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Pseudoclitocybe cyathiformis*** (Bull.) Singer. Kh-2554, 13.9.10; Kh-2611, 14.9.10; Kh-4796, 13.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among moss and litter. Saprotrophic on soil, in deciduous and coniferous forests [Knudsen and Vesterholt, 2008]. Edible [Phillips, 2006]; not recommended since possibility of misidentification [Arora, 1986]. ***Resupinatus applicatus*** (Batsch) Gray. Kh-1842, 31.5.08. Single collection, mixed forest, on fallen branch of *Populus tremula*. Saprotrophic on deciduous wood, on stumps, logs and branches [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Tricholoma frondosae*** Kalamees & Shchukin. Kh-4801, 13.9.14. Single collection, mixed predominantly deciduous forest, on soil among leaf litter. Mycorrhizal, under *Populus* on rather rich soil [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Tricholoma fulvum*** (DC.) Bigeard & H. Guill. Kh-4732, 11.9.14. Single collection, mixed predominantly coniferous forest, on soil among leaf litter. Mycorrhizal, under *Betula*, more rarely *Abies* and *Picea*, in deciduous and mixed forests [Knudsen and Vesterholt, 2008]. Edible, but poor [Phillips, 2006]. ***Tricholoma inamoenum*** (Fr.) Gillet. Kh-4766, 12.9.14. Single collection, mixed predominantly coniferous forest, on soil among litter. Mycorrhizal with *Picea*, often in deep moss [Knudsen and Vesterholt, 2008]. Poisonous [Ammirati et al., 1985]. ***Tricholoma olivaceotinctum*** Heilm.-Claus. & Mort. Chr. Kh-4523, 7.9.14, 9.9.14, 11.9.14. Regularly collected, mixed coniferous and deciduous forests, on soil among moss and litter. Mycorrhizal, in mossy *Picea* forests [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Tricholoma populinum*** J.E. Lange. Kh-4638, 9.9.14. Single collection, mixed forest with *Populus tremula*, on soil among litter. Mycorrhizal with *Populus*, on rich clayey soil [Knudsen and Vesterholt, 2008]. Edible, good quality [Arora, 1986]. ***Tricholoma portentosum*** (Fr.) Quél. Kh-4802, 13.9.14. Single collection, mixed predominantly coniferous forest, on soil among litter. Mycorrhizal with coniferous and deciduous trees [Knudsen and Vesterholt, 2008]. Edible, good quality, but could be misidentified and therefore not recommended to the beginners [Arora, 1986]. ***Tricholoma saponaceum*** (Fr.) P. Kumm. Kh-4633, 9.9.14. Single collection, mixed predominantly coniferous forest, on soil among litter. Mycorrhizal [Knudsen and Vesterholt, 2008]. Edible, but poor [Phillips, 2006]; inedible, it has soapy taste and may be poisonous [Arora,1986]. ***Tricholoma squarrulosum*** Bres. Kh-4731, 11.9.14. Single collection, mixed predominantly coniferous forest, on soil among litter. Mycorrhizal with deciduous trees, on clay and calcareous soil [Knudsen and Vesterholt, 2008]. Edible [Phillips, 2006]. ***Tricholoma sudum*** (Fr.) Quél. Kh-4776, 12.9.14. Single collection, mixed predominantly coniferous forest, on soil among litter. Mycorrhizal, under conifers, mainly *Pinus* [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Tricholoma*** cf.***terreum*** (Schaeff.) P. Kumm. Kh-2871, 18.9.10. Regularly collected, mixed predominantly coniferous forest, on soil among litter. Mycorrhizal with coniferous, rarely deciduous trees [Knudsen and Vesterholt, 2008]. Edible [Phillips, 2006]; not recommended since possibility of confusion with other close species which were not tested [Arora, 1986]. ***Tricholoma virgatum*** (Fr.) P. Kumm. Kh-4632, 9.9.14. Single collection, mixed predominantly coniferous forest, on soil among litter. Mycorrhizal with coniferous and deciduous trees [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]; may be poisonous and it has resemblance with poisonous *T. pardinum* [Arora, 1986]. ***Tricholoma viridilutescens*** M.M. Moser. Kh-4807, 13.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal, under conifers [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Tricholomopsis decora*** (Fr.) Singer. Kh-4624, 9.9.14, 21.9.14. Regularly collected, mixed predominantly coniferous forest, on fallen aspen trunk. Saprotrophic on coniferous wood [Knudsen and Vesterholt, 2008]. Edibility unknown [Phillips, 2006].

TUBARIACEAE. ***Tubaria confragosa*** (Fr.) Kühner. Kh-2372, 22.8.10; Kh-2720, 16.9.10; Kh-2969, 20.9.10; Kh-4803, 13.9.14. Regularly collected, mixed predominantly coniferous forest, on soft wood of fallen aspen trunk. Saprotrophic on wood, woodchips or sawdust of conifers [Knudsen and Vesterholt, 2008]. Edibility unknown [Arora, 1986]. ***Tubaria conspersa*** (Pers.) Fayod. Kh-0033, 13.9.10. Single collection, mixed forest in valley, on fallen deciduous branches. Saprotrophic on soil, debris, wood chips [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Tubaria furfuracea*** (Pers.) Gillet. Kh-2716, 16.9.10; Kh-3125, 13.6.10. Single collection, disturbed location near the station house, on soil with wood chips and different debris. Saprotrophic on twigs, organic debris [Knudsen and Vesterholt, 2008]. Edibility unknown [Arora, 1986]; not edible [Phillips, 2006].

TYPHULACEAE. ***Macrotyphula fistulosa*** (Holmsk.) R.H. Petersen. Kh-1113, 3.10.09; Kh-2779, 17.9.10; Kh-3040, 23.9.10; Kh-3115, 2.10.10; Kh-4656, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among moss and litter. Saprotrophic on deciduous debris or on soil [Hansen and Knudsen, 1997]. Edible, but not worthwhile [Phillips, 2006]. ***Macrotyphula juncea*** (Alb. & Schwein.) Berthier. Kh-2642, 14.9.10; Kh-2780, 17.9.10; Kh-2839, 17.9.10. Regularly collected, mixed predominantly coniferous forest, on soil leaf litter. Saprotrophic on leaf litter of deciduous trees [Hansen and Knudsen, 1997]. Not edible [Phillips, 2006], too small [Arora, 1986].

BOLETALES

BOLETACEAE. ***Boletus edulis*** Bull. Kh-2832, 17.9.10; Kh-4756, 11.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among moss and forest litter. Mycorrhizal with deciduous and coniferous trees, on acid to mesic soils [Knudsen and Vesterholt, 2008]. Edible, one of the most prized edible species [Phillips, 2006; Arora, 1986]. ***Boletus subtomentosus*** L. Kh-2778, 17.9.10; Kh-2980, 20.9.10, Kh-4653, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among moss and forest litter. Mycorrhizal with deciduous trees [Knudsen and Vesterholt, 2008]. Edible, but of poor quality compared to

other boletes [Arora, 1986]. ***Chalciporus piperatus*** (Bull.) Bataille. Kh-2588, 13.9.10; Kh-2831, 17.9.10; Kh-4617, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among moss and forest litter. Mycorrhizal status doubtful, in a wide range of forest types on acid to somewhat richer soil [Knudsen and Vesterholt, 2008]. Edible, but reportedly has hot and peppery taste [Phillips, 2006] which disappears after cooking. ***Leccinum albostipitatum*** den Bakker & Noordel. Kh-4715, 9.9.14. Single collection, mixed predominantly coniferous forest, on soil among litter and mosses. Mycorrhizal with *Populus* [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Leccinum aurantiacum*** (Bull.) Gray. Kh-2582, 13.9.10; Kh-2873, 18.9.10. Regularly collected, mixed predominantly coniferous forest, on soil among litter and mosses. Mycorrhizal with deciduous trees (*Populus*, *Quercus*, *Betula*, *Salix*) [Knudsen and Vesterholt, 2008]. Edible [Phillips, 2006]. ***Leccinum holopus*** (Rostk.) Watling. Kh-1766, 12.7.09; Kh-1767, 12.7.09; Kh-1768, 12.7.09; Kh-2765, 16.9.10; Kh-2880, 18.9.10. Regularly collected, bogged forests, on soil among litter and *Sphagnum* spp., also in treed bogs. Mycorrhizal with *Betula*, on acid moist soil [Knudsen and Vesterholt, 2008]. Edible, but not worthwhile [Phillips, 2006]. ***Leccinum scabrum*** (Bull.) Gray. Kh-2649, 14.9.10; Kh-2874, 18.9.10; Kh-2914, 19.9.10; Kh-4757, 11.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among litter and mosses. Mycorrhizal with *Betula* [Knudsen and Vesterholt, 2008]. Edible, but not worthwhile [Phillips, 2006]; good choice when young tough specimens collected [Arora, 1986]. ***Leccinum variicolor*** Watling. Kh-2580, 13.9.10; Kh-4564, 8.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among litter and mosses. Mycorrhizal with *Betula*, mostly on moist acid, sandy or peaty soil [Knudsen and Vesterholt, 2008]. Edible [Phillips, 2006]. ***Leccinum versipelle*** (Fr. & Hök) Snell. Kh-1139, 27.7.09; Kh-2581, 13.9.10; Kh-4688, 12.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among litter and mosses. Mycorrhizal with *Betula* [Knudsen and Vesterholt, 2008]. Edible, good [Phillips, 2006]. ***Tylopilus felleus*** (Bull.) P. Karst. Kh-4763, 12.9.14. Single collection, bogged forest on transition to the bog, on soil among *Sphagnum* spp. Mycorrhizal with deciduous and coniferous trees [Knudsen and Vesterholt, 2008]. Not edible due to bitter taste [Phillips, 2006]; not reported before to be poisonous [Arora, 1986]. **GOMPHIDIACEAE.** ***Chroogomphus rutilus*** (Schaeff.: Fr.) O.K. Mill. Kh-1585, 29.8.8; Kh-1057, 28.8.9; Kh-2640, 14.9.10; Kh-4553, 9.9.14; Kh-4700, 10.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among moss and forest litter. Mycorrhizal with *Pinus*, rarely with *Picea*, on acid to calcareous soil [Knudsen and Vesterholt, 2008]. Edible, but not recommended [Phillips, 2006] preferably dried before cooking [Arora, 1986]. ***Gomphidius glutinosus*** (Schaeff.) Fr. Kh-4654, 9.9.14. Single collection, mixed predominantly coniferous forest, on soil among mosses and forest litter. Mycorrhizal with *Picea*, on acid soil [Knudsen and Vesterholt, 2008]. Edible, but soft, viscid and putrescent [Arora, 1986], not recommended [Phillips, 2006]. **PAXILLACEAE.** ***Paxillus involutus*** (Batsch) Fr. Kh-2590, 13.9.10; Kh-3003, 22.9.10; Kh-4544, 8.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among litter, often in bogged forests, among *Sphagnum* spp. Mycorrhizal with various hosts, with *Picea* and *Betula*, on acid, sandy or peaty soil [Knudsen and Vesterholt, 2008]. Deadly poisonous [Phillips, 2006], a poison probably has a cumulative effect; should be never consumed raw and not recommended to eat even after thorough cooking [Arora, 1986]. **SUILLACEAE.** ***Suillus acidus*** (Peck) Singer. Kh-4536, 8.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal. Not edible because of acid taste. ***Suillus bovinus*** (L.) Roussel. Kh-2661, 14.9.10. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Pinus*, on acid soils [Knudsen and Vesterholt, 2008]. Edible. ***Suillus pictus***(Kuntze) A.H. Sm. & Thiers. Kh-2176, 18.8.10. Single collection, mixed coniferous forest dominated by *Pinus sibirica*, on soil among *Polytrichum* sp. Mycorrhizal with 5-needle pines [Smith and Thiers, 1991], with *P. sibirica* in the area. Edible, well good by some people, mediocre by others [Arora, 1986], discoloration to blackish when cut and canned may be confusing to some people. ***Suillus placidus*** (Bonord.) Singer. Kh-2709, 16.9.10; Kh-4795, 12.9.14. Regularly collected, mixed predominantly coniferous forest with *P. sibirica*, on soil. Mycorrhizal, with 5-needle *Pinus* [Knudsen and Vesterholt, 2008]. Edible. ***Suillus sibiricus*** (Singer) Singer. Kh-2751, 16.9.10; Kh-4626, 9.9.14. Regularly collected, mixed predominantly coniferous forest with *P. sylvestris*, on soil. Mycorrhizal, with 5-needle *Pinus* [Knudsen and Vesterholt, 2008]. Edible, but thin-fleshed and slimy [Arora, 1986]. ***Suillus variegatus***(Sw.) Richon & Roze. Kh-0954, 20.8.09; Kh-4629, 9.9.14. Regularly collected, mixed predominantly coniferous forest with *P. sylvestris*, on soil. Mycorrhizal, with 5-needled *Pinus* [Knudsen and Vesterholt, 2008]. Edible.

CANTHARELLALES

CANTHARELLACEAE. ***Cantharellus cibarius*** Fr. Kh-2552, 13.9.10; Kh-2705, 16.9.10; Kh-2965, 20.9.10; Kh-4528, 7.9.14. Regularly collected, mixed predominantly coniferous forest, often on the slopes to spring valleys, on soil among moss and forest litter. Mycorrhizal with coniferous and deciduous treed [Hansen and Knudsen, 1997]. Edible and of high quality [Arora, 1985]. **HYDNACEAE.** ***Hydnum repandum*** L. Kh-0508, 25.9.10; Kh-2508, 20.8.10; Kh-4644, 9.9.14; Kh-4764, 12.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among litter and moss. Mycorrhizal with coniferous and deciduous trees [Kuo, 2003]. Edible and of good quality [Phillips, 2006; Arora, 1986]. ***Sistotrema confluens*** Pers. Kh-4799, 13.9.14. Single collection, mixed predominantly coniferous forest, on soil among moss and litter. Saprotrophic on litter [Hansen and Knudsen, 1997]. Edibility unknown.

GOMPHALES

CLAVARIADELPHACEAE. ***Clavariadelphus ligula*** (Schaeff.) Donk. Kh-1156, 13.8.9; Kh-2585, 13.9.10; Kh-2817, 17.9.10; Kh-4582, 8.9.14. Regularly collected, and commonly growing in large aggregations, mixed predominantly coniferous forest, on soil among moss and forest litter. Saprotrophic on litter of conifers [Hansen and Knudsen, 1997]. Edible but poor quality [Phillips, 2006] or worthless [Arora, 1986]. **GOMPHACEAE.** ***Gomphus clavatus*** (Pers.) Gray. Kh-4533, 7.9.14. Several population registered near the station in 2014, mixed predominantly coniferous forest, often in dense dark locations, on soil among needle litter. Saprotrophic on soil, in coniferous, rarely deciduous forests [Hansen and Knudsen, 1997]. Edible, considered of good quality by some people [Arora, 1986]. ***Ramaria abietina*** (Pers.) Quél. Kh-4772, 12.9.14. Single collection, mixed predominantly coniferous forest, on soil among litter. Saprotrophic, on needles in coniferous forests [Hansen and Knudsen, 1997]. Not edible, small, tough

and/or bitter [Arora, 1986]. ***Ramaria flava*** (Schaeff.) Quél. s.l. Kh-4726, 11.9.14. Single collection, mixed predominantly coniferous forest, on soil among litter. Mycorrhizal (probably), in deciduous and coniferous forests [Hansen, 1997]. Edible, but has laxative effect on some people [Phillips, 2006]. ***Ramaria pallida*** (Schaeff.) Ricken. Kh-4727, 11.9.14. Single collection, mixed predominantly coniferous forest, on soil among litter. Mycorrhizal (probably), in coniferous and deciduous forests [Hansen and Knudsen, 1997]. Edibility unknown. ***Ramaria stricta*** (Pers.) Quél. Kh-4542, 8.9.14. Single collection, mixed predominantly coniferous forest, on soil (probably submerged wood). Saprotrophic on wood [Hansen and Knudsen, 1997]. Not edible [Phillips, 2006], tough and smell is unpleasant [Arora, 1986]. ***Ramaria tsugina*** (Peck) Marr & D.E. Stuntz. Kh-2929, 19.9.10; Kh-4545, 8.9.14. Regularly, mixed predominantly coniferous forest, on old mossy log and on soil (probably submerged wood). Saprotrophic on wood [Hansen, 1997]. Edibility unknown. **LENTARIACEAE.** ***Lentaria dendroidea*** (O.R. Fr.) J.H. Petersen. Kh-4771, 12.9.14. Single collection, mixed predominantly coniferous forest, on soil among litter. Saprotrophic, on litter in forests of *Picea* and *Alnus* [Hansen, 1997]. Edibility unknown [Phillips, 2006], for *L. afflata*. **POLYPORACEAE.** ***Lentinus lepideus*** (Fr.) Fr. Kh-0002, 16.08.10. Single collection, mixed predominantly coniferous forest, on fallen trunk of *Populus tremula*. Saprotrophic on conifers (especially *Pinus* and *Larix*), rarely on deciduous wood [Knudsen and Vesterholt, 2008]. Edible and good, but young specimens should be collected and thorough cooked [Arora, 1986]. ***Lentinus pilososquamulosus*** Lj.N. Vassiljeva. Kh-4625, 9.9.14. Single collection, mixed predominantly coniferous forest, on fallen trunk of *Populus tremula*. Saprotrophic. Edibility unknown. ***Neolentinus cyathiformis*** (Schaeff.) Della Maggiora & Trassinelli. Kh-1761, 12.7.09; Kh-1816, 18.7.08; Kh-2371, 21.8.10; Kh-3320, 14.6.11; Kh-3392, 16.6.11. Regularly collected, mixed predominantly coniferous forest, on wood of *Populus tremula* and others. Saprotrophic on wood, on sun-exposed wood of *Populus* [Knudsen and Vesterholt, 2008]. Edibility unknown.

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HERICIACEAE. ***Hericium cirrhatum*** (Pers.) Nikol. Kh-3479, 20.8.09. Single collection, mixed predominantly coniferous forest, on standing-dead birch (*B. pubescens*) log. Parasitic on living and recently dead trunks of deciduous trees [Hansen, 1997]. Edible [Arora, 1986; Phillips, 2006]. ***Hericium coralloides*** (Scop.) Pers. Kh-2776, 17.9.10; Kh-3478, 16.7.08; Kh-3480, 20.8.09; Kh-4518, 7.9.14. Regularly collected, mixed predominantly coniferous forest, on standing-dead or laying birch and aspen logs. Saprotrophic on deciduous wood [Knudsen, 2007]. Edible [Arora, 1986; Phillips, 2006]. **AURISCALPIACEAE.** ***Artomyces pyxidatus*** (Pers.) Jülich. Kh-3135, 21.6.10. Single collection, on decayed mossy log of aspen and birch [Hansen, 1997].Saprotrophic on deciduous wood, large rotten trunks [Hansen and Knudsen, 1997]. Edible [Phillips, 2006], but should not be mistaken with *Ramaria* spp., where certain species can cause gastrointestinal upset [Ammirati et al., 1985]. ***Auriscalpium vulgare*** Gray. Kh-4786, 12.9.14. Single collection, mixed predominantly coniferous forest with *Pinus sylvestris*, fallen cones of *P. sylvestris*. Saprotrophic on *Pinus*, rarely *Picea*, cones [Hansen and Knudsen, 1997]. Not edible [Phillips, 2006], too small and tough to be of value [Arora, 1986]. ***Lentinellus micheneri*** (Berk. & M.A. Curtis) Pegler. Kh-2654, 15.9.10; Kh-2974, 20.9.10; Kh-4645, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on leaf and mixed litter. Saprotrophic on woody debris and coniferous and deciduous wood [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Lentinellus vulpinus*** (Sowerby) Kühner & Maire. Kh-4615, 9.9.14. Single collection, mixed predominantly coniferous forest, on standing trunk of living *Populus tremula*. Saprotrophic on old stumps and trunks, on *Fagus*, *Populus*, *Ulmus* [Knudsen and Vesterholt, 2008]. Edibility unknown. **RUSSULACEAE.** ***Lactarius deterrimus*** Gröger. Kh-4532, 7.9.14. Single collection, mixed predominantly coniferous forest, on soil among litter and mosses. Mycorrhizal with *Picea*, often in young stands [Knudsen and Vesterholt, 2008]. Edible [Phillips, 2006]. ***Lactarius fuliginosus*** (Fr.) Fr. Kh-4658, 9.9.14. Single collection, mixed predominantly coniferous forest, on soil among litter and mosses. Mycorrhizal with deciduous trees [Knudsen and Vesterholt, 2008]. Edible but poor [Phillips, 2006]. ***Lactarius fulvissimus*** Romagn. Kh-4561, 8.9.14. Single collection, mixed predominantly coniferous forest, on soil among litter and mosses. Mycorrhizal, on reach clayey soils with deciduous trees [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]. ***Lactarius glyciosmus*** (Fr.) Fr. Kh-4769, 12.9.14. Single collection, mixed predominantly coniferous forest, on soil among litter and mosses. Mycorrhizal with *Betula* [Knudsen and Vesterholt, 2008]. Edible [Phillips, 2006]. ***Lactarius helvus*** (Fr.: Fr.) Fr. Kh-4562, 8.9.14. Single collection, mixed predominantly coniferous forest, on soil among feather mosses. Mycorrhizal with conifers or *Betula* on sandy or peaty soils [Knudsen and Vesterholt, 2008]. Not edible: slightly poisonous but could be dried and used as a condiment [Phillips, 2006]. ***Lactarius lacunarum*** Hora. Kh-4745, 11.5.14. Single collection, mixed predominantly coniferous forest, on soil among feather mosses. Mycorrhizal, in humid places with *Alnus*, *Betula*, *Populus* [Knudsen and Vesterholt, 2008]. Edibility unknown. ***Lactarius rufus*** (Scop.) Fr. Kh-2657, 15.9.10; Kh-2752, 17.9.10; Kh-2995, 20.9.10; Kh-4693, 10.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among litter and mosses. Mycorrhizal with *Picea*, *Pinus*, less often with deciduous trees, on acid soil [Knudsen and Vesterholt, 2008]. Not edible, but also used as seasoning (peppery taste) [Phillips, 2006]; harvested and canned commercially in Scandinavia [Arora, 1986]. ***Lactarius spinosulus*** Quél. & Le Bret. Kh-4738, 11.9.14. Single collection, mixed predominantly coniferous forest, on soil among litter and mosses. Mycorrhizal with deciduous trees, mainly *Betula* [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]. ***Lactarius torminosus*** (Schaeff.) Gray. Kh-2587, 13.9.10; Kh-2711, 16.9.10; Kh-2789, 17.9.10; Kh-3000, 21.9.10; Kh-4664, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among litter and mosses. Mycorrhizal with *Betula*, in forests, parks and gardens [Knudsen and Vesterholt, 2008]. Poisonous [Phillips, 2006]; not recommended as it is poisonous unless thorough cooked, but it is commonly collected in Russia (consumed pickled) and in Norway it is roasted and added to coffee [Arora, 1986]. ***Lactarius trivialis***(Fr.) Fr. Kh-2788, 17.9.10; Kh-2881, 18.9.10; Kh-4537, 8.9.14; Kh-4541, 8.9.14; Kh-4657, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among litter and mosses. Mycorrhizal with *Betula* and *Picea*, often in damp habitats [Knudsen and Vesterholt, 2008]. Edible, used pickled and canned. ***Lactarius turpis*** (Weinm.) Fr. Kh-2764, 16.9.10; Kh-4699, 10.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among litter and mosses. Mycorrhizal with *Picea* or *Betula* [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]. ***Lactarius uvidus*** (Fr.) Fr. Kh-4713, 10.9.14; Kh-

4723, 9.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among litter and mosses. Mycorrhizal with *Betula*, *Salix*, *Picea*, in wet habitats [Knudsen and Vesterholt, 2008]. Not edible [Phillips, 2006]; said to be poisonous [Arora, 1986]. ***Russula acrifolia*** Romagn. Kh-4704, 10.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal, in deciduous and coniferous forests [Knudsen and Vesterholt, 2008]. Edible, but mediocre [Phillips, 2006]. ***Russula aeruginea*** Lindbl. ex Fr. Kh-4531, 7.9.14; Kh-4724, 11.9.14. Two collections, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Betula*, on acid, sandy or peaty soil [Knudsen and Vesterholt, 2008]. Edible [Arora, 1986]. ***Russula alutacea*** (Fr.) Fr. Kh-4573, 8.9.14; Kh-4746, 11.9.14. Two collections, mixed predominantly coniferous forest, on soil.Mycorrhizal with deciduous trees (*Fagus, Quercus*) on rich soil [Knudsen and Vesterholt, 2008]. Not recommended since large number of close species which are not all tested [Arora, 1986]. ***Russula aquosa*** Leclair. Kh-4563, 8.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal, in coniferous forests, rarely with *Betula* [Knudsen and Vesterholt, 2008]. ***Russula atrorubens*** Quél. Kh-4569, 8.9.14; Kh-4720, 9.9.14. Two collections, mixed predominantly coniferous forest, on soil. Mycorrhizal, in coniferous forests [Knudsen and Vesterholt, 2008]. ***Russula claroflava*** Grove. Kh-4613, 9.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Betula*, mostly in moist sites [Knudsen and Vesterholt, 2008]. Edible [Arora, 1986], good [Phillips, 2006]. ***Russula clavipes*** Velen. Kh-4612, 9.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal, in coniferous and deciduous forests [Knudsen and Vesterholt, 2008]. ***Russula consobrina*** (Fr.) Fr. Kh-4787, 12.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal, under *Picea* or *Betula* in mountains [Knudsen and Vesterholt, 2008]. ***Russula decolorans*** (Fr.) Fr. Kh-4762, 11.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal with *Pinus*, in coniferous forests [Knudsen and Vesterholt, 2008]. Not edible, it is said to be edible but several close species were not tested [Arora, 1986]; edible [Phillips, 2006]. ***Russula delica*** Fr. Kh-4753, 11.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal [Knudsen and Vesterholt, 2008]. Edible, but poor [Phillips, 2006]. ***Russula densifolia*** Gillet. Kh-4754, 9.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal, in coniferous forests on needle litter, often on calcareous soils [Knudsen and Vesterholt, 2008]. Not edible, could be used after cooking but not recommended [Arora, 1986]. ***Russula raoultii*** Quél. Kh-4581, 8.9.14. Single collection, mixed predominantly coniferous forest, on soil. Mycorrhizal, in deciduous forests [Knudsen and Vesterholt, 2008].

THELEPHORALES

THELEPHORACEAE. ***Thelephora terrestris*** Ehrh. Kh-2702, 14.9.10; Kh-4555, 8.9.14. Regularly collected, mixed predominantly coniferous forest, on soil among litter, on wood, also in treed bogs among *Sphagnum* on different litter. Saprotrophic, mycorrhizal or semi-parasitic, on humus, roots, among mosses in coniferous forests [Hansen and Knudsen, 1997]. Not edible [Phillips, 2006].

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МАРШРУТНЫЕ ИССЛЕДОВАНИЯ МАКРОМИЦЕТОВ В ОКРЕСТНОСТЯХ СТАЦИОНАРА МУХРИНО ЮГУ (ЗАПАДНАЯ СИБИРЬ)

***Филиппова Н.В.*[1)], *Бульонкова Т.М.*[2)], *Лапшина Е.Д.* [1)]**

[1)] *Югорский государственный университет, г. Ханты-Мансийск*
[2)] *Институт систем информатики им. А.П. Ершова СО РАН, г. Новосибирск*

В статье представлены результаты изучения микобиоты макромицетов в окрестностях полевого стационара Мухрино ЮГУ (средне-таежная зона Западной Сибири, г. Ханты-Мансийск). Сбор макромицетов проводили в течение 2008-2014 гг. в ходе маршрутов в лесных, пойменных и болотных экосистемах. Около 600 образцов было обработано и определено по общепринятой методике. Образцы в сухом виде и сопутствующие данные хранятся в Фунгарии ЮГУ. Видовое богатство выявленной микобиоты макромицетов представлено 324 таксонами из 110 родов, 43 семейств и 10 порядков. Большая часть видов (40%) формируют микоризу с древесными растениями, другие являются сапротрофами на древесине (27%), почве (18%) и других субстратах. Показана фитоценотическая приуроченность для ряда видов. Приводится приблизительная оценка обилия по числу собранных в коллекции образцов. В виду важного пищевого значения макромицетов, проведен анализ их съедобных качеств: 23% (73 вида) являются съедобными, включая 30 видов высокого качества; 5% являются ядовитыми, включая несколько смертельно ядовитых; 14% условно съедобны; информация о съедобности большей части видов списка (57%) в литературе отсутствует. Выявленная микобиота в окрестностях стационара Мухрино включает семь видов, занесенных в Красную книгу ХМАО; сообщается информация о их местонахождениях и состоянии популяций. Сравнение выявленного списка с ранее опубликованным для ХМАО показало высокую степень новизны выявленной микобиоты: только треть видов отмечалась ранее, остальные (198 видов) являются новыми регистрациями для территории округа. В аннотированном списке сообщается информация о дате, местообитании, обилии, трофической группе и съедобности каждого таксона.

***Ключевые слова*:** микология, макромицеты, микота, биоразнообразие, охрана грибов, Красная книга, Западная Сибирь, Россия

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