Aphyllophoroid fungi in insular woodlands of eastern Ukraine

Alexander Ordynets†, Anton Savchenko§, Alexander Akulov¶, Eugene Yurchenko‖, Vera F. Malyshева*, Urmas Kõljalg§, Josef Vlasák®, Karl-Henrik Larsson**, Ewald Langer‡

† Department of Ecology, University of Kassel, Kassel, Germany
§ Institute of Ecology and Earth Sciences, University of Tartu, Tartu, Estonia
¶ Department of Biotechnology, Paleski State University, Pinsk, Belarus
‖ V.N. Karazin Kharkiv National University, Kharkiv, Ukraine
‡ Department of Ecology, University of Tartu, Tartu, Estonia
* V.N. Karazin Kharkiv National University, Kharkiv, Ukraine
** Department of Research and Collections, University of Oslo, Natural History Museum, Oslo, Norway

Corresponding author: Alexander Ordynets (a.ordynets@uni-kassel.de)

Academic editor: Dmitry Schigel

Received: 21 Nov 2017 | Accepted: 13 Dec 2017 | Published: 22 Dec 2017

Citation: Ordynets A, Savchenko A, Akulov A, Yurchenko E, Malyshева V, Kõljalg U, Vlasák J, Larsson K, Langer E (2017) Aphyllophoroid fungi in insular woodlands of eastern Ukraine. Biodiversity Data Journal 5: e22426. https://doi.org/10.3897/BDJ.5.e22426

Abstract

Background

Fungi play crucial roles in ecosystems and are among the species-richest organism groups on Earth. However, knowledge on their occurrence lags behind the data for animals and plants. Recent analyses of fungal occurrence data from Western, Central and Northern Europe provided important insights into response of fungi to global warming. The consequences of the global changes for biodiversity on a larger geographical scale are not yet understood. Landscapes of Eastern Europe and particularly of eastern Ukraine, with their specific geological history, vegetation and climate, can add substantially new information about fungal diversity in Europe.
New information

We describe the dataset and provide a checklist of aphyllorhoid fungi (non-gilled macroscopic *Basidiomycota*) from eastern Ukraine sampled in 16 areas between 2007 and 2011. The dataset was managed on the PlutoF biodiversity workbench ([http://dx.doi.org/10.15156/BIO/587471](http://dx.doi.org/10.15156/BIO/587471)) and can also be accessed via Global Biodiversity Information Facility (GBIF, parts of datasets [https://doi.org/10.15468/kuspi6](https://doi.org/10.15468/kuspi6) and [https://doi.org/10.15468/h7qtf6](https://doi.org/10.15468/h7qtf6)). This dataset includes 3418 occurrences, namely 2727 specimens and 691 observations of fructifications belonging to 349 species of fungi. With these data, the digitised CWU herbarium (V. N. Karazin Kharkiv National University, Ukraine) doubled in size. A most detailed description of the substrate's properties and habitat for each record is provided. The specimen records are supplemented by 26 nuclear ribosomal DNA ITS sequences and six 28S sequences. Additionally, 287 photographs depicting diagnostic macro- and microscopic features of fungal fruitbodies as well as studied habitats are linked to the dataset. Most of the specimens have at least one mention in literature and relevant references are displayed as associated with specimen data. In total, 16 publication references are linked to the dataset. The dataset sheds new light on the fungal diversity of Eastern Europe. It is expected to complement other public sources of fungal occurrence information on continental and global levels in addressing macroecological and biogeographical questions.

Keywords

*Basidiomycota*, Agaricomycetes, diversity, checklist, wood-inhabiting fungi, ectomycorrhizal fungi, corticioid fungi, polypore fungi, substrate, dead wood, Kharkiv, Donetsk, Luhansk, Nature Reserve, National Park

Introduction

Fungi play crucial roles in ecosystems and are among the species-richest organism groups on Earth (Mora et al. 2011, Heilmann-Clausen et al. 2014, Peay et al. 2016). However, their occurrence has been poorly documented so far due to the difficulties of species detection, identification and delimitation. The situation is now rapidly changing due to substantial improvements in the methods used to identify and communicate the taxa of fungi (Kõljalg et al. 2013, Hibbett et al. 2016). On the other hand, possibilities to digitise the taxon occurrences during the few last years have been additionally improved, providing great benefits for all biodiversity researchers including mycologists (Abarenkov et al. 2010, Senderov et al. 2016).

Europe is the continent with the most advanced knowledge of fungal diversity due to a long-standing tradition of mycological research (Dahlberg et al. 2010). In the last decades, numerous national projects documenting fungal diversity have been initiated. Furthermore,
national efforts have been consolidated into the international projects. Such cooperation enables researchers to investigate important ecological questions, for example, species- and community-level responses of fungi to global warming (Andrew et al. 2016, Kauserud et al. 2012). Answering macroecological questions may be facilitated by broad spatial coverage of the dataset, as exemplified by "Climate Change Impacts on the Fungal Ecosystem Component" project, ClimFun (Andrew et al. 2017). There is a place to further expand geographic coverage of successful projects such as ClimFun, but this requires filling sampling gaps and digitisation efforts for national datasets, especially from Eastern Europe. In this region, sparse data availability and accessibility generally result from low numbers of both professional mycologists and citizen scientists (Dahlberg et al. 2010).

The environment of eastern Ukraine (Kharkiv, Donetsk and Luhansk regions) offers a special possibility to study fungal diversity associated with woody plants. Severe continental climate substantially limits the distribution of forests on the local scale, resulting in forest patches of limited size. These "forest oases" are separated from each other by the steppe vegetation or human-managed lands (Popovych 1990). Unlike the other parts of Ukraine and Europe, the European beech and Norway spruce are totally absent in the forests, while pedunculate oak and other numerous deciduous trees form a forest canopy. A specific geological history of the region resulted in the development of forest habitats on chalk outcrops or sandy sediments which are unique on a European scale (Fedorova 1980, Onyshchenko et al. 2007, Didukh and Pashkevich 2003).

Fungal diversity of eastern Ukraine remains insufficiently known. The first scanty documentation of fungal occurrences dates back to the beginning of 19th century (Akulov et al. 2003). The first inventory, specifically focused on the region, was completed four decades ago (Wasser and Soldatova 1977). Less than a decade ago, we reported the results of aphyllorhizoid fungi species inventories in several protected areas of eastern Ukraine (Ordynets and Akulov 2011, Ordynets and Akulov 2012, Ordynets et al. 2012, Ordynets et al. 2013). However, these were mostly species lists with sparse metadata, spread over several "floristic papers". This valuable information on fungal occurrences hardly meets the criteria of accessibility, reusability and sharing claimed for biodiversity data nowadays (Senderov and Penev 2016, Costello et al. 2013). Moreover, during the last four years, specimens collected by us were involved in a series of taxonomic studies and were re-identified. All the past and future identifications of the specimens represent valuable information which ideally should be easily updated and traced. Finally, the research area is affected by military activity for more than three years (Vasyliuk et al. 2015) and its preservation and accessibility for research in the forthcoming decades is questionable. Therefore, a proper preservation of the currently available data is required. In this data paper, we describe the effort of digitising and sharing the dataset of aphyllorhizoid fungi in selected areas of eastern Ukraine according to the current standards of publishing biodiversity information.
General description

Additional information: The project focuses on the diversity of aphylophoroid fungi. These fungi form neither an evolutionary nor an ecological group but are often targeted as a research object because of both strong taxonomic tradition and sampling convenience. During most of the 20th century, fungi with macroscopic fruitbodies were taxonomically classified according to their fruitbody morphologies. Several generations of mycologists were trained using the morphological classification of fungi. Though these morphological groups barely represent monophyletic taxa and are usually the result of convergent evolution (Hibbett 2007), the present-day identification keys for macrofungi for practical reasons are still compiled based on the principal fruitbody type (e.g. Bernicchia and Gorjón 2010, Krieglsteiner and Kaiser 2000, Ryvarden and Melo 2014).

Aphyllophoroid fungi represent those basidial macrofungi which do not develop gills or closed reproductive structures but have smooth, toothed, irregularly folded to poroid hymenophore and one-celled basidia. They were previously treated as a single taxonomic order but are now found among ca. 20 orders mostly of the class Agaricomycetes (Kirk et al. 2008, Hibbett et al. 2014). Aphyllophoroid fungi are among the best-known groups of fungi globally and especially in Europe (Bernicchia and Gorjón 2010, Ryvarden and Melo 2014). They comprise a highly diverse group both in terms of species richness and functional differentiation. They are the most important agents of wood decay globally (Stokland et al. 2012), but also include mycorrhizal species, plant pathogens and litter saprotrophs (Tedersoo and Smith 2013). In general, aphylophoroid fungi are strongly dependent on woody plants in terms of nutrition and habitat.

Project description

Study area description: Within the project, we inventoried aphylophoroid fungi on 16 sampling areas located in eastern Ukraine and covering parts of three administrative regions, namely Kharkiv, Donetsk and Luhansk. All sampling areas are located in the middle basin of Siverskyi Donets River, Black Sea basin and their geomorphology developed due to the erosive activity of the river on the massive Upper Cretaceous sediments. We focused on the inventory of the well-preserved areas. We carried out the inventory in two Nature Reserves, i.e. the most strictly protected areas according to the Ukrainian conservational legislation (3 sampling areas), one National Nature Park (8 sampling areas) and one Regional Landscape Park (one sampling area). Four areas had no protected status but were located close to the protected ones. The list of areas with their definition, short characteristics including protection status, links to the areas as PlutoF objects and visiting/sampling statistics are provided in the Table 1. Beside the text description, each area was captured in photographs viewable on the respective area page in PlutoF (see web links in Table 1)
Table 1.
Definitions of 16 sampling areas in eastern Ukraine where aphyllophoroid fungi were inventoried, with number of visits and taxa occurrences recorded.

| Sampling area name | Locality text | Region | Commune | URL to the area in PlatoF | Number of visits to area | Number of specimens collected | Number of observations |
|--------------------|---------------|--------|---------|---------------------------|--------------------------|----------------------------|----------------------------|
| Ukraine, Iziumska Luka floodplain | Iziumska Luka Regional Landscape Park, floodplain of the Siverskyi Donets River | Kharkiv | Balaklea | https://plutof.ut.ee/#/area/view/1782438 | 2 | 588 | 25 |
| Ukraine, Iziumska Luka sandy terrace | Large sandy massif to the east from Iziumska Luka Regional Landscape Park | Kharkiv | Balaklea | https://plutof.ut.ee/#/area/view/1782428 | 2 | 78 | 11 |
| Ukraine, Yaremivka | Area between Siverskyi Donets River and railway Izium-Sviatohirsk, between "Bukino" and "Studenok" train stations, including the candidate protected area Yaremivskyi Preserve | Kharkiv | Izium | https://plutof.ut.ee/#/area/view/1782489 | 2 | 74 | 43 |
| Ukraine, Sviatohirsk floodplain | Sviati Hory National Nature Park, floodplain to the south of Sviatohirsk town | Donetsk | Sloviansk | https://plutof.ut.ee/#/area/view/1782490 | 7 | 127 | 39 |
| Location | Description | Region | Division | Code | Population | Employment |
|----------|-------------|--------|----------|------|------------|-------------|
| Ukraine, Sviatohirsk hills | Sviati Hory National Nature Park, high steep hills south of the Syverskyi Donets River | Donetsk | Sloviansk | 4 | 75 | 34 |
| Ukraine, Sviatohirsk sandy terrace | Sviati Hory National Nature Park, pinery with inclusion of deciduous forest patches to the north and east of Sviatohirsk town | Donetsk | Lyman | 8 | 610 | 206 |
| Ukraine, Teplynske | Sviati Hory National Nature Park, west of Bogorodychne village | Donetsk | Sloviansk | 5 | 115 | 149 |
| Ukraine, Maiatske | Sviati Hory National Nature Park, west of Maiaki village | Donetsk | Sloviansk | 2 | 85 | 5 |
| Ukraine, Drobyshevske | Sviati Hory National Nature Park, forest south-west of Drobyshevo village | Donetsk | Lyman | 3 | 52 | 110 |
| Ukraine, Lyman sandy terrace | Sviati Hory National Nature Park, sandy terrace south of Lyman town (before 2016 named Krasnyi Lyman) | Donetsk | Lyman | 1 | 23 | 0 |
| Location                            | Area Description                                                                 | Region       | Other Location       | URL                                                                 | Area | Species | Notes |
|------------------------------------|----------------------------------------------------------------------------------|--------------|----------------------|----------------------------------------------------------------------|------|---------|-------|
| Ukraine, Lyman floodplain          | Sviati Hory National Nature Park, floodplain south of Brusivka and Dibrova villages | Donetsk     | Lyman                | https://plutof.ut.ee/#/area/view/1782499                             | 1    | 6       | 0     |
| Ukraine, Kreidova flora hills      | Kreidova Flora, division of the Ukrainian Steppe Nature Reserve, vicinities of Kryva Luka village | Donetsk     | Sloviansk            | https://plutof.ut.ee/#/area/view/1782500                             | 1    | 220     | 0     |
| Ukraine, Kreidova flora floodplain | Floodplain of the Syverskyi Donets River near Kryva Luka village                 | Donetsk     | Sloviansk            | https://plutof.ut.ee/#/area/view/1782501                             | 1    | 101     | 0     |
| Ukraine, Trokhizbenka sandy terrace| Trokhizbenskyi Step division of the Luhansk Nature Reserve, north of Trokhizbenka and Kriakivka villages | Luhansk     | Slovianoserbsk       | https://plutof.ut.ee/#/area/view/1782503                             | 1    | 136     | 52    |
| Ukraine, Trokhizbenka floodplain   | Floodplain of Syverskyi Donets River south of Trokhizbenka and Kriakivka villages | Luhansk     | Slovianoserbsk       | https://plutof.ut.ee/#/area/view/1782505                             | 1    | 11      | 17    |
| Ukraine, Stanychno-Luhanske        | Stanychno-Luhanske division of the Luhansk Nature Reserve, east of Stanytsia Luhanska town | Luhansk     | Stanytsia Luhanska   | https://plutof.ut.ee/#/area/view/1782502                             | 1    | 426     | 0     |
The sampling areas lie in the East European Plain. The elevation varies between 35 and 220 m a.s.l. The Upper Cretaceous sediments (of a chalk and marl) form a series of hills along the right bank of the Siverskyi Donets River, often with outcroppings. Quaternary sediments were formed mostly on the left bank of the river as alluvial and massive sandy accumulations (Bondarchuk 1959). The soils vary according to the bedrock characteristics. On the products of eolation, the ordinary chernozems with medium humus contents were formed. Slopes of the river valley and ravines are covered with the leached sod-calcareous soils. The river floodplain is dominated by meadow chernozems. Alluvial sand accumulations of the second river terrace bear sod-podzolic soils (Didukh and Pashkevich 2003).

According to the Köppen climate classification, the region falls into the area of a cold forest climate with severe winters and dry, long and hot summers (Jylhä et al. 2010). Compared to the rest of Ukraine, here the climate has the most pronounced continental characteristics. The mean annual temperature is 7.5°C, with recorded minimum of -40°C (January) and maximum of 39°C (July). The average annual precipitation is 400–540 mm, while the evaporation is 580–650 mm. Up to 60 days per year with very strong hot dry winds are possible (Popov et al. 1968).

According to the classification of terrestrial ecoregions of the world, the study area belongs to the biome of temperate grasslands, savannahs and shrublands (Olson et al. 2001). It is also known as a steppe region (EEA 2015). In these conditions, the natural woody vegetation mostly represents forest patches of limited size. The few striking exceptions exist due to their proximity to the large Siverskyi Donets River, as well as hilly landscape. Two broadleaf forests (called Teplynska dacha and Maiatska dacha) are the largest forest massifs on the watershed in the Ukrainian steppe zone (Onyshchenko et al. 2007).

The pedunculate oak *Quercus robur* L. is one of the most important tree species in the area. In the forests on the watershed, this oak species is accompanied by *Fraxinus excelsior* L., *Tilia cordata* Mill., *Acer platanoides* L., *A. campestre* L., *A. tataricum* L. and *Corylus avellana* L. In the Siverskyi Donets floodplain, the oak forest grows mosaically with the forests composed of *Alnus glutinosa* (L.) Gaertn., various poplars (*Populus nigra* L., *P. alba* L. and *P. tremula* L.), willows (*Salix alba* L., *Salix fragilis* L.) and *Acer negundo* L. (Popovych 1990).

The massive sandy terrace of the Siverskyi Donets River is basically a habitat for the psammophytic grasses and herbs. However, there are numerous depressions which provide a suitable microclimate for the development of the wetland local forests (groves). The usual trees in these habitats are: *Betula pendula* Roth, *B. pubescens* Ehrh., *Populus tremula*, *P. nigra* and *P. alba*, *Alnus glutinosa* and *Crataegus* spp. The willow shrubby communities of *Salix acutifolia* Willd. and *Salix rosmarinifolia* L. are common in some localities (Popovych 1990). As a result of land-use in the 19th and 20th centuries, large areas of the sandy terrace are currently covered not by primary vegetation of psammophytic grasses and herbs, but by plantations of *Pinus sylvestris* L. However, some of these stands are about 200 years old and resemble natural forests. The true natural pine forests in the region are currently confined to the chalky outcrops with the sod-calcareous
soils. These populations were treated in the past decades as a relict species *Pinus cretacea* Kalen. (Didukh and Pashkevich 2003, Fedorova 1980) currently regarded as a variety of Scots pine, *P. sylvestris* var. *cretacea* (Kalen.) Kom. (Gardner 2013).

**Funding:** The work of Alexander Ordynets and Alexander Akulov in eastern Ukraine was supported by the V.N. Karazin Kharkiv National University and Ukrainian Ministry of Education and Science Grant Number 0112U007570/16-16-13 “Biodiversity exploration as a base for the nature conservation network development in Ukraine”. Alexander Ordynets and Ewald Langer were supported by the University of Kassel and the programme LOEWE (“Landes-Offensive zur Entwicklung Wissenschaftlich-ökonomischer Exzellenz”) of the Hesse’s Ministry of Higher Education, Research and Arts within the framework of the Integrative Fungal Research (IPF) project (http://www.integrative-pilzforschung.de). The work of Alexander Ordynets on the molecular identification of *Thelephorales* was undertaken due to support from the European Social Fund’s Doctoral Studies and Internationalisation Programme DoRa and hosted by the Chair of Mycology, Institute of Ecology and Earth Sciences, University of Tartu, Estonia.

**Sampling methods**

**Sampling description:** In 16 areas, we sampled living fungal fruitbodies according to the standards for macrofungi collecting (Lodge et al. 2004). We were interested in recording the majority of species from the local species pool. Therefore we sampled not within fixed areas, but covered larger areas by sampling along the forest paths. We were passing up to ten kilometres of forest paths per day. We spent more time at the points which visually harboured higher amounts and diversity of deadwood. Visiting and sampling statistics for each area are provided in Table 1.

If the species could be readily identified in the field, the occurrence was recorded without taking a specimen, i.e. as observation, except for the very first finding of the species during the field work. All fruiting bodies from a single woody substrate or growing in a single cluster on debris or litter were treated as a single individual. For the records on woody substrata (which prevail in the dataset), principal tree fraction, diameter class, decay stage, spatial location and presence/absence of the direct contact with soil were recorded. For all the records, plant species of the substrate as well as characteristics of forest habitat and mesorelief were described (Table 2). All collected data were uploaded and managed on the PlutoF platform (Abarenkov et al. 2010).
Table 2.  
Substrate and habitat characteristics of fungal occurrence data recorded in the project.

| Variable attribution | Variable                        | Number of categories | States of the variable                                                                 | Reference                       |
|----------------------|---------------------------------|----------------------|---------------------------------------------------------------------------------------|---------------------------------|
| Substrate: all records | Plant species                   | 56                   |                                                                                        |                                 |
| Substrate: records from wood | Principal tree fraction            | 3                    | branch; stump; trunk                                                                   | Safonov 2003                    |
|                      | Diameter class                   | 4                    | 1 (<3 cm); 2 (3–10 cm); 3 (10–20 cm); 4 (>20 cm), according to measurement at the base of woody unit | Safonov 2003                    |
|                      | Wood decay stage                 | 5                    | 1–5 according to the depth of knife penetration into the wood, bark cover, preservation of initial circumference | Heilmann-Clausen and Christensen 2003, Renvall 1995 |
|                      | Spatial location of substrate    | 3                    | attached (including suspended); fallen; standing (including snags and stumps)          | This project                    |
|                      | Direct contact with soil         | 2                    | in contact with soil; no contact with soil                                             | This project                    |
| Habitat              | Forest spread type               | 5                    | continuous; focal in steppe; focal surrounded by artificial pine forest; sparse; windbreaks | This project                    |
|                      | Forest type, according to dominating tree species | 6                    | alder, birch, oak, pinery, poplar, willow                                             | This project                    |
|                      | Mesorelief type                  | 6                    | floodplain, ravine, sands depression, sands rising, steep river bank, watershed         | Belgard 1971                    |

**Quality control:** One of the challenges in inventorying fungal diversity based on fruiting bodies is the temporal irregularity of fruiting. To reduce the bias associated with this phenomenon, within five years (2007–2011), we carried out 15 expeditions, usually making one expedition per season (spring, summer and autumn). The earliest and latest sampling dates were March 9 and November 22 respectively. Each expedition lasted as a minimum three and as a maximum seven days. Within a single expedition, we visited up to four sampling areas (see Table 1). Some areas could be visited only once. This may be
acceptable in the case of aphyllorhoid fungi which, as opposed to other fruiting fungi, in general create more lasting fruitbodies.

Along with the specimens which were more or less easily identified, there were also collections whose identifications were verified by another expert or collections which we could identify to the genus level only. Wolfgang Dämon, Ivan Zmitrovich, Anton Shyriaev, Heikki Kotiranta, Masoomeh Ghobad-Nejhad, Philomena Bodensteiner, Sergey Volobuev, Viacheslav Spirin and Erast Parmasto kindly helped us in such issues. The names of the experts who verified or improved our identifications are provided in the pane "Identifications", fields "Identifiers" and/or "Remarks" on the respective specimen page as viewed in PlutoF. Additionally, each PlutoF observation linked to our dataset was verified by the platform developer as seen in the pane "Discussion" on the single observation page.

Step description: Noticeable specimens were photographed directly in the field or after drying in the laboratory. The micromorphology study of the dried specimens was performed under 1000× magnification using light microscopes Zeiss Primo Star (Carl Zeiss Jena GmbH, Jena, Germany) and Nicon Eclipse 90i (Nikon Corp., Tokyo, Japan). The specimens were examined in 5% aqueous potassium hydroxide solution, Melzer’s reagent and 1% Congo red solution in concentrated ammonia (Ryvarden and Melo 2014). The main identification keys used were Bernicchia and Gorjón (2010), Kõljalg (1996), Larsson (1992), Ryvarden and Melo (2014).

Geographic coverage

Description: The extent of all sampling areas covers about 180 km in the longitudinal and 60 km in latitudinal direction. The total area of study is 380 km².

Coordinates: 48.7175° and 49.29° Latitude; 36.91884° and 39.39385° Longitude.

Taxonomic coverage

Description: The dataset contains 3418 species occurrences. It has 2727 specimens and 691 observation records, containing 349 species of fungi from the phylum Basidiomycota. Additional 16 items have no specific epithet but only genus-level (in one case order-level) identification (Table 3).
Table 3.
Species checklist and frequencies of occurrence of aphyllorophoid fungi (phylum *Basidiomycota*) from insular woodlands of eastern Ukraine. Specific epithet is available for 349 taxa, while it could not be found for 16 items (only genus-level or order-level identification was possible).

| Taxon name                | Count specimens | Count observations | Class            | Order            | Family          | Genus           |
|---------------------------|-----------------|--------------------|------------------|------------------|-----------------|-----------------|
| Abortiporus biennis       | 1               |                    | Agaricomycetes   | Polyporales      | Podoscyphaceae  | Abortiporus     |
| Aleurodiscus dextrinoideo-cerussatus | 2 |                    | Agaricomycetes   | Russulales       | Stereaceae      | Aleurodiscus    |
| Amphinema byssoides       | 6               |                    | Agaricomycetes   | Atheliales       | Atheliales      | Amphinema       |
| Amyloxenasma allantosporum| 1               |                    | Agaricomycetes   | Amylocorticialea | Amylocorticialea| Amyloxenasma    |
| Antrodia albida           | 2               |                    | Agaricomycetes   | Polyporales      | Fomitopsidaceae | Antrodia        |
| Antrodia gossypium        | 9               |                    | Agaricomycetes   | Polyporales      | Fomitopsidaceae | Antrodia        |
| Antrodia hyalina          | 13              |                    | Agaricomycetes   | Polyporales      | Fomitopsidaceae | Antrodia        |
| Antrodia malicola         | 24              | 4                  | Agaricomycetes   | Polyporales      | Fomitopsidaceae | Antrodia        |
| Antrodia ramentacea       | 4               |                    | Agaricomycetes   | Polyporales      | Fomitopsidaceae | Antrodia        |
| Antrodia sinuosa          | 1               |                    | Agaricomycetes   | Polyporales      | Fomitopsidaceae | Antrodia        |
| Antrodia sp.              | 1               |                    | Agaricomycetes   | Polyporales      | Fomitopsidaceae | Antrodia        |
| Antrodia xantha           | 2               |                    | Agaricomycetes   | Polyporales      | Fomitopsidaceae | Antrodia        |
| Antrodiella faginea       | 2               |                    | Agaricomycetes   | Polyporales      | Steccherinaceae | Antrodiella     |
| Antrodiella ichnusana     | 1               |                    | Agaricomycetes   | Polyporales      | Steccherinaceae | Antrodiella     |
| Antrodiella romellii      | 1               |                    | Agaricomycetes   | Polyporales      | Steccherinaceae | Antrodiella     |
| Aphanobasidium pseudotsugae| 2              |                    | Agaricomycetes   | Agaricales       | Pterulaceae     | Aphanobasidium  |
| Aporpium canescens        | 10              |                    | Agaricomycetes   | Auriculariales    | Auriculariales fam incertae sedis | Aporpium |
| Artomyces pyxidatus       | 5               | 5                  | Agaricomycetes   | Russulales       | Auriscalpiaceae | Artomyces       |
| Species                  | Index | Family           | Order            | Suborder           | Tribe              |
|-------------------------|-------|------------------|------------------|--------------------|--------------------|
| Athelia acrospora       | 2     | Agaricomycetes   | Atheliales       | Atheliaceae        | Athelia            |
| Athelia arachnoidea     | 33    | Agaricomycetes   | Atheliales       | Atheliaceae        | Athelia            |
| Athelia bombacina       | 2     | Agaricomycetes   | Atheliales       | Atheliaceae        | Athelia            |
| Athelia decipiens       | 14    | Agaricomycetes   | Atheliales       | Atheliaceae        | Athelia            |
| Athelia epiphylla       | 26    | Agaricomycetes   | Atheliales       | Atheliaceae        | Athelia            |
| Athelia fibulata        | 3     | Agaricomycetes   | Atheliales       | Atheliaceae        | Athelia            |
| Athelia salicum         | 2     | Agaricomycetes   | Atheliales       | Atheliaceae        | Athelia            |
| Athelia sp.             | 11    | Agaricomycetes   | Atheliales       | Atheliaceae        | Athelia            |
| Aurantiporus fissilis   | 2     | Agaricomycetes   | Polyporales      | Meruliaceae        | Aurantiporus       |
| Auriscalpium vulgare    | 3     | Agaricomycetes   | Russulales       | Auriscalpiaceae    | Auriscalpium       |
| Basidiodendron caesiocinereum | 1 | Agaricomycetes   | Auriculariales   | Exidiaceae         | Basidiodendron     |
| Basidiodendron deminutum | 2    | Agaricomycetes   | Auriculariales   | Exidiaceae         | Basidiodendron     |
| Basidiodendron eyrei    | 8     | Agaricomycetes   | Auriculariales   | Exidiaceae         | Basidiodendron     |
| Basidiobasidum tuberculatum | 32 | Agaricomycetes   | Hymenochaetales  | Schizoporaceae     | Basidiobasidum     |
| Bjerkandera adusta      | 19    | Agaricomycetes   | Polyporales      | Meruliaceae        | Bjerkandera        |
| Bjerkandera fumosa      | 2     | Agaricomycetes   | Polyporales      | Meruliaceae        | Bjerkandera        |
| Boidinia furfuracea     | 1     | Agaricomycetes   | Russulales       | Russulales fam incertae sedis | Boidinia |
| Botryobasidium arachnoideum | 1 | Agaricomycetes   | Cantharellales   | Botryobasidiaceae  | Botryobasidium     |
| Botryobasidium aureum   | 2     | Agaricomycetes   | Cantharellales   | Botryobasidiaceae  | Botryobasidium     |
| Botryobasidium candidans | 22   | Agaricomycetes   | Cantharellales   | Botryobasidiaceae  | Botryobasidium     |
| Botryobasidium conspersum | 34  | Agaricomycetes   | Cantharellales   | Botryobasidiaceae  | Botryobasidium     |
| Botryobasidium curtisii | 3     | Agaricomycetes   | Cantharellales   | Botryobasidiaceae  | Botryobasidium     |
| Species Name                  | Combined Rank | Order | Suborder   | Family            | Genus       |
|------------------------------|---------------|-------|------------|-------------------|-------------|
| Botryobasidium laeve         | 12            | Agaricomycetes | Cantharellales | Botryobasidiaceae  | Botryobasidium |
| Botryobasidium pruinatum     | 10            | Agaricomycetes | Cantharellales | Botryobasidiaceae  | Botryobasidium |
| Botryobasidium robustius     | 8             | Agaricomycetes | Cantharellales | Botryobasidiaceae  | Botryobasidium |
| Botryobasidium simile        | 1             | Agaricomycetes | Cantharellales | Botryobasidiaceae  | Botryobasidium |
| Botryobasidium sphaericosporum | 8         | Agaricomycetes | Cantharellales | Botryobasidiaceae  | Botryobasidium |
| Botryobasidium subcoronatum  | 46            | Agaricomycetes | Cantharellales | Botryobasidiaceae  | Botryobasidium |
| Botryohypochnus isabellinus  | 7             | Agaricomycetes | Cantharellales | Botryobasidiaceae  | Botryohypochnus |
| Bourdotia galzinii           | 1             | Agaricomycetes | Auriculariales | Auriculariales incertae sedis | Bourdotia |
| Brevicellicium olivascens    | 1             | Agaricomycetes | Trechisporales | Hydnodontaceae     | Brevicellicium |
| Bulbillomyces farinosus      | 8             | Agaricomycetes | Polyporales   | Podoscyphaceae     | Bulbillomyces |
| Byssomerulius corium         | 23            | 10    | Agaricomycetes | Polyporales       | Meruliaceae  | Byssomerulius |
| Ceraceomyces serpens         | 12            | Agaricomycetes | Polyporales   | Meruliaceae        | Ceraceomyces |
| Ceraceomyces tessulatus      | 3             | Agaricomycetes | Polyporales   | Meruliaceae        | Ceraceomyces |
| Ceratobasidium cornigerum    | 10            | Agaricomycetes | Cantharellales | Ceratobasidiaceae  | Ceratobasidium |
| Ceriporia purpurea           | 19            | 1     | Agaricomycetes | Polyporales       | Meruliaceae  | Ceriporia |
| Ceriporia reticulata         | 1             | Agaricomycetes | Polyporales   | Meruliaceae        | Ceriporia |
| Ceriporia viridans           | 4             | Agaricomycetes | Polyporales   | Meruliaceae        | Ceriporia |
| Ceriporiopsis mucida         | 1             | Agaricomycetes | Polyporales   | Steccherinaceae    | Ceriporiopsis |
| Ceriporiopsis resinascens    | 3             | Agaricomycetes | Polyporales   | Steccherinaceae    | Ceriporiopsis |
| Cerrena unicolor             | 8             | 3     | Agaricomycetes | Polyporales       | Cerrenaceae  | Cerrena |
| Species                          | Family                          | Order                  | Suborder | Class               | Kingdom |
|---------------------------------|---------------------------------|------------------------|----------|---------------------|---------|
| **Chondrostereum purpureum**    | **Agaricomycetes**              | **Agaricales**         | **Fam incertae sedis** | **Chondrostereum** |
| **Colacogloea peniophorae**     | **Microbotryomycetes**          | **Microbotryomycetes ord incertae sedis** | **Fam incertae sedis** | **Colacogloea** |
| **Coltricia perennis**          | **Agaricomycetes**              | **Hymenochaetales**    | **Hymenochaetaeae**    | **Coltricia** |
| **Coniophora arida**            | **Agaricomycetes**              | **Boletales**          | **Coniophoraceae**     | **Coniophora** |
| **Coniophora fusispora**        | **Agaricomycetes**              | **Boletales**          | **Coniophoraceae**     | **Coniophora** |
| **Coniophora olivacea**         | **Agaricomycetes**              | **Boletales**          | **Coniophoraceae**     | **Coniophora** |
| **Coniophora puteana**          | **Agaricomycetes**              | **Boletales**          | **Coniophoraceae**     | **Coniophora** |
| **Coniophora sp.**              | **Agaricomycetes**              | **Boletales**          | **Coniophoraceae**     | **Coniophora** |
| **Coriolopsis gallica**         | **Agaricomycetes**              | **Polyporales**        | **Polyporaceae**       | **Coriolopsis** |
| **Corticium roseum**            | **Agaricomycetes**              | **Corticales**         | **Corticiaceae**       | **Corticium** |
| **Cristinia helvetica**         | **Agaricomycetes**              | **Agaricales**         | **Stephanosporaceae**  | **Cristinia** |
| **Cristinia rhenana**           | **Agaricomycetes**              | **Agaricales**         | **Stephanosporaceae**  | **Cristinia** |
| **Cylindrobasidium evolvens**   | **Agaricomycetes**              | **Agaricales**         | **Physalacriaceae**    | **Cylindrobasidium** |
| **Dacryobolus sudans**          | **Agaricomycetes**              | **Polyporales**        | **Fomitopsidaceae**    | **Dacryobolus** |
| **Daedalea quercina**           | **Agaricomycetes**              | **Polyporales**        | **Fomitopsidaceae**    | **Daedalea** |
| **Daedaleopsis confragosa**     | **Agaricomycetes**              | **Polyporales**        | **Polyporaceae**       | **Daedaleopsis** |
| **Datronia mollis**             | **Agaricomycetes**              | **Polyporales**        | **Polyporaceae**       | **Datronia** |
| **Dendrothele acerina**          | **Agaricomycetes**              | **Agaricomycetes ord incertae sedis** | **Agaricomycetes fam incertae sedis** | **Dendrothele** |
| **Dendrothele alliacea**        | **Agaricomycetes**              | **Agaricomycetes ord incertae sedis** | **Agaricomycetes fam incertae sedis** | **Dendrothele** |
| **Dendrothele minutissima**     | **Agaricomycetes**              | **Agaricomycetes ord incertae sedis** | **Agaricomycetes fam incertae sedis** | **Dendrothele** |
| **Dichomitus campestris**        | **Agaricomycetes**              | **Polyporales**        | **Polyporaceae**       | **Dichomitus** |
| **Dichomitus squalens**         | **Agaricomycetes**              | **Polyporales**        | **Polyporaceae**       | **Dichomitus** |
| Species                        | Rank          | Kingdom       | Phylum         | Class           | Order            | Family          | Genus         | Species       |
|-------------------------------|---------------|---------------|---------------|-----------------|------------------|----------------|---------------|---------------|
| Dichostereum effuscatum       | Agaricomycetes | Russulales    | Lachnocladiaceae | Dichostereum    |                  |                |               |               |
| Diplomitoporus flavescens     | Agaricomycetes | Polyporales   | Meripilaceae   | Diplomitoporus  |                  |                |               |               |
| Erythricium hypnophilum       | Agaricomycetes | Corticiales   | Corticiaceae   | Erythricium     |                  |                |               |               |
| Exidiopsis galzinii           | Agaricomycetes | Auriculariales | Exidiaceae     | Exidiopsis      |                  |                |               |               |
| Exidiopsis griseobrunnea      | Agaricomycetes | Auriculariales | Exidiaceae     | Exidiopsis      |                  |                |               |               |
| Fibriciellum silvae-ryae      | Agaricomycetes | Trechisporales | Hydnodontaceae | Fibriciellum    |                  |                |               |               |
| Fibricium subceraceum         | Agaricomycetes | Polyporales   | Steccherinaceae | Fibricium       |                  |                |               |               |
| Fibrodontia gossypina         | Agaricomycetes | Trechisporales | Hydnodontaceae | Fibrodontia     |                  |                |               |               |
| Fibroporia vaillantii         | Agaricomycetes | Polyporales   | Fomitopsidaceae | Fibroporia      |                  |                |               |               |
| Fibulomyces fusoides          | Agaricomycetes | Atheliales    | Atheliaceae    | Fibulomyces     |                  |                |               |               |
| Fibulomyces mutabilis         | Agaricomycetes | Atheliales    | Atheliaceae    | Fibulomyces     |                  |                |               |               |
| Fibulomyces sp.               | Agaricomycetes | Atheliales    | Atheliaceae    | Fibulomyces     |                  |                |               |               |
| Fistulina hepatica            | Agaricomycetes | Agaricales    | Fistulinaceae  | Fistulina       |                  |                |               |               |
| Fomes fomentarius             | Agaricomycetes | Polyporales   | Polyporaceae   | Fomes           |                  |                |               |               |
| Fomitiporia punctata          | Agaricomycetes | Hymenochaetales | Hymenochaetales | Fomitiporia     |                  |                |               |               |
| Fomitiporia robusta           | Agaricomycetes | Hymenochaetales | Hymenochaetales | Fomitiporia     |                  |                |               |               |
| Fuscoporia contigua           | Agaricomycetes | Hymenochaetales | Hymenochaetales | Fuscoporia      |                  |                |               |               |
| Fuscoporia ferruginosa        | Agaricomycetes | Hymenochaetales | Hymenochaetales | Fuscoporia      |                  |                |               |               |
| Galzinia incrustans           | Agaricomycetes | Corticiales   | Corticiaceae   | Galzinia        |                  |                |               |               |
| Ganoderma applanatum          | Agaricomycetes | Polyporales   | Ganodermataceae | Ganoderma       |                  |                |               |               |
| Ganoderma lucidum             | Agaricomycetes | Polyporales   | Ganodermataceae | Ganoderma       |                  |                |               |               |
### Aphyllophoroid fungi in insular woodlands of eastern Ukraine

| Species                  | Order      | Class       | Family       | Subclass   | Genus         |
|--------------------------|------------|-------------|--------------|------------|---------------|
| **Ganoderma resinaceum** | Agaricomycetes | Polyporales | Ganodermataceae | Ganoderma |
| **Gloeocystidiellum porosum** | Agaricomycetes | Russulales | Gloeocystidiellaceae | Gloeocystidiellum |
| **Gloeohypochnicium analogum** | Agaricomycetes | Amylocorticaceae | Amylocorticaceae | Gloeohypochnicium |
| **Gloeophyllum sepiarium** | Agaricomycetes | Gloeophyllaceae | Gloeophyllaceae | Gloeophyllum |
| **Gloeophyllum trabeum** | Agaricomycetes | Gloeophyllaceae | Gloeophyllaceae | Gloeophyllum |
| **Gloeoporus dichrous** | Agaricomycetes | Polyporales | Meruliaceae | Gloeoporus |
| **Gloeoporus pannocinctus** | Agaricomycetes | Polyporales | Meruliaceae | Gloeoporus |
| **Gloeoporus taxicola** | Agaricomycetes | Polyporales | Meruliaceae | Gloeoporus |
| **Gliotothe lactescens** | Agaricomycetes | Russulales | Lachnocladaceae | Gliotothe |
| **Granulobasidium vellereum** | Agaricomycetes | Agaricomycetes ord incertae sedis | Agaricomycetes ord incertae sedis | Granulobasidium |
| **Hapalopilus nidulans** | Agaricomycetes | Polyporales | Meruliaceae | Hapalopilus |
| **Helicogloea farinacea** | Atractiellomycetes | Atractiellales | Atractiellales fam incertae sedis | Helicogloea |
| **Helicogloea lagerheimii** | Atractiellomycetes | Atractiellales | Atractiellales fam incertae sedis | Helicogloea |
| **Henningsomyces candidus** | Agaricomycetes | Agaricales | Cyphellaceae | Henningsomyces |
| **Henningsomyces stipitus** | Agaricomycetes | Agaricales | Cyphellaceae | Henningsomyces |
| **Hericium coralloides** | Agaricomycetes | Russulales | Hericiaceae | Hericium |
| **Heterobasidion annosum** | Agaricomycetes | Russulales | Bondarzewiaceae | Heterobasidion |
| **Heteroradulum kmetii** | Agaricomycetes | Auriculariales | Exidiaceae | Heteroradulum |
| Genus              | Species         | Class            | Order             | Family            | Subfamily | Hydnocristella himantia | Hymenochaete cinnamomea | Hymenochaete fuliginosa | Hymenochaete rubiginosa | Hyphoderma argillaceum | Hyphoderma griseolavescens | Hyphoderma mutatum | Hyphoderma setigerum | Hyphoderma sp. | Hyphoderma transiens | Hyphodontia argula | Hyphodontia aspera | Hyphodontia breviseta | Hyphodontia crustosa | Hyphodontia erastii | Hyphodontia incrustata | Hyphodontia microspora | Hyphodontia nespori | Hyphodontia palidula | Hyphodontia pruni |
|--------------------|-----------------|------------------|-------------------|-------------------|-----------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Genus                | Species    | Order            | Family             | Subfamily       | Genus  |
|---------------------|------------|------------------|--------------------|-----------------|--------|
| Hyphodontia         | quercina   | Agaricomycetes   | Hymenochaetales    | Schizoporaceae  | Hyphodontia |
|                     | radula     | Agaricomycetes   | Hymenochaetales    | Schizoporaceae  | Hyphodontia |
|                     | sambuci    | Agaricomycetes   | Hymenochaetales    | Schizoporaceae  | Hyphodontia |
|                     | sp.        | Agaricomycetes   | Hymenochaetales    | Schizoporaceae  | Hyphodontia |
|                     | spathulata | Agaricomycetes   | Hymenochaetales    | Schizoporaceae  | Hyphodontia |
|                     | subalutacea| Agaricomycetes   | Hymenochaetales    | Schizoporaceae  | Hyphodontia |
|                     | tuberculata| Agaricomycetes   | Hymenochaetales    | Schizoporaceae  | Hyphodontia |
| Hypochniellum       | ovoideum   | Agaricomycetes   | Amylocorticaceae   | Amylocorticaceae| Hypochniellum |
| Hypochnicium        | geogenium  | Agaricomycetes   | Polyporales        | Podoscyphaceae  | Hypochnicium |
|                     | wakefieldiae| Agaricomycetes  | Polyporales        | Podoscyphaceae  | Hypochnicium |
| Inonotus             | cuticularis| Agaricomycetes   | Hymenochaetales    | Hymenochaetaeae | Inonotus |
|                     | hispidus   | Agaricomycetes   | Hymenochaetales    | Hymenochaetaeae | Inonotus |
|                     | lonicerinus| Agaricomycetes   | Hymenochaetales    | Hymenochaetaeae | Inonotus |
|                     | obliquus   | Agaricomycetes   | Hymenochaetales    | Hymenochaetaeae | Inonotus |
|                     | rheades    | Agaricomycetes   | Hymenochaetales    | Hymenochaetaeae | Inonotus |
| Irpex                | lacteus    | Agaricomycetes   | Polyporales        | Meruliaceae     | Irpex   |
| Junghuhnia           | nitida     | Agaricomycetes   | Polyporales        | Steccherinaceae | Junghuhnia |
| Lachnella            | albiovioscens| Agaricomycetes | Agaricales         | Tricholomataeae | Lachnella |
|                     | sp.        | Agaricomycetes   | Agaricales         | Tricholomataeae | Lachnella |
| Laetiporus           | sulphureus | Agaricomycetes   | Polyporales        | Fomitopsidaceae | Laetiporus |
| Lagarobasidium       | detriticum | Agaricomycetes   | Hymenochaetales    | Schizoporaceae  | Lagarobasidium |
| **Laxitextum bicolor** | 2 | Agaricomycetes | Russulales | Gloeocystidiellaceae | **Laxitextum** |
|--------------------|---|-----------------|-----------|----------------------|----------------|
| **Lentaria patouillardi** | 3 | Agaricomycetes | Gomphales | Lentariaceae | **Lentaria** |
| **Lenzites betulina** | 1 | Agaricomycetes | Polyporales | Coriolaceae | **Lenzites** |
| **Lenzites warnieri** | 7 | Agaricomycetes | Polyporales | Coriolaceae | **Lenzites** |
| **Leptosporomyces galzinii** | 1 | Agaricomycetes | Atheliiales | Atheliaceae | **Leptosporomyces** |
| **Leptosporomyces mundus** | 1 | Agaricomycetes | Atheliiales | Atheliaceae | **Leptosporomyces** |
| **Leucozyrophana mollusca** | 12 | Agaricomycetes | Boletales | Boletales fam incertae sedis | **Leucozyrophana** |
| **Leucozyrophana pinastri** | 1 | Agaricomycetes | Boletales | Boletales fam incertae sedis | **Leucozyrophana** |
| **Loweomyces fractipes** | 2 | Agaricomycetes | Polyporales | Steccherinaceae | **Loweomyces** |
| **Macrotyphula fistulosa** | 4 | Agaricomycetes | Agaricales | Typhulaceae | **Macrotyphula** |
| **Macrotyphula juncea** | 10 | Agaricomycetes | Agaricales | Typhulaceae | **Macrotyphula** |
| **Maireina maxima** | 2 | Agaricomycetes | Agaricales | Niaceae | **Maireina** |
| **Mensularia radiata** | 18 | Agaricomycetes | Hymenochaetales | Hymenochaetaceae | **Mensularia** |
| **Merismodes fasciculata** | 5 | Agaricomycetes | Agaricales | Tricholomataceae | **Merismodes** |
| **Merulius tremellosus** | 26 | Agaricomycetes | Polyporales | Meruliaceae | **Merulius** |
| **Metulodontia nivea** | 1 | Agaricomycetes | Russulales | Peniophoraceae | **Metulodontia** |
| **Mucronella calva** | 4 | Agaricomycetes | Agaricales | Clavariaceae | **Mucronella** |
| **Mucronella flavia** | 1 | Agaricomycetes | Agaricales | Clavariaceae | **Mucronella** |
| **Mycoacia columellifera** | 1 | Agaricomycetes | Polyporales | Meruliaceae | **Mycoacia** |
| **Mycoacia fuscoatra** | 2 | Agaricomycetes | Polyporales | Meruliaceae | **Mycoacia** |
| **Mycoacia uda** | 7 | Agaricomycetes | Polyporales | Meruliaceae | **Mycoacia** |
| **Mycoaciella bispora** | 4 | Agaricomycetes | Polyporales | Meruliaceae | **Mycoaciella** |
| **Odontia ferruginea** | 1 | Agaricomycetes | Thelephorales | Thelephoraceae | **Odontia** |
| Species                        | Order       | Family            | Subfamily | Genus            | Subgenus | Infrageneric Group |
|-------------------------------|-------------|-------------------|-----------|------------------|----------|-------------------|
| *Odontia fibrosa*             | Agaricomycetes | Thelephorales | Thelephoraceae | *Odontia* |          |                   |
| *Oxyporus corticola*          | Agaricomycetes | Hymenochaetales | Schizoporaceae | *Oxyporus* |          |                   |
| *Oxyporus latermarginatus*    | Agaricomycetes | Hymenochaetales | Schizoporaceae | *Oxyporus* |          |                   |
| *Oxyporus obducens*           | Agaricomycetes | Hymenochaetales | Schizoporaceae | *Oxyporus* |          |                   |
| *Oxyporus similis*            | Agaricomycetes | Hymenochaetales | Schizoporaceae | *Oxyporus* |          |                   |
| *Oxyporus sp.*                | Agaricomycetes | Hymenochaetales | Schizoporaceae | *Oxyporus* |          |                   |
| *Paullicorticium pearsonii*   | Agaricomycetes | Polyporales | Polyporales fam incertae sedis | *Paullicorticium* |          |                   |
| *Peniophora cinerea*          | Agaricomycetes | Russulales | Peniophoraceae | *Peniophora* |          |                   |
| *Peniophora erikssonii*       | Agaricomycetes | Russulales | Peniophoraceae | *Peniophora* |          |                   |
| *Peniophora incamata*         | Agaricomycetes | Russulales | Peniophoraceae | *Peniophora* |          |                   |
| *Peniophora laeta*            | Agaricomycetes | Russulales | Peniophoraceae | *Peniophora* |          |                   |
| *Peniophora lilacea*          | Agaricomycetes | Russulales | Peniophoraceae | *Peniophora* |          |                   |
| *Peniophora limitata*         | Agaricomycetes | Russulales | Peniophoraceae | *Peniophora* |          |                   |
| *Peniophora lycii*            | Agaricomycetes | Russulales | Peniophoraceae | *Peniophora* |          |                   |
| *Peniophora nuda*             | Agaricomycetes | Russulales | Peniophoraceae | *Peniophora* |          |                   |
| *Peniophora pini*             | Agaricomycetes | Russulales | Peniophoraceae | *Peniophora* |          |                   |
| *Peniophora polygonia*        | Agaricomycetes | Russulales | Peniophoraceae | *Peniophora* |          |                   |
| *Peniophora quercina*         | Agaricomycetes | Russulales | Peniophoraceae | *Peniophora* |          |                   |
| *Peniophora rufomarginata*    | Agaricomycetes | Russulales | Peniophoraceae | *Peniophora* |          |                   |
| *Peniophora violaceolivida*   | Agaricomycetes | Russulales | Peniophoraceae | *Peniophora* |          |                   |
| *Peniophorella pallida*       | Agaricomycetes | Hymenochaetales | Hymenochaetales fam incertae sedis | *Peniophorella* |          |                   |
| *Peniophorella praetermissa*  | Agaricomycetes | Hymenochaetales | Hymenochaetales fam incertae sedis | *Peniophorella* |          |                   |
| *Peniophorella pubera*        | Agaricomycetes | Hymenochaetales | Hymenochaetales fam incertae sedis | *Peniophorella* |          |                   |
| **Peniophorella tsugae** | 1 | Agaricomycetes | Hymenochaetales | Hymenochaetales fam incertae sedis | Peniophorella |
|-------------------------|---|----------------|-----------------|------------------------------------|--------------|
| **Perenniporia narymica** | 1 | Agaricomycetes | Polyporales | Ganodermataceae | Perenniporia |
| **Phaeolus swineinitzii** | 2 | Agaricomycetes | Polyporales | Fomitopsidaceae | Phaeolus |
| **Phanerochaete cumulodentata** | 5 | Agaricomycetes | Polyporales | Meruliaceae | Phanerochaete |
| **Phanerochaete deflectens** | 1 | Agaricomycetes | Polyporales | Meruliaceae | Phanerochaete |
| **Phanerochaete jose-ferreirae** | 2 | Agaricomycetes | Polyporales | Meruliaceae | Phanerochaete |
| **Phanerochaete livescens** | 3 | Agaricomycetes | Polyporales | Meruliaceae | Phanerochaete |
| **Phanerochaete sanguinea** | 1 | Agaricomycetes | Polyporales | Meruliaceae | Phanerochaete |
| **Phanerochaete sordida** | 21 | Agaricomycetes | Polyporales | Meruliaceae | Phanerochaete |
| **Phanerochaete sp.** | 1 | Agaricomycetes | Polyporales | Meruliaceae | Phanerochaete |
| **Phanerochaete tuberculata** | 16 | Agaricomycetes | Polyporales | Meruliaceae | Phanerochaete |
| **Phanerochaete velutina** | 9 | Agaricomycetes | Polyporales | Meruliaceae | Phanerochaete |
| **Phellinus igniarius** | 8 | 14 | Agaricomycetes | Hymenochaetales | Hymenochaetales | Phellinus |
| **Phellinus pomaceus** | 4 | 2 | Agaricomycetes | Hymenochaetales | Hymenochaetales | Phellinus |
| **Phellinus populicola** | 2 | Agaricomycetes | Hymenochaetales | Hymenochaetales | Phellinus |
| **Phellinus rhamni** | 6 | Agaricomycetes | Hymenochaetales | Hymenochaetales | Phellinus |
| **Phellinus tremulae** | 5 | Agaricomycetes | Hymenochaetales | Hymenochaetales | Phellinus |
| **Phlebia acerina** | 7 | 1 | Agaricomycetes | Polyporales | Meruliaceae | Phlebia |
| **Phlebia albida** | 1 | Agaricomycetes | Polyporales | Meruliaceae | Phlebia |
| **Phlebia bresadolai** | 1 | Agaricomycetes | Polyporales | Meruliaceae | Phlebia |
| **Phlebia lilascens** | 2 | Agaricomycetes | Polyporales | Meruliaceae | Phlebia |
| **Phlebia radiata** | 9 | 5 | Agaricomycetes | Polyporales | Meruliaceae | Phlebia |

Ordynets A et al
| Genus                  | Species Code | Order          | Suborder          | Family           | Genus Code |
|-----------------------|--------------|----------------|-------------------|------------------|------------|
| *Phlebia*             | *subochracea* | Agaricomycetes | Polyporales       | Meruliaceae      | *Phlebia*  |
|                       | 10           |                |                   |                  |            |
| *Phlebia*             | *tremelloidea* | Agaricomycetes | Polyporales       | Meruliaceae      | *Phlebia*  |
|                       | 1            |                |                   |                  |            |
| *Phlebia*             | *tuberculata* | Agaricomycetes | Polyporales       | Meruliaceae      | *Phlebia*  |
|                       | 1            |                |                   |                  |            |
| *Phlebiopsis*         | *gigantea*   | Agaricomycetes | Polyporales       | Meruliaceae      | *Phlebiopsis* |
|                       | 3            |                |                   |                  |            |
|                       | 4            |                |                   |                  |            |
| *Phylloporia*         | *ribis*      | Agaricomycetes | Polyporales       | Hymenochaetales  | *Phylloporia* |
|                       | 1            |                |                   | Hymenochaetaeace |            |
|                       | 4            |                |                   |                  |            |
| *Piptoporus*          | *betulinus*  | Agaricomycetes | Polyporales       | Fomitopsidaceae  | *Piptoporus* |
|                       | 2            |                |                   |                  |            |
|                       | 11           |                |                   |                  |            |
| *Piptoporus*          | *quercinus*  | Agaricomycetes | Polyporales       | Fomitopsidaceae  | *Piptoporus* |
|                       | 1            |                |                   |                  |            |
| *Polyporus*           | *alveolaris* | Agaricomycetes | Polyporales       | Polyporaceae     | *Polyporus* |
|                       | 5            |                |                   |                  |            |
|                       | 5            |                |                   |                  |            |
| *Polyporus*           | *arcularius* | Agaricomycetes | Polyporales       | Polyporaceae     | *Polyporus* |
|                       | 6            |                |                   |                  |            |
|                       | 5            |                |                   |                  |            |
| *Polyporus*           | *ciliatus*   | Agaricomycetes | Polyporales       | Polyporaceae     | *Polyporus* |
|                       | 1            |                |                   |                  |            |
| *Polyporus*           | *squamosus*  | Agaricomycetes | Polyporales       | Polyporaceae     | *Polyporus* |
|                       | 4            |                |                   |                  |            |
| *Polyporus*           | *varius*     | Agaricomycetes | Polyporales       | Polyporaceae     | *Polyporus* |
|                       | 2            |                |                   |                  |            |
| *Porodaedalea*        | *pini*       | Agaricomycetes | Hymenochaetales   | Hymenochaetaeace | *Porodaedalea* |
|                       | 4            |                |                   | Hymenochaetaeace |            |
|                       | 4            |                |                   |                  |            |
| *Porostereum*         | *spadiceum*  | Agaricomycetes | Polyporales       | Meruliaceae      | *Porostereum* |
|                       | 21           |                |                   |                  |            |
|                       | 5            |                |                   |                  |            |
| *Postia*              | *alni*       | Agaricomycetes | Polyporales       | Fomitopsidaceae  | *Postia* |
|                       | 15           |                |                   |                  |            |
| *Postia*              | *floriformis*| Agaricomycetes | Polyporales       | Fomitopsidaceae  | *Postia* |
|                       | 1            |                |                   |                  |            |
| *Postia*              | *leucomallella* | Agaricomycetes | Polyporales       | Fomitopsidaceae  | *Postia* |
|                       | 8            |                |                   |                  |            |
| *Postia*              | *stiptica*   | Agaricomycetes | Polyporales       | Fomitopsidaceae  | *Postia* |
|                       | 1            |                |                   |                  |            |
| *Postia*              | *tephroleuca*| Agaricomycetes | Polyporales       | Fomitopsidaceae  | *Postia* |
|                       | 1            |                |                   |                  |            |
| *Pseudoinonotus*      | *dryadeus*   | Agaricomycetes | Hymenochaetales   | Hymenochaetaeace | *Pseudoinonotus* |
|                       | 2            |                |                   | Hymenochaetaeace |            |
| *Radulodon*           | *aneirinus*  | Agaricomycetes | Polyporales       | Cerrenaceae      | *Radulodon* |
|                       | 5            |                |                   |                  |            |
| *Radulomyces*         | *confluens*  | Agaricomycetes | Agaricales        | Pterulaceae      | *Radulomyces* |
|                       | 107          |                |                   |                  |            |
|                       | 2            |                |                   |                  |            |
| Species                  | Order          | Family         | Genus          | Species              | Order          | Family         | Genus          | Species              |
|--------------------------|----------------|----------------|----------------|----------------------|----------------|----------------|----------------|----------------------|
| Radulomyces molaris      | Agaricomycetes | Agaricales     | Pterulaceae    | Radulomyces          |                |                |                |                      |
| Ramaria abietina         | Agaricomycetes | Gomphales      | Gomphaceae     | Ramaria              |                |                |                |                      |
| Ramaria corrugata        | Agaricomycetes | Gomphales      | Gomphaceae     | Ramaria              |                |                |                |                      |
| Ramaria flaccida         | Agaricomycetes | Gomphales      | Gomphaceae     | Ramaria              |                |                |                |                      |
| Ramaria ochracea         | Agaricomycetes | Gomphales      | Gomphaceae     | Ramaria              |                |                |                |                      |
| Ramaria stricta          | Agaricomycetes | Gomphales      | Gomphaceae     | Ramaria              |                |                |                |                      |
| Resupinatus poriaeformis| Agaricomycetes | Agaricales     | Tricholomataceae| Resupinatus           |                |                |                |                      |
| Rigidoporus pouzarrii    | Agaricomycetes | Polyporales    | Meripilaceae   | Rigidoporus          |                |                |                |                      |
| Rigidoporus sanguinolentus| Agaricomycetes | Polyporales    | Meripilaceae   | Rigidoporus          |                |                |                |                      |
| Royoporus badius         | Agaricomycetes | Polyporales    | Polyporaceae   | Royoporus            |                |                |                |                      |
| Sarcodontia pachyodon    | Agaricomycetes | Polyporales    | Meruliaceae    | Sarcodontia          |                |                |                |                      |
| Schizophyllum amplum     | Agaricomycetes | Agaricales     | Schizophyllaceae| Schizophyllum         |                |                |                |                      |
| Schizophyllum commune    | Agaricomycetes | Agaricales     | Schizophyllaceae| Schizophyllum         |                |                |                |                      |
| Schizopora flavipora     | Agaricomycetes | Hymenochaetales| Schizoporaceae | Schizopora            |                |                |                |                      |
| Schizopora paradoxa      | Agaricomycetes | Hymenochaetales| Schizoporaceae | Schizopora            |                |                |                |                      |
| Scopuloides hydnoides    | Agaricomycetes | Polyporales    | Meruliaceae    | Scopuloides           |                |                |                |                      |
| Scytinostroma hemidichophyticum | Agaricomycetes | Russulales | Lachnocladiaceae | Scytinostroma |                |                |                |                      |
| Serpula himantioides     | Agaricomycetes | Boletales      | Serpulaceae    | Serpula               |                |                |                |                      |
| Sistotrema binucleosporum| Agaricomycetes | Cantharellales | Cantharellales fam incertae sedis | Sistotrema |                |                |                |                      |
| Sistotrema brinkmannii   | Agaricomycetes | Cantharellales | Cantharellales fam incertae sedis | Sistotrema |                |                |                |                      |
| Sistotrema diademiferum  | Agaricomycetes | Cantharellales | Cantharellales fam incertae sedis | Sistotrema |                |                |                |                      |
| Sistotrema oblongisporum | 1 | Agaricomycetes | Cantharellales | Cantharellales fam incertae sedis | Sistotrema |
|-------------------------|---|----------------|----------------|----------------------------------|-----------|
| Sistotrema octosporum   | 1 | Agaricomycetes | Cantharellales | Cantharellales fam incertae sedis | Sistotrema |
| Sistotrema porulosum    | 1 | Agaricomycetes | Cantharellales | Cantharellales fam incertae sedis | Sistotrema |
| Sistotrema resinicystidium | 1 | Agaricomycetes | Cantharellales | Cantharellales fam incertae sedis | Sistotrema |
| Sistotrema semanderi    | 2 | Agaricomycetes | Cantharellales | Cantharellales fam incertae sedis | Sistotrema |
| Sistotrema sp.          | 3 | Agaricomycetes | Cantharellales | Cantharellales fam incertae sedis | Sistotrema |
| Sistotremastrum niveocremeum | 6 | Agaricomycetes | Trechisporales | Trechisporales fam incertae sedis | Sistotremastrum |
| Sistotremastrum suecicum | 16 | Agaricomycetes | Trechisporales | Trechisporales fam incertae sedis | Sistotremastrum |
| Sistotremella hauerslevii | 1 | Agaricomycetes | Trechisporales | Hydnodontaceae | Sistotremella |
| Skeletocutis amorpha    | 3 | Agaricomycetes | Polyporales    | Fomitopsidaceae | Skeletocutis |
| Skeletocutis carneogrisea | 17 | 2 | Agaricomycetes | Polyporales | Fomitopsidaceae | Skeletocutis |
| Skeletocutis nivea      | 6 | Agaricomycetes | Polyporales | Fomitopsidaceae | Skeletocutis |
| Stecherinum bourdotii   | 2 | Agaricomycetes | Polyporales    | Stecherinaceae | Stecherinum |
| Stecherinum fimbriatum  | 21 | 6 | Agaricomycetes | Polyporales | Stecherinaceae | Stecherinum |
| Stecherinum ochraceum   | 13 | 6 | Agaricomycetes | Polyporales | Stecherinaceae | Stecherinum |
| Stecherinum oreophilum  | 1 | Agaricomycetes | Polyporales    | Stecherinaceae | Stecherinum |
| Stereum gausapatum     | 2 | 2 | Agaricomycetes | Russulales | Stereaceae | Stereum |
| Stereum hirsutum        | 32 | 24 | Agaricomycetes | Russulales | Stereaceae | Stereum |
| Stereum sanguinolentum  | 4 | 4 | Agaricomycetes | Russulales | Stereaceae | Stereum |
| Name                          | Genus     | Family         | Order          | Class          | Subphylum | Kingdom |
|-------------------------------|-----------|----------------|----------------|----------------|-----------|---------|
| Stereum subtomentosum        | Agaricomycetes | Russulales     | Stereaceae     | Stereum        |
| Stypella dubia               | Agaricomycetes | Auriculariales | Hyaloricaeae   | Stypella       |
| Stypella grilletii           | Agaricomycetes | Auriculariales | Hyaloricaeae   | Stypella       |
| Subulicystidium longisporum  | Agaricomycetes | Russulales     | Peniophoraceae | Subulicystidium |
| Thanatephorus fusisporus      | Agaricomycetes | Cantharellaes  | Ceratobasidiaceae | Thanatephorus |
| Thelephora terrestris        | Agaricomycetes | Thelephorales   | Thelephoraceae | Thelephora     |
| Thelephorales sp.            | Agaricomycetes | Thelephorales   | Thelephorales fam incertae sedis | Thelephorales gen incertae sedis |
| Tomentella badia             | Agaricomycetes | Thelephorales   | Thelephoraceae | Tomentella     |
| Tomentella ferruginea        | Agaricomycetes | Thelephorales   | Thelephoraceae | Tomentella     |
| Tomentella italica           | Agaricomycetes | Thelephorales   | Thelephoraceae | Tomentella     |
| Tomentella pilosa            | Agaricomycetes | Thelephorales   | Thelephoraceae | Tomentella     |
| Tomentella radiosap           | Agaricomycetes | Thelephorales   | Thelephoraceae | Tomentella     |
| Tomentella sp.               | Agaricomycetes | Thelephorales   | Thelephoraceae | Tomentella     |
| Tomentella spinosispora      | Agaricomycetes | Thelephorales   | Thelephoraceae | Tomentella     |
| Tomentella stuposa           | Agaricomycetes | Thelephorales   | Thelephoraceae | Tomentella     |
| Tomentella sublilacina       | Agaricomycetes | Thelephorales   | Thelephoraceae | Tomentella     |
| Tomentella subtestaceae      | Agaricomycetes | Thelephorales   | Thelephoraceae | Tomentella     |
| Tomentellopsis bresadolana    | Agaricomycetes | Thelephorales   | Thelephoraceae | Tomentellopsis |
| Tomentellopsis echinospora    | Agaricomycetes | Thelephorales   | Thelephoraceae | Tomentellopsis |
| Tomentellopsis pulchella      | Agaricomycetes | Thelephorales   | Thelephoraceae | Tomentellopsis |
| Tomentellopsis sp.           | Agaricomycetes | Thelephorales   | Thelephoraceae | Tomentellopsis |
| Trametes hirsuta             | Agaricomycetes | Polyporales    | Corioliciaeae  | Trametes       |
| Trametes ljubarskyi          | Agaricomycetes | Polyporales    | Corioliciaeae  | Trametes       |
| Fungus                  | Infraspecific Rank | Family                | Order            | Class               | Fungus                      |
|------------------------|-------------------|-----------------------|------------------|---------------------|-----------------------------|
| Trametes ochracea      | 22                | Agaricomycetes        | Polyporales      | Agaricomycetes      | Trametes                    |
| Trametes pubescens     | 1                 | Agaricomycetes        | Polyporales      | Agaricomycetes      | Trametes                    |
| Trametes suaveolens    | 2                 | Agaricomycetes        | Polyporales      | Agaricomycetes      | Trametes                    |
| Trametes trogii        | 13                | Agaricomycetes        | Polyporales      | Agaricomycetes      | Trametes                    |
| Trametes versicolor     | 9                 | Agaricomycetes        | Polyporales      | Agaricomycetes      | Trametes                    |
| Trametopsis cervina    | 3                 | Agaricomycetes        | Polyporales      | Meruliaceae         | Trametopsis                 |
| Trechinothus smaradae  | 1                 | Agaricomycetes        | Trichisporales   | Hydnodontaceae      | Trechinothus smaradae       |
| Trechispora alnicola   | 3                 | Agaricomycetes        | Trichisporales   | Hydnodontaceae      | Trechispora                 |
| Trechispora cohaerens  | 19                | Agaricomycetes        | Trichisporales   | Hydnodontaceae      | Trechispora                 |
| Trechispora confinis   | 2                 | Agaricomycetes        | Trichisporales   | Hydnodontaceae      | Trechispora                 |
| Trechispora farinacea  | 4                 | Agaricomycetes        | Trichisporales   | Hydnodontaceae      | Trechispora                 |
| Trechispora hypoleucum | 1                 | Agaricomycetes        | Trichisporales   | Hydnodontaceae      | Trechispora                 |
| Trechispora kavinoides | 1                 | Agaricomycetes        | Trichisporales   | Hydnodontaceae      | Trechispora                 |
| Trechispora microspora | 2                 | Agaricomycetes        | Trichisporales   | Hydnodontaceae      | Trechispora                 |
| Trechispora nivea      | 2                 | Agaricomycetes        | Trichisporales   | Hydnodontaceae      | Trechispora                 |
| Trechispora praeocata  | 1                 | Agaricomycetes        | Trichisporales   | Hydnodontaceae      | Trechispora                 |
| Trechispora stevensonii| 15                | Agaricomycetes        | Trichisporales   | Hydnodontaceae      | Trechispora                 |
| Trichaptum biforme     | 6                 | Agaricomycetes        | Hymenochaetales  | Hymenochaetales fam incertae sedis | Trichaptum biforme |
| Trichaptum fuscoviolaceum | 29 | Agaricomycetes        | Hymenochaetales  | Hymenochaetales fam incertae sedis | Trichaptum fuscoviolaceum |
| Tubulicrinis calothrix | 1                 | Agaricomycetes        | Hymenochaetales  | Tubulicrinaceae     | Tubulicrinis                |
| Common Name           | Genus          | Family           | Order             | Class          | Kingdom          |
|----------------------|---------------|------------------|-------------------|---------------|------------------|
| Tubulicrinis strangulatus | Tubulicrinis   | Agaricomycetes   | Hymenochaetales   | Tubulicrinaceae | Agaricomycetes   |
| Tubulicrinis subulatus | Tubulicrinis   | Agaricomycetes   | Hymenochaetales   | Tubulicrinaceae | Agaricomycetes   |
| Tulasnella albida    | Tulasnella    | Agaricomycetes   | Cantharellales    | Tulasnellaceae | Hymenochaetales  |
| Tulasnella brinkmannii | Tulasnella    | Agaricomycetes   | Cantharellales    | Tulasnellaceae | Hymenochaetales  |
| Tulasnella deliquescens | Tulasnella    | Agaricomycetes   | Cantharellales    | Tulasnellaceae | Hymenochaetales  |
| Tulasnella eichlerianna | Tulasnella   | Agaricomycetes   | Cantharellales    | Tulasnellaceae | Hymenochaetales  |
| Tulasnella hyalina   | Tulasnella    | Agaricomycetes   | Cantharellales    | Tulasnellaceae | Cantharellales   |
| Tulasnella pallida   | Tulasnella    | Agaricomycetes   | Cantharellales    | Tulasnellaceae | Cantharellales   |
| Tulasnella pinicola  | Tulasnella    | Agaricomycetes   | Cantharellales    | Tulasnellaceae | Cantharellales   |
| Tulasnella pruinos a | Tulasnella    | Agaricomycetes   | Cantharellales    | Tulasnellaceae | Cantharellales   |
| Tulasnella saveloides | Tulasnella    | Agaricomycetes   | Cantharellales    | Tulasnellaceae | Cantharellales   |
| Tulasnella sp.       | Tulasnella    | Agaricomycetes   | Cantharellales    | Tulasnellaceae | Cantharellales   |
| Tulasnella thelephorea | Tulasnella    | Agaricomycetes   | Cantharellales    | Tulasnellaceae | Cantharellales   |
| Tulasnella tomaculum | Tulasnella    | Agaricomycetes   | Cantharellales    | Tulasnellaceae | Cantharellales   |
| Tulasnella violea    | Tulasnella    | Agaricomycetes   | Cantharellales    | Tulasnellaceae | Cantharellales   |
| Typhula erythropus   | Typhula       | Agaricomycetes   | Agaricales        | Typhulaceae    | Agaricales       |
| Typhula euphorbiae   | Typhula       | Agaricomycetes   | Agaricales        | Typhulaceae    | Agaricales       |
| Typhula micans       | Typhula       | Agaricomycetes   | Agaricales        | Typhulaceae    | Agaricales       |
| Typhula setipes      | Typhula       | Agaricomycetes   | Agaricales        | Typhulaceae    | Agaricales       |
| Typhula sp.          | Typhula       | Agaricomycetes   | Agaricales        | Typhulaceae    | Agaricales       |
| Typhula sphaeroidea  | Typhula       | Agaricomycetes   | Agaricales        | Typhulaceae    | Agaricales       |
| Tyromyces chioneus   | Tyromyces     | Agaricomycetes   | Polyporales       | Fomitopsidaceae| Agaricales       |
| Vararia ochroleuca   | Vararia       | Agaricomycetes   | Russulales        | Lachnocladiaceae| Agaricales       |
Most of the species belong to subphylum Agaricomycotina, class Agaricomycetes and represent 14 orders (Agaricales, Atheliales, Amylocorticiales, Auriculariales, Cantharellales, Boletales, Gloeophyllales, Corticiales, Hymenochaetales, Gomphales, Polyporales, Russulales, Thelephorales and Trechisporales). One genus belongs to a separate lineage of presumably order level (Xenasmatella spp.) and five species have an unclear position within Agaricomycetes (three Dendrothele spp., Granulobasidium vellereum and Trechinothus smardae). Three species in the dataset represent the subphylum Pucciniomycotina: Helicogloea farinacea and H. lagerheimii (Atractiellales, Atractiellomycetes) and Colacogloea peniophorae (Microbotryomycetes).

The dataset includes several species described or raised to the species level status in the the last two decades: Antrodiella ichnusana, Lyomyces erastii, L. incrustatus, Phlebia tuberculata and Xylodon tuberculatus. We could use these names for identification purposes by 2012, i.e. by the end of specimen identification phase of the project. However, to some specimens, new important identifications were added in the course of taxonomic revisions published after 2011 (Table 4). Further important recent nomenclatural innovations reflected in the dataset are treating Tomentella crinalis and T. fibrosa in the separate genus Odontia, following Tedersoo et al. (2014).

Table 4.
Re-identifications of the eastern Ukrainian fungal collections based on recent taxonomical revisions. For all such species, the specimens were studied and cited personally by the authors of the new names (but see comment for Antrodia hyalina).

| Original identification | Current name        | Reference                                    |
|-------------------------|---------------------|----------------------------------------------|
| Antrodia pulvinascens    | Antrodia hyalina    | V. Spirin, personal communication; see also Spirin et al. 2013 |
| Eichleriella deglubens   | Heteroradulum kmetii | Malycheva and Spirin 2017                   |
From 19 specimens representing 16 species, we generated 19 nuclear ribosomal DNA ITS sequences and four 28S sequences. Further seven ITS and two 28S sequences were produced in collaborative studies focusing on a particular taxonomic problem (see Table 4). The sequences can be found in the public repositories UNITE (Kõljalg et al. 2013) and GenBank (Benson et al. 2013) and linked to the respective CWU vouchers in PlutoF. The sequence UDB033929*1 from specimen CWU4336*1 is the first barcode sequence for the species Phellinus rhamni. Our photographs of Dichomitus squalens (CWU6509) and Lenzites warnieri (CWU6505) linked to the dataset illustrate the respective species in the latest key to European polypores (Ryvarden and Melo 2014).

Traits coverage

The assignments to the 1) lifestyle and 2) fruiting-body principal configuration (morph) type were provided for each species. Lifestyle is a predefined field in PlutoF, from which we used the categories saprotroph, symbiotroph and parasite.

The principal fruitbody configuration of macrofungi is an increasingly addressed species trait in the ecological and evolutionary studies (Abrego et al. 2016, Hibbett 2007). We classified the species of our dataset into the following groups: those where fruitbodies have smooth spore-producing surface (corticiod), species with cup-shaped fruitbodies (cyphelloid), species with toothed hymenophore (hydnoid), species developing pores (poroid), species having gelified fruiting bodies (heterobasidial) and species having coralloid, club-like or funnel-like fruiting bodies which grow negatively geotropic (clavarioid). As the trait module for fungi in PlutoF is still under development (July 2017), we specified the fruiting body morph in the field "Identifications.Remarks" for each specimen and observation.

Temporal coverage

Data range: 2007-3-09 - 2011-5-07.

Collection data

Collection name: All the specimens are stored in the V.N. Karazin National University Herbarium, Kharkiv, Ukraine (CWU). Many specimens belonging to the order Thelephorales are recorded in PlutoF having their main deposition place as: University of Tartu; Natural History Museum and Botanic Garden; Botanical and Mycological Museum;
Department of Mycology, TU(M). The duplicates of CWU specimens studied by colleagues were placed in the herbaria of their institutions: M.G. Kholodny Institute of Botany, National Academy of Sciences of Ukraine (KW), V.F. Kuprevich Institute of Experimental Botany, Belarus Academy of Sciences (MSK), V.L. Komarov Botanical Institute (LE) and Institute of Plant and Animal Ecology (SVER) of the Russian Academy of Sciences, University of Gothenburg (GB) and personal collections of Josef Vlasák, Wolfgang Dämon, Heikki Kotiranta and Masoomeh Ghobad-Nejhad (will join the Iranian Cryptogamic Herbarium, ICH).

Collection identifier: CWU, TU(M), KW, MSK, LE, SVER, GB, ICH.

Specimen preservation method: Fresh specimens were dried with an electric fan dryer on the day of collection and placed in grip seal plastic bags. Shortly after drying, the specimens were placed into a deep freezer (−20°C) for a week, to prevent their destruction by insects. Specimens are preserved in cardboard herbarium boxes.

Curatorial unit: CWU fungal specimens are curated by the Department of Mycology and Plant Resistance of V.N. Karazin Kharkiv National University, Ukraine.

Usage rights

Use license: Open Data Commons Attribution License

IP rights notes: The dataset is hosted by PlutoF and accessible from the latter under Attribution-NonCommercial-ShareAlike 4.0 International License (CC BY-NC-SA 4.0). The source records compiled into the dataset are available in the dedicated PlutoF project (http://plutof.ut.ee/#/study/view/38925). Project specimens and sequences are open for alternative taxon identifications. The occurrence records may also be viewed in the GBIF occurrence dataset of CWU herbarium (Savchenko 2017, https://doi.org/10.15468/kuspi6) and the GBIF dataset of PlutoF platform observations (PlutoF 2017, https://doi.org/10.15468/h7qtfd). All data resources are also provided in Suppl. material 1.

Data resources

Data package title: Aphylloroid fungi in insular woodlands of eastern Ukraine.

Resource link: http://dx.doi.org/10.15156/BIO/587471

Alternative identifiers: https://plutof.ut.ee/#/study/view/38925

Number of data sets: 3

Data set name: Specimens

Character set: UTF-8

Download URL: https://data.datacite.org/application/zip/10.15156/BIO/587471
Data format: Darwin Core Archive

Data format version: 1.0

Description: Specimens of aphyllophoroid fungi (non-gilled macroscopic Basidiomycota) from eastern Ukraine collected between 2007 and 2011.

| Column label       | Column description                  |
|--------------------|-------------------------------------|
| http://rs.tdwg.org/dwc/terms/ | See terms in the link               |

Data set name: Observations

Character set: UTF-8

Download URL: https://data.datacite.org/text/zip-1072799/10.15156/BIO/587471

Data format: Darwin Core Archive

Data format version: 1.0

Description: Observations of aphyllophoroid fungi (non-gilled macroscopic Basidiomycota) from eastern Ukraine made between 2007 and 2011.

| Column label       | Column description                  |
|--------------------|-------------------------------------|
| http://rs.tdwg.org/dwc/terms/ | See terms in the link               |

Data set name: Areas shape files

Character set: UTF-8

Download URL: http://data.datacite.org/text/x-rar/10.15156/BIO/587471

Data format: ESRI Shapefile

Description: Shapefile of all sampling areas used in the study

| Column label | Column description                        |
|--------------|------------------------------------------|
| id           | Short identifier without whitespaces (text string) |
| name         | Full names of areas (text string)         |
Additional information

Results communication

The results of species inventories in eastern Ukraine were communicated and discussed at several conferences and meetings attended by Alexander Ordynets and Alexander Akulov:

- Conferences for young scientists organised by M.G. Kholodny Institute of Botany, National Academy of Sciences of Ukraine (2008 in Kamianets-Podilskyi, 2009 in Kremianets, 2010 and 2011 in Kiev, Ukraine);
- Conferences for young scientists organised by V.N. Karazin National University in Kharkiv, Ukraine (2008-2011);
- Presentations on Ukrainian fungi at the Microbial Evolution Research Group, University of Oslo (2012-10-16) and Botanical Museum, University of Oslo (2014-03-27);
- Field course on identification of corticioid Basidiomycetes (2012-09-10 – 2012-09-15) and winter seminar (2013-02-25), organised by the Chair of Mycology, Institute of Ecology and EarthSciences, University of Tartu, Estonia;
- Presentation on Ukrainian fungi diversity at the Department of Mycology, University of Marburg, Germany (2013-06-17).

Outlook

While uploading and processing our data in the PlutoF system, we found that some species were missing in the PlutoF classification. Therefore we added manually to the PlutoF taxonomy one genus (*Heteroradulum*) and the six following species: *Basidiodendron deminutum*, *B. rimulentum*, *Heteroradulum kmetii*, *Hyphodontia incrustata*, *Maireina maxima* and *Trechinothus smaradce*. Two more species, *Sistotremla hauerslevi* and *Henningsomyces stipitatus*, were added to PlutoF classification by means of import from the GBIF Backbone Taxonomy of 2016. One plant species, *Prunus stepposa*, was also manually added to the Plantae kingdom of PlutoF taxonomy. These taxon additions will ease the data upload for subsequent PlutoF users.

Our data contribute to more than a doubling in size of the digitised CWU herbarium, the first and the largest digital collection outside Estonia hosted by PlutoF (Savchenko 2017). Our dataset sheds further light on the fungal diversity of Eastern Europe and it is anticipated that it will complement other data sources on European fungi in addressing macroecological and biogeographical questions. It is also hoped that the example of this data paper will promote further effective enrichment of PlutoF platform with fungal occurrence data.
Acknowledgements

We thank the administration and staff of the Luhansk and Ukrainian Steppe Nature Reserves, Sviati Hory National Nature Park and Valeriy Lovchinovskyy for immense help in organising field work. Irina Dudka and her colleagues from the Department of Mycology, M.G. Kholodny Institute of Botany provided comments at the designing phase of the project and Eugen Dykyi and Ihor Dzeverin commented on some preliminary results of data sampling. The voluntary help with the sampling and photographing specimens and sampling sites was provided by Olga Ternovska, Artem Bogatkov and Olena Bogatkova and occasionally by Oleg Prylutskyi, Iryna Kulyk and Eugen Nagornyi, all of whom are thanked for accompanying the team in the field. Kadri Põldmaa kindly shared her experience of modern light microscopy. Leif Ryvarden, Nils Hallenberg and Tatiana Atemasova provided some literature relevant to the project. We are indebted to our colleagues who helped with specimens identification: Wolfgang Dämon, Ivan Zmitrovich, Anton Shyriaev, Heikki Kotiranta, Masoomeh Ghobad-Nejad, Philomena Bodenstein, Sergey Volobuev, Viacheslav Spirin and Erast Parmasto. We thank Kessy Abarenkov, Allan Zirk and all other members of PlutoF team for help with data management. We thank editors and reviewers for the helpful comments on the manuscript.

Author contributions

Alexander Ordynets and Alexander Akulov are the main collectors of specimens and observations. Alexander Ordynets, Alexander Akulov, Eugene Yurchenko, Vera Malysheva, Urmas Kõljalg, Josef Vlasák, Karl-Henrik Larsson and Wolfgang Dämon identified the specimens. Urmas Kõljalg, Josef Vlasák, Karl-Henrik Larsson and Ewald Langer sequenced some of the specimens. Alexander Ordynets and Anton Savchenko uploaded data to the PlutoF workbench and further managed it. Alexander Ordynets wrote the first version of the manuscript and all co-authors contributed to the writing.

References

- Abarenkov K, Tedersoo L, Nilsson RH, Vellak K, Saar I, Veldre V, Parmasto E, Prous M, Aan A, Ots M, Kurina O, Ostonen I, Jõgeva J, Halapuu S, Põldmaa K, Toots M, Truu J, Larsson K, Kõljalg U (2010) PlutoF – a web-based workbench for ecological and taxonomic research, with an online implementation for fungal ITS sequences. Evolutionary Bioinformatics 189. https://doi.org/10.4137/ebo.s6271
- Abrego N, Halme P, Purhonen J, Ovaskainen O (2016) Fruit body based inventories in wood-inhabiting fungi: Should we replicate in space or time? Fungal Ecology 20: 225-232. https://doi.org/10.1016/j.funeco.2016.01.007
- Akulov AY, Usichenko AS, Leontyev DV, Yurchenko EO, Prydiuk NP (2003) Annotated checklist of aphyllophoroid fungi of Ukraine. Mycena 2 (2): 1-76. URL: http://dspace.univer.kharkov.ua/handle/123456789/5105
• Andrew C, Heegaard E, Halvorsen R, Martínez-Peña F, Egli S, Kirk P, Bässler C, Büntgen U, Aldea J, Heiland K, Boddy L, Kauserud H (2016) Climate impacts on fungal community and trait dynamics. Fungal Ecology 22: 17-25. https://doi.org/10.1016/j.funeco.2016.03.005

• Andrew C, Heegaard E, Kirk P, Bässler C, Heilmann-Clausen J, Krisai-Greilhuber I, Kuyper T, Senn-Irlet B, Büntgen U, Diez J, Egli S, Gange A, Halvorsen R, Høiland K, Nordén J, Rustøen F, Boddy L, Kauserud H (2017) Big data integration: Pan-European fungal species observations’ assembly for addressing contemporary questions in ecology and global change biology. Fungal Biology Reviews 31 (2): 88-98. https://doi.org/10.1016/j.fbr.2017.01.001

• Belgard A (1971) Steppe dendrology. Forest industry, Moscow, 336 pp. [In Russian].

• Benson D, Cavanaugh M, Clark K, Karsch-Mizrachi I, Lipman D, Ostell J, Sayers E (2013) GenBank. Nucleic Acids Research 41: D36-D42. https://doi.org/10.1093/nar/gks1195

• Bernicchia A, Gorjón SP (2010) Fungi Europaei. No 12. Corticiaceae s.l. Ed. Candusso, Italia.

• Bondarchuk VG (1959) Geology of Ukraine. Ukrainian SSR Academy of Sciences Press, Kiev. [In Ukrainian].

• Costello M, Michener W, Gahegan M, Zhang Z, Bourne P (2013) Biodiversity data should be published, cited, and peer reviewed. Trends in Ecology & Evolution 28 (8): 454-461. https://doi.org/10.1016/j.tree.2013.05.002

• Dahlberg A, Genney D, Heilmann-Clausen J (2010) Developing a comprehensive strategy for fungal conservation in Europe: current status and future needs. Fungal Ecology 3 (2): 50-64. https://doi.org/10.1016/j.funeco.2009.10.004

• Didukh YP, Pashkevich NA (2003) Ecological patterns of the vegetation distribution in the “Svyaty Gory” National Nature Park. Ukrainian Phytocenotic Transactions Series C 1 (20): 83-98. [In Ukrainian].

• EEA (2015) European Environment Agency, Biogeographical Regions, Europe 2015. http://www.eea.europa.eu/data-and-maps/data/biogeographical-regions-europe-2

• Fedorova I (1980) East European forest-steppe and steppe coniferous forests. In: Gribova SA, Isachenko TI, Lavrenko E (Eds) Vegetation of the European part of the USSR. Nauka, Leningrad. [In Russian].

• Gardner M (2013) Pinus sylvestris. The IUCN Red List of Threatened Species 2013 https://doi.org/10.2305/iucn.uk.2013-1.rlts.t42418a2978732.en

• Heilmann-Clausen J, Christensen M (2003) Fungal diversity on decaying beech logs – implications for sustainable forestry. Biodiversity and Conservation 12 (5): 953-973. https://doi.org/10.1023/A:1022825809503

• Heilmann-Clausen J, Barron E, Boddy L, Dahlberg A, Griffith G, Nordén J, Ovaskainen O, Perini C, Senn-Irlet B, Halme P (2014) A fungal perspective on conservation biology. Conservation Biology 29 (1): 61-68. https://doi.org/10.1111/cobi.12388

• Hibbett D (2007) After the gold rush, or before the flood? Evolutionary morphology of mushroom-forming fungi (Agaricomycetes) in the early 21st century. Mycological Research 111 (9): 1001-1018. https://doi.org/10.1016/j.mycres.2007.01.012

• Hibbett D, Abarenkov K, Köljalg U, Öpik M, Chai B, Cole J, Wang Q, Crous P, Robert V, Helgason T, Herr Jr, Kirk P, Lueschow S, O’Donnell K, Nilsson RH, Oono R, Schoch C, Smyth C, Walker DM, Porras-Alfaro A, Taylor JW, Geiser DM (2016) Sequence-based
classification and identification of fungi. Mycologia 108 (6): 1049-1068. https://doi.org/10.3852/16-130

- Hibbett DS, Bauer R, Binder M, Giachini AJ, Hosaka K, Justo A, Larsson E, Larsson KH, Lawrey JD, Miettinen O, Nagy LG, Nilsson RH, Weiss M, Thorn RG (2014) Agaricomycetes. In: McLaughlin DJ, Spatafora JW (Eds) Systematics and Evolution. The Mycota VII Part A. 2nd Edition. Springer, Berlin, Heidelberg, 56 pp. https://doi.org/10.1007/978-3-642-55318-9_14

- Jylhä K, Tuomenvirta H, Ruosteenoja K, Niemi-Hugaerts H, Keisu K, Karhu J (2010) Observed and projected future shifts of climatic zones in Europe and their use to visualize climate change information. Weather, Climate, and Society 2 (2): 148-167. https://doi.org/10.1175/2010wcas1010.1

- Kauserud H, Heegaard E, Büntgen U, Halvorsen R, Egli S, Senn-Irlet B, Krisai-Greilhuber I, Dämon W, Sparks T, Nordén J, Høiland K, Kirk P, Semenov M, Boddy L, Stenseth NC (2012) Warming-induced shift in European mushroom fruiting phenology. Proceedings of the National Academy of Sciences 109 (36): 14488-14493. https://doi.org/10.1073/pnas.1200789109

- Kirk PM, Cannon PF, Minter DW, Stalpers JA (2008) Dictionary of the Fungi . 10th Edition. CABI, Wallingford, UK. [ISBN 978-0851998268]

- Kõljalg U (1996) Tomentella (Basidiomycota) and related genera in temperate Eurasia. Fungi flora, Oslo. [ISBN 9788290724165]

- Kõljalg U, Nilsson RH, Abarenkov K, Tedersoo L, Taylor AFS, Bahram M, Bates ST, Bruns TD, Bengtsson-Palme J, Callaghan TM, Douglas B, Drenkhan T, Eberhardt U, Dueñas M, Grebenc T, Griffith GW, Hartmann M, Kirk PM, Kohout P, Larsson E, Lindahl BD, Lücking R, Martín MP, Matheny PB, Nguyen NH, Niskanen T, Oja J, Peay KG, Peintner U, Peterson M, Pöldmaa K, Saag L, Saar I, Schüßler A, Scott JA, Senés C, Smith ME, Suíja A, Taylor DL, Telleria MT, Weiss M, Larsson K (2013) Towards a unified paradigm for sequence-based identification of fungi. Molecular Ecology 22 (21): 5271-5277. https://doi.org/10.1111/mec.12481

- Krieglstin G, Kaiser A (2000) Die Großpilze Baden-Württembergs. Band 1. Allgemeiner Teil. Spezieller Teil: Ständerpilze: Gallert-, Rinden-, Stachel- und Porenpilze. Ulmer, Stuttgart. [ISBN 3800135280]

- Larsson K (1992) The genus Trechispora (Corticiaceae, Basidiomycetes). Dissertation. Göteborg University, Göteborg.

- Lodge DJ, Ammirati J, O'Dell TE, Mueller GM (2004) Collecting and describing macrofungi: inventory and monitoring methods. In: Mueller GM, Bills G, Foster MS (Eds) Biodiversity of Fungi . Elsevier Academic Press, San Diego, CA, 30 pp.

- Malysheva V, Spirin V (2017) Taxonomy and phylogeny of the Auriculariales (Agaricomycetes, Basidiomycota) with stereoid basidiocarps. Fungal Biology 121 (8): 689-715. https://doi.org/10.1016/j.funbio.2017.05.001

- Mora C, Tittensor D, Adl S, Simpson AB, Worm B (2011) How many species are there on Earth and in the ocean? PLoS Biology 9 (8): e1001127. https://doi.org/10.1371/journal.pbio.1001127

- Olson M, Dinerstein E, Wikramanayake E, Burgess H, Powell T, Underwood E, D'Amico J, Itoua I, Strand B, Morrison J, Loucks C, Allnutt T, Ricketts T, Kura Y, Lamoreux J, Wettengel W, Hedao P, Kassem K (2001) Terrestrial ecoregions of the world: a new map of life on Earth. Bioscience 51: 933-938. https://doi.org/10.1641/0006-3568(2001)051[0933:TEOTWA]2.0.CO;2
• Onyshchenko V, Diakova O, Karpenko Y (2007) Forests vegetation of Teplynska Dacha and Mayatska Dacha forests (National Nature Park “Sviaty Hory”). Chornomorskyi Botanical Journal 3 (2): 88-99. [In Ukrainian]. URL: http://cbj.kspu.edu/images/PDF/ChBotJ_2007_3_2_files/Onyshchenko_et_all_07.PDF
• Ordynets O, Akulov O (2012) Aphyllophoroid fungi of Stanychno-Luhanske division of Luhansk Nature Reserve. Nature Reserves in Ukraine 17 (1-2): 28-33. [In Ukrainian]. URL: http://dspace.univer.kharkov.ua/handle/123456789/12014
• Ordynets O, Akulov O, Helleman S (2013) First data about fungal diversity of the “Trekhizbenskyi Step” division of the Luhansk Nature Reserve. Chornomorskyi Botanical Journal 9 (1): 57-83. URL: http://cbj.kspu.edu/images/PDF/2013/9.1b/57-83.pdf
• Ordynets OV, Akulov OY (2011) Aphyllophoroid fungi of the “Cretaceous flora” division of Ukrainian Steppe Nature Reserve. Studia Biologica 5 (3): 109-124. [In Ukrainian]. URL: http://bioweb.lnu.edu.ua/studia/pdf/201153/2011_5_3_154.pdf
• Ordynets OV, Akulov OY, Usichenko AS (2012) Aphyllophoroid fungi of the Regional landscape park “Iziumska luka” and adjacent territories. Chornomorskyi Botanical Journal 8 (4): 413-431. [In Ukrainian]. URL: http://cbj.kspu.edu/images/PDF/2012tom8/413-431.pdf
• Peay K, Kennedy P, Talbot J (2016) Dimensions of biodiversity in the Earth mycobiome. Nature Reviews Microbiology 14 (7): 434-447. https://doi.org/10.1038/nrmicro.2016.59
• PlutoF (2017) PlutoF platform observations. Version 1.15. Occurrence Dataset. https://doi.org/10.15156/bio/587440. Accessed on: 2017-12-12.
• Popov V, Marynych A, Lanko A (1968) Steppe zone. In: Popov VP, Marynych A, Lanko A (Eds) Physiographic Zoning of the Ukrainian SSR. Kiev University Press, Kiev. [In Russian].
• Popovych SJ (1990) Landscape forest coenocomplexes of the Syverskyi Donets River valley. Ukrainian Botanical Journal 47: 36-40. [In Ukrainian].
• Renvall P (1995) Community structure and dynamics of wood-rotting Basidiomycetes on decomposing conifer trunks in northern Finland. Karstienia 35: 1-51.
• Ryvarden L, Melo I (2014) Poroid Fungi of Europe (illustr. by T. Niemelä). Fungiflora, Oslo. [ISBN 9788290724462]
• Safonov MA (2003) Community structure of wood-decomposing fungi. Ural Division of RAS, Ekaterinburg, 271 pp. [In Russian]. [ISBN 5-7691-1334-0]
• Savchenko A (2017) V. N. Karazin Kharkiv National University herbarium. Occurrence Dataset. Version 1.2. V. N. Karazin Kharkiv National University https://doi.org/10.15468/kuspi6
• Senderov V, Penev L (2016) The open biodiversity knowledge management system in scholarly publishing. Research Ideas and Outcomes 2: e7757. https://doi.org/10.3897/rio.2.e7757
• Senderov V, Georgiev T, Penev L (2016) Online direct import of specimen records into manuscripts and automatic creation of data papers from biological databases. Research Ideas and Outcomes 2: e10617. https://doi.org/10.3897/rio.2.e10617
• Spirin V, Mettinen O, Pennanen J, Kotiranta H, Niemelä T (2013) Antrodia hyalina, a new polypore from Russia, and A. leucaena, new to Europe. Mycological Progress 12 (1): 53-61. https://doi.org/10.1007/s11557-012-0815-0
• Stokland J, Siltonen J, Jonsson B (2012) Biodiversity in dead wood. Cambridge University Press [ISBN 9780521717038]
• Tedersoo L, Smith M (2013) Lineages of ectomycorrhizal fungi revisited: Foraging strategies and novel lineages revealed by sequences from belowground. Fungal Biology Reviews 27: 83-99. https://doi.org/10.1016/j.fbr.2013.09.001
• Tedersoo L, Harend H, Buegger F, Pritsch K, Saar I, Kõjalg U (2014) Stable isotope analysis, field observations and synthesis experiments suggest that Odontia is a non-mycorrhizal sister genus of Tomentella and Thelephora. Fungal Ecology 11: 80-90. https://doi.org/10.1016/j.funeco.2014.04.006
• Vampola P, Vlasák J (2012) Rigidoporus pouzarii, a new polypore species related to Rigidoporus crocatus. Czech Mycology 64 (1): 3-11. URL: http://www.czechmycology.org/_cmo/CM64101.pdf
• Vasyliuk OV, Nekrasova OD, Shyriaieva DV, Kolomytsev GO (2015) A review of major impact factors of hostilities influencing biodiversity in the eastern Ukraine (modeled on selected animal species). Vestnik Zoologi 49 (2): 145-158. https://doi.org/10.1515/vzoo-2015-0016
• Volobuev S, Okun M, Ordynets A, Spirin V (2015) The Phanerochaete sordida group (Polyporales, Basidiomycota) in temperate Eurasia, with a note on Phanerochaete pallida. Mycological Progress 14 (10): 1-13. https://doi.org/10.1007/s11557-015-1097-0
• Wasser S, Soldatova I (1977) Higher Basidiomycetes of steppe zone of Ukraine. Naukova dumka, Kiev, 355 pp. [In Russian].

Supplementary material

Suppl. material 1: Data resources: Aphyllophoroid fungi in insular woodlands of eastern Ukraine doi

Authors: Alexander Ordynets, Anton Savchenko, Alexander Akulov, Eugene Yurchenko, Vera Malyshova, Urmas Köjalg, Josef Vlasák, Karl-Henrik Larsson, Ewald Langer
Data type: occurrences, links to multimedia
Brief description: Separate Darwin Core Archives for specimens and observations, plus shape files of sampling areas.
Filename: Ordynets_et_al_e-Ukraine_data_resources.zip - Download file (162.45 kb)

Endnotes

*1 open for registered users of PlutoF platform (Abarenkov et al. 2010, https://plutof.ut.ee)