

УДК 582.284 (470.67)

NEW AND NOTEWORTHY RECORDS OF APHYLLOPHOROID FUNGI FROM THE GUNIB PLATEAU (DAGESTAN, RUSSIA)

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Received April 24, 2022; revised May 30, 2022; accepted June 7, 2022

An annotated list of 80 aphyllorphoid fungi species registered on the Gunib Plateau (Inner-mountainous Dagestan, North-Eastern Caucasus) with detailed information on substrata, habitats, localities, and collection numbers of specimens deposited in the Mycological Herbarium of the Komarov Botanical Institute RAS (LE) is provided. Among them 39 fungal species are recorded for the Republic of Dagestan for the first time, including *Phlebia caspica* is new to Russia and *Lindtneria chordulata* is the second record for Russia. Seven species (*Amylocorticium cebennense*, *A. subsulphureum*, *Henningsomyces candidus*, *Kneiffiella microspora*, *Leucogyrophana sororia*, *Mucronella flava*, *Vararia ochroleuca*) are new to the Caucasus. Data on the Gunib record of *Thelephora caryophyllea*, red-listed species in the Republic of Dagestan, is presented.

Keywords: Agaricomycetes, Basidiomycota, corticioid fungi, Eastern Caucasus, fungal distribution, mountain forests, species diversity

DOI: 10.31857/S0026364822060058

INTRODUCTION

The Gunib Plateau is situated in the northwestern part of the Inner-mountainous Dagestan and is not only a well-studied area for many wildlife species of higher vascular plants, mosses, and lichens, but also a local concentration of rare and endemic representatives (Ignatov et al., 2010; Asadulaev, Sadykova, 2011; Omarova, 2013; Urbanavichus, Ismailov, 2013; Ismailov, Urbanavichus, 2014; Abdurakhmanova, Sadykova, 2015).

Studies on the funga of the Gunib Plateau were initiated by the authors in 2018. Several publications are devoted to the species diversity, molecular identity and ecology of tomentelloid (Volobuev et al., 2019; Ivanushenko, Volobuev, 2020) and poroid fungi (Volobuev et al., 2021), as well as to aphyllorphoid fungi species dwelling on *Juniperus oblonga* wood (Volobuev, Ivanushenko, 2020). Habitats of rare species of aphyllorphoid fungi, subsequently included in the new edition of the Red Data Book of the Republic of Dagestan (2020), were recorded on the Gunib Plateau.

Corticioid fungi remain one of the poorly studied ecological and morphological groups of xylobiont fungi on the plateau. In this regard, our work is devoted to updating the information on their diversity, occurrences and ecology, as well as supplementing the already available data on other groups of aphyllorphoid fungi in the Gunib Plateau (Inner-mountainous Dagestan).

MATERIALS AND METHODS

Study area. The Gunib Plateau is shaped like a truncated cone. The internal slopes of the plateau are dramatically different: the surface of the southern slope is represented by stone slabs with little or no soil, the slope is well-insolated, while the northern slope is characterized by gentle topography and high humidity and covered with forest (Gabibova et al., 2009; Ismailov, Urbanavichus, 2014; Dibirov et al., 2012). Forest-forming species are *Pinus kochiana*, *Betula litwinowii*, *B. pendula*, and *B. raddeana*. Communities dominated by other tree species (*Salix caprea*, *Populus tremula*, *Carpinus betulus*, etc.) are less common and form the lower and upper edges of the forest belt. The slopes are divided by the canyon of the Gunibka River, with *Alnus incana* growing along its bed (Ismailov, Urbanavichus, 2014). The shrub layer in the plateau forests is monotonous (*Juniperus oblonga*, *Rosa canina*, *R. oxyodon*, *R. pulverulenta*, *R. spinosissima*, *Cotoneaster racemiflorus*, and *Euonymus verrucosus*) (Gabibova et al., 2009). The climate of the plateau is continental. The relative humidity is 65%.

Sampling. Basidiomata of aphyllorphoid fungi were collected in September – October of 2018–2021, May 2019 and June 2021 during the field survey by the authors in main forest types of the plateau territory. Fungal specimens have been gathered from various kinds of wood substrata presented by fallen trunks and branches, dry attached branches, stumps, living shrubs

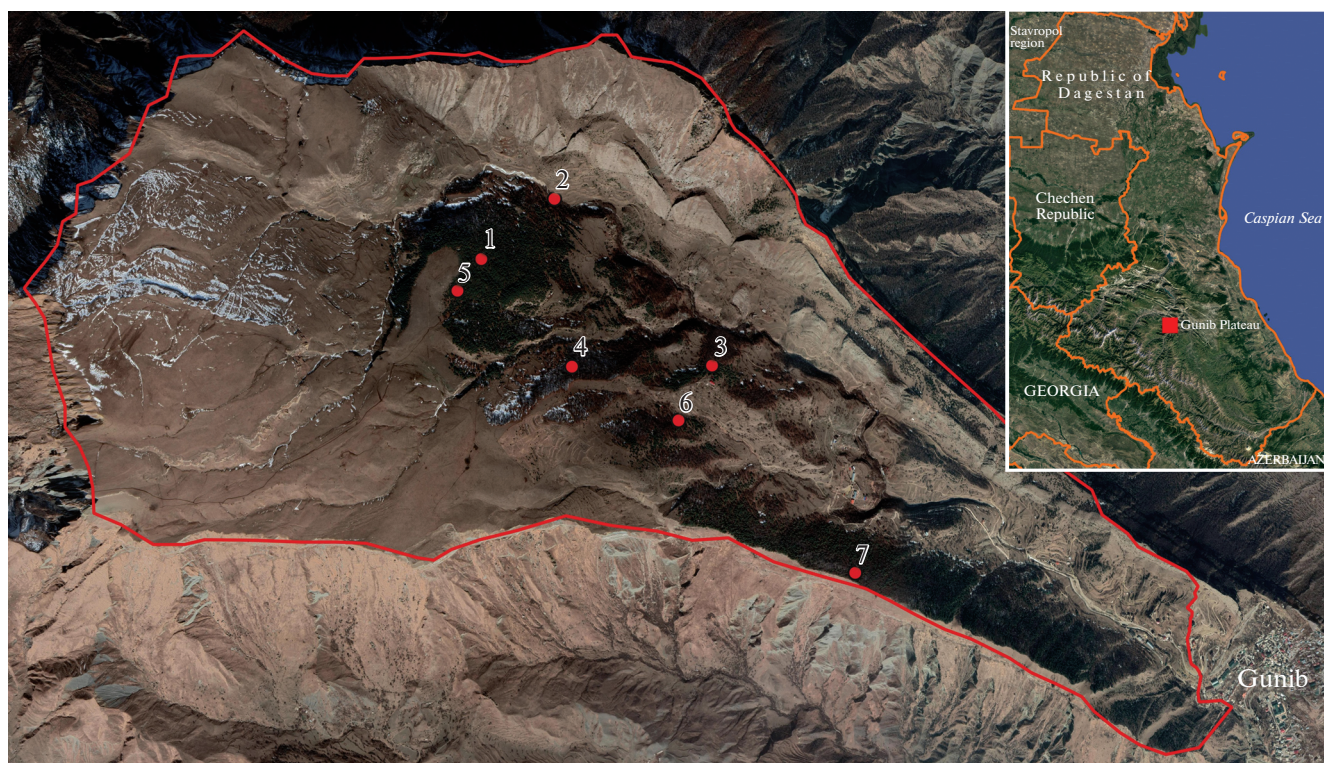


Fig. 1. The location of the Gunib Plateau and studied areas with numbers listed in the text.

and trees. The geographical coordinates and altitudes of studied localities were determined using the Garmin 64st GPS-navigator. The investigated localities (Fig. 1) in the annotated list of species are numbered as follows:

1 – old-growth pine-dominated forest (42°24'33.3"–39.3" N, 46°54'6.0"–31.6" E, 1809–1946 m a.s.l.);

2 – floodplain of the Gunibka River (42°24'21.3"–44.7" N, 46°54'36.1"–55'13.7" E, 1603–1716 m a.s.l.);

3 – vicinity of the Gunib experimental base of the Mountain Botanical Garden of the Dagestan Federal Research Centre RAS (DFRC RAS) (42°24'5.1"–13.1" N, 46°55'15.5"–27.4" E, 1700–1727 m a.s.l.);

4 – mixed pine-birch forest (42°24'11.5"–14.7" N, 46°54'40.6"–45.3" E, 1799–1836 m a.s.l.);

5 – upper boundary of forest (42°24'15.4"–32.7" N, 46°54'4.3"–23.0" E, 1823–1959 m a.s.l.);

6 – birch-dominated forest in vicinity of the Gunib experimental base of the Mountain Botanical Garden of DFRC RAS (42°24'2.7"–3.1" N, 46°54'36.6"–55'8.0" E, 1720–1906 m a.s.l.);

7 – mixed pine-dominated forest on a north-facing slope (42°23'26.6"–50.6" N, 46°55'11.7"–56'10.3" E, 1567–1759 m a.s.l.).

Identification and examination of specimens. Microscopic identification of dried collected specimens were performed using a LOMO Mikmed-6 microscope (Russia), an AxioScope A1 microscope (Germany), a LOMO Mikmed-6 microscope (Russia) with a stan-

dard set of chemicals (5% KOH, Melzer's reagent, 0.1% Cotton Blue) based on key monographs on European corticioid and poroid fungi (Bernicchia, Gorjón, 2010, 2020; Ryvarden, Melo, 2017) as well as some modern articles on the taxonomy of these fungal groups. Data on the fungal species distribution is based on available publications and according to the updated database on *Agaricomycetes* diversity (Bolshakov et al., 2017, 2019). Voucher specimens are deposited in the Mycological Herbarium of the Komarov Botanical Institute RAS, Saint Petersburg (LE).

RESULTS

Altogether 80 species of aphylloroid fungi from 45 genera and 10 orders of *Agaricomycetes* (*Basidiomycota*) are reported, including 39 species new to the Republic of Dagestan. *Phlebia caspica* is registered for Russia for the first time. *Lindtneria chordulata* is the second record for Russia. Seven species (*Amylocorticium cebennense*, *A. subsulphureum*, *Henningsomyces candidus*, *Kneiffiella microspora*, *Leucogyrophana sororia*, *Mucronella flava*, *Vararia ochroleuca*) are new to the Caucasus. Most of fungal species have been collected from dead wood of *Pinus kochiana* and *Betula* spp. (Fig. 2) which are the main forest-forming trees on the territory of the Gunib Plateau.

The species revealed are listed below with data on localities, description of substrata and habitats, date of collection, as well as herbarium numbers of specimens

examined. The nomenclature of fungal taxa follows the Index Fungorum (2022) with some exceptions. Species new to the Caucasus are marked with an exclamation point. An asterisk shows the species recorded for the Republic of Dagestan for the first time.

Annotated list of species

AGARICOMYCETES

Agaricales

!*Henningsomyces candidus* (Pers.) Kuntze – 1: on fallen branches of *Betula* sp. in herb-rich birch forest, 04.10.2018 (LE F-334778).

!*Lindtneria chordulata* (D.P. Rogers) Hjortstam – 1: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 15.09.2020 (LE F-334788).

Mucronella calva (Alb. et Schwein.) Fr. – 1: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 15.09.2020 (LE F-334789).

!*M. flava* Corner – 7: on fallen burned trunk of *Pinus kochiana* in herb-mosses pine forest with birch, 28.09.2019 (LE F-334729).

Porotheleum fimbriatum (Pers.) Fr. – 1, 4: on fallen trunks and branches of *Betula* sp. in herb-rich birch forest, 03.10.2018, 04.10.2018, in herb-mosses pine forest with birch, 29.05.2019.

Radulomyces confluens (Fr.) M.P. Christ. – 4, 5, 6, 7: on fallen branches of *Sorbus* sp. in herb-rich birch forest with pine, 03.10.2018 (LE F-334746); on fallen branches and trunks of *Betula* sp. in herb-rich birch forest, 03.10.2018 (LE F-334747), 05.10.2018; on fallen branches of *Carpinus betulus* in hornbeam forest with no undergrowth, 29.09.2019 (LE F-334785); on fallen trunk of *Pinus kochiana* in herb-rich pine forest with birch, 04.10.2018 (LE F-334748).

Amylocorticiales

!*Amylocorticium cebennense* (Bourdot) Pouzar – 1: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 15.09.2020 (LE F-334813).

!*A. subsulphureum* (P. Karst.) Pouzar – 1: on fallen trunk of *Pinus kochiana* in herb-rich pine forest, 15.09.2020 (LE F-334809).

Plicaturopsis crispa (Pers.) D.A. Reid – 1, 5: on fallen branches of *Betula* sp. in herb-rich birch forest, 04.10.2018 (LE F-334744); on fallen trunk of *Pinus kochiana* in herb-mosses pine forest with birch, 06.10.2018 (LE F-334745).

Atheliales

Amphinema byssoides (Pers.) J. Erikss. – 1, 4, 5, 6: on litter in herb-rich birch forest, 05.10.2018; on fallen trunks and branches of *Pinus kochiana* in herb-mosses pine forest with birch, 06.10.2018 (LE F-334707), in herb-rich pine forest with birch, 01.10.2019, in herb-mosses pine forest, 15.09.2020 (LE F-334792).

Athelia decipiens (Höhn. et Litsch.) J. Erikss. – 1: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 15.09.2020 (LE F-334811).

**Leptosporomyces galzinii* (Bourdot) Jülich – 5: on fallen branches of *Pinus kochiana* in herb-mosses birch forest with pine, 07.10.2018 (LE F-334726).

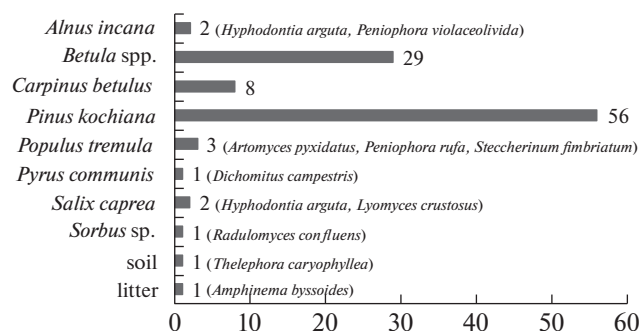


Fig. 2. Distribution of fungal species by substrata occupied. Numbers indicate the quantity of species registered on each substrate type.

Boletales

Coniophora arida (Fr.) P. Karst. – 7: on fallen burned trunk of *Pinus kochiana* in herb-mosses pine forest with birch, 28.09.2019 (LE F-334775).

C. fusispora (Cooke et Ellis) Cooke – 5: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 06.10.2018 (LE F-334712).

C. olivacea (Fr.) P. Karst. – 1, 5, 7: on fallen trunks of *Pinus kochiana* in herb-mosses pine forests, 04.10.2018 (LE F-334713); in herb-mosses birch forest with pine, 07.10.2018; in herb-mosses pine forests with birch, 29.05.2019; in herb-rich pine forests, 29.05.2019, 28.09.2019.

C. puteana (Schumach.) P. Karst. – 1: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 15.09.2020 (LE F-334810).

!*Leucogyrophana sororia* (Burt) Ginns – 1: on fallen trunk of *Pinus kochiana* in herb-rich pine forest, 15.09.2020 (LE F-334807).

**Serpula himantoides* (Fr.) P. Karst. – 1: on fallen trunk of *Pinus kochiana* in herb-rich pine forest, 29.05.2019 (LE F-334753).

Cantharellales

**Botryobasidium conspersum* J. Erikss. – 1: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 15.09.2020 (LE F-334791).

B. subcoronatum (Höhn. et Litsch.) Donk – 1: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 15.09.2020 (LE F-334814).

Rhizoctonia fusispora (J. Schröt.) Oberw., R. Bauer, Garnica et R. Kirschner – 1: at trunk base and on fallen trunk of *Pinus kochiana* in herb-mosses pine forests, 04.10.2018 (LE F-334751), 15.09.2020 (LE F-334794).

Rh. ochracea (Masse) Oberw., R. Bauer, Garnica et R. Kirschner – 6: on fallen trunk of *Betula* sp. in herb-rich birch forest, 05.10.2018 (LE F-334816).

Sistotrema brinkmannii (Bres.) J. Erikss. – 1: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 04.10.2018 (LE F-334754).

Tulasnella violea (Quél.) Bourdot et Galzin – 4: on fallen trunk of *Betula* sp. in herb-rich birch forest, 03.10.2018 (LE F-334769).

Hymenochaetales

**Alutaceodontia alutacea* (Fr.) Hjortstam et Ryvarden – 1: on fallen trunks of *Pinus kochiana* in herb-mosses pine forest, 15.09.2020 (LE F-334796), in herb-rich pine forest, 15.09.2020 (LE F-334805).

**Hyphodontia abieticola* (Bourdot et Galzin) J. Erikss. – 3: on fallen branches of *Pinus kochiana* in herb-rich pine forest with birch, 08.10.2018 (LE F-334717).

H. arguta (Fr.) J. Erikss. – 2, 5: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 06.10.2018 (LE F-334718, LE F-334719); on fallen trunk of *Salix caprea* in herb-rich birch forest with pine, 07.10.2018; on dry standing tree of *Alnus incana* in riverine alder forest, 30.05.2019 (LE F-334720); at trunk base of living *Salix caprea* in herb-fern birch forest with alder, 31.05.2019 (LE F-334721).

**H. pallidula* (Bres.) J. Erikss. – 1: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 15.09.2020 (LE F-334815).

Kneiffiella abdita Riebesehl et Langer – 2: on fallen trunk of *Betula* sp. in herb-fern birch forest with alder, 31.05.2019 (LE F-334722).

**K. barba-jovis* (Bull.) P. Karst. – 4, 5: on fallen trunk of *Betula* sp. in herb-rich birch forest, 03.10.2018 (LE F-334723); on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 04.10.2018 (LE F-334724).

!*K. microspora* (J. Erikss. et Hjortstam) Jülich et Stalpers – 1: on fallen branches of *Betula* sp. in herb-rich birch forest, 04.10.2018 (LE F-334780).

**K. subalutacea* (P. Karst.) Jülich et Stalpers – 1: on fallen trunks of *Pinus kochiana* in herb-mosses pine forests, 04.10.2018 (LE F-334725), 15.09.2020 (LE F-334793).

Lyomyces crustosus (Pers.) P. Karst. – 5: on dry standing tree of *Salix caprea* in herb-rich birch forest with pine, 07.10.2018 (LE F-334727).

**Peniophorella pallida* (Bres.) K.H. Larss. – 1: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 15.09.2020 (LE F-334802).

P. praetermissa (P. Karst.) K.H. Larss. – 1, 3, 4: on fallen trunk of *Betula* sp. in herb-rich birch forest, 03.10.2018 (LE F-334735); on fallen trunks of *Pinus kochiana* in herb-mosses pine forest, 04.10.2018 (LE F-334736), juniper dry forest, 08.10.2018, in herb-rich pine forest, 29.05.2019.

P. pubera (Fr.) P. Karst. – 1, 4, 5: on fallen trunks and branches of *Betula* sp. in herb-rich birch forest, 03.10.2018 (LE F-334734, LE F-334737), 04.10.2018; on fallen trunks of *Pinus kochiana* in herb-rich pine forest, 04.10.2018 (LE F-334738), in herb-mosses pine forest with birch, 06.10.2018.

**P. tsugae* (Burt) K.H. Larss. – 1: on fallen trunk of *Pinus kochiana* in herb-rich pine forest, 15.09.2020 (LE F-334808).

**Resinicium furfuraceum* (Bres.) Parmasto – 1: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 15.09.2020 (LE F-334800).

**Tubulicrinis glebulosus* (Fr.) Donk – 1: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 15.09.2020 (LE F-334812).

**T. subulatus* (Bourdot et Galzin) Donk – 1: on fallen trunks of *Pinus kochiana* in herb-mosses pine forests, 15.09.2020 (LE F-334798, LE F-334804).

Xylodon asperus (Fr.) Hjortstam et Ryvarden – 4, 5: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 04.10.2018 (LE F-334773); on fallen trunk of *Betula* sp. in herb-rich birch forest, 28.05.2019.

**X. borealis* (Kotir. et Saaren.) Hjortstam et Ryvarden – 1: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 15.09.2020 (LE F-334801).

**X. spathulatus* (Schrad.) Kuntze – 1: on fallen branches of *Pinus kochiana* in herb-mosses pine forest, 04.10.2018 (LE F-334774).

Polyporales

Byssomerulius corium (Pers.) Parmasto – 7: on dry attached branches of *Carpinus betulus* in herb-rich hornbeam forest with birch, 30.09.2019 (LE F-334711).

**Crustoderma dryinum* (Berk. et M.A. Curtis) Parmasto – 1, 5: on fallen trunk and stump of *Pinus kochiana* in herb-mosses pine forests, 04.10.2018 (LE F-334776), 06.10.2018 (LE F-334714).

Dichomitus campestris (Quél.) Domański et Orlicz – 3: on dry attached branches of *Pyrus communis* in orchard, 19.06.2021 (LE F-334777).

**D. squalens* (P. Karst.) D.A. Reid – 1: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 15.09.2020 (LE F-334799).

**Hyphoderma medioburiense* (Burt) Donk – 1: on fallen trunk of *Pinus kochiana* in herb-rich pine forest, 15.09.2020 (LE F-334806).

H. setigerum (Fr.) Donk – 3, 5, 7: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 04.10.2018 (LE F-334715); on fallen branches of *Betula* sp. in herb-rich pine forest with birch, 08.10.2018 (LE F-334716); at trunk base of *Carpinus betulus* in herb-rich birch forest with hornbeam, 27.09.2019 (LE F-334779).

Merulius tremellosus Schrad. – 1, 4: on stump and fallen branches of *Betula* sp. in herb-rich birch forest with pine, 03.10.2018 (LE F-334728), in herb-rich birch forest, 04.10.2018.

Phanerochaete laevis (Fr.) J. Erikss. et Ryvarden – 5: on cone of *Pinus kochiana* in herb-mosses birch forest with pine, 07.10.2018 (LE F-334784).

**Phanerochaete sanguinea* (Fr.) Pouzar – 7: on fallen branches of *Pinus kochiana* in herb-mosses pine forest, 30.09.2019 (LE F-334739).

Ph. sordida (P. Karst.) J. Erikss. et Ryvarden – 1: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 15.09.2020 (LE F-334803).

Ph. velutina (DC.) P. Karst. – 1, 5: on fallen trunk of *Betula* sp. in herb-mosses birch forest with pine, 07.10.2018 (LE F-334740); on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 15.09.2020.

!*Phlebia caspica* Hallenb. – 1: on fallen trunk of *Betula* sp. in herb-rich birch forest, 04.10.2018 (LE F-334741). Fig. 3.

**Ph. radiata* Fr. – 1, 6, 7: on fallen branches and trunks of *Betula* sp. in herb-rich birch forests, 04.10.2018, 01.10.2019, in herb-mosses pine forest with birch, 28.09.2019 (LE F-334742).

**Phlebiopsis gigantea* (Fr.) Jülich – 5: on dry standing and fallen trunks and branches of *Pinus kochiana* in herb-mosses pine forest, 06.10.2018 (LE F-334743), in herb-mosses birch forest with pine, 07.10.2018.

**Postia sericeomollis* (Romell) Jülich – 1: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 15.09.2020 (LE F-334795).

**Rhizochaete sulphurina* (P. Karst.) K.H. Larss. – 1, 5: on fallen trunks and branches of *Pinus kochiana* in herb-mosses

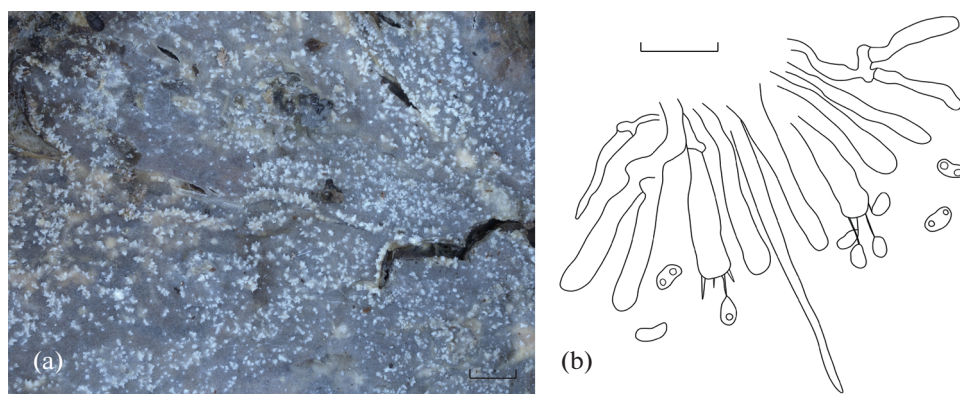


Fig. 3. *Phlebia caspica* (LE F-334741): a – basidioma with odontoid hymenophore, scale bar 1 mm; b – hymental section with basidia, basidiospores and cystidium, scale bar 10 μ m.

pine forests, 04.10.2018 (LE F-334749), in herb-rich pine forest, 29.05.2019 (LE F-334750).

**Scopuloides rimosa* (Cooke) Jülich – 1, 5: on fallen branches of *Betula* sp. in herb-rich birch forest, 04.10.2018 (LE F-334752); on fallen trunk of *Betula* sp. in herb-mosses birch forest with pine, 07.10.2018; on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 15.09.2020 (LE F-334797).

**Skeletocutis kuehneri* A. David – 1: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 15.09.2020 (LE F-334790).

Steccherinum fimbriatum (Pers.) J. Erikss. – 5, 6, 7: on fallen branches and trunks of *Betula* sp. in herb-rich birch forest, 05.10.2018, in herb-rich birch forest with pine, 07.10.2018 (LE F-334759), in herb-rich pine forest with birch and hornbeam, 30.09.2019; on fallen branches of *Carpinus betulus* in hornbeam forest with no undergrowth, 29.09.2019 (LE F-334761); on fallen branches of *Populus tremula* in herb-rich aspen forest, 28.09.2019 (LE F-334760).

**S. laeticolor* (Berk. et M.A. Curtis) Banker – 7: at trunk base of *Betula* sp. in herb-rich hornbeam forest with birch and pine, 29.09.2019 (LE F-334755).

**S. ochraceum* (Pers. ex J.F. Gmel.) Gray – 1, 4, 5, 7: on fallen trunks and branches of *Betula* sp. in herb-rich birch forest, 03.10.2018, in herb-mosses pine forest with birch, 29.05.2019 (LE F-334757); on fallen branches of *Carpinus betulus* in herb-rich birch forest with hornbeam, 27.09.2019 (LE F-334758), in herb-rich aspen forest with hornbeam, 29.09.2019, in herb-rich hornbeam forest, 29.09.2019; on fallen trunks and branches of *Pinus kochiana* in herb-mosses pine forests, 04.10.2018 (LE F-334756), 30.09.2019.

Russulales

**Artomyces pyxidatus* (Pers.) Jülich – 7: on fallen trunk of *Populus tremula* in herb-fern aspen forest with pine, 30.09.2019 (LE F-334708).

Auriscalpium vulgare Gray – 1, 5: on cones of *Pinus kochiana* in herb-mosses pine forests, 04.10.2018 (LE F-334709, LE F-334710).

**Peniophora cinerea* (Pers.) Cooke – 2: on dry attached branches of *Betula* sp. in herb-fern birch forest with alder, 31.05.2019 (LE F-334730).

P. laeta (Fr.) Donk – 7: on fallen branches of *Betula* sp. in herb-mosses birch forest with pine, 27.09.2019; on fallen branches of *Carpinus betulus* in hornbeam forest with no undergrowth, 29.09.2019 (LE F-334731); on dry attached branches of *Carpinus betulus* in herb-rich hornbeam forest with birch, 30.09.2019.

P. rufa (Fr.) Boidin – 7: on fallen branches of *Populus tremula* in herb-fern aspen forest with pine, 30.09.2019 (LE F-334732).

P. violaceolivida (Sommerf.) Masee – 2: on dry attached branches of *Alnus incana* in herb-fern birch forest with alder, 31.05.2019 (LE F-334733).

Stereum hirsutum (Willd.) Pers. – 4, 7: on fallen branches of *Betula* sp. in herb-rich birch forest with pine, 03.10.2018 (LE F-334762); at trunk base of *Carpinus betulus* in herb-rich birch forest with hornbeam, 27.09.2019.

S. rugosum Pers. – 4: on stump of *Betula* sp. in herb-rich birch forest with pine, 03.10.2018 (LE F-334764).

S. sanguinolentum (Alb. et Schwein.) Fr. – 4: on fallen trunk of *Pinus kochiana* in herb-rich birch forest with pine, 03.10.2018 (LE F-334763).

**Vararia ochroleuca* (Bourdot et Galzin) Donk – 5: on fallen trunk of *Pinus kochiana* in herb-mosses pine forest, 06.10.2018 (LE F-334770).

Xenasmattella alnicola (Bourdot et Galzin) K.H. Larss. et Ryvarde – 5: on fallen trunk of *Betula* sp. in herb-mosses pine forest, 06.10.2018 (LE F-334771).

X. vaga (Fr.) Stalpers – 1, 4, 5, 7: on fallen trunks and branches of *Betula* sp. in herb-rich birch forest, 03.10.2018 (LE F-334772), 04.10.2018, in herb-mosses pine forest with birch, 06.10.2018; on fallen trunks and branches of *Pinus kochiana* in herb-rich pine forest, 04.10.2018 (LE F-334786), in herb-mosses pine forest, 06.10.2018; on fallen branches of *Carpinus betulus* in herb-rich pine forest with birch and hornbeam, 30.09.2019 (LE F-334787).

Thelephorales

Thelephora caryophyllea (Schaeff.) Pers. – 7: on soil in mosses pine forest, 30.09.2019 (LE F-334765).

**Th. terrestris* Ehrh. ex Fr. – 1, 5: on stumps of *Pinus kochiana* in herb-mosses pine forests, 04.10.2018, 06.10.2018 (LE F-334766).

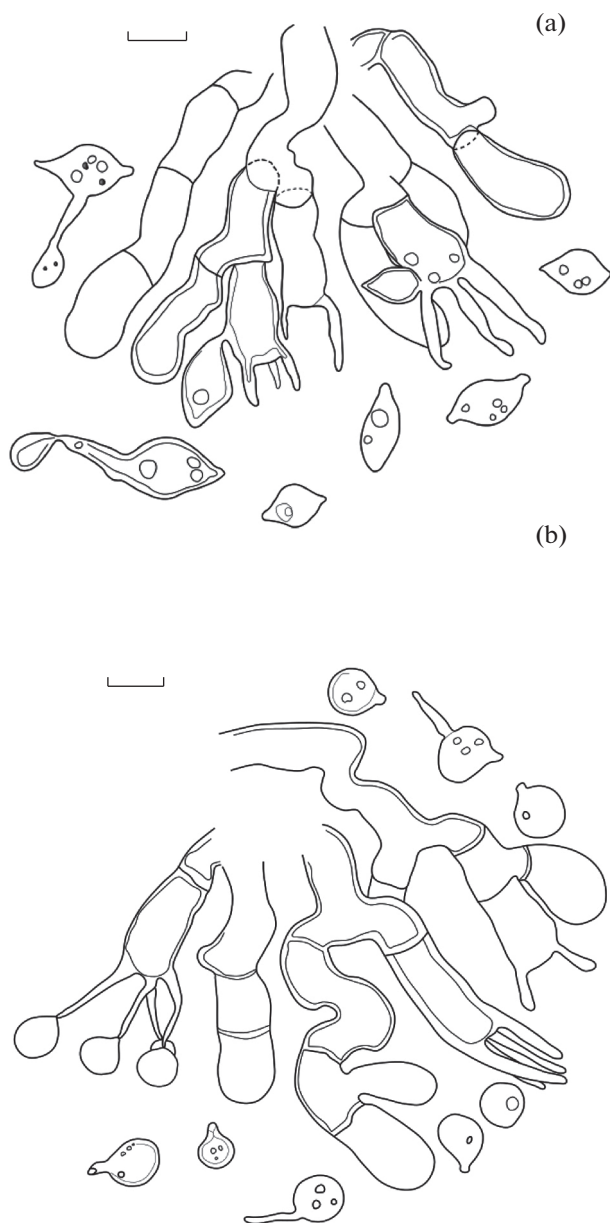


Fig. 4. Basidia and basidiospores of *Rhizoctonia* species: a – *Rhizoctonia fusispora* (LE F-334751); b – *Rh. ochracea* (LE F-334816). Scale bar 10 μ m.

Trechisporales

Trechispora cohaerens (Schwein.) Jülich et Stalpers – 4: on fallen trunk of *Betula* sp. in herb-rich birch forest, 03.10.2018 (LE F-334767).

T. farinacea (Pers.) Liberta – 5: on fallen trunk of *Betula* sp. in herb-mosses pine forest with birch, 06.10.2018 (LE F-334768).

DISCUSSION

Phlebia caspica is registered for Russia for the first time by basidiomata growing on a fallen decaying trunk of *Betula* sp. on the Gunib Plateau. This species was

described by N. Hallenberg based on specimens collected on fallen branches and a fallen trunk of *Fagus orientalis* and other deciduous trees in Iran (Hallenberg, 1980). Only more than 20 years later, *Ph. caspica* was found in France (Eyssartier, 2006), Spain (De-Esteban-Resino, Gorjón, 2016), and Ethiopia (Spirin, Ryvardeen, 2018). The species is distinguished by cream-coloured to light ochraceous odontoid hymenophore, subulate leptocystidia and ellipsoid basidiospores slightly concave on the adaxial side (Fig. 3). Among substrata inhabited by *Ph. caspica* there are noted both angiosperms, namely *Alnus* and *Fagus* (Hallenberg, 1980; De-Esteban-Resino, Gorjón, 2016), and gymnosperms, in particular, *Juniperus* (Spirin, Ryvardeen, 2018). Our finding from the Gunib Plateau is fully compliant with the protologue and extends the list of substrata occupied by this species to include birch (*Betula* sp.) wood.

Lindtneria chordulata is listed for the second time for Russia following a record from Arkhangelsk Oblast (Svetasheva et al., 2017). This species is distributed sporadically in Europe (Bernicchia, Gorjón, 2010). Both Russian specimens of *L. chordulata* were collected in pine forests from *Pinus fallen trunks*, *Pinus sylvestris* in Arkhangelsk Oblast and *P. kochiana* in the Republic of Dagestan. Based on the suspected sensitivity of this fungus to any anthropogenic impact, *Lindtneria chordulata* is included in the Red Data Book of Arkhangelsk Oblast (Aksenova et al., 2020) as a declining species (category 2).

Kneiffiella microspora belongs to remarkable and little-known in Russia species. Previously this fungus was registered only in five Russian regions, including the north-west of the European part (Arkhangelsk and Leningrad Oblasts), the Volga Region (Nizhny Novgorod and Samara Oblasts), and the Urals (Sverdlovsk Oblast) (Spirin, 2003; Bolshakov et al., 2016). Our Gunib record of *K. microspora* on fallen branches of *Betula* sp. is the first finding for the Caucasus. Besides this, species such as *Amylocorticium cebennense*, *A. subsulphureum*, *Henningsomyces candidus*, *Leucogyrophana sororia*, *Mucronella flava*, and *Vararia ochroleuca* are also new to the Caucasus. All of them were collected on the dead wood of *Pinus kochiana*, except for *Henningsomyces candidus*, which grew on fallen branches of *Betula* sp.

Two species of the genus *Rhizoctonia*, *R. fusispora* and *R. ochracea* (Fig. 4), are re-collected from the Gunib Plateau, having been previously known from this area as aphyllorhizoid fungi associated with *Juniperus oblonga* (Volobuev, Ivanushenko, 2020). Our new finds of *Rhizoctonia fusispora* are obtained from *Pinus kochiana* wood, and *Rhizoctonia ochracea* is found on a fallen trunk of *Betula* sp.

A new substratum inhabited by *Kneiffiella abdita* in the Gunib Plateau is noted. This fungus is considered as a very rare species in Europe (Bernicchia, Gorjón, 2020). *K. abdita* was registered within the studied area on fallen trunks of *Pinus kochiana* (Volobuev et al.,

2021). We have now supplemented the substrate range of the species with a find on *Betula* sp. dead wood.

During mycological survey carried out the population of ectomycorrhizal fungus *Thelephora caryophyllea* has been monitored. This species is regionally protected and included in the Red Data Book of the Republic of Dagestan (2020) as a vulnerable species (category 3). The only Gunib locality of *Th. caryophyllea* in pine forest with mosses is currently known in Dagestan.

CONCLUSION

The species diversity of aphylloroid fungi discovered on the Gunib Plateau, both those presented in this study and those published previously (Volobuev et al., 2019, 2021; Ivanushenko, Volobuev, 2020; Volobuev, Ivanushenko, 2020), indicates the special nature conservation value of the area. This fact is confirmed, on the one hand, by the findings of fungal species new to the Caucasus and, on the other hand, by the presence of rare species and taxa with a sporadic distribution. The latter may exhibit particular requirements for environmental conditions and the state of forest ecosystems, requiring large-measured woody debris and stable moisture regimes. Further studies on aphylloroid fungi in the Gunib Plateau will allow not only to reveal new species for this area, but also to determine species of fungi the most sensitive to anthropogenic disturbance.

The authors are grateful to Dr. A.B. Ismailov (Mountain Botanical Garden of DFRC RAS, Makhachkala) for organisation of field studies. The work of S.V. Volobuev was carried out within the framework of the institutional research project of the Komarov Botanical Institute (project 122011900032-7) using the equipment of the Core Facility Centre “Cell and Molecular Technologies in Plant Science” at the Komarov Botanical Institute, RAS (St. Petersburg, Russia).

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Новые и интересные находки афиллофороидных грибов на территории плато Гуниб (Дагестан, Россия)

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Представлен аннотированный список из 80 видов афиллофороидных грибов, зарегистрированных на территории плато Гуниб (Внутригорный Дагестан, Северо-Восточный Кавказ), с подробной информацией о субстратах, местообитаниях, локалитетах и коллекционных номерах образцов, депонированных в Микологическом гербарии Ботанического института им. В.Л. Комарова РАН (LE). 39 видов указываются впервые для Республики Дагестан, в том числе новый для России вид – *Phlebia caspica*. Вид *Lindtneria chordulata* отмечен для России второй находкой. Новыми для Кавказа являются семь видов (*Amylocorticium cebennense*, *A. subsulphureum*, *Henningsomyces candidus*, *Kneiffiella microspora*, *Leucogyrophana sororia*, *Mucronella flava*, *Vararia ochroleuca*). Приводятся сведения о находке на плато Гуниб вида *Thelephora caryophyllea*, включенного в Красную книгу Республики Дагестан (2020).

Ключевые слова: видовое разнообразие, Восточный Кавказ, горные леса, кортициоидные грибы, распространение грибов, *Agaricomycetes*, *Basidiomycota*