Species Diversity With Comprehensive Annotations of Wood-Inhabiting Poroid and Corticioid Fungi in Uzbekistan

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Uzbekistan, located in Central Asia, harbors high diversity of woody plants. Diversity of wood-inhabiting fungi in the country, however, remained poorly known. This study summarizes the wood-inhabiting basidiomycete fungi (poroid and corticioid fungi plus similar taxa such as Merismodes, Phellodon, and Sarcodon) (Agaricomycetes, Basidiomycota) that have been found in Uzbekistan from 1950 to 2020. This work is based on 790 fungal occurrence records: 185 from recently collected specimens, 101 from herbarium specimens made by earlier collectors, and 504 from literature-based records. All data were deposited as a species occurrence record dataset in the Global Biodiversity Information Facility and also summarized in the form of an annotated checklist in this paper. All 286 available specimens were morphologically examined. For 138 specimens, the 114 ITS and 85 LSU nrDNA sequences were newly sequenced and used for phylogenetic analysis. In total, we confirm the presence of 153 species of wood-inhabiting poroid and corticioid fungi in Uzbekistan, of which 31 species are reported for the first time in Uzbekistan, including 19 that are also new to Central Asia. These 153 fungal species inhabit 100 host species from 42 genera of 23 families. Polyporales and Hymenochaetales are the most recorded fungal orders and are most widely distributed around the study area. This study provides the first comprehensively updated and annotated the checklist of wood-inhabiting poroid and corticioid fungi in Uzbekistan. Such study should be expanded to other countries to further clarify species diversity of wood-inhabiting fungi around Central Asia.

Keywords: Basidiomycota, Central Asia, distribution, substrate preferences, taxonomic diversity, GIS mapping
INTRODUCTION

Central Asia is a biological crossroads at the most westerly part of the Himalayan range and supports both Palearctic species and others representative of more southerly subtropical latitudes. The peculiarity of fauna and flora is due to its mixed characters: Indo-Himalayan, Mongolian, Eurasian, and Mediterranean species are present (Anonymous, 2001). Uzbekistan in the heart of Central Asia has a diversity of habitats that are globally and regionally important in ecological functions. The varying landscapes of high mountain ranges, wide steppes, deserts, and riparian wetlands in Uzbekistan result in a high diversity of habitats. The mountain areas occupy 15% of the territory of Uzbekistan. Biodiversity of Uzbekistan includes more than 27,000 species, including over 15,000 animal species; plants, algae, and fungi total about 11,000 species (Anonymous, 1998). The flora of Uzbekistan includes 4500 species of vascular plants, of which about 400 species are endemic, rare, and relict. Many of the animals and higher plants are included in the Red List of the International Union for Conservation of Nature (IUCN) and the Red Book of the Republic of Uzbekistan.

In contrast to the great number of publications dealing with the flora, limited studies document the fungi in Uzbekistan and Central Asia in general (Gafforov, 2017; Gafforov et al., 2017). Current surveys in areas of high plant endemism, such as tropical and subtropical regions, are actually showing an even higher ratio of fungal to plant diversity and uncovering an extraordinary number of endemic fungi (e.g., Crous et al., 2006; Mueller and Schmit, 2007; Schmit and Mueller, 2007; Aime and Brearley, 2012; Hawksworth, 2012). Mountains of the Central Asia Biodiversity Hotspot consist of two major mountain systems, the Pamir and the Tien Shan. Both belong to the most diverse regions in the world with respect to fauna and flora and are regarded as areas of occurrence of many endemic, relict, and endangered species. Therefore, diverse and regionally limited fungi are expected to exist in the region. However, while knowledge of fungal diversity is developing rapidly in some areas of the world, data on the fungi in Central Asia are severely limited (Gafforov et al., 2017; Antonelli et al., 2020; Cheek et al., 2020): the current knowledge of Uzbekistan fungal biodiversity status and even a rough estimate of the number of fungal species in countries of Central Asia is unavailable. This knowledge gap has significantly impeded understanding the role of the region in biogeographic history of Asia and prevented conservation efforts in the region.

Fungi are essential components of ecosystems and are both directly and indirectly important for human cultures. Various fungal species are key symbionts of trees enabling the survival of the latter in the arid areas (Varma, 1995; Stutz et al., 2000). Fungal names used in other regional floras have often been applied to fungi in Uzbekistan. However, the Uzbek fungi often represent new, unrelated species as was shown for Uzbekistan ascomycetous microfungi (Solieva and Gafforov, 2001, 2002; Gafforov and Hoshino, 2015; Gafforov, 2002, 2010, 2015, 2016a,b; Gafforov and Rakhimov, 2017; Gafforov et al., 2019; Wanasinghe et al., 2017, 2018a,b; Samarakoon et al., 2018; Pem et al., 2018, 2019a,b; Hyde et al., 2019, 2020; Yuan et al., 2020). Basidiomycetous fungi have received even less attention than ascomycetous microfungi (Gafforov, 2014; Gafforov et al., 2014, 2017).

Among the basidiomycetous macrofungi, especially those with poroid fertile surface of fruiting bodies (poroid fungi) and corticioid fertile surface (corticioid fungi) play several essential roles in forest ecosystems (Swift, 1982). Most of these fungi are saprobes causing brown or white wood rot, whereas some of them form ectomycorrhizae with woody plants. Therefore, they play an important function in nutrient cycling and soil formation (Soudzilovskaia et al., 2019). Some of them are also known to be serious pathogenic disease agents of ecologically and economically important coniferous and deciduous woody plants. Regardless of the relationship, wood-inhabiting basidiomycetous fungi are often treated as a single research object by both taxonomists and ecologists.

The first mycological investigations on wood-inhabiting fungi in Uzbekistan were started by Sinadskiy and Bondartseva in 1950, who reported 21 polypore species (Sinadskiy and Bodartseva, 1956, 1960; Kleyner, 1958; Panfilova and Gaponenko, 1963; Gaponenko, 1965; Sinadskiy, 1968). The first study specifically in state reserves of Uzbekistan listed 71 polypore species (Baltaeva, 1992, 1993). In the study of macrofungi of Fergana valley (Andijan, Fergana and Namangan Provinces), Tashkent Province, 25 species of poroid and corticioid fungi were reported (Khalkina, 1989; Iminova, 2009). However, the fungal species recorded in these studies were identified solely by morphological characters and no specimen was preserved, which makes the reassessment of taxonomic affiliation of these records impossible.

Recent developments in DNA sequencing have revolutionized identification and systematics of fungi. This has rapidly advanced the mycological communities’ ability to document fungal biodiversity, distribution, ecological preferences, and biogeographic history (e.g., Hattori et al., 2012; Ovaskainen et al., 2013; Tsukun et al., 2013; Tedersoo et al., 2014). DNA barcodes can facilitate taxonomic research by increasing the ability to matching individuals regardless of the fruiting body, identifying specimens with morphological diagnostic characters either subtle, difficult to visualize, or absent, as well as reassessing intraspecific polymorphisms. With the aid of DNA sequences, research on the wood-inhabiting basidiomycetous fungi during the last decade has yielded some species previously unknown in Uzbekistan, as well as some species new to science (Gafforov, 2014; Gafforov et al., 2014, 2017; Yuan et al., 2017, 2020; Kan et al., 2017). Moreover, the first fungal checklist of the corticioid genus Hypodontia from Central Asia was published (Gafforov et al., 2017). However, despite these steps forward, comprehensive information of the wood-inhabiting poroid and corticioid fungi is still unavailable in Uzbekistan.

On the basis of our own collections, literatures, and herbarium data reassessments, the present study aimed to recognize species diversity of wood-inhabiting poroid and corticioid fungi (plus similar taxa such as Merismodes, Phellodon and Sarcodon) in Uzbekistan from morphological and, where possible, phylogenetic perspectives, and also to provide comprehensive
annotations for these species including host, substratum, distribution, and occurring frequency.

**MATERIALS AND METHODS**

**Vegetation and Climate of the Study Area**

The Uzbekistan territory falls in the flora of Central Asian botanical region within the larger temperate Asia floral geographic region according to the World Geographical Scheme for Recording Plant Distributions’ system (Brummitt, 2001). The main ecological forest types in Uzbekistan are mountain, desert, and flood-plain forests (Figure 1). The majority of Uzbekistan forests are xerophytic open woodlands of deciduous trees and shrubs, constituting about 7.3% of the territory (Botman, 2009). These forests play an important role in the protection and prevention from environmental degradation, particularly land degradation and natural disasters, and also in the conservation of biodiversity and preservation of water quality.

Uzbekistan has a continental climate with hot and dry summers and cold winters. Summer temperature often surpasses 40°C (104°F), and winter average temperature is about −2°C (28°F) but may fall as low as −40°C (−40°F). Most parts of the country are arid with average annual rainfall amounting to between 100 and 200 mm (3.9 and 7.9 in) and occurring mostly in winter and spring. Between July and September, little precipitation falls, essentially stopping the growth of vegetation during that period (Klein Tank et al., 2006; Lioubimtseva and Henebry, 2009).

**Specimen Assembly**

A total of 286 specimens of wood-inhabiting poroid and corticoid were examined. This includes 101 specimens from Mycological Herbarium of Estonian University of Life Sciences, Tartu, Estonia (TAAM); 3 specimens from Tashkent Mycological Herbarium, Institute of Botany of the Academy of Sciences of Uzbekistan, Tashkent (TASM); and 185 specimens from our own field surveys, which are deposited in TASM. Our own specimens were recently collected from Tashkent Botanical Garden (Tashkent city), Tashkent Province (Ugam-Chatkal State Nature National Park in Western Tien Shan Mountain), Jizzakh Province (Zaamin National Nature Park, Zaamin State Reserve in Turkestan range and Nurata State Reserve in Nurata range of Pamir-Alay), Surxondaryo Province (Baysun and Husar ranges in Pamir-Alay Mountains), and Fergana Valley (Namangan Province) (Figure 2). In addition, we reviewed 504 records of Uzbekistan fungi published between 1950 and 2020.

**FIGURE 1** | Forest types in study area. (A) Mountain juniper forests. (B) Wild fruit tree forests in mountain. (C) Desert saxaul (Haloxylon spp.) forests. (D) Tugai forests (Photo: Yusufjon Gafforov).
Morphological Study

Morphological characters were described based on fresh and dried fruiting bodies. Microscopic characters of fruiting bodies were observed on dried specimens at a magnification up to $1000 \times$ with a Leica DM 1000 (Tokyo, Japan) microscopes in 5% aqueous KOH plus 1% phloxine, Melzer's reagent for amyloid or dextrinoid reactions, cotton blue in lactic acid for cyanophily, and 1% aqueous cresyl blue for metachromatism (Hawksworth et al., 1995). Macromorphological characters of fruiting bodies and hymenophores were observed under a Leica M165 FC stereomicroscope. Scientific names, both of the fungi and the host plants, were checked for potential synonyms in the databases Index Fungorum (2020) and ThePlantList (2013), respectively. Species whose taxonomic placement is not established are listed under incertae sedis.

DNA Extraction, Amplification, and Sequencing

Genomic DNA was extracted from the dried basidiocarps of herbarium materials using DNeasy Plant Mini Kit (Qiagen, Valencia, CA, United States), QIAamp DNA Micro Kit (Qiagen), and the Extract-N-Amp Plant PCR Kit (Sigma-Aldrich, St. Louis, MO, United States), following protocols from the manufacturers, and was diluted as a template for subsequent amplification. PCR amplification targeted the internal transcribed spacer (ITS) region of the ribosomal RNA gene (rRNA), the universal DNA barcode for identification of fungi (Schoch et al., 2012), and the nuclear large ribosomal subunit (nLSU) region. Amplification was carried out using the fungal-specific primer sets ITS1F/ITS4b (Gardes and Bruns, 1996) and ITS1/ITS4 (White et al., 1990) for the ITS region and LR0R and LR5 for the nLSU region (Vilgalys and Hester, 1990;
Rehner and Samuels, 1994). Purified PCR products were sequenced using DNA ABI 3730 XL automated sequencers (Applied Biosystems) by Macrogen Inc. (Seoul, Korea), by Eurofins Genomics (Ebersberg, Germany), and by the Beijing Genomics Institute (Beijing, China). All newly generated sequences of poroid and corticioid species from Uzbekistan were submitted to GenBank (Table 1).

Phylogenetic Analyses

After a preliminary BLAST search, 40 sequences related to those from Uzbekistan specimens were downloaded from GenBank to assist species identification (Table 1). The datasets of ITS and nLSU regions were separately aligned using MAFFT 7.110 (Katoh and Standley, 2013) under the G-Ini-i option (Katoh et al., 2005) and then the two alignments were concatenated. The concatenated alignment, deposited in TreeBASE1 (accession number S26575), was subjected to an estimation of the best-fit evolutionary model using jModelTest (Guindon and Gascuel, 2003; Posada, 2008) with calculation under Akaike information criterion. Following this model, maximum likelihood (ML) and Bayesian inference (BI) methods were employed for phylogenetic analyses. The ML method was conducted using raxmlGUI 1.2 (Stamatakis, 2006; Silvestro and Michalak, 2012) with calculation of bootstrap (BS) replicates under the auto FC option (Pattengale et al., 2010). The BI method was conducted using MrBayes 3.2 (Ronquist et al., 2012). Two independent runs were employed. Each run had four chains and started from random trees. Trees were sampled every 1000th generation, of which the first 25% were removed and the other 75% were used for constructing a 50% majority consensus tree and calculating Bayesian posterior probabilities (BPPs). Tracer 1.52 was used to determine chain convergence. iTOL was used to visualize the tree to a circular form (Letunic and Bork, 2019).

GBIF Occurrence Dataset and Checklist Preparation

The occurrence data of wood-inhabiting poroid and corticioid fungi was extracted from 504 records in 19 publications as well as 185 records of our own recent collections in field surveys and 101 herbarium specimens from TAAM and TASM. All but collection data from TAAM (which are already displayed in GBIF) were formatted according to the Darwin Core Standard3 and published as an occurrence dataset (Gafforov and Ordynets, 2020, 4alternative identifier5). When compiling the annotated species checklist for this paper, for the sake of conciseness, all occurrence records were linked to 50 localities that are listed in the study.

GIS Data Processing

A point distribution map of fungal orders was produced using the ArcGIS 10.7 desktop software (ArcGISDesktop,2020).

A GPS navigation device and Google Earth software6 (2020) were used for geo-referencing all available occurrence data of wood-inhabiting poroid and corticioid fungi in the study sites. A WGS84 geographic coordinate system was used as a reference datum. The land cover data were adapted from the 500-m Moderate Resolution Imaging Spectroradiometer (MODIS) land cover product (MCD12Q1; Friedl et al., 2002) which has 17 IGBP classes, including water, evergreen needleleaf forests (ENF), evergreen broadleaf forests (EBF), deciduous needleleaf forests (DNF), deciduous broadleaf forests (DBF), mixed forests (MF), closed shrublands (CSH), open shrublands (OSH), woody savannas (WSA), savannas (SAV), grasslands (GRA), permanent wetlands, cropland (CRO), urban and built-up, cropland and natural vegetation mosaics (CNM), snow and ice, and barren. Considering the spatial distribution of irrigated and cultivated croplands, we further integrated these two classes from Klein et al. (2012). Data for roads, rivers, lake centerlines, and country boundaries were downloaded from the Natural Earth database (Natural Earth, 2020).

RESULTS

Phylogenetic Placement of Collections of Poroid and Corticoid Fungi From Uzbekistan

In addition to morphological characters, DNA sequences were used to identify certain specimens. A total of 114 ITS and 85 LSU sequences from 138 specimens representing 40 species were newly generated for this study, and submitted to GenBank (Table 1). The alignment used for phylogenetic analysis included 178 collections (Table 1). The best-fit evolutionary model for this alignment was estimated as GTR + I + G. In the ML method, the BS search stopped after 250 replicates. In the BI method, all chains were converged after 6 million generations, where the average standard deviation of split frequencies is 0.006815, the estimated sample sizes of all parameters are above 700, and the potential scale reduction factor approaches 1.0. Both phylogenetic methods generated congruent topologies in main lineages, and thus only the topology from the ML method is visualized in a circle form with BS and BPP at the nodes (Figure 3). From a phylogenetic perspective, 36 species were recovered and four potential new lineages representing members of Hyphoderma, Neoantrodiaella, Phlebia, and Vuilleminia were identified from the newly sequenced specimens.

Species Diversity of Wood-Inhabiting Poroid and Corticoid Fungi in Uzbekistan

Taking literature information and morphological and phylogenetic evidence into consideration, we report 153 species of wood-inhabiting poroid and corticioid fungi including 149 described species and four single-specimen undescribed lineages belonging to 10 orders (Agaricales, Atheliales, Cantharellales, Corticales, Gloeophyllales, Hymenochaetales, Russulales,
TABLE 1 | Newly generated sequences and specimens used for the phylogenetic analyses.

| Species                     | Specimens voucher | Host/geographic origin         | GenBank accession no. | References               |
|-----------------------------|-------------------|--------------------------------|-----------------------|--------------------------|
|                             |                   |                                |                       |                          |
| Athelia arachnoidea         | CBS 105.18        | Unknown/DE                     | MH854664              | Vu et al., 2019          |
| YG-23                       |                   | Fallen angiosperm/UZ           | MH866181              | This study               |
| YG/PS154                    |                   | Crataegus sp./UZ               | MT526279              | This study               |
| YG1111                      |                   | Lonicera sp./UZ                | MT524543              | This study               |
| Aurantiporus fissilis       | BRNM 699803       | Populus tremula/CZ             | HG728292              | Tomilovskiy, 2012        |
| YG/brt3                     |                   | Juglans regia/UZ               | MT526280              | This study               |
| YG/brt23a                   |                   | Unknown wood/UZ                | MT524545              | This study               |
| Bjerkandera adusta          | CBS 371.52        | Unknown/JP                     | MH857085              | Vu et al., 2019          |
| YG-21                       |                   | Angiosperm fallen branch/UZ    | MT524550              | This study               |
| YG-X3                       |                   | Dried branch of Prunus vulgaris/UZ | MT524551 | This study               |
| Cerrena unicolor            | FD 299            | Dead standing hardwood/US      | KP135304              | Froudas and Hibbett, 2015 |
| YG-28                       |                   | Dried fallen stem of angiosperm/UZ | MT526292 | This study               |
| YG/PS79                     |                   | Acer tataricum subsp. semenovii/UZ | MT526291 | This study               |
| YG003                       |                   | Crataegus pseudoheterophylla subsp. turkestanica/UZ | MT526289 | This study               |
| YG18                        |                   | Acer tataricum subsp. semenovii/UZ | MT526290 | This study               |
| Ceriporiopsis gilvescens   | YG046             | Dried angiosperm wood/UZ       | MT526293              | This study               |
| YG049                       |                   | Rotten trunk of wood/UZ        | MT526293              | This study               |
| Yuan 2752                   |                   | Unknown/CN                     | KF845953              | Zhao and Cui, 2014       |
| Flavidoporia pulverulenta  | BR3450            | Picea abies/FR                 | JQ700280              | Sprin et al., 2013       |
| YG/PS167                    |                   | Salix sp./UZ                   | MT526295              | This study               |
| YG1110                      |                   | Salix alba/UZ                  | MT526294              | This study               |
| Fomes fomentarius           | Cui 5769          | Unkonwn/CN                     | KX885072              | Direct submission        |
| YG/brt2                     |                   | Populus sp./UZ                 | MT526299              | This study               |
| YG/brt4                     |                   | Decaying trunk of angiosperm/UZ | MT526300 | This study               |
| YG/Un2                      |                   | Juglans regia/UZ               | MT526302              | This study               |
| YG/PS174                    |                   | Juglans regia/UZ               | MT526301              | This study               |
| YG014                       |                   | Juglans regia/UZ               | MT526298              | This study               |
| YG-60                       |                   | Unknown wood/UZ                | MT526296              | This study               |
| YG-70                       |                   | Unknown wood/UZ                | MT526297              | This study               |
| Ganoderma adspersum         | FGA1              | Pterocarya fraxinfolia/IT      | AM269771              | Guglielmo et al., 2007   |
| YG/brt24                    |                   | Acer saccharum/UZ              | MT526303              | This study               |
| Ganoderma resinaceum        | MFLU 19-2153      | Albius mollis/CN               | MN398315              | Direct submission        |
| YG-X4                       |                   | Salix sp./UZ                   | MT526304              | This study               |
| Gloeophyllum abietinum      | Dai 3595          | Pinus sp./CN                   | JX524620              | He et al., 2014          |
| TAAM127397                  |                   | Trunk of Juniperus sp./UZ      | MT526306              | This study               |
| Hyphoderma setigerum        | FP150263          | Unkonw/NI                      | GQ409528              | Direct submission        |
| Hyphoderma sp.              | YG/PS133          | Betula sp./UZ                  | MT526306              | This study               |
| Hyphodontia zhixiangi       | LWZ 20160909-4    | Juniperus sp./UZ               | NR154098              | Kan et al., 2017         |
| YG1098                      |                   | Unkonw angiosperm branch/UZ    | MT526308              | This study               |
| YG1104                      |                   | Fallen angiosperm branches/UZ  | MT526307              | This study               |

(Continued)
### TABLE 1 | Continued

| Species                  | Specimens voucher | Host/geographic origin | GenBank accession no. | References                  |
|--------------------------|-------------------|------------------------|-----------------------|-----------------------------|
| Inonotus hispidus        | S45               | Vitis vinifera/ES      | EU282482              | EU282484                    | González et al., 2009        |
|                          | YG/AG3            | Morus alba/UZ          |                       | MT524564                    | This study                   |
|                          | YG/bot1           | Dried trunk angiosperm/UZ |                       | MT524565                    | This study                   |
|                          | YG/PS148          | Malus sieversii/UZ     |                       | MT526310                    | This study                   |
|                          | YG/PS156          | Pinus sp./UZ           |                       | MT526309                    | This study                   |
|                          | YG/PS157          | Pinus sp./UZ           |                       | MT524566                    | This study                   |
| Lentinus tigrinus        | CBS 249.39        | Unknown/Yugoslavia     | MH856001              | MH867501                    | Vu et al., 2019              |
|                          | YG-J7             | Dried strum of angiosperm/UZ |                       | MT526312                    | This study                   |
|                          | YG/PS162          | Malus domestica/UZ     |                       | MT526311                    | This study                   |
|                          | TAAM094847        | Acer tree trunk/UZ     |                       | MT526313                    | This study                   |
|                          | TAAM094857        | Prunus armeniaca/UZ    |                       | MT526314                    | This study                   |
| Lenzites warnieri        | CIRM-BRFM 972     | Unknown/FR             | GU731567              |                             | Direct submission            |
| Lyomyces erastii         | RM21              | Unknown shrub/UZ       | MT526316              |                             | This study                   |
| Neoantrodiaella sp.      | TAAM104307        | Juniperus polycarpors var. seravschianica/UZ | MT526317 |                             | This study                   |
| Neoantrodiaella gypseae  | Yuan 5589         | Unknown/CN             | KT203292              | KT203313                    | Aryawansa et al., 2015       |
| Peniophora cinerea       | He 3725           | Unknown/CN             | MK588769              | MK588809                    | Direct submission            |
| Peniophora incarnata     | YG/PS84           | Fallen stem of deciduous wood/UZ | MT526319 | MT524570                    | This study                   |
| Peniophorella praetemissa| GEL2182           | Betula sp./NO          | AY854081              | AY700185                    | Direct submission            |
|                          | YG-G16            | Juglans regia/UZ       | MT526320              | MT524571                    | This study                   |
|                          | YG-G37            | Fallen unknown angiosperm/UZ | MT526321 |                             | This study                   |
|                          | YG-G40            | Fallen unknown angiosperm/UZ | MT526322 |                             | This study                   |
| Phellinus betulinus      | DVB-Betula        | Betula nigra/US        | KU139151              | KU139246                    | Braze, 2015                  |
| Phellinus pomaceus       | CBS 171.32        | Unknown/NL             | MH860518              | MH872230                    | Vu et al., 2019              |
|                          | YG/PS84           | Fallen stem of deciduous wood/UZ | MT526319 | MT524570                    | This study                   |
|                          | TAAM126269        | Celtis australis subsp. caucasia/IR | MT526324 | MT524572                    | This study                   |
|                          | TASM582           | Lonicera sp./UZ        | MT526326              |                             | This study                   |
|                          | YG/PS3X           | Cerasus tianshanica/IR | MT526328              | MT524576                    | This study                   |
|                          | YG/PS28           | Prunus dulcis/UE       | MT526325              | MT524574                    | This study                   |
|                          | YG/PS82           | Prunus sp./UZ          | MT526333              |                             | This study                   |
|                          | YG/S1             | Salix sp./UZ           | MT526331              |                             | This study                   |
|                          | YG/PS189          | Fallen branch of angiosperm/UZ | MT526335 |                             | This study                   |
| Phlebia bresadolae       | MG291             | Acer monspessulanum/IU | KU213584              |                             | Ghobad-Nejad and Langer, 2016 |
| Phlebia cf. bresadolae   | RLG10795s         | Unknown/US             | KY948785              | KY948885                    | Justo et al., 2017           |
|                          | YG/PS89           | Fallen wooden plants branch/UZ | MT526336 | MT524578                    | This study                   |
| Phlebia sp.              | YG-64             | Crataegus pseudoacacioides/UZ subsp. turkestanica/IR | MT526337 |                             |                             |
|                          | YG326             | Dead hardwood/UZ       | MT526338              | MT524579                    |                             |
| Phlebia rufa             | MR 4280           | Hardwood/US            | KP135373              | KO65989                     | Foulad and Hibbett, 2015; direct submission |
|                          | YG/PS189          | Fallen branch of angiosperm/UZ | MT526335 |                             | This study                   |

(Continued)
| Species                  | Specimens voucher | Host/geographic origin                        | GenBank accession no. | References                  |
|-------------------------|-------------------|-----------------------------------------------|-----------------------|-----------------------------|
| Phlebiella christianseni | KHL 11689         | Unknown/FI                                    | EU118659              | EU118659                    | Larsson, 2007               |
|                         | YG-G22            | Gleditsia triacanthos/UZ                      | MT526340              | This study                  |
|                         | YG-G26            | Fallen angiosperm/UZ                          | MT526341              | This study                  |
|                         | YG-G36            | Dried stump of deciduous/UZ                   | MT526342              | This study                  |
| Phyllopora yuchengii     | YG-J5             | Populus sp./UZ                                | MT526344              | This study                  |
|                         | YG-J10            | Morus alba/UZ                                 | MT524585              | This study                  |
|                         | YG-J11            | Morus alba/UZ                                 | MT524586              | This study                  |
|                         | YG033             | Dead angiosperm trunk and stem/UZ              | NG060132              | Gafforov et al., 2014       |
|                         | YG043             | Juglans regia/UZ                              | MT524581              | This study                  |
|                         | YG343             | Prunus sp./UZ                                 | MT524582              | This study                  |
|                         | YG1093            | Crataegus pseudoheterophylia subsp. turkestanica/UZ | MT524583              | This study                  |
|                         | YG1011            | Crataegus sp./UZ                              | MT524587              | This study                  |
| Pilatoporus ibericus     | O 10811           | Pinus sp./IT                                   | KR605772              | KR605711                    | Han et al., 2016            |
|                         | YG-G24            | Trunk of angiosperm/UZ                        | MT526345              | This study                  |
|                         | YG-G43            | Dead stump/UZ                                 | MT524589              | This study                  |
| Radulomyces contlvens    | K(M) 181613       | Unknown/GB                                    | MK653390              | MK653401                    | Leal-Dutra et al., 2020     |
|                         | YGcor-80          | Strum of angiosperm/UZ                        | MT526346              | This study                  |
|                         | YG-G2             | Strum of deciduous/UZ                         | MT524590              | This study                  |
|                         | YG-G3             | Strum of deciduous/UZ                         | MT524591              | This study                  |
|                         | YG-G35            | Decay branch of angiosperm/UZ                 | MT526347              | This study                  |
|                         | Sanghuangporus lonicerinus | Lonicera sp./UZ                              | MF772787              | MF772806                    | Zhu et al., 2019            |
|                         | TAAM0104264       | Lonicera sp./UZ                                | MT526352              | MT524597                    | This study                  |
|                         | TAAM127578        | Dry trunk of deciduous trunk/UZ               | MT526353              | MT524598                    | This study                  |
|                         | YG/PS92           | Lonicera sp./UZ                                | MT526348              | This study                  |
|                         | YG/PS129          | Lonicera sp./UZ                                | MT526349              | This study                  |
|                         | YG/Un1            | Acer tataricum subsp. semenovii/UZ            | MT526350              | MT524595                    | This study                  |
|                         | YG018             | Lonicera nummulatiformis/UZ                    | MT524593              | This study                  |
|                         | YG1112            | Lonicera sp./UZ                                | MT526351              | MT524596                    | This study                  |
| Schizophyllum commune    | CBS 124811        | Unknown                                       | MH863418              | MH874930                    | Vu et al., 2019             |
|                         | YG-J2             | Populus sp./UZ                                | MT526354              | MT524599                    | This study                  |
|                         | YG/PS169          | Juglans regia/UZ                              | MT526355              | MT524600                    | This study                  |
| Stereum hirsutum         | CBS 930.70        | Unknown                                       | MH860009              | MH871796                    | Vu et al., 2019             |
|                         | TAAM104393        | Deciduous tree trunk/UZ                       | MT526367              | This study                  |
|                         | TAAM126921        | Populus alba/UZ                               | MT526368              | MT524610                    | This study                  |
|                         | YG-G12            | Fraxinus excelsior/UZ                          | MT524601              | This study                  |
|                         | YG-G15            | Quercus sp./UZ                                | MT524605              | This study                  |
|                         | YG/PS135          | Juglans regia/UZ                              | MT524606              | This study                  |
|                         | YG/PS176          | Juglans regia/UZ                              | MT524607              | This study                  |
|                         | YG51              | Acer sp./UZ                                    | MT526356              | MT524602                    | This study                  |
|                         | YG030             | Acer tataricum subsp. semenovii/UZ             | MT526357              | This study                  |
|                         | YG048             | Unknown dried wood/UZ                         | MT526358              | This study                  |
|                         | YG056             | Unknown decay wood/UZ                         | MT526359              | This study                  |
|                         | YG057             | Acer tataricum subsp. semenovii/UZ             | MT526360              | This study                  |
|                         | YG320             | Salix alba/UZ                                  | MT526361              | MT524604                    | This study                  |
|                         | YG1091            | Unknown woody branch/UZ                       | MT526365              | MT524608                    | This study                  |
|                         | YG1092            | Fallen trunk of angiosperm wood/UZ             | MT526366              | This study                  |
|                         | YG3.04.13         | Dead fallen trunk of angiosperm/UZ             | MT526409              | This study                  |

(Continued)
Table 1 | Continued

| Species                  | Specimens voucher | Host/geographic origin          | GenBank accession no. | References               |
|--------------------------|-------------------|---------------------------------|-----------------------|--------------------------|
| **Subantrodia uzbekistanica** | Dai 17105         | Juniperus polycarpos var. seravschanica/UZ | KX958183              | KX958187                | Yuan et al., 2017        |
|                          | YG1100            | Unknown woody branches/UZ       | MT526370              | This study               |
|                          | YG1107            | Juniperus polycarpos var. seravschanica/UZ | MT526371              | This study               |
| **Trametes hirsuta**     | CBS 282.73        | Unknown/DE                      | MH860685              | MH872390                | Vu et al., 2019          |
|                          | RM44              | Died angiosperm strum/UZ        | MT526381              | This study               |
|                          | TAAAM104394       | Juglans regia/UZ                | MT526369              | This study               |
|                          | YG/Ch40           | Stem of angiosperm tree/UZ      | MT526382              | MT524614                | This study               |
|                          | YG/PS128          | Unidentified angiosperm stem/UZ | MT526378              | MT524612                | This study               |
|                          | YG/PS138          | Prunus sp./UZ                   | MT526379              | This study               |
|                          | YG/PS168          | Juglans regia/UZ                | MT526380              | MT524612                | This study               |
|                          | YG004             | Prunus armeniaca/UZ             | MT526372              | This study               |
|                          | YG007             | Prunus vulgaris/UZ               | MT526373              | This study               |
|                          | YG037             | Juglans regia/UZ                | MT526374              | This study               |
|                          | YG055             | Unknown decay wood/UZ            | MT526375              | This study               |
|                          | YG073             | Dried unknown woody trunk/UZ    | MT526376              | This study               |
|                          | YG314             | Prunus sp./UZ                   | MT526377              | MT524611                | This study               |
| **Trametes trogii**      | Dai 11246         | Unknown/ON                      | KC867380              | KC867451                | Li et al., 2016          |
|                          | TAAAM189940       | unidentified wood/UZ             | MT526387              | MT524621                | This study               |
|                          | YG/bot23b         | Fallen deciduous branch/UZ      | MT534628              | This study               |
|                          | YG/G14            | Unknown woody branches/UZ       | MT534629              | MT534627                | This study               |
|                          | YG/G17            | Unknown strum of angiosperm/UZ  | MT526383              | MT524615                | This study               |
|                          | YG/G18            | Unknown strum of angiosperm/UZ  | MT526384              | MT524616                | This study               |
|                          | YG/G19            | Unknown strum of angiosperm/UZ  | MT526385              | MT524617                | This study               |
|                          | YG/GX1            | Populus sp./UZ                  | MT526388              | This study               |
|                          | YG/PSX2           | Dried on Salix sp./UZ           | MT526389              | MT524622                | This study               |
|                          | YG/J4             | Populus nigra/UZ                | MT526395              | MT524619                | This study               |
|                          | YG/J6             | Populus nigra/UZ                | MT526386              | MT524620                | This study               |
|                          | YG/JX4            | Populus sp./UZ                  | MT524623              | This study               |
|                          | YG/N7             | Populus alba/UZ                 | MT524618              | This study               |
| **Trametes versicolor**  | Cui 9310          | Unknown/ON                      | KC848266              | KC848351                | Direct submission        |
|                          | YG/J3             | Prunus sp./UZ                   | MT526389              | MT524624                | This study               |
|                          | YG/PS170          | Juglans regia/UZ                | MT526390              | This study               |
| **Trametes villosa**     | CBS 334.49        | Unknown/AR                      | MH856545              | MH868069                | Vu et al., 2019          |
|                          | YG/AG11           | Dried stem of angiosperm/UZ     | MT526390              | This study               |
| **Vuilleminia comedens** | CBS 428.72        | Unknown/NL                      | MH860516              | MH872229                | Vu et al., 2019          |
| **Vuilleminia sp.**      | TAAAM104410       | Lonicera sp./UZ                 | MT524626              | This study               |

Polyporales, Thelephorales and Trechisporales), 26 families, and 97 genera in Uzbekistan (Table 2 and Figure 4). Data on own specimens and extracted from literature records are accessible as an occurrence dataset (Gafforov and Ordynets, 2020, alternative identifier). Among the 153 species, 31 are reported for the first time in Uzbekistan, including 19 also new to Central Asia. The orders represented by the most specimens are Polyporales (7 families, 59 genera, and 88 species) and Hymenochaetales (4; 20; 41). Together they contain 129 species or 84.3% of the total wood-inhabiting poroid and corticioid biota of Uzbekistan (Table 2). The most species-rich families are Polyporaceae (40 species in 25 genera), Hymenochaetales (25; 13), Fomitopsidaceae (21; 16), and Meruliaceae (15; 12) and contain 66 genera and 101 species that constitute 66% of the total poroid and corticoid species number. The genus with the highest number of recorded species are Trametes (9 species); Inonotus (5); Ganoderma, Lentinus, Phellinus, Rigidoporus, and Stereum (4 each); and Antrodia, Cerioporus, Gloeophyllum, Fomitiporia, Hyphodontia, Lyomyces, Phlebia, Phyllopora, Postia, and Trichaptum (3 each) that contain...
64 species or 41.8%, and the other genera have one to two species (Table 2).

**Annotated Checklist of Wood-Inhabiting Poroid and Corticioid Species in Uzbekistan**

The checklist of 153 species of wood-inhabiting poroid and corticioid fungi is arranged alphabetically by orders, family, and species. The currency sign (¤) indicates potentially new species to science and asterisk (*) denotes new fungal records to Central Asia and thus to Uzbekistan, while the new fungal records to Uzbekistan but not to Central Asia is indicated by a number sign (#). A filled circle (●) means identification was DNA-assisted. Short notes are provided for some taxa. Photos of basidiocarps in situ are shown for some species (Figures 5–7).

All occurrence records considered in this study are attributed to 50 localities that are listed below and represented by
### TABLE 2  | Number of wood-inhabiting poroid and corticioid species in the most representative orders, families, and genera in the study area and proportion accounting for total species number.

| ORDERS       | FAMILY | GENERA | SPP. | %   | FAMILY | GENERA | spp. | %   | GENERA | spp. | %   |
|--------------|--------|--------|------|-----|--------|--------|------|-----|--------|------|-----|
| Polyporales  | 7      | 59     | 88   | 57.5| Polyporaceae | 25     | 40   | 26.1| Tametes | 9    | 5.87|
| Hymenochaetales | 4     | 20     | 41   | 26.8| Hymenochaetaceae | 13    | 25   | 16.3| Inonotus | 5    | 3.25|
| Russulales   | 4      | 4      | 8    | 5.23| Fomitopsidaceae | 16    | 21   | 13.7| Antrodia | 4    | 2.61|
| Agaricinales | 4      | 4      | 4    | 2.63| Meruliaceae    | 12    | 15   | 9.9 | Ganoderma | 4    | 2.61|
| Thelephorales | 2      | 3      | 3    | 1.97| Schizoporaceae | 3     | 7    | 4.6 | Lentinus | 4    | 2.61|
| Gloeophyllales | 1    | 1      | 1    | 1.97| Phanerochaetaceae | 4     | 5    | 3.26| Phellinus | 4    | 2.61|
| Corticiales  | 1      | 2      | 2    | 1.3 | Ganodermataceae | 1     | 4    | 2.61| Stereum   | 4    | 2.61|
| Atheliales   | 1      | 1      | 1    | 0.65| Oxyporaceae    | 1     | 4    | 2.61| Cerioporus  | 3    | 2.61|
| Cantharellal | 1      | 1      | 1    | 0.65| Stereaceae     | 1     | 4    | 2.61| Hyphodontia | 3    | 2.61|
| Trenchiporales | 1   | 1      | 1    | 0.65| Gloeophyllaceae | 1     | 3    | 1.98| Phyllopora     | 3    | 2.61|
| Subtotal     | 26     | 96     | 152  | 99.35| Subtotal       | 77    | 128  | 83.67| Subtotal   | 43   | 28.11|
| with uncertain (1) | 0 | 1      | 1    | 0.65| Other families (16) | 20   | 25   | 16.33| Other genera (87) | 110  | 71.89|
| Total        | 26     | 97     | 153  | 100% | Total         | 26    | 97   | 153  | 100% |

All territories of Uzbekistan except Kyzyl-kum desert (1); AP, Andijan District, Kutarma village (2); AP, Garden and Parks (3); AP, Shaxrioxon district, Holdovonbek village (4); BP (5); FP (6); JP, Nurata State Reserve, Nurata Range, Pamir-Alay Mountain System (7); JP, Zaamin District, Zaamin National Park, Zaamin State Reserve in the South and South-east of the Turkestan Range (8); K, Lower-Amudarya Biosphere Reserve (9); Kyzyk-kum Desert (10); NMP, Chortoq District, Chortoq dam olishmaskani, Chortoq foothills (11); NMP, Haqiloobod District, Haqiloobod village (12); NMP, Mingbuluq District, Qorasuv garden (13); NMP, National Parks and Gardens (14); NMP, Pop District, Chodaksay basin, Kurama Mountain Range of Western Tien Shan (15); NMP, Turuqgorn District, Kuymazor village, Pop and Chust foothills (16); NP, Sarims valley (17); NP, Tamdy District, Bomyurot village, desert (18); QP, Hisar State Reserve in North-western of Hisar Range, Pamir-Alay Mountain System (19); QP, Yakkaobod village, Yakkaobog forestry (20); SP, Zarafshan State Reserve, Zarafshan river valley, Pamir Mountains (21); SRP, Baysun District, Baysun village, Omonkhona, Baysun Mountain, South-western spur of the Hisar Range in the Western part of the Pamir-Alay System (22); SRP, Baysun District, Darband village, Baysun Mountain, South-western spur of the Hisar Range in the Western part of the...
FIGURE 5 | Basidiocarps in situ. (A) Radulomyces confusens; (B) Schizophyllum commune; (C) Bjerkandera adusta; (D) Phlebia rufa; (E) Laetiporus sulphureus; (F) Cerioporus squamosus; (G) Cerrena unicolor; (H) Fomes fomentarius (Photo: Yusufjon Gafforov).

Pamir-Alay System (23); SRP, Baysun District, Machay village, Baysun Mountain, South-western spurs of the Hissar Range in the Western part of the Pamir-Alay System (24); SRP, Hissar Range of Pamir-Alay Mountains (25); SRP, Surkhan State Reserve (26); SDR (27); TBG (28); Tashkent, olimlar shaxarchasi (29); TP, Angren, Yangibod village, South-eastern slope of Chatkal Mountain Range of Western Tien Shan (30); TP, Bekabad District, NW of Bekabad, Dalverzin village (31); TP, Bustonliq District, Beldersay, Greater Chimgan, Chatkal Mountain Range of Western Tien Shan (32); TP, Bustonliq District, Burchmulla village, Kulabsay, Western Tien Shan Mountains (33); TP, Bustonliq District, Gazalkent, spurs of the Western Tien Shan (34); TP, Bustonliq District, Kayinarsay and Sarvasay, Western Tien Shan (35); TP, Bustonliq District, Kuksu River, Pskem Mountain Range of Western Tien Shan (36); TP, Bustonliq District, Onaulgansoy, Pskem river, Pskem Mountain Range of Western Tien Shan (37); TP, Bustonliq District, Oqtosh village, Ugam Mountain Range of Western Tien Shan (38);
FIGURE 6 | Basidiocarps in situ of (A) Lentinus tigrinus; (B) Pyrofomes demidoffi; (C) Trametes hirsuta; (D) Trametes trogi; (E) Ganoderma adspersum; (F) Ganoderma applanatum; (G) Inonotus hispidus; (H) Phellinus igniarius (Photo: Yusufjon Gafforov).
FIGURE 7 | Basidiocarps in situ of (A) Phellinus pomaceus; (B) Phylloporia yuchengii; (C) Sanghuangporus lonicerinus; (D) Lyomyces erasti; (E) Lyomyces sambuci; (F) Stereum hirsutum (Photo: Yusufjon Gafforov).

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of Western Tien Shan Mountains (46); TP, Parkent District, Nivich and Qiziljar villages, Bashkyzylsay, Chatkal Biosphere Reserve, Chatkal Mountain Range of Western Tien Shan (47); TP, Tuyatashsoy, Western Tien Shan Mountains (48); TP, Ugam-Chatkul State Nature National Park, Western Tien Shan Mountains (49); TP, Yangikurgan village, Kurigansay river, Western Tien Shan Mountains (50).

AGARICALES Underw.

CYPELLACEAE Lotsky

*Chondrostereum purpureum* (Pers.) Pouzar, Česká Mykol. 13(1): 17 (1959)

Specimen examined: (24): on *Acer pentapomicum* Stewart ex Brandis, 17 May 2016, YG-B01.

PTERULACEAE Corner

*Radulomyces confluens* (Fr.) M.P. Christ., Dansk bot. Ark. 19 (no. 2): 230 (1960)

Specimens examined: (39): on fallen rotten trunk, 2 Nov. 2011, YG006; (39): on trunks of angiosperm woody plant, 20 Nov. 2013, YGcor-80; (28): on dead stump, 2 Sept. 2013, YG-G43.

NIACEAE Jülich

*Merismodes anomalus* (Pers.) Singer, Agaric. mod. Tax., Edn 3 (Vaduz): 665 (1975)
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Celtis

Sept. 2014, YG/PS169; (45): on a dry branch of Cyphellopsis anomala

Apr. 1988, A. Kollom, TAAM127588; (20): on Populus sp., 1 Jun. 1987; (8): on strum of unknown woody plants, 1 Jun. 1987; (7): on trunk of deciduous tree, 4 Oct. 1988; (21): on fallen stem of angiosperm, 22 Jun. 1988; (19): on dried stem of Quercus sp., 19 Mar. 1988; (9): on Quercus sp., 7 May 1988.

POLYPORALES Gáum.

Meruliaceae Rea

Abortionus biennis (Bull.) Singer, Mycologia 36(1): 68 (1944)

Literature: Baltaeva (1992), [(45): on dead attached branches of living Quercus sp., 12 Sept. 1990].

Aurantiporus fissilis (Berk. and M.A. Curtis) H. Jahn ex Ryvarden, Polyp. N. Eur. (Oslo) 2: 222 (1978).

≡ Tyromyces fissilis (Berk. and M.A. Curtis) Donk.

Specimen examined: (28): on living stem of Juglans regia, 9 Jun. 2014, YG/bot3.

Literature: Kravtzev (1950), (as Tyromyces fissilis, (19): on stem of Malus sp.); Baltaeva (1992, 1993), (as Tyromyces fissilis, (1): on various deciduous wood).

Bjerkandera adusta (Willd.) P. Karst., Meddn Soc. Fauna Flora fenn. 5: 38 (1879)

Specimen examined: (40): on dead stump of Juglans regia, 26 May 2011, YG012; (37): on dried stump of Populus sp., 2 Apr. 2013, YG/G41; (28): on unknown wood, 3 Sept. 2013, YG/bot23a; (47): on trunk of Populus alba L., 4 May 1988, I. Parmasto, TAAM12629; (19): on fallen stump of Populus sp., 15 Jun. 2013, YG-O1.

Literature: Panfilova and Gaponenko (1963), [(44): on dried log of Salix sp.], Khalikova (1989), [(34): on decaying Prunus armeniaca log], Baltaeva (1992, 1993), [(49): on trunk of Salix sp., 13 Aug. 1986; (45): on dried stem and trunk of Populus sp., 25 Jul. 1986; (19): on decaying Quercus log, 6 May 1986; (6): on Tilia sp., 29 May 1989; (19): on stump of Ulmus sp., 28 Jun. 1988].

Note: This species is very common and occurs on dead and senescent deciduous wood. We mostly found it on Juglans, Populus, and Prunus species in Uzbekistan.

Bjerkandera fumosa (Pers.) P. Karst., Meddn Soc. Fauna Flora fenn. 5: 38 (1879)

Literature: Baymuratova (1963), [(27): on trunk of Quercus sp.], Khalikova (1989), [(28): on Quercus sp., Jun. 1983; (49): on dried trunk of Populus sp., Jul. 1984; Baltaeva (1992, 1993), [(49): on Populus sp., 19 May 1985; (45): on stem of Populus sp., 6 Jun. 1986; (1): on trunk of hardwood].

Gelatoporia dichrou (Fr.) Ginns, Index Fungorum 156: 1 (2014)

≡ Gloeoporus dichrous (Fr.) Bres.

Literature: Panfilova and Gaponenko (1963), (as Gloeoporus dichrous, (49): dried stem of Morus alba, 1962); Baltaeva (1992, 1993), (as Gloeoporus dichrous, (45): on decaying Picea sp., 4 Jul. 1988; (8): on dried stem of Pinus sp., 6 Aug. 1987; (19): on Pinus sp., 18 Jul. 1989; (26): on Pinus sp., 10 Aug. 1989).

Hypoderma sp.

Specimen examined: (37): on decaying branch of Betula sp., 19 Jun. 2014, YG/PS133.

Irpe fuscusus (Fr.) Fr., Elench. fung. (Greifswald) 1: 142 (1828)
Literature: Kleyner (1958), (25): on branch of Pyrus sp., 1957; Baltaeva (1992, 1993), (19): on stump of Populus sp., 19 Aug. 1985, (19): on Ulmus sp., 12 Aug. 1989; (8): on branch of Abies sp., 9 Sept. 1986; (7): on Quercus sp., 4 Aug. 1987; (45): on dried stem of Salix sp., 16 Oct. 1988.

Irpiciporus litschaueri (Lohwag) Zmitr., Folia Cryptogamica Petropolitana (Sankt-Peterburg) 6: 105 (2018).

≡ Spongipellis litschaueri Lohwag

Literature: Baltaeva (1992, 1993), (as Spongipellis litschaueri, 7: on stem of Malus sp., 7 Aug. 198; (7): on trunk of Quercus sp., 14 Aug. 1986; (8): on Fraxinus sp., 29 Jul. 1989; (9): on Quercus sp., 19 Aug. 1987; (45): on stems of Ulmus sp., 4 Sept. 1987; (21): on angiosperm fallen wood, 27 Sept. 1987; (26): on dead Fraxinus branch, 3 Sept. 1989.

*Mycoacia aurea* (Fr.) J. Erikss. and Ryvarden, Cortic. N. Eur. (Oslo) 4: 877 (1976).

≡ Phlebia aurea (Fr.) Nakasone

Specimen examined: (28): on a fallen rotten deciduous trunk, 20 Apr. 1982, E. Parmasto, TAAM104289.

Note: In TAAM, this specimen was originally labeled as *Phlebia aurea*.

≡ Phlebia bresadolae Parmasto, Eesti NSV Tead. Akad. Toim., Biol. seer 16(4): 390 (1967)

Specimens examined: (37): on fallen branch of angiosperm, 18 Jun. 2014, YG/PS189; (37): on unknown woody plants branch, 19 Jun. 2014, YG/PS89.

≡ Phlebia sp. (P. Karst.) Ryvarden, Rept. Kevo subarct. Res. Stn 8: 151 (1971)

Specimens examined: (39): on dead hardwood, 2 Nov. 2011, YG326; (40): on living *Crataegus pseudoheretophylla* subsp. turkestanica, 26 May 2011, YG64.

≡ Phlebia rufa (Pers.) M.P. Christ., Dansk bot. Ark. 19(no. 2): 164 (1960)

Specimen examined: (40): on living stems of *Robinia pseudacacia* L., 26 May 2011, YG77.

Resiniporus resinascens (Romell) Zmitr., Folia Cryptogamica Petropolitana (Sankt-Peterburg) 6: 98 (2018)

≡ Ceriporiopsis resinascens (Romell) Domański

Literature: Baltaeva (1992, 1993), (as Ceriporiopsis resinascens (Romell) Domański, (45): on fallen branch of Betula sp., 7 May 1987; (19): on fallen log of *Populus sp.*, 30 May 1987).

Sarcodontia spumae (Sowerby) Spiirin, Mycena 1(1): 64–71 (2001)

≡ Spongipellis spumae (Sowerby) Pat.

Literature: Baltaeva (1992, 1993), (as Spongipellis spumae (Sowerby) Pat., (45): on fallen stem of Ulmus sp., 4 Sept. 1987; (21): on trunk of Ulmus sp., 27 Sept. 1987; (7): on stem of Malus sp., 7 Aug. 1986, (7): on Quercus sp., 19 Aug. 1989; (8): on Fraxinus sp., 29 Jul. 1988; (19): on dried trunk of Fraxinus sp., 3 Sept. 1989; (9): on dried strum of *Quercus sp.*, 14 Aug. 1986.

≡ Stecherinum ciliolatum (Berk. and M.A. Curtis) Gilb. and Budington, J. Ariz. Acad. Sci. 6(2): 97 (1970).

Literature: Gafforov et al. (2017), (45): on dead trunk of *Prunus spinosissima* (Bunge) Franch., 29 Apr. 1988, A. Kollom, TAAM127581.

Fomitopsidaceae Jülich

Amyloporia sinuosa (Fr.) Rajchenb., Gorjón and Pildain, Aust. Syst. Bot. 24(2): 117 (2011)

≡ Antrodia sinuosa (Fr.) P. Karst.

Literature: Baltaeva (1992), (as Antrodia sinuosa) (Fr.) P. Karst., (21): on wet trunk of *Pinus sp.*, 15 Aug. 1990.

Antrodia albida (Fr.) Donk, Persoonia 4(3): 339 (1966)

Literature: Kravtzev (1950), (27): on *Quercus sp.*; Baltaeva (1992, 1993), (49): on bark of *Quercus* fallen branches, 5 Apr. 1987; (45): on fallen *Betula* trunk, 18 May 1986; (26): on stumps of *Populus sp.*, 25 Jun. 1988; (8): on wet woody plant, 5 Apr. 1987.

Antrodia heteromorpha (Fr.) Donk, Persoonia 4(3): 339 (1966)

Literature: Baltaeva (1992), (21): on rotten *Pinus* fallen trunk, 17 Aug. 1990.

Antrodia xantha (Fr.) Ryvarden, Norw. Jl Bot. (20): 8 (1973)

Specimens examined: (33): on trunk of *Juniperus polycarpos* var. *seravschanica*, 22 Apr. 1982, E. Parmasto, TAAM104400; (50): on rotten trunk of *Juniperus semiglobosa* Regel, 24 Apr. 1982, E. Parmasto, TAAM104301; (33): on fallen rotten trunk of *Juniperus semiglobosa*, 24 Apr. 1982, E. Parmasto, TAAM104289.

Literature: Baltaeva (1992, 1993), (45): on *Pinus sp.*, 19 Aug. 1988; (19): on *Juniperus polycarpos* var. *seravschanica*, 15 Aug. 1988; (21): on *Pinus sp.*, 3 Jul. 1989; (7): on stumps of *Picea sp.*, 13 Jul. 1989; (7): on *Juniperus sp.*, 15 Jul. 1989; (49): on *Pinus sp.*, 20 Jul. 1989.

Note: This species appears to be common in the study area. However, we did not find fresh specimens during our field trips.

#Brunneoporus juniperinus (Murrill) Zmitr., Folia Cryptogamica Petropolitana (Sankt-Peterburg) 6: 86 (2018).

Specimen examined: (36): on base of tree of *Juniperus semiglobosa*, 25 Apr. 1982, M. Khalikova, TAAM104433.

Note: In TAAM, this specimen was originally labeled as *Antrodia juniperina* (Murrill) Niemelä and Ryvarden.

Climacocystis borealis (Fr.) Koll. and Pouzar, Česká Mykol. 12(2): 103 (1958)

Literature: Baltaeva (1992, 1993), (as *Climacocystis borealis*) (21): on rotten trunk of *Picea sp.*, 24 Jul. 1988; (26): on fallen trunk of *Picea sp.*, 26 Aug. 1989.

Daedalea queicina (L.) Pers., Syn. meth. fung. (Göttingen) 2: 500 (1801)

Literature: Baltaeva (1992), (21): on stem of *Juglans regia*, 15 Aug. 1990.

≡ Flavidoporia pulverulenta (B. Rivoire) Audet, Mushrooms nomenclatural novelties 4: [1] (2017)

Specimens examined: (37): on trunk of Salix sp., 19 Jun. 2014, YG/PS167; (37): on rotten trunk of *Salix alba* L., 11 Sept. 2016, YG1110.

Fomitopsis betulina (Bull.) B.K. Cui, M.L. Han and Y.C. Dai, in Han, Chen, Shen, Song, Vlasák, Dai and Cui, Fungal Diversity 80: 359 (2016)

≡ Piptoporus betulinus (Bull.) P. Karst.

Literature: Panfilova and Gaponenko (1963); Khalikova (1989), (as *Piptoporus betulinus*) (49): on stem of *Betula sp.*; Baltaeva (1992, 1993), (as *Piptoporus betulinus*) (45): on trunk of *Betula sp.*, 14 Jul. 1987; (19): on wet *Betula* stems, 5 Aug. 1987; (26): on *Betula sp.*, 30 Jun. 1988; (8): on dried...
stems of *Betula* sp., 24 Aug. 1989); Iminova (2009), (as *Piptoporus betulinus*), (3): on *Betula tianschanica*, Jul.–Nov. 2003–2005.

**Fomitopsis pinicola** (Sw.) P. Karst., Meded Soc. Fauna Flora fenn. 6: 9 (1881)

Specimen examined: (48): on *Juniperus polycarpos* var. *seravschanica*, J.K. Rotkevich, Jul. 1956, TASM002.

Literature: Baltaeva (1992, 1993), ([45]: on living trunk of *Pinus* sp., 25 Jul. 1986; (7): on living trunk of *Pinus* sp., 11 Jun. 1987; (8): on living stem of *Picea* sp.; (21): on living *Pinus* tree, 3 Aug. 1987; (19): on fallen stem of conifer tree, 19 Jul. 1988).

**Laetiporus sulphureus** (Bull.) Murrill, Annls mycol. 18(1/3): 51 (1920)

Specimens examined: (28): on stem of *Salix* sp., 2 Sept. 2011, YG031; (28): on dried strum angiosperm wood, 3 Oct. 2011, YG041; (24): on *Acer tataricum* subsp. *semenovii* (Regel and Herder) A.E. Murray, 20 Aug. 2016, YG-B10.

Literature: Panfilova and Gaponenko (1963); Khalikova (1989), ([49]: on living stem of *Prunus mahaleb* L. and *Juglans regia* L.; Baltaeva (1992, 1993), ([45]: on trunk of *Robinia pseudoacacia* L., 16 Oct. 1986; (1): on trunks of *Acacia*, 30 Jul. 1989; (1): on trunk of *Quercus*, 12 Sept. 1989).

**Neoantrodia serialis** (Fr.) Pat., Essai Tax. Hyménomyc. Phaeolus schweinitzii (Fr.) Audet, Mushrooms nomenclatural novelties 6: [2] (2017)

≡ **Antrodia serialis** (Fr.) Donk

Literature: Baltaeva (1992), (as *Antrodia serialis*, (19): on dried of *Pinus* trunk, 6 Apr. 1989).

**Phaeodaelea incerta** (Curr.) Tura, Zmitr., Wasser and Spirin, Biodiversity of the Heterobasidiomycetes and non-gilled Hymenomycetes (former Aphyllophorales) of Israel: 401 (2011).

≡ **Gloeophyllum sprucei** (Berk.) Teixeira

Literature: Baltaeva (1992), (as *Gloeophyllum sprucei*, (19): on wet branches of *Pinus* sp., 25 Jul. 1990).

**Phaeolus schweinitzii** (Fr.) Pat., Essai Tax. Hyménomyc. (Lons-le-Saunier): 86 (1900)

Literature: Baltaeva (1992, 1993), ([49]: on dried fallen stem of *Pinus* sp., 30 Jul. 1989; (45): on trunk of *Picea* sp., 29 Jul. 1989); Iminova (2009), ([3]: on *Platanus orientalis* Jun.–Jul. 2005).

≡ **Pilatoporus ibericus** (Melo and Ryvarden) Kotl. and Pouzar, Cryptog. Mycol. 14(3): 217 (1993)

Specimens examined: (49): on trunk of angiosperm tree, 3 Sept. 2013, YG-G24.

**Postia caesia** (Schrad.) P. Karst., Revue mycol., Toulouse 3(no. 9): 19 (1881)

≡ **Oligoporus caesius** (Schrad.) Gilb. and Ryvarden

Literature: Baltaeva (1992, 1993), (as *Oligoporus caesius*, (45): on stump of *Picea* sp., 17 Oct. 1987, 6 Nov. 1987; (8): on trunk of *Pinus* sp., 28 Oct. 1987; (7): on *Pinus* fallen branch, 12 Nov. 1988).

≡ **Postia seriecомнollis** (Romell) Jülich, Persoonia 11(4): 423 (1982)

≡ **Oligoporus seriecомнollis** (Romell) Bondartseva

≡ **Chaetoporellus litschaueri** (Pilát) Bondartsev

Literature: Baltaeva (1992, 1993), (as *Oligoporus seriecомнollis*, *Chaetoporellus litschaueri*), ([45]: on stump of *Pinus* sp., 18 Sept. 1986; (19): on *Pinus* sp., 21 Jun. 1989; (8): on trunk of *Picea* sp., 9 May 1987; (7): on fallen branch of *Picea* sp., 9 May 1987).

**Postia stiptica** (Pers.) Jülich, Persoonia 11(4): 424 (1982)

≡ **Oligoporus stipticus** (Pers.) Gilb. and Ryvarden

Literature: Baltaeva (1992, 1993), (as *Oligoporus stipticus*, (45): on stump of *Pinus* sp, 9 Oct. 1987; (19): on *Pinus* sp., 24 Oct. 1987; (21): on fallen trunk of *Picea* sp., 6 Nov. 1988).

**Osteinia obducta** (Berk.) Donk, Schweiz. Z. Pilzk. 44: 86 (1966)

≡ **Oligoporus obductus** (Berk.) Gilb. and Ryvarden

Literature: Baltaeva (1992), (as *Oligoporus obductus*, (21): on root of *Pinus* sp., 15 Aug. 1990).

**Rhodofomes roseus** (Alb. and Schwein.) Vlasák, Česká Mykol. 44(4): 235 (1990)

≡ **Fomitopsis rosea** (Alb. and Schwein.) P. Karst

Specimens examined: (45): on conifer trunk fallen, 15 Jun. 1980, S.S. Ramazanova, N4 (TASM).

Literature: Baltaeva (1992, 1993), (as *Fomitopsis rosea*, (45): on dead standing *Picea* trunk, 7 Apr. 1987; (45): on *Picea*, 21 May 1988; (8): on trunk of *Picea* sp., 9 Jun. 1987; (7): on fallen branch of *Pinus* sp., 30 May 1988; (14): on *Pinus* sp., 5 May 1989).

≡ **Subantartria uzbekistanica** (Yuan, Gafforov and F. Wu) Aydet, Mushrooms nomenclatural novelties 9: [1] (2017).

≡ **Antrodia uzbekistanica** Yuan, Gafforov and F. Wu

Specimens examined: (8): on Juniper tree rotten wood, 8 Sept. 2016, YG1014; (8): on trunk of *Juniperus* sp., 4 Sept. 2017, YG1103; (8): on rotten stem of *Juniperus polycarpos* var. *seravschanica* (Kom.) Kitam., 10 Sept. 2017, YG1107; (8): on unknown woody branches, 9 Sept. 2016, YG1100.

Literature: Yuan et al. (2017), (same place: as **Antrodia uzbekistanica**).

**Phanerochaetaea aevicularia** (Pers.) Parmasto, Eesti NSV Tead. Akad. Toim., Biol. seer 16(4): 383 (1967)

Specimens examined: (28): on angiosperm fallen branch, 2 Sept. 2013, YG-G21; (7): on dried branch of *Prunus vulgaris* L., 28 Aug. 2013, YG-X3.

≡ **Byssomerulius corium** (Pers.) Donk, Proc. K. Ned. Akad. Wet., Ser. C, Biol. Med. Sci. 74(1): 28 (1971)

Specimen examined: (45): on a deciduous tree, 1 May 1988, A. Kollom, TAAM127605.

≡ **Ceriporia gilvescens** (Bres.) Domanski, Acta Soc. Bot. Pol. 32(4): 731 (1963)

≡ **Tyromyces gilvescens** (Bres.) Ryvarden

Specimens examined: (28): on dried angiosperm wood, 14 Oct. 2011, YG046; (36): on base of rotten trunk of wood, 8 Jun. 2011, YG049; (32): on *Juniperus pseudosabina* Fisch. et C.A. Mey., 26 May 2011, YG008.

Literature: Baltaeva (1992, 1993), (as *Tyromyces gilvescens*, (45): on fallen branch of *Populus* sp., 2 May 1987; (19): on *Quercus* trunk, 19 Aug., 1988; (26): on died fallen of *Populus* sp., 1 Sept. 1988; (9): on rotten trunk of *Populus* sp., 10 Jul. 1987; (21): on rotten trunk of *Malus* sp., 21 Jul. 1986; (6): on dead stump and trunk of deciduous wood, 13 Apr. 1986).

≡ **Ceriporia muscida** (Pers.) Gilb. and Ryvarden, Mycotaxon 22(2): 364 (1985)

Literature: Baltaeva (1992), ([5]: on dried branch of *Populus* sp., 28 Aug. 1990).

≡ **Efibula tuberculata** (P. Karst.) Zmitr. and Spirin, in Zmitrovich, Malyshova and Spirin, Mycena 6: 33 (2006)
Specimen examined: (18): on fallen trunk of *Haloxylon* sp., 6 Apr. 1979, K. Kalamees, TAAM120642.

**Note:** In TAAM, this specimen was originally labeled as *Athelia* sp.

**POLYPORACEAE Fr. ex Corda**

*Cerioporus mollis* (Sommerf.) Zmitr. and Kovalenko, Int. J. Med. Mushrooms 18(1): 33 (2016)

≡ *Datronia mollis* (Sommerf.) Donk

Literature: Baltaeva (1992, 1993), (as *Datronia mollis*, (45): on wet dead trunk of *Populus* sp., 10 May 1985; (19): on *Populus* sp., 21 Apr. 1986; (26): on *Populus* sp., 17 Jun. 1987.

*Cerioporus squamosus* (Huds.) Qué., Enchir. fung. (Paris): 167 (1886)

≡ *Polyporus squamosus* (Huds.) Fr.

Specimens examined: (50): on trunk of *Juglans regia*, 24 Apr. 1982, A. Kollom, TAAM127413; (36): on dried trunk and stem of angiosperm woody plant, 6 Jun. 2011, YG026; (37): on rotten trunk of *Acer tataricum* subsp. *semenovii*, 2 Sept. 2017, YG20170902; (22): on dried stump of *Acer tataricum* sp., 10 May 1980.

**Note:** This species is widespread on angiosperm woody plants across study area.

*Cerioporus varius* (Pers.) Zmitr. and Kovalenko, Int. J. Med. Mushrooms 18(1): 33 (2016)

≡ *Polyporus varius* (Pers.) Fr.

Literature: Baltaeva (1992), (as *Polyporus varius*, (45): on deadwood stem of *Quercus* sp., 23 Jun. 1990; (19): on fallen stem of *Loniceria* sp., 10 Aug. 1990.

≡ *Cerrena unicolor* (Bull.) Murrill, J. Mycol. 9(2): 91 (1903)

Specimens examined: (28): on dried fallen stem of angiosperm tree, 2 Sept. 2013, YG-G28; (32): on *Acer tataricum* subsp. *semenovii*, 15 May 2011, YG18; (32): on dried stem of *Acer tataricum* subsp. *semenovii*, 15 May 2011, YG027; (38): on *Crataegus pseudoheterophylla* subsp. *turkestanica*, 1 Jun. 2011, YG003; (41): on a trunk of *Juglans regia*, 22 Apr. 1982, E. Parmasto, TAAM104271; (41): on dry twig of *Acer* sp., 22 Apr. 1982, A. Kollom, TAAM127385; (50): on dead trunk of *Salix* sp., 24 Apr. 1982, A. Kollom, TAAM127405; (37): on *Acer tataricum* subsp. *semenovii*, 19 Sept. 2014, YG/PS79; (45): on dry branch of *Celtis australis* subsp. *caucasica*, 29 Apr. 1988, A. Kollom, TAAM127582; (45): on *Celtis australis* subsp. *caucasica*, 3 May 1988, A. Kollom, TAAM127632; (45): on dry trunk of *Celtis australis* subsp. *caucasica*, 1 May 1988, I. Parmasto, TAAM126263; (47): on trunk of *Prunus mahaleb*, 29 Apr. 1988, I. Parmasto, TAAM126248.

Literature: Akhmedova (1966), (45): on *Populus* sp.; Khalikova (1989), (45): on trunk of *Populus* sp., Jul. 1988; Baltaeva (1992, 1993), (1): on stump of *Quercus* sp., *Populus* sp., *Salix* sp., Jul.–Aug. 1988–1989.

**Note:** This species is widespread and causes damage to *Acer tataricum* subsp. *semenovii* trees in Tien Shan Mountain.

*Coriolopsis gallica* (Fr.) Ryvarden, Norw. Jl Bot. 19: 230 (1973)

≡ *Funalia gallica* (Fr.) Bondartsev and Singer

Literature: Panfilova and Gaponenko (1963), (as *Funalia gallica*, (49): on *Quercus* sp.); Khalikova (1989), (as *Funalia gallica*, (28): on stumps and dried trunks of *Fraxinus americana* L., Jun. 1986, Sept. 1986, Dendropark, May, 1987; Baltaeva (1992, 1993), ([45]: on dried stem and branches of *Quercus* sp., 6 Jun. 1985, (45): on *Quercus* sp., 3 Jun. 1988, (45): on *Salix* sp., 17 Jul. 1987, (47): on *Populus* sp., 27 Jul. 1987; (8): on *Fraxinus* sp., 4 Jul. 1989; (7): on *Fraxinus* sp., 1 Aug. 1989; (9): on stem of *Fraxinus* sp., 20 Jul. 1986; (21): on trunk of *Populus* sp., 27 Jul. 1987; (6): on *Quercus* sp., 3 Jun. 1988; (9): on trunk of *Populus tremula* L., 1 Aug. 1989); Iminova (2009), (as *Funalia gallica*, (3): on fallen trunks of *Platanus orientalis* L., May 2005, Sept. 2005).

*Daedaleopsis confragosa* (Bolton) J. Schröt., in Cohn, Krypt.-Fl. Schlesien (Breslau) 3.1(25–32): 492 (1888) [1889]

Literature: Baltaeva (1992), ([45]: on decaying stem of *Betula* sp., 11 Aug. 1990; (6): on *Betula* sp., 12 Sep. 1991; on fallen tree of *Betula* sp., 6 Aug. 1990, on *Betula* sp., 19 Jul. 1988.

*Dichomitus squaustens* (P. Karst.) D.A. Reid, Revta Biol., Lisb. 5(1–2): 150 (1965) [1964–5]

Literature: Baltaeva (1992, 1993), ([45]: on the bark of *Pinus* sp., 9 May 1987; (21): on *Biota* sp., 21 Jun. 1989; (21): on *Pinus* sp., 14 May 1988; (7): on *Pinus* sp., 9 Jun. 1989; (8): on *Picea* sp., 20 Jun. 1988; (19): on living stem of old *Biota* sp., 19 Jul. 1988.

*Diplomitoporus flavescens* (Bres.) Doma ´nski, Acta Soc. Bot. Pol. (39): 191 (1970)

≡ *Antrodia flavescens* (Bres.) Ryvarden

Literature: Khalikova (1989), (as *Antrodia flavescens*, (45): on fallen logs of *Picea* sp., 22 Apr. 1980); Baltaeva (1992), (as *Diplomitoporus flavescens*), Baltaeva, 1993 (as *Antrodia flavescens*, (7): on *Picea* stumps, 20 Jul. 1987; (26): on *Juniper* fallen stems, 17 Jun. 1987; (21): on *Pinus* trunk, 21 Jun. 1989.

*Fibroporia vaillantii* (DC.) Parmasto, Conspl. System. Corticiac. (Tartu): 177 (1968)

≡ *Antrodia vaillantii* (DC.) Ryvarden

Literature: Baltaeva (1992, 1993), (as *Antrodia vaillantii*, (45): on trunk of *Picea* sp., 18 Aug. 1989).

≡ *Fomes fomentarius* (L.) Fr., Summa veg. Scand., Sectio Post. (Stockholm): 321 (1849)

Specimens examined: (28): on living stem of *Populus* sp., 3 Sept. 2013, YG/bot2; (28): on decaying trunk of identified angiosperm, 4 Sept. 2013, YG/bot4; (40): on living trunk of *Juglans regia*, 26 May 2011, YG/014; (28): on unknown wood, 7 Nov. 2014, YG-60, *ibit.*, on unknown trunk decaying wood, YG-70; (38): on *Juglans regia*, 13 Sept. 2012, YG/Un2; (37): on dried *Juglans regia* trunk, 14 Sept. 2014, YG/PS174; (23): on living stem of *Juglans regia*, 13 Aug. 2015, YG-B03; (22): on dried stem of *Salix alba*, 17 Aug. 2016, YG-B04.

Literature: Panfilova and Gaponenko (1963); Akhmedova (1966); Khalikova (1989), ([49]: on stem and trunk decaying and living *Juglans regia*); Baltaeva (1992), ([1]: on dead and living decidueous trees of *Malus* sp., *Quercus* sp., *Populus* sp.); Iminova...
Salix wilhelmsiana (2009), [(3): on living stem of Salix alba, Oct. 2001].

Note: This species is widespread on living trees in the study area.

Hapalopilus rutilans (Pers.) Murrill, Bull. Torrey bot. Club 31(8): 416 (1904)

= Hapalopilus nidulans (Fr.) P. Karst.

Literature: Baltaeva (1992, 1993), (as Hapalopilus nidulans, (49): on dead branch of Betula sp., 1 Jul. 1989, (49): on fallen stem of Populus sp., 14 Jul. 1989; (19): on fallen strums of Populus sp., 29 Jul. 1989).

Lentinus arcularius (Batsch) Zmitr., Int. J. Med. Mushrooms 12(1): 88 (2010)

≡ Polyporus arcularius (Batsch) Fr.

Literature: Khalikova (1989), (as Polyporus arcularius, (45): on dead branch of Juglans regia, May, 1982, Nov. 1983; (41): on Salix interior Rowlee, Apr.–May 1983; Iminova (2009), (as Polyporus arcularius; (11): dried trunk of Juglans regia, Apr. 2000, Nov. 2004).

Lentinus brunalis (Pers.) Zmitr., Int. J. Med. Mushrooms 12(1): 88 (2010)

≡ Polyporus brunalis (Pers.) Fr.

Literature: Schwartzman (1964), (as Polyporus brunalis, (49): on Celtis australis subsp. Caucaica); Baltaeva (1993), (as Polyporus brunalis, (21): on stem of branch of Salix sp., 21 Jul. 1987; (3): on Salix sp., 15 Aug. 1987; (45): on Betula sp., 10 May 1987; (19): on Betula sp., 20 Jul. 1988; (8): on Populus sp., 6 Sept. 1988; (7): on small branches of Salix sp., 24 Aug. 1987; (27): 20 Jul. 1988; (10): on dried stem of Populus sp., 24 Aug. 1989).

Lentinus substrictus (Bolton) Zmitr. and Kovalenko, Int. J. Med. Mushrooms 18(1): 35 (2016)

≡ Polyporus ciliatus Fr.

Literature: Baltaeva (1992), (as Polyporus ciliatus, (45): on branches of Salix sp., 15 Aug. 1987; (8): on Salix sp., 21 Aug. 1987; (7): on strum and branch of Populus sp., 6 Nov. 1988; (19): on Betula fallen trumps, 10 May 1987; (21): on Betula sp., 30 Aug. 1988; (3): on Populus sp., 24 Aug. 1989).

≡ Lentinus tigrinus (Bull.) Fr., Syst. orb. veg. (Lundae) 1: 78 (1825)

≡ Panus tigrinus (Fr.) Sing.

Specimens examined: (28): on Salix sp., 24 Apr. 1989, K. Kalamees, TAAM144150; (28): on stump of Lonicera sp., 20 Apr. 1982, A. Kollom, TAAM104259; (40): on decaying Juglans regia, 26 May YG029; (33): on fallen trunk of angiosperm, 23 Apr. 1982, M. Khalikova, TAAM104290; (33): on trunk of Juglans regia, 23 Apr. 1982, E. Parmasto, TAAM104406; (33): on stump of Salix sp., 23 Apr. 1982, A. Kollom, TAAM127396; (41): on stump of unidentified wood, 23 Apr. 1982, A. Kollom, TAAM127381; (41): on trunk of angiosperm tree, 22 Apr. 1982, M. Khalikova, TAAM104275; (47): on Salix sp., 1 May 1988, A. Kollom, TAAM127603; (37): on trunk of Malus domestica, 18 Jun. 2014, YG/PS162; (17): on Salix sp., 7 May 1976, TAAM094856; (17): on stump of Prunus armeniaca, 7 May 1976, K. Kalamees and others, TAAM094857; (17): on Acer tree trunk, 7 May 1976, K. Kalamees and others, TAAM094847; (20): on dried trunks of angiosperm wood, 13 Jun. 2013, YG-J7.

Literature: Panfilova and Gaponenko (1963), [(44): on living trunk and stems of Lonicera sp., and on fallen dried trunk of Acer sp.]; Khalikova (1989), [(34): on dried stem of Malus domestica]; Iminova (2009), [(3): on Salix wilhelmsiana, on Populus euphratica Oliv., on living stem of Populus talassica Kom., Nov. 2005]; Iminova (2009), (as Panus tigrinus, (4): on Salix linearifolia Wolf.).

Note: This is a widespread species in the study area.

Lentis betulinus (Fr.) E. Durieu and Mont., Anns Sci. Nat., Bot., sér. 4 14: 182 (1860)

Specimen examined: (49): on branch of Populus nigra L., 15 Jul. 1985, E. Krall, Z. Narbal, TAAM126870.

Literature: Baltaeva (1992, 1993), [(45): on wet branch of Betula sp., 17 Aug. 1987; (19): on Populus sp., 22 Jul. 1988; (7): died trunk of Populus sp. 10 Sept. 1988; (8): on Salix sp., 26 Sept. 1988; (26): on Quercus sp., 10 Aug. 1990; (18): on Salix sp., 18 Aug. 1988).

Neoletus lepideus (Fr.) Redhead and Ginnns, Trans. Mycol. Soc. Japan 26(3): 357 (1985)

≡ Lentinus lepideus (Fr.) Fr.

Literature: Khalikova (1989), (as Lentinus lepideus, (28): on softwood conifer stumps, Sept. 1980, 1982); Baltaeva (1992), (as Lentinus lepideus, (45): on Populus sp. 13 Sept. 1990); Iminova (2009), (as Lentinus lepideus, (2): on stem of Populus talassica Kom., Nov. 2005).

Perenniporia fraxinea (Bull.) Ryvarden, Grundr. Krauterk. 2: 307 (1978)

Literature: Baltaeva (1992), [(45): on stem of Biot a sp., 13 Sept. 1990].

Picipes badius (Pers.) Zmitr. and Kovalenko, International Journal of Medicinal Mushrooms (Redding) 18(1): 35 (2016)

≡ Polyporus badius (Pers.) Schwein

Literature: Baltaeva (1992), (as Polyporus badius, (19): on stump of woody plant, 13 Jul. 1989).

≡ Picipes melanopus (Pers.) Zmitr. and Kovalenko, International Journal of Medicinal Mushrooms (Redding) 18(1): 36 (2016)

≡ Polyporus melanopus (Pers.) Fr.

Literature: Baltaeva (1992), (as Polyporus melanopus (Pers.) Fr., (21): on Prunus sp., 2 Sept. 1990).

Podofomes trogii (Fr.) Pouzar, Česká Mykol. 25(1): 19 (1971)

≡ Ischnoderma trogii (Fr.) Teixeira

Literature: Khalikova (1989), (as Ischnoderma trogii, (49): on Abies alba Mill., Oct. 1982).

Polyporus lipsiensis (Batsch) E.H.L. Krause, Basidiomycetum Rostochiensium: 54 (1928)

≡ Ganoderma lipsiense (Batsch) G.F. Atk.

Literature: Iminova (2009), (as Ganoderma lipsiense, (6): on dried stem of angiosperm wood, Sept. 2002).

Pycnoporus cinnabarinus (Jacq.) P. Kast., Revue mycol., Toulouse 3 (no. 9): 18 (1881)
Literature: Baltaeva (1992), (45): on strum of Salix sp., 13 Jun. 1990.

Pyrofomes demidoffii (Lév.) Kotl. and Pouzar, Repriov num. Spec. Regni veg. 69: 140 (1964)

Specimen examined: (45): on living trunk of Juniperus polycarpos var. seravschanica, 29 Apr. 1988, I. Parmasto, TAAM126251.

Literature: Panfilova and Gaponenko (1963); Akhmedova (1966); Khalikova (1989), (49): on decaying branch of the Quercus tree; Sinadskiy (1968), (18): on fallen log of Quercus.

Note: This is one of the most common and widespread species in Uzbekistan. This species is mostly found on Pinus, Platanus, Prunus, Quercus, and Juglans species in the study area.
Literature: Khalikova (1989), [(33): on dried stem of *Malus sieversii*, 17 Apr. 1986]; Iminova (2009), (as *Coriolus tephroleucus* (Fr.) Bonk., (14): on *Prunus vulgaris* and *Juglans regia*, May 1999).

- *Trametes trogii* Berk., in Trog. Mittheil. d. schweiz. Naturf. Ges. in Bern 2: 52 (1850)

  - Funalia trogii (Berk.) Bondartsev and Singer

  Specimens examined: (28): on fallen deciduous branch, 2 Sept. 2013, YG/bot23b; 11 Sept. 2014; (38): on *Acer tataricum* subsp. semenovii, 9 Sept. 2016, YG1017; (49): on *dried Populus alba*, 17 Sept. 2014, YG-N6, *ibit* on trunk of *Populus alba*, 17 Sept. 2014, YG-N7; (31): on unidentified wood, 17 Sept. 2009, O. Kurina, TAAM189940 (as *Funalia* sp. in TAAM); (37): on *dried Salix* trunk, 14 Sept. 2014, YG/PS2X; (20): on *Populus* sp., 14 Sept. 2014, YG-JX4; (20): on *unknown stump of angiosperm*, 13 Jun. 2013, YG-G17, *ibit* 13 Jun. 2013, YG-G18, *ibit* 13 Jun. 2013, YG-G19; (20): on *Populus nigra* L., 16 Jun. 2013, YG-J4; (20): on *dried stem of living Populus nigra*, 15 Jun. 2013, YG-J6; (20): on *Populus* sp., 16 Jun. 2013, YG-GX1; (8): on *unknown woody branches*, 13 Jun. 2016, YG-G14, *ibit*, 13 Jun. 2016, YG1090.

  - *Fulania trogii* (Berk.) Bondartsev and Singer

  Specimens examined: (28): on *dead trunk of Betula* sp., 5 May 1988, I. Parmasto, TAAM126293; (28): on *Betula* trunk, 5 May 1988, A. Kollom, TAAM127635; (37): on *dried stem of angiosperm wood*, 19 Jun. 2014, YG/PS128-1; (37): on *dried stem of angiosperm wood*, 19 Jun. 2014, YG/PS170; (45): on *trunk of Prunus* sp., 22 Apr. 1982, A. Kollom, TAAM127389; (49): on *a fallen decisuous trunk*, 22 Apr. 1982, A. Kollom, TAAM127388; (35): on *Crataegus pseudoheterophylla* subsp. *tataricum* (Pojark.) K.I.Chr., in Trog, Mittheil. d. schweiz. Naturf. Ges. in Bern 2: 52 (1850); (14): on *various angiosperm trunks*, Sept. 2002.

  - *Trametes versicolor* (L.) Lloyd, Mycol. Notes (Cincinnati) 65: 1045 (1921) [1920]

  - Coriolus versicolor (L.) Quél.

  Specimens examined: (28): on *trunk of Betula* sp., 5 May 1988, I. Parmasto, TAAM126293; (28): on *Betula* trunk, 5 May 1988, A. Kollom, TAAM127635; (37): on *dried stem of angiosperm wood*, 19 Jun. 2014, YG/PS128-1; (37): on *dried stem of angiosperm wood*, 19 Jun. 2014, YG/PS170; (45): on *trunk of Prunus* sp., 22 Apr. 1982, A. Kollom, TAAM127389; (49): on *a fallen decisuous trunk*, 22 Apr. 1982, A. Kollom, TAAM127388; (35): on *Crataegus pseudoheterophylla* subsp. *tataricum* (Pojark.) K.I.Chr., in Trog, Mittheil. d. schweiz. Naturf. Ges. in Bern 2: 52 (1850); (14): on *various angiosperm trunks*, Sept. 2002.

  - Tyromyces lacteus (Fr.) Murr, N. Amer. Fl. (New York) 9(1): 36 (1907)

  Literature: Panfilova and Gaponenko (1963); Khalikova (1989), [(49): on *dried trunk of Betula pendula* Roth].

- *Sparassidaceae* Herter

  *Sparassis crispa* (Wulfen) Fr., Syst. mycol. (Lundae) 1: 465 (1821)

  Literature: Iminova (2009), [(3): on *trunk of angiosperm trees*, Aug. 2000, Sept. 2003, Oct. 2003].

  - *Ganoderma applanatum* (Schulzer) Donk, Proc. K. Ned. Akad. Wet., Ser. C, Biol. Med. Sci. 72(3): 273 (1969)

  Specimens examined: (28): on *dead trunk of Acer saccharum* Marshall, 7 Jun. 2014, YG/bot24; (49): on *trunk of Acer* sp., 12 Sept. 2011, YG/UG3; (49): on *trunk of Acer* sp., 12 Sept. 2014, YG/Gan1.

  - *Ganoderma adspersum* (Schulzer) Donk, Proc. K. Ned. Akad. Wet., Ser. C, Biol. Med. Sci. 72(3): 273 (1969)

  Specimens examined: (28): on *dead trunk of Acer saccharum*, 14 Oct. 2011.

  - *Ganoderma applanatum* (Pers.) Pat., Hyménomyc. Eur. (Paris) 143 (1887)

  Specimen examined: (23): on *Juglans regia*, 18 Aug. 2016, YG-B06.

  - *Ganoderma lucidum* (Curtis) P. Karst., Revue mycol., Toulouse 3(no. 9): 17 (1881)
Literature: Panfilova and Gaponenko (1963); Schwartzman (1964); Khalikova (1989), [(49): on various deciduous wood]; Baltaeva (1992, 1993), [(49): on stump of deciduous wood, 13 Aug. 1989; (45): on living Quercus sp., 14 Aug. 1987; (19): on Quercus sp., 29 Jul. 1988; (19): on Ulmus sp., 2 Aug. 1988; (8): on stump of deciduous wood, 14 Aug. 1988; (6): on various deciduous woody plants, 9 Aug. 1989]; Iminova (2009), [(14): on trunks of angiosperm wood, 2000–2002].

#*Ganoderma resinaceum* Boud., in Patouillard, Bull. Soc. mycol. Fr. 5(2,3): 72 (1889)

Specimen examined: (8): on living stem of Salix sp., 7 Sept. 2016, YG-X4.

**Merypilaceae** Jülich

**Grifola fomentaria** (Pers.) T. Wagner and M. Fisch., Mycol. Res. 105(7): 780 (2001)

**Fomitiporia hispida** (Pat.) Fiasson and Niemelä, Karstenia 24(1): 25 (1984)

**Fomitiporia punctata** (P. Karst.) Murrill, Lloydia 10: 254 (1947)

**Fomitiporia robusta** (P. Karst.) Bourdot and Niemela, Karstenia 21(1): 25 (1984)

**Fulviformes rimosus** (Berk.) Fiasson and Niemelä, Karstenia 24(1): 26 (1984)

**Phellinus rimosus** (Berk.) Pilát

Literature: Baltaeva (1992, 1993), [(45): on trunk of Pistacia vera, 1963]; Baltaeva (1992, 1993), [(49): on Quercus ramosissima trunk, 6 Jul. 1985; (21): on Quercus, 12 Jul. 1985; (19): on Quercus sp., 30 Jul. 1985; (45): on dried trunk of Salix sp., 25 Apr. 1986; (7): on Salix sp., 6 Jul. 1987; (8): on Populus sp., 19 Aug. 1989; (19): on Populus sp., 10 Apr. 1989).

**Fuscospora contigua** (Pers.) G. Cunn., Bull. N.Z. Dept. Sci. Industr. Res., Pl. Dis. Div. 73: 4 (1948)

**Phellinus contigua** (Pers.) Pat.

Literature: Baltaeva (1992, 1993), [(49): on stem of Elaeagnus rhamnoides, 19 Sept. 1986; (45): on fallen Accacia trunk, 27 Aug. 1987, 6 Sept. 1987; (19): on stem of Alnus sp., 23 Sept. 1987; (7): on Alnus sp., 16 Aug. 1988; (8): on dried stem of Ulmus sp., 19 Sept. 1988; (9): on Ulmus sp., 30 Aug. 1989).

**Fuscospora torulosa** (Pers.) T. Wagner and M. Fisch., Mycol. Res. 105(7): 780 (2001)

**Phellinus torulosa** (Pers.) Bourdot and Galzin

Literature: Khalikova (1989), [(as Inonotus tamaricis, 9): on Tamarix hispida Willd.]; Baltaeva (1992, 1993), [(as Inonotus tamaricis, 9): on Tamarix ramosissima Ledebe., 27 Aug. 1989; (9): on Tamarix sp., 24 Sept. 1986; (26): on Tamarix sp., 6 May 1987; (21): on stem of living Tamarix hispida, 31 Sept. 1987; (10): on dried stem of Tamarix hispida, 18 Mar. 1988).

**Inonotus andersonii** (Ellis and Everh.) Černý, Česká Mykol. 17(1): 1 (1963)

**Inonotus tamaricis** (Pat.) Maire

Literature: Gaponenko (1965); Sinadskiy and Bodartseva (1956), [(as Inonotus tamaricis, 10): on living stem of Tamarix hispida Willd.]; Baltaeva (1992, 1993), [(as Inonotus tamaricis, 9): on Tamarix ramosissima Ledebe., 27 Aug. 1989; (9): on Tamarix sp., 24 Sept. 1986; (26): on Tamarix sp., 6 May 1987; (21): on stem of living Tamarix hispida, 31 Sept. 1987; (10): on dried stem of Tamarix hispida, 18 Mar. 1988).

**Inonotus cuticularis** (Bull.) P. Karst., Meddn Soc. Fauna Flora Fenn. 5: 39 (1879)

**Inonotus hispidus** (Bull.) P. Karst., Medddn Soc. Fauna Flora Fenn. 5: 39 (1879)

Specimens examined: (40): on stem of living Juglans regia, 26 May 2011, YG054; (38): on Juglans regia, 6 Jun. 2011, YG055; (38): on stem of Juglans regia, 11 Jun. 2014, YG/UG1; (37): on living Pinus sp., 19 Jun. 2014, YG/PS156; (37): on trunk of living Pinus sp., 19 Jun. 2014, YG/PS157; (37): on Malus sieversii, 14 Sept. 2014, YG/PS148; (39): on living Juglans regia, 9 Sept. 2016, YG1015; (22): on Juglans regia, 11 Aug. 2015, YG-B07; (28): on dried trunk angiosperm wood, 27 Sept. 2014, YG/bot1; (29): on living Morus alba stem, 17 Sept. 2015, YG/AG1; (23): on living stem of Juglans regia, 15 May 2016, YG-B08;
(41): on a wood of *Juglans regia*, 22 Apr. 1982, E. Parmasto, TAAM207844; (17): on a wood of *Morus alba*, 8 May 1976, K. Kalamees, TAAM080947.

Literature: Panfilova and Gaponenko (1963); Akhmedova (1966); Khalikova (1989); Baltaeva (1992, 1993); Iminova (2009), [(1): on living trunks of deciduous woody plants: *Malus domestica* Borkh., *S. sieversii* (Ledeb.) M.Reom., *Morus alba*, *Juglans regia*, *Prunus avium* (L.) L.].

*Inonotus obliquus* (Fr.) Pilát, Atlas Champ. l’Europe, III, Polyporaceae (Praha) 1: 572 (1942).

Specimens examined: (28): unknown angiosperm fallen trunk, 14 Oct. 2011, YG001.

Literature: Baltaeva (1992, 1993), [(45): on living *Betula* sp., 28 Aug. 1987; (19): on trunk of *Fraxinus* sp., 21 May 1986; (7): on *Alnus* sp., 9 Jul. 1986; (8): on dried fallen trunk of *Salix* sp., 13 Jun. 1987; (9): on *Salix* sp., 20 Apr. 1988; (3): on *Salix* sp., 29 Jun. 1989.]

*Inonotus pseudohispidus* Kravtzev, Bull. Acad. Sci. Kazakh SSR 98: 128 (1950)

Specimens examined: (28): unknown angiosperm fallen trunk, 14 Oct. 2011, YG001.

Literature: Baltaeva (1992, 1993), [(45): on living *Betula* sp., 28 Aug. 1987; (19): on stump of *Fraxinus* sp., 21 May 1986; (7): on *Alnus* sp., 9 Jul. 1986; (8): on dried fallen trunk of *Salix* sp., 13 Jun. 1987; (9): on *Salix* sp., 20 Apr. 1988; (3): on *Salix* sp., 29 Jun. 1989.]

*Phellinus conchatus* (Pers.) Y.C. Dai, Fungal Diversity 45: 309 (2010)

Specimens examined: (50): on a trunk of *Betula tianschanica*, 24 Apr. 1982, E.Parmasto, TAAM104436; (50): on a dead branch of *Betula tianschanica*, 24 Apr. 1982, E.Parmasto, TAAM104285.

Literature: Panfilova and Gaponenko (1963); Khalikova (1989), [(41): on live trunk of *Juglans regia*, 1 Jun. 1980, Sept. 1984); Baltaeva (1992, 1993), [(45): on trunk of *Prunus vulgaris*, 10 Sept. 1988; (21): on trunk of *Prunus* sp., 9 Aug. 1988; (9): on trunk of *Acer* sp., 12 Apr. 1987; (14): on *Acer* sp., 19 Aug. 1987; (8): on *Salix* sp., 6 Apr. 1988; (7): on *Salix* sp., 16 Jul. 1989; (19): on dried trunk of *Salix* sp., 24 Jul. 1988; Iminova (2009), [(3): on *Juglans regia*, Apr.-May 2000].

Note: This species causes white rot of broad-leaved trees from many genera and is most common on *Ailanthus*, *Betula*, and *Corylus* spp. (all Betulaceae) and *Salix* spp. (Salicaceae), also fairly common on *Acer* (Sapindaceae) and *Malus*, *Prunus*, and *Sorbus* spp. (all Rosaceae), more rarely on *Aesculus*, *Amelanchier*, *Carpinus*, *Carya*, *Castanea*, *Crataegus*, *Fraxinus*, *Hippophae*, *Hydrangea*, *Juglans*, *Laburnum*, *Morus*, *Populus*, *Pterocarya*, *Robinia*, *Pyrus*, *Syringa*, *Tilia*, and *Ulmus*. Since this species is defined both in a wide and in a narrow sense, the lists of hosts should be interpreted with care.

**Phellinus pomaceus** (Pers.) Maire, Mus. barcin. Scient. nat. Op., Ser. Bot. 15: 37 (1933)

≡ *Phellinus tuberculosis* Niemelä

Specimens examined: (33): on a living trunk of *Prunus* sp., 26 Apr. 1982, E. Parmasto, TAAM104413, (35): on *Prunus cerasifera* Ehrl., 31 Aug. 1963, A. Raitviir, TAAM043492; (33): on a fallen trunk of *Prunus* sp., 23 Apr. 1982, A. Kollom, TAAM127401; (41): on the base living fruit trees, 26 Apr. 1982, E. Parmasto, TAAM104434; (50): on a trunk of *Prunus mahaleb*, 24 Apr. 1982, A. Kollom, TAAM127411; (50): on a dry trunk of *Prunus erythrocarpa* (Nevski) Gilli, 24 Apr. 1982, A. Kollom, TAAM203618; (50): on a trunk of *Salix* sp., 24 Sep. 2014, YG/S1; (38): on *Prunus cerasi*era, 1 Jun. 2011, YG052; (38): on *Prunus* sp., 11 Sept. 2011, YG51-pb; (38): on a dry trunk of *Prunus* sp., 12 Sept. 2014, YG/Us01; (38): on living *Prunus* sp., 12 Sept. 2014, YG/Us02; (39): on a dry trunk of *Prunus dulcis* (Mill.) D.A.Webb, 2 Nov. 2011, YG009; (39): on living stem of *Cerasus tianshanica* Pojarj., 2 Nov. 2011, YG028, *ibid* on living stem of *Cerasus tianshanica* Pojarj., 20 Sept. 2014, YG/Ps5X; (39): on *Prunus cerasi*era, 2 Nov. 2011, YG337; (39): on living trunk of *Prunus cerasi*era, 2 Nov. 2011, YG338; (32): on *Prunus mahaleb*, 15 May 2011, YG28; (32): on a dry trunk of *Prunus* sp., 13 Sept. 2014, YG/bi164; (37): on *Prunus* sp., 19 Sept. 2014, YG/ps82; (45): on a dry trunk of *Crataegus altaica* Ledeb., 2 May 1988, I. Parmasto, TAAM126247; (48): on *Lonicera* sp., Sept. 1982, N.I. Gaponenko, TASM582; (8): on a dry trunk of *Prunus* sp., 9 Sept. 2016, YG1102; (45): on dry branch of *Juglans regia*, 29 Apr. 1988, I. Parmasto, TAAM126253; (45): on dry trunk of *Celtis australis* subsp. *caucasica*, 1 May 1988, I. Parmasto, TAAM126269. In TAAM two specimens reported as *Phellinus* sp.

Literature: Panfilova and Gaponenko (1963); Khalikova (1989), [(41): on live trunk of *Juglans regia*, 1 Jun. 1980, Sept. 1984]; Baltaeva (1992, 1993), [(45): on trunk of *Prunus vulgaris*, 10 Sept. 1988; (21): on trunk of *Prunus* sp., 9 Aug. 1988; (9): on trunk of *Acer* sp., 12 Apr. 1987; (14): on *Acer* sp., 19 Aug. 1987; (8): on *Salix* sp., 6 Apr. 1988; (7): on *Salix* sp., 16 Jul. 1989; (19): on dried trunk of *Salix* sp., 24 Jul. 1988]; Iminova (2009), [(3): on *Juglans regia*, Apr.-May 2000].
Phellinus tuberculosis, (15): on living stem of Cydonia oblonga Mill., May 2003; (2): on trunk of living Prunus domestica L. and on Malus domestica, May–Aug. 2002.

Note: First report of this species is on Celtis australis subsp. caucasica and Lonicera sp. from Uzbekistan. Usually it is largely confined to trees belonging to the Rosaceae, chiefly on Prunus and rarely on Malus, Pyrus, and Cydonia, and causes white rot of the heartwood of living fruit trees. This species is widespread in the northern hemisphere and probably occurs wherever native species of Prunus from the stone fruit group and where peaches, cherries, and plums are cultivated as fruit trees. This species is also reported on Acer, Alnus, Carpinus, Ceratonia, Cornus, Corylus, Crataegus, Fagus, Ficus, Juglans, Malus, Olea, Pyrus, Salix, and Ulmus.

Phellinus tremulae (Bondartsev) Bondartsev and P.N. Borisov, Trut. Grib Evrop. Chasti SSSR Kavkaza [Bracket Fungi Europ. U.S.S.R. Caucasus] (Moscow-Leningrad): 358 (1953)

Literature: Balteava (1992, 1993), (45): on trunk of Populus tremula, 20 Jul. 1985; (19): on Populus tremula, 16 Aug. 1985; (21): on Populus tremula, 10 Aug. 1986; (7): on Populus sp., 25 Aug. 1986; (26): on dried fallen of Populus tremula, 19 Aug. 1987; (6): on living of Populus sp., 8 Aug. 1988; Khalikova (1989), ([49]: on live trunk of Populus sp., 20 Jul. 1985).

Phylloporia ampelina (Bondartsev and Singer) Bondartseva, Mikol. Fitopolat. 17(4): 279 (1983)

Phylloporia ampelina Bondartsev and Singer

Literature: Bondarceva and Parmasto (1986), (as Phellinus ampelina), (49): on dead and live trunk of Vitis vinifera L.).

Phylloporia ephedrae (Woron.) Parmasto, Proc. Indian Acad. Sci., Pl. Sci. 94(2–3): 377 (1985)

Specimens examined: (45): on stem of living Ephedra equisetina Bunge, 1 May 1988, I. Parmasto, TAAM126265; (45): on Ephedra equisetina, 2 May 1988, I. Parmasto, TAAM126279; (45): on stem of Ephedra equisetina, 1 May 1988, A. Kollom, TAAM127593.

Phylloporia yuchengsti Gafforov, Tomöovský, Langer and L.W. Zhou, Cryptog. Mycol. 35(4): 318 (2015) [2014]

Specimens examined: (38): on trunk of Juglans regia, 1 Jun. 2011, YG043; (40): on Prunus sp., 11 Sept. 2011, YG343; (45): on a trunk of Juglans regia, 29 Apr. 1988, I. Parmasto, TAAM126260, in TAAM as Phellinus sp.; (7): on trunk of Crataegus pseudoheterophylla subsp. tuerkestanica, 11 Sept. 2015, YG1093; (39): on Crataegus sp., 9 Oct. 2016, YG1011; (8): on fallen unknown woody branches, 9 Sept. 2016, YG1101; (20): on trunk of Populus sp., 12 Jun. 2013, YG-J5; (20): on Morus alba, 13 Jun. 2013, YG-J10; (20): on Morus alba, 13 Jun. 2013, YG-J11.

Literature: Gafforov et al. (2014), ([38]: on dead angiosperm trunk and stem, 1 Jun. 2011; (39): on dead angiosperm trunk, 2 Nov. 2011).

Note: This species was first described from north-eastern Uzbekistan in 2014. Later, we collected this species in central and south Uzbekistan. It seems that this species is widespread in the study area. This species grows on Crataegus, Juglans, Morus, Populus, and Prunus, which represent four plant families.

Porodaedalea pini (Brot.) Murrill, Bull. Torrey bot. Club 32(7): 367 (1905)

Phellinus pini (Brot.) Pilát

Literature: Balteava (1992, 1993), (as Phellinus pini, (1): on trunks and stumps of conifer tees); Khalikova (1989), (as Phellinus pini, (28): on live trunk of Pinus pallasiana D. Don, Oct. 1984); Iminova (2009), (as Phellinus pini, (13): on dried stem of angiosperm, May 2003).

* Sanghuangporus lonicerinus *(Bondartsev) Sheng H. Wu, L.W. Zhou and Y.C. Dai, in Zhou, Vlasák, Decock, Assefa, Stenlid, Abate, Wu and Dai, Fungal Diversity 77: 340 (2015)

Phellinus lonicerinus (Bondartsev) Bondartsev and Singer

Specimens examined: (49): on dried stem of Lonicera sp., 8 Nov. 2016, YG1095; (36): on Lonicera sp., 8 Nov. 2016, YG1096; (32): on stem of living Lonicera nummularifolia Jaub. and Spach, 15 May 2011, YG018; (41): on the base of a living trunk of Lonicera sp., 22 Apr. 1982, E. Parmasto, TAAM203688; (36): on a trunk of Lonicera sp., 25 Apr. 1982, E. Parmasto, TAAM104407; (36): on the base of a living trunk of Lonicera sp., 25 Apr. 1982, E. Parmasto, TAAM104439; (50): on the base of Lonicera sp., 24 Apr. 1982, E. Parmasto, TAAM0104264; (50): on a dry trunk of Lonicera sp., 24 Apr. 1982, A. Kollom, TAAM127410; (39): on Lonicera sp., 9 Oct. 2016, YG1012; (50): on Lonicera nummularifolia, 9 Oct. 2016, YG1013; (38): on Lonicera sp., 9 Sept. 2016, YG1016; (37): 19 Jun. 2014, on living stem of Lonicera sp., YG/PS92; (37): 20 Jun. 2014, dried stem of Lonicera sp., YG/PS129; (37): on Acer sp., 20 Jun. 2014; (30): on living stem of Acer tataricum subsp. semenovii, 5 May 2014, YG/Un1; (46): on a dry trunk of deciduous trunk, 29 Apr. 1988, A. Kollom, TAAM127578; (7): on Lonicera sp., 11 Sept. 2016, YG1094; (8): on Lonicera sp., 26 May 2018, YG1097; (8): on living stem of Lonicera microphylla Willd. ex Schult., 26 May 2018, YG1112.

Literature: Panfilova and Gaponenko (1963); Khalikova (1989); Iminova (2009), (Phellinus lonicerinus, (1): on Lonicera sp.).

Note: This species was thought to grow exclusively on Lonicera, but a new host Acer tataricum subsp. semenovii is recorded here from Uzbekistan.

Tropicoporus linteus (Berk. and M.A. Curtis) L.W. Zhou and Y.C. Dai, in Zhou, Vlasák, Decock, Assefa, Stenlid, Abate, Wu and Dai, Fungal Diversity 77: 344 (2015)

Phellinus linteus (Berk. and M.A. Curtis) Teng

Specimens examined: (42): on dry branch of Rosa fedtschenkouana Regel, 21 Apr. 1982, E. Parmasto, TAAM104272 (as Phellinus sp. in TAAM).

Literature: Panfilova and Gaponenko (1963); Khalikova (1989), (as Phellinus linteus, (49): on dead and living trunk and stem of angiosperm woody plants); Balteava (1992, 1993), (as Phellinus linteus, (49): on Salix sp., 16 Aug. 1985, (45): on living trunk of Lonicera sp., 9 Apr. 1985; (21): on Quercus sp., 12 Sept. 1986; (7): on Populus sp., 5 May 1987; (8): on Acer sp., 4 Sept. 1989; (19): on Ulmus sp., 27 Aug. 1987; Iminova (2009), (as Phellinus linteus, (3): on Salix wilhelmsiana, Apr. 2000, May 2003).

Neoantrodillaceae Y.C. Dai, B.K. Cui, Jia J. Chen and H.S. Yuan

* Neoantrodiella * sp.

Specimen examined: (33): on trunk of Juniperus polycarpos var. seravschanica, 22 Apr. 1982, E. Parmasto, TAAM104307.
Oxyporaceae Zmitr. and Malysheva

Rigidoporus corticola (Fr.) Pouzar, Folia geobot. phytotax. bohemoslov. 1(4): 368 (1966)
≡ Oxyporus corticola (Fr.) Ryvarden

Specimens examined: (49): on fallen trunk, 22 Sept. 2014, YG-P55, *ibid.*, YG-P67; (49): on dried branch of angiosperm, 23 Sept. 2014, YG-P35.

Literature: Baltaeva (1992, 1993), (as *Oxyporus corticola*, (21): on stump of *Quercus* sp., 6 May, 1985; (21): on *Fraxinus* sp., 12 Aug. 1988; (45): on stem of *Fraxinus* sp., 6 May 1988; (20): on dried stem of living *Salix alba* L., 29 Aug. 1989; (19): on dead trunk of *Populus* sp., 15 Apr. 1987; (9): on *Populus* sp., 30 Jul. 1987; (7): on *Populus tremula*, 19 Oct. 1987.

Rigidoporus latemarginatus (Durieu and Mont.) Pouzar, Folia geobot. phytotax. bohemoslov. 1(4): 368 (1966)
≡ Oxyporus latemarginatus (Durieu and Mont.) Donk
≡ Chaetoporus ambiguus (Bres.) Bondartsev and Singer

Literature: Baltaeva (1992), (as *Oxyporus latemarginatus*, (28): on stump of *Pyrus* sp., 16 Sept. 1990), Sinadskiy and Bodartseva, 1960 (as *Chaetoporus ambiguus*, (27): on *Elaeagnus rhamnoides*, Jun. 1960).

Rigidoporus populinus (Schumach.) Pouzar, Folia geobot. phytotax. bohemoslov. 1(4): 368 (1966)
≡ Oxyporus populinus (Schumach.) Donk

Literature: Panfilova and Gaponenko (1963), (as *Oxyporus populinus*, 49: on dead stem of *Acer tataricum* Ledeb., 29 Aug. 1958, E. Parmasto, TAAM009360).

Rigidoporus ginkgonis (Y.C. Dai) F. Wu, Jia J. Chen and L.W. Zhou and Gafforov, Phytotaxa 299(2): 275 (2017)

Specimens examined: (8): on unknown angiosperm branch, 9 Sept. 2016, YG1098; (49): on fallen angiosperm branches, 7 Oct. 2016, YG1104.

Literature: Kan et al., 2017 [(8): on stem of *Juniperus* sp., 9 Sept. 2016].

Lyomyces crustosus (Pers.) P. Karst., Revue mycol., Toulouse 3(no. 9): 23 (1881)

Literature: Gafforov et al. (2017), [(38): on branch of living tree *Fraxinus pennsylvanica* Marshall, 3 Sept. 2013].

Lyomyces erastii (Saaren. and Kotir.) Hjortstam and Ryvarden, Syn. Fung. (Oslo) 26: 43 (2009)

Specimen examined: (15): on unknown shrub, 12 Jul. 2017, RM21.

Literature: Gafforov et al. (2017), [(39): on deciduous wood, 2 Nov. 2011].

Lyomyces sambuci (Pars.) P. Karst., Bidr. Känn. Finl. Nat. Folk 37: 153 (1882)

Literature: Gafforov et al. (2017), [(28): on dead wood of *Philadelphus* sp., 20 Apr. 1982; (39): on a dead branch of angiosperm, 2 Sept. 2013].

Xylodon paradoxus (Schrad.) Chevall., Fl. gén. env. Paris (Paris) 1: 274 (1826)
≡ Schizopora paradoxo (Schrad.) Donk

Literature: Baltaeva (1992, 1993), (as *Schizopora paradoxo*, (49): on trunks of *Quercus* sp., 20 Aug. 1989; (45): on trunk of *Quercus* sp., 7 Oct. 1988; (8): on *Quercus* sp., 19 Nov. 1989).

TAXA WITH UNCERTAIN POSITION AT THE FAMILY LEVEL (INCERTAE SEDIS)

**Sidera lenis** (P. Karst.) Miettinen, in Miettinen and Larsson, Mycol. Progr. 10(2): 136 (2011)
≡ Diplomitoporus lenis (P. Karst.) Gilb. and Ryvarden
≡ Antrodia lenis (P. Karst.) Ryvarden

Literature: Baltaeva (1992, 1993), [(45): on wet trunk of *Pinus* sp., 12 Mar. 1988; (7): on stump of *Pinus* sp., 15 Aug. 1988; (19): on *Pinus* sp., 9 Jul. 1989].

**Trichaptum abietinum** (Pers.) Ryvarden, Norw. Jl Bot. 19: 237 (1972)

Literature: Baltaeva (1992, 1993), [(45): on wet trunk of *Pinus* sp., 12 Mar. 1988; (7): on stump of *Pinus* sp., 15 Aug. 1988; (19): on *Pinus* sp., 9 Jul. 1989].

**Trichaptum biforme** (Fr.) Ryvarden, Norw. Jl Bot. 19(3–4): 237 (1972)
≡ Hirschioporus pergamenus (Fr.) Bondartsev and Singer

Literature: Panfilova and Gaponenko (1963), (as *Hirschioporus pergamenus*, (49): on dried woody plants); Khalikova (1989), [(49): on dead trunk of *angiosperms tree*]; Baltaeva (1992, 1993), [(45): on fallen stem of *Populus* sp., 18 Jul. 1988; (26): on *Salix* sp., 18 Jul. 1988; 9: on dead trunk of *Populus* sp., 7 Sep. 1987; (21): on *Salix* sp., 15 Sep. 1987].

**Trichaptum fusciolaceum** (Ehrenb.) Ryvarden, Norw. Jl Bot. 19: 237 (1972)

Literature: Baltaeva (1992, 1993), [(45): on a fallen trunk of *Abies sibirica* Ledeb., 29 Aug. 1958, E. Parmasto, TAAM009360).

Note: This species is reported for the first time on *Abies sibirica* from Uzbekistan.

RUSSULALES Kreis et P.M.Kirk, P.F.Cannon and J.C.David

**Bondarzewiaceae** Kotl. and Pouzar

Heterobasidion annosum (Fr.) Bref., Unters. Gesamtgeb. Mykol. (Liepzig) (8): 154 (1888)
Stereum hirsutum (Willd.) Pers., Observ. mycol. (Lipsiae) 2: 90 (1800) [1799]

Specimens examined: (33): on deciduous tree trunk, 23 Apr. 1982, E. Parmasto, TAAM104393; (43): on unknown woody branch, 8 Sept. 2016, YG1091; (43): on fallen trunk of angiosperm wood, 8 Sept. 2016, YG1092; (40): on dried stem of Juglans regia, 26 May 2011, YG029; (46): on Crataegus sp., 13 May 1990, K. Kalamees and M. Vaasma, TAAM144492; (32): on Acer tataricum subsp. semenovii, 15 May 2011, YG030; (32): on Acer sp., 15 May 2011, YG51; (32): on unknown decaying wood, 15 May 2011 YG056; (32): on Acer tataricum subsp. semenovii, 15 May 2011, YG057; (32): on dead dried wood, 7 Jun. 2011 YG048; (39): on stem of living Salix ibiensis Regel, 2 Nov. 2011, YG034; (38): on Juglans regia, 1 Jun. 2011, YG109; (38): on dried stem of Fraxinus excelsior L., 3 Sept. 2013, YG12; (38): on Quercus sp., 3 Sept. 2013, YG-G15; (38): on dried stem of Salix alba, 3 Sept. 2013, YG320; (37): on living stem of Juglans regia, 19 Jun. 2014, YG/PS135; (37): on dried stem of Juglans regia, 19 Jun. 2014, YG/PS176; (45): on a dry trunk of Celtis australis subsp. caucasica, 29 Apr. 1989, TAAM126246; (45): on Crataegus pseudoheterophylla subsp. turkestanica, 29 Apr. 1988, I. Parmasto, TAAM126255; (45): on trunk of Quercus sp., 29 Apr. 1988, A. Kollom, TAAM127585; (46): on trunk of Populus alba, 4 May 1988, I. Parmasto, TAAM126291 (as Coriolopsis sp.); (8): on fallen branch, 10 Sept. 2016, YG1099; (28): on dead trunk of angiosperm, 3 Apr. 2013, YG3.04.13.

Stereum rugosum Pers., Neues Mag. Bot. 1: 110 (1794)

Specimens examined: (50): on a dead trunk of Salix sp., 24 Apr. 1982, TAAM127402

Styela varians (Pers.) Noé, Grev. (C. H. Pers.) in Rees, Flora (Edinburgh) 2 (59): 1 (1955) [1955]

Specimens examined: (30): on a dead trunk of Betula pendula, 25 Apr. 1958, YG/PS102; (46): on trunk of Populus alba, 4 May 1988, I. Parmasto, TAAM126291 (as Coriolopsis sp.); (8): on fallen branch, 10 Sept. 2016, YG1099; (28): on dead trunk of angiosperm, 3 Apr. 2013, YG3.04.13.

Peniophoraceae Lotsy

*Peniophora cinerea* (Pers.) Cooke, Grevillea 8(no. 45): 20 (1879)

Specimens examined: (39): on fallen trunks of angiosperm woody plant, 2 Nov. 2011, YG039; (39): on stem and dried branch of Juglans regia, 1 Jun. 2011, YG058.

*Peniophora incarnata* (Pers.) P. Karst., Hedwigia 28: 27 (1889)

Specimen examined: (39): on fallen stem of deciduous wood, 16 Jun. 2014, YG/PS84.

Stereaceae Pilát

*Stereum gausapatum* (Fr.) Fr., Hymenomyc. eur. (Upsaliae): 638 (1874)

Specimen examined: (49): on trunk of *Picea schrenkiana* Fisch. and C.A.Mey., 7 Sept. 2013, YG-Gxx.

Note: This species occurs on *Quercus*, *Castanea*, and *Carpinus* species in Europe, particularly in the Mediterranean area. Fruiting bodies develop on dead stems, rotten stumps, trunks, or more rarely on fallen branches and other debris of angiosperm woody plants. However, we found that species on the conifer tree, *Picea schrenkiana* from Western Tien Shan Mountains of Uzbekistan.

*Stereum hirsutum* (Willd.) Pers., Observ. mycol. (Lipsiae) 2: 90 (1800) [1799]

Note: This species occurs on *Quercus*, *Castanea*, and *Carpinus* species in Europe, particularly in the Mediterranean area. Fruiting bodies develop on dead stems, rotten stumps, trunks, or more rarely on fallen branches and other debris of angiosperm woody plants. However, we found that species on the conifer tree, *Picea schrenkiana* from Western Tien Shan Mountains of Uzbekistan.

Stereum hirsutum (Willd.) Pers., Observ. mycol. (Lipsiae) 2: 90 (1800) [1799]

Note: This species occurs on *Quercus*, *Castanea*, and *Carpinus* species in Europe, particularly in the Mediterranean area. Fruiting bodies develop on dead stems, rotten stumps, trunks, or more rarely on fallen branches and other debris of angiosperm woody plants. However, we found that species on the conifer tree, *Picea schrenkiana* from Western Tien Shan Mountains of Uzbekistan.

THELEPHORALES Corner ex Oberw.

Bankeraceae Donk

Phellodon fulgineoalbus (J.C. Schmidt) R.E. Baird, in Baird, Wallace, Baker and Scruggs, Fungal Diversity 62: 63 (2013)

≡ Bankera fulgineoalba (J.C. Schmidt) Coker and Beers.

Literature: Schwartzman (1964), (as Bankera fulgineoalba (49): on Salix caprea L., and on Betula pendula).

Sarcodon imbricatus (L.) P. Karst., Revue mycol., Toulouse 3(no. 9): 20 (1881)

≡ Sarcodon squamosus (Schaeff.) Quél.

Literature: Schwartzman (1964), (as Sarcodon squamosus (49): on old stump of *Populus tremula*).

THELEPHORALES Chevall.

Pseudotomentiella mucidula (P. Karst.) Svrček, Česká Mykol. 12(2): 68 (1958)

Specimen examined: (47): on fallen trunk of *Pinus sibirica* Du Tour, 29 Aug. 1958, TAAM009363.

TRECHISPORALES K.H. Larss.

Hydnodontaceae Jülich

Fibuloporia desertorum (Kravtzev) Schwartzman, Flora Sporovyykh Rastenii Kazakhstan [Cryptogamic Flora of Kazakhstan], 4, Auriculariales, Tremellales, Dacrymycetales, Exobasidiales, Aphyllophorales (Alma-Ata): 299 (1964)

≡ Dextrinosporium desertorum (Kravtzev) Bondartseva

AGARICOMYCETES Doweld

ORDER AND FAMILY UNCERTAIN (INCERTAE SEDIS)
TABLE 3 | Number of host family, genus, and species and number of wood-inhabiting poroid and corticioid species on host family in the study area.

| Host family | No. of host genera | No. of host species | No. of fungal species |
|-------------|--------------------|---------------------|----------------------|
| Salicaceae  | 2                  | 16                  | 72                   |
| Pinaceae    | 3                  | 8                   | 51                   |
| Rosaceae    | 9                  | 27                  | 48                   |
| Fagaceae    | 2                  | 3                   | 31                   |
| Juglandaceae| 2                  | 2                   | 30                   |
| Betulaceae  | 2                  | 4                   | 25                   |
| Cupressaceae| 2                  | 5                   | 16                   |
| Sapindaceae | 2                  | 6                   | 16                   |
| Ulmaceae    | 1                  | 1                   | 11                   |
| Oleaceae    | 2                  | 5                   | 11                   |
| Moraceae    | 1                  | 2                   | 9                    |
| Caprifoliaceae | 1        | 4                   | 8                    |
| Cannabaceae | 1                  | 1                   | 7                    |
| Leguminosae | 3                  | 3                   | 6                    |
| Anacardiaceae| 1                  | 2                   | 3                    |
| Platanaceae | 1                  | 1                   | 3                    |
| Elaeagnaceae| 1                  | 1                   | 3                    |
| Amaanthaceae| 1                  | 2                   | 2                    |
| Tamaricaceae| 1                  | 3                   | 1                    |
| Vitaceae    | 1                  | 1                   | 1                    |
| Ephedraceae | 1                  | 1                   | 1                    |
| Hydrangeaceae| 1            | 1                   | 1                    |
| Malvaceae   | 1                  | 1                   | 1                    |
| Total: 23   | 42                 | 100                 | n.a.                 |

*Peniophorea praetermissa* (P. Karst.) K.H. Larss., Mycol. Res. 111(2): 192 (2007)

Specimens examined: (38): on living stem of *Juglans regia*, 3 Sept. 2013, YG-G16; (38): on fallen unknown angiosperm branches, 3 Sept. 2013, YG-G40; (28): on dried stump of deciduous tree, 3 Sept. 2013, YG-G37.

**Substrate Preferences of Wood-Inhabiting Poroid and Corticioid Species in Uzbekistan**

In this study, poroid and corticioid fungal species were found on 100 woody plant species belonging to 23 families and 42 genera. One hundred wood-inhabiting species (accounting for 65.3% of the total wood-inhabiting poroid and corticioid species of Uzbekistan) were recorded exclusively on deciduous wood, 33 species (21.6%) were found exclusively on coniferous wood, and 5 species were recorded as inhabiting both groups of woody plants (Figure 8). The hosts were not determined for the remaining 15 species. These wood-inhabiting fungi were most frequently found on hosts belonging to Salicaceae (72 fungal species), Pinaceae (51), Rosaceae (48), Fagaceae (31), Juglandaceae (30), Betulaceae (25), Cupressaceae (16), Sapindaceae (16), and Ulmaceae and Oleaceae (each 11). Collectively, these families host about 70% of fungal species present in the study area; other plant families host one to nine species (Table 3).

The highest number of wood-inhabiting poroid and corticioid species is reported in the following host genera: *Populus* (40 species, 26.4% of the total species number), *Quercus* (30, 19.6%), *Juglans*, *Pinus*, and *Salix* (each 29, 18.9%), *Betula* (20, 13.0%), *Picea* (19, 12.4%), *Prunus* (17, 11.5%), *Acer* (14, 9.2%), *Malus* (12, 7.8%), *Juniperus* and *Ulmus* (each 11, 7.1%), *Fraxinus* (10, 6.5%); other plant genera host one to nine fungal species (Figure 9).

Among the wood-inhabiting poroid and corticioid fungi, 25 species were associated with a wide range of plant hosts, such as *Phellinus pomaceus* (16 host species), *Stereum hirsutum* (14), *Trametes versicolor* (11), *Lentinus tigrinus* (10), *Cerrena unicolor* (9), *Bjerkandera adusta*, *Schizophyllum commune*, *Trametes hirsuta*, *T. tephroleuca*, and *T. trogii* (8 hosts each); *Coriolopsis gallica*, *Fomes fomentarius*, *Fomitoporia robusta*, *Tropicoporus linteus*, and *Laetiporus sulphureus* (7 each); *Irpex lacteus*, *Phylloporia yuchengii*, *Inonotus hispidus*, and *Cerioporus squamosus* (6 each); and *Fuscospora torulosa*, *Trametes gibbosa*, *Antrodia xanthan*, *Phellinus igniarius*, *Lenzites warnieri*, and *Rigidoporus corticola* (5 each) (Figure 10). The other 128 wood-inhabiting poroid and corticioid fungi studied each grew on one to four host species. Regarding the host preference, some wood-inhabiting poroid and corticioid species are tolerant, such as *Phellinus pomaceus* recorded on 16 plant species of nine genera (*Prunus* sp., *P. mahaleb*, *P. cerasifera*, *P. erythrorcarpa*, *P. dulcis*, *P. persica*, *P. domestica*, *Cerasus tianshanica*, *Cynhondia oblonga*, *Celtis australis* subsp. *caucasica*, *Crataegus altaica*, *Juglans regia*, *Lonicera sp.*, *Malus* sp., *M. domestica*, and *Salix* sp.), followed by *Stereum hirsutum* on 14 species of seven genera (*Juglans regia*, *Acer sp.*, *A. tataricum* subsp. *somentoii*, *Salix iliensis*, *S. interior*, *S. alba*, *Fraxinus excelsior*, *Quercus sp.*, *Q. robur*, *Celtis australis* subsp. *caucasica*, *Crataegus pseudoeuphus* subsp. *turkestanica*, *Crataegus sp.*, *Populus sp.*, and *P. alba*), and *Trametes versicolor* on 11 species of nine genera (*Betula*, *Prunus*, *Crataegus*, *Lonicera*, *Juglans*, *Populus*, *Malus*, and *Celtis*). Other wood-inhabiting species each colonized 1 to 10 plant species (Figure 10).

**The Distribution Range and Niches of Wood-Inhabiting Poroid and Corticioid Fungi in Uzbekistan**

By importing all known records of wood-inhabiting poroid and corticioid fungi in Uzbekistan into ArcGIS, a distribution GIS map of wood-inhabiting poroid and corticioid species in Uzbekistan was produced (Figure 11). The distribution of all records in the whole study area was first mapped (Figure 11a), and then five subareas where fungal records are relatively dense were presented (Figures 11b–f). Fungal species were most commonly collected in subarea f with 445 records in Western Tien Shan Mountains in Tashkent province, followed by subarea b with 142 records in Pamir-Alay Mountain in Samarkand, Qashqadaryo, and Surkhandaryo Provinces of Central and Southern Uzbekistan. Subareas c, e, and d have 58, 51, and 46 records, respectively, in Turkestan, Nurata, Kurama, and Fergana.
ranges in Pamir Alay and Western Tien Shan Mountains in Navoi, Jizzakh, and Fergana valley of Uzbekistan (Figures 11c–e).

Polyporales is the most commonly collected fungal order with 451 records in urban and mountain areas of Uzbekistan. The next most abundant order is Hymenochaetales with 258 records mainly distributed in Tashkent Botanical Garden, Chatkal Biospheric, Nurata, Zarakshan, Surkhan, and Hissar State Reserves in North-eastern and southern Uzbekistan. The orders Russulales (42), Gleophyllales (13), and Agaricales (11) are distributed in coniferous and deciduous mixed forest trees in Ugam, Chatkal, Turkestan, Pskem, Nurata, and Hissar ranges in Pamiy-Alay and Western Tien Shan Mountains. Other orders with fewer records include Atheliales (4), Thelephorales (4), Cantharellales (1), and Trechisporales (1). In addition, three records have uncertain taxonomic positions at the order level. The most frequently recorded species in Uzbekistan are Phellinus pomaceus (34 records); Stereum hirsutum (27); Trametes hirsuta (25); T. trogii (22); Lentinus tigrinus (21); Sanghuangporus lonicerinus and Trametes versicolor (20 each); Cerrena unicolor, Fomes fomentarius, and Inonotus hispidus (17 each); Bjerkandera adusta and Phellinus igniarius (14 each); Coriolopsis gallica, Fomitopsis betulina, and Trametes tephrcoleuca (13 each); Fuscosporia contigua (12); Phylloporia yuchengii and Tropicoporus linteus (each 11); Antrodia xantha, Cerioporus squamosus, Fomitiporia robusta, and Rigidoporus corticola (each 10); and Ceriporiopsis gilvescens (8).

**DISCUSSION**

In this study, we compiled for the first time the species diversity of wood-inhabiting poroid and corticioid fungi in Uzbekistan. Comprehensive information of these species is provided, including taxonomic diversity, substrate preference, and distribution of geographic and landscape position, on the basis of 790 fungal records collected from 1950 to 2020.

A total of 153 wood-inhabiting poroid and corticioid species, belonging to 10 orders, 26 families, and 97 genera, were confirmed to be present mainly based on literature references, morphological examinations, and also on phylogenetic analysis wherever possible. Of these 153 species, 19 are new for mycobiota to Central Asia and 31 are reported for the first time in Uzbekistan. In addition, four taxa that may be new to science were discovered and must be examined further. The fungal diversity reported here for Uzbekistan is much lower than that in other regions where the diversity of wood-inhabiting poroid and corticioid fungi is well explored. For example, 1210 wood-inhabiting poroid and corticioid species, including ecologically similar hydnoid fungi, are recorded in China (Dai, 2011, 2012). Also, the number of wood-inhabiting poroid fungi recorded is 492 and 394 in North America and Europe, respectively (Ryvarden and Melo, 2014; Zhou et al., 2016). The low species number in Uzbekistan is partly due to the relatively small area, but also due to the lack of systematic field surveys and thorough identification with the aid of molecular sequencing. Few scientists
study the ecologically important fungi of Uzbekistan. Although this report is the most comprehensive study of diversity of wood-inhabiting poroid and corticioid fungi in Uzbekistan today, it must be considered provisional. In contrast, tens of taxonomists have jointly contributed records of hundreds of (mainly new) wood-inhabiting poroid and corticioid species in China since the publications of Dai (2011, 2012). Therefore, even if we have reported the most comprehensive diversity of wood-inhabiting poroid and corticioid fungi in Uzbekistan to date, the current knowledge has to be considered as a provisional species checklist to be complemented. It is known that higher diversity of plant species results in a higher diversity of associated fungal species (Küffer and Senn-Irlet, 2005; Yamashita et al., 2010; Hawksworth and Lücking, 2017). Uzbekistan, with its mountainous landscape, is characterized by a high diversity of trees and shrubs, perhaps 500–600 species (Eastwood et al., 2009). Therefore, maybe more taxa of wood-inhabiting poroid and corticioid species, including new and even endemic species, still await to be revealed from Uzbekistan (Hyde et al., 2020; Yuan et al., 2020).

Most of the reported wood-inhabiting poroid and corticioid fungi in Uzbekistan are wood decomposers,
which release matter and energy to the ecological system. These saprophytic species possess powerful enzymes, which can effectively degrade lignocellulose (Riley et al., 2014). In the current Uzbekistan mycota, several species in *Trametes* are considered to have potential biotechnological applications (Knežević et al., 2013; Wang and Chen, 2019; Yang et al., 2020).

Although the resource recycling functions are generally considered beneficial to trees, forests, and humans, some of the wood-inhabiting poroid and corticioid fungi studied inhabit living trees as forest pathogens. According to previous studies (Kleyner, 1958; Sinadskiy and Bodartseva, 1960; Panfilova and Gaponenko, 1963; Sinadskiy, 1968; Khalikova, 1989; Baltaeva, 1992; Gafforov, 2014; Gafforov et al., 2014) and our field observations, *Inonotus hispidus*, *Bjerkandera adusta*, *Cerrena unicolor*, *Lentinus tigrinus*, *Fomes fomentarius*, *Laetiporus sulphureus*, *Phylloporia yuchengii* and *Ganoderma applanatum*, *Aurantiporus fissilis*, and some species from the genera *Trametes* and *Phellinus* can cause root rot disease. In addition, moreover, *Cerrena unicolor* also produces a stem canker of living *Acer*...
poroid and corticioid fungi, their distributions associated with favored host genera. Juglans regia, semenovii, and Celtis australis subsp. caucasica. Noteworthy, Inonotus hispidus is widespread in the walnut-fruit forests of Uzbekistan and damages up to 4% of the trees of Juglans regia and Malus sieversii trees in Baysun and Turkestan ranges of Pamir Alay Mountains (unpublished data Gaffarov); Phellinus igniarius was observed both as a parasite and saprophyte of deciduous trees from the genera Juglans, Salix, and Acer in Ugam-Chatkal Natural State Park and Zaamin and Hissar State Reserve. The forest diseases caused by these wood-inhabiting poroid and corticioid fungi and the corresponding economic loss should be considered by relevant management departments.

In addition, some macrofungi including wood-inhabiting poroid and corticioid species are important edible and medicinal fungi (Wu et al., 2019; Zhou et al., 2020). Some poroid species known from Uzbekistan are recognized as valuable medicinal fungi, while Grifola frondosa, Laetiporus sulphureus, and Sarcodon imbricatus are important edible fungi. Cultivation of wood-inhabiting fungi is an important agricultural industry worldwide, especially in East Asia. Several medicinal and edible species, like Ganoderma spp. and Auricularia spp. in mainland China, Taiwanfungus in Taiwan, China, and Sanghuangporus spp. in South Korea, have huge economic value. In China, edible and medicinal fungi are the fifth largest crop industry (Dong et al., 2017). Industrial development of suitable endemic wood-inhabiting poroid and corticioid fungi will undoubtedly benefit the Uzbekistan economy. Uzbekistan materials must be directly studied for utilization of these fungal resources. For this purpose, strains of wood-inhabiting poroid and corticioid fungi firstly need to be isolated and preserved in public organizations.

The proportion of wood-inhabiting poroid and corticioid fungi found on different hosts differs in Uzbekistan from that in comparable temperate and warm temperate forest zones of China (Zhou et al., 2011). Compared with the proportions in temperate and warm temperate forest zone (Zhou et al., 2011), the proportion of wood-inhabiting poroid and corticioid species in Uzbekistan found on deciduous wood (72.46%) is similar, but the proportion on coniferous wood is much higher (23.91%) and that on both groups of wood is much lower (3.62%). The differences in the proportions on coniferous wood and both groups of wood compared to the Chinese case may be either the real status in Uzbekistan or a misleading failure to observe that some species recorded exclusively on coniferous wood do actually occur also on deciduous wood. Many more field surveys are needed to clarify this issue.

Among the 100 woody plant species belonging to 23 families and 42 genera recorded as hosts for wood-inhabiting poroid and corticioid species, Salicaceae, Pinaceae, and Rosaceae are the most favored, and Populus, Quercus, Juglans, and Salix are the most favored host genera. To well understand the spatial patterns of wood-inhabiting poroid and corticioid fungi, their distributions associated with geography and landscapes were visualized using GIS maps (Figure 11). Wood-inhabiting poroid and corticioid species in Uzbekistan are distributed mostly in the regions of open shrublands and grasslands, and rarely in various kinds of forests. This distribution pattern is opposite to the natural habitats of such fungi as reported in previous studies. For example, Zhou and Dai (2012) reported that reserved forest with amounts of woody substrates for the growth of wood-inhabiting poroid fungi has significantly higher polypore diversity than unprotected forest. Moreover, normally, forests have higher species diversity of woody plants, which result in higher diversity of wood-inhabiting poroid fungi (Dai et al., 2015). This unusual phenomenon in Uzbekistan might be caused by a lower proportion of field surveys carried out in virginal forests due to difficult access. Therefore, more efforts should be made to reveal the diversity of wood-inhabiting poroid and corticioid fungi in the most primeval forests.

The two fungal orders with highest record diversity, viz., Polyporales and Hymenochaetales, are common in the whole studied area (Figure 11a). This reflects that geography and landscape factors do not have significant effects on the distribution of these two fungal orders. These two fungal orders have high species diversity (Table 2), resulting from a wide adaption to the environment. Species diversity of these two orders are also highest in other regions of the world (Dai, 2012; Ryvarden and Melo, 2014; Zhou et al., 2016). Russulales, the order with the third highest recorded diversity, also occurs in all five subareas, but mainly in the subarea f, viz., Western Tien Shan Mountains in Tashkent region (Figure 11f). Other orders and the species without a confirmed position at the order level are present only in small areas. Such species may be sensitive to environmental changes. So, to sustain species diversity of wood-inhabiting poroid and corticioid fungi, special attention should be paid to protecting their habitats. Using the GIS data, the potential future distribution of certain important (biotechnological, pathogenic, medicinal, and edible) wood-inhabiting poroid and corticioid species could be predicted. Similar studies have been performed on some wood-inhabiting poroid and corticioid species worldwide (Yuan et al., 2015; Elias et al., 2020). Generally, knowledge of species diversity and occurrence in an area is a baseline for benefiting from ecosystem services, monitoring environmental changes, and implementing conservation actions (Mueller and Schmit, 2007; Hibbett et al., 2007, 2011; Brock et al., 2009; Hyde et al., 2013; Osmundson et al., 2013; Truong et al., 2017). Therefore, the current GIS data are important for management and utilization of wood-inhabiting poroid and corticioid fungi in Uzbekistan.

In conclusion, this study provides the first comprehensive, thoroughly annotated checklist of species diversity of wood-inhabiting poroid and corticioid fungi in Uzbekistan. These species are ecologically and economically important as decomposers, pathogens, and sources of food and medicines. Beyond local scale, these data are also crucial as a supplement of the global knowledge of wood-inhabiting poroid and corticioid fungi and for elucidating the evolutionary history of wood-inhabiting poroid and corticioid fungi worldwide. More importantly, the current project exploring wood-inhabiting poroid and corticioid fungi in a less studied country may initiate similar explorations in other Central Asian countries and also other regions worldwide, which will largely fulfill the knowledge gap of wood-inhabiting poroid and corticioid fungi in certain rarely studied regions.
DATA AVAILABILITY STATEMENT

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found in the article/ supplementary material.

AUTHOR CONTRIBUTIONS

YG and MY collected fungal specimens and performed DNA lab work. YG and AO were responsible for morphological identification and management of collection data. L-WZ and YG performed the molecular phylogenetic analyses. YZ mapped the fungal taxa. YG, AO, and L-WZ drafted the manuscript. EL, AG, DS, LP, and LC improved and revised it. All authors have read the final manuscript version and approved it. All authors contributed to the article and approved the submitted version.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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