

## ADDITIONS TO THE POLYPORALES OF PAKISTAN

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### Abstract

During a survey of macrofungi, nine species belonging to order Polyporales of Phylum Basidiomycota viz., *Bjerkandera adusta*, *Fomes fomentarius*, *Heteroporus biennis*, *Laetiporus sulphureus*, *Phaeolus schwinitzii*, *Polyporus squamosus*, *Rigidoporus ulmarius*, *Royoporus badius* and *Trametes versicolor* were collected for the first time from Gilgit-Baltistan. Of these, *Bjerkandera adusta*, *Fomes fomentarius*, *Heteroporus biennis*, *Phaeolus schwinitzii*, *Rigidoporus ulmarius*, *Royoporus badius* and *Trametes versicolor* appeared to be new records from Pakistan not hitherto reported.

**Key words:** New records, Polyporales, Gilgit-Baltistan, Pakistan.

### Introduction

Phylum Basidiomycota of Kingdom Fungi has worldwide distribution and includes more than 31,000 species (Kirk *et al.*, 2010). This phylum is a large and diverse group that comprises of mushrooms, boletus, puffballs, earthstars, stinkhorns, birds nest fungi, jelly fungi, bracket or shelf fungi, rust and smut fungi (Alexopolus *et al.*, 1996). Members of Basidiomycota characteristically produce sexual spores i.e. basidiospores on the surface of a basidium. Several members of Basidiomycota are well known plant pathogens, whereas others are important for their food value or because of scents, tastes, colours, and toxic properties of a wide variety of secondary products (Galloiset *et al.*, 1990).

According to Hawksworth *et al.* (1995) there were about 22,000 species of basidiomycetous fungi. This number increase to more than 31,000 within 13 years (Kirk *et al.*, 2008). This increase of about 9,000 species of basidiomycetous fungi indicates that there are numerous species of fungi that are still unknown to science. In contrast to more than 31,000 species reported from different parts of the world, only about 700 species have been reported from Pakistan (Ahmad *et al.*, 1997; Sultana & Qureshi, 2007; Sultana *et al.*, 2011). It means that there is a potential of recording several new species or new records from mycologically unexplored areas of Pakistan. The present report describes seven new records of the members of the order Polyporales from Pakistan.

### Materials and Methods

Samples of fungi belonging to the order Polyporales of phylum Basidiomycota growing in different areas of Gilgit-Baltistan were photographed in their natural habitat and the macroscopic details were recorded. The samples brought to the Department of Biological Sciences, Karakoram International University, Gilgit, examined microscopically and identified up to species level after reference to Ahmad *et al.* (1997), Demoulin & Mirriott (1981), Surcek (1988), Buczacki (1989), Leelavathy & Ganesh (2000), Swann & Taylor (1993), Shibata (1992), Murakami (1993) and Sultana *et al.* (2011). Synonymy of the species confirmed from

[www.speciesfungorum.org](http://www.speciesfungorum.org). The specimens dried at room temperature to make a herbarium.

### Results

During the present work, nine species of order Polyporales viz., *Abortiporus biennis*, *Bjerkandera adusta*, *Rigidoporus ulmarius* (Family Meruliaceae), *Laetiporus sulphureus*, *Phaeolus schwinitzii* (family Fomitopsidaceae), *Fomes fomentarius*, *Polyporus squamosus*, *Royoporus badius* and *Trametes versicolor* (Family Polyporaceae) were recorded for the first time from Gilgit-Baltistan. Of these, only *Laetiporus sulphureus* and *Polyporus squamosus* have been reported from Pakistan previously, whereas, the remaining five species appeared to be new records from Pakistan not hitherto reported (Ahmad *et al.*, 1997; Sultana & Qureshi, 2007; Sultana *et al.*, 2011). All the recorded species are described and illustrated herein.

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

#### Synonymy:

*Boletus biennis* Bull., *Herb. Fr.* 10: tab. 449 (1789)

*Sistotrema bienne* (Bull.) Pers., *Syn. meth. fung.* (Göttingen) 2: 550 (1801)

*Hydnum bienne* (Bull.) Lam. & DC., *Fl. franç.*, Edn 3 (Paris) 2: 112 (1805)

*Thelephora biennis* (Bull.) Fr., *Syst. mycol.* (Lundae) 1: 449 (1821)

*Daedalea biennis* (Bull.) Fr., *Syst. mycol.* (Lundae) 1: 332 (1821)

*Polyporus biennis* (Bull.) Fr., *Epit. syst. mycol.* (Upsaliae): 433 (1838)

*Phylacteria biennis* (Bull.) Bigeard & H. Guill., *Fl. Champ. Supér.* France (Chalon-sur-Saône), 2: 452 (1913)

*Heteroporus biennis* (Bull.) Lázaro Ibiza, *Rev. Acad. Ci. Madrid* 15: 119 (1916)

*Phaeolus biennis* (Bull.) Pilát, *Beih. bot. Zbl., Abt. 2*, 52: 69 (1934)

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

*Tomentella biennis* (Bull.) A.M. Rogers, *Mycologia*, 40(5): 634 (1948)

*Grifola biennis* (Bull.) Zmitr. & Malysheva, in Zmitrovich, Malysheva & Spirin, *Mycena*, 6: 21 (2006)

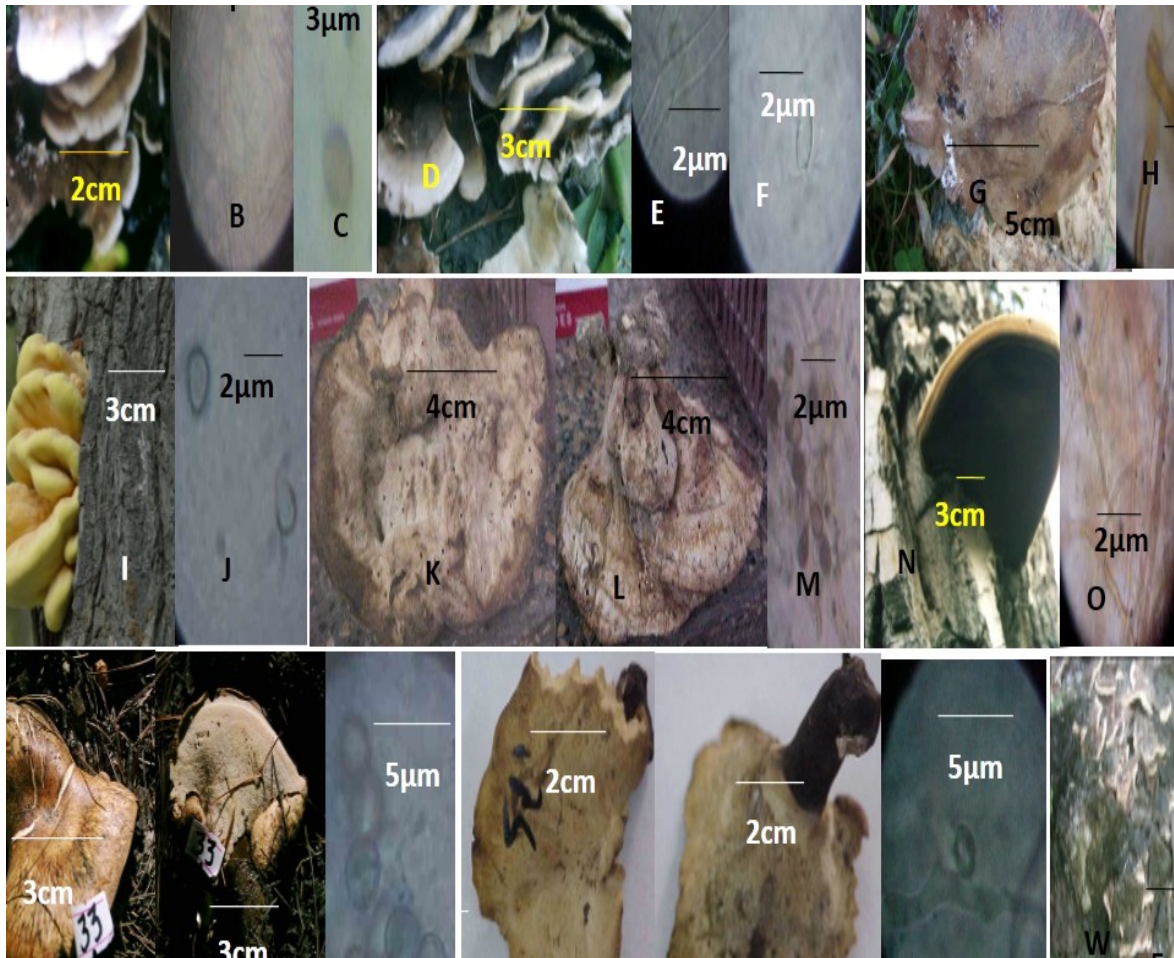


Fig. 1. A-C: *Bjerkandera adusta*, D-F: *Fomes fomentarius*, G-I: *Abortiporus biennis*, J-K: *Laetiporus sulphureus*, L-O: *Phaeolus schwinitzii*, P-Q: *Rigidoporus ulmarius*, R-T: *Trametes versicolor*.

**Distinguishing characters:** Fruit body 2-9cm, annual, bracket-like, almost smooth; initially soft and whitish, becoming hard and gray. Tubes 0.7cm deep, grayish. Pores 1-3mm, angular. Spore print white. Spores sub spherical-ellipsoid, smooth, 3-4x4-6µm in size, non-amyloid. Hyphal system monomitic.

**Habit/Habitat:** Grows in groups overlapping, on trunks of dead or living trees.

**Season:** June-July.

**Occurrence:** Sultanabad, District Gilgit, alt 2120m, N=36°12', E=74°17'.

**Ethnic uses/importance:** Inedible.

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

**Synonymy:**

*Boletus adustus* Willd., *Fl. berol. prodr.* 392 (1787)  
*Polyporus adustus* (Willd.) Fr., *Syst. mycol.* (Lundae), 1: 363 (1821)

*Leptoporus adustus* (Willd.) Quél., *Enchir. fung.* (Paris): 177 (1886)

*Polystictus adustus* (Willd.) Gillot & Lucand, *Bull. soc. Hist. nat. Autun*, 3: 173 (1890)

*Gloeoporus adustus* (Willd.) Pilát, in Kavina & Pilát, *Atlas Champ. Europe* (Praha), 3: 137 (1937)

*Tyromyces adustus* (Willd.) Pouzar, *Folia geobot. phytotax. bohemoslov.* 1: 370 (1966)

*Grifola adusta* (Willd.) Zmitr. & Malysheva, in Zmitrovich, Malysheva & Spirin, *Mycena*, 6: 21 (2006)

**Distinguishing characters:** Fruit body irregular, and effused but usually at least partly bracket like, annual, flat and velvety, downy above, then smoother, pores below and dark, margin at first paler, wavy. Tubes 0.2mm deep, gray-black. Pores 4-6mm, angular. Flesh whitish, fibrous, and leathery. Spores ellipsoid, smooth, 2.5-3x4-5.5µm. Hyphal system monomitic.

**Habit/Habitat:** Usually in fused masses, overlapping, on dead wood of broad-leaved trees.

**Season:** July- August.

**Occurrence:** Jalalabad, District Gilgit, alt 2138m, N=36°07, E=74°14.

**Ethnic uses/importance:** Inedible. Used for the treatment of joint pain.

**Rigidoporus ulmarius** (Sowerby) Imazeki, *Bull. Gov. Forest Exp. Stn Tokyo*, 57: 119 (1952)

**Synonymy:**

*Boletus ulmarius* Sowerby, *Fung. Mushr.* 1: 39 (1797)

*Polyporus ulmarius* (Sowerby) Fr., *Syst. mycol.* (Lundae) 1: 365 (1821)

*Fomes ulmarius* (Sowerby) Gillet, *Hyménomycètes* (Alençon): 683 (1878)

*Placodes ulmarius* (Sowerby) Quél., *Enchir. fung.* (Paris): 172 (1886)

*Scindalma ulmarium* (Sowerby) Kuntze, *Revis. gen. pl.* (Leipzig) 3(2): 519 (1898)

*Ungulina ulmaria* (Sowerby) Pat., *Essai Tax. Hyménomyc.* (Lons-le-Saunier): 103 (1900)

*Mensularia ulmaria* (Sowerby) Lázaro Ibiza, *Revta R. Acad. Cienc. exact. fis. nat. Madr.* 14: 737 (1916)

*Fomitopsis ulmaria* (Sowerby) Bondartsev & Singer, *Annls mycol.* 39(1): 55 (1941)

*Leucofomes ulmarius* (Sowerby) Kotl. & Pouzar, *ČeskáMykol.* 11(3): 157 (1957)

**Distinguishing characters:** Fruit body annual with variable shape and size, 8-11cm, perennial, bracket-like, broadly attached, flat above, very irregularly warty, at first finely velvety then smooth, concentrically ridge, margin thick, rounded, often supporting algal growth. Pore surface at first pink –orange, then brownish. Tubes layered, each layer 0.5cm, pinkish brown-brown. Pores 5-8mm, rounded-angular. Spore print white. Flesh at first cream-buff, tough fibrous, then very hard, woody. Spore spherical, smooth, 4-6x5µm in size, non-amyloid. Hyphal system monomitic.

**Habit/Habitat:** Solitary or in a small overlapping groups. On wood of broad leaved tree especially in base of trunk.

**Season:** July- August.

**Occurrence:** Sultanabad, District Gilgit, alt 2120m, N=36°12, E=74°17.

**Ethnic uses/importance:** Inedible.

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

**Synonymy:**

*Boletus sulphureus* Bull., *Herb. Fr.* 9: tab. 429 (1789)

*Polyporus sulphureus* (Bull.) Fr., *Syst. mycol.* (Lundae) 1: 357 (1821)

*Merisma sulphureum* (Bull.) Gillet, *Hyménomycètes* (Alençon): 691 (1878)

*Polypilus sulphureus* (Bull.) P. Karst., *Acta Soc. Fauna Flora fenn.* 2(no. 1): 29 (1881)

*Leptoporus sulphureus* (Bull.) Quél., *Fl. mycol. France* (Paris): 386 (1888)

*Cladomeris sulphurea* (Bull.) Bigeard & H. Guill., *Fl. Champ. Supér. France* (Chalon-sur-Saône) 1: 408 (1909)

*Tyromyces sulphureus* (Bull.) Donk, *Meded. Bot. Mus. Herb. Rijks Univ. Utrecht* 9: 145 (1933)

*Grifola sulphurea* (Bull.) Pilát, *Beih. bot. Zbl., Abt.* 2 52: 39 (1934)

*Cladoporus sulphureus* (Bull.) Teixeira, *Revista Brasileira de Botânica* 9(1): 43 (1986)

**Distinguish characters:** Fruit body 10-30cm, annual, bracket-like, semicircular, broadly attached with substrate, often slightly wavy. Pore surface sulphur-yellow, paler when dry, then straw-coloured. Tubes 0.4mm deep, sulphur-yellow. Pores 3-5mm, rounded. Flesh cream, white when dry. Spores sub-spherical, smooth, 3.5-5x5-6µm, non-amyloid. Cystidia absent.

**Habit/Habitat:** Usually in large overlapping groups, on living broad-leaved trees.

**Season:** August- September.

**Occurrence:** Dashkin forest, District Astore, alt 3022m, N=35°27, E=74°46.

**Ethnic uses/Importance:** Edible when young, inedible when mature., causing dark reddish brown cubical rot.

**Previous report from Pakistan:** On the base of *Quercus* (Sultana *et al.*, 2011).

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

**Synonymy:**

*Polyporus schweinitzii* Fr., *Syst. mycol.* (Lundae) 1: 351 (1821)

*Polystictus schweinitzii* (Fr.) P. Karst., *Meddn Soc. Fauna Flora fenn.* 5: 39 (1879)

*Cladomeris schweinitzii* (Fr.) Quél., *Enchir. fung.* (Paris): 169 (1886)

*Inodermus schweinitzii* (Fr.) Quél., *Fl. mycol. France* (Paris): 394 (1888)

*Hapalopilus schweinitzii* (Fr.) Donk, *Meded. Bot. Mus. Herb. Rijks Univ. Utrecht*, 9: 173 (1933)

*Coltricia schweinitzii* (Fr.) G. Cunn., *Bull. N.Z. Dept. Sci. Industr. Res., Pl. Dis. Div.*, 77: 7 (1948)

*Polyporus spongia* Fr., *Monogr. Hymenomyc. Suec.* (Upsaliae), 2(2): 268 (1863)

*Inonotus spongia* (Fr.) P. Karst., *Bidr. Känn. Finl. Nat. Folk*, 37: 69 (1882)

*Cladomeris spongia* (Fr.) Quél., *Enchir. fung.* (Paris): 169 (1886)

*Mucronoporus spongia* (Fr.) Ellis & Everh., *J. Mycol.* 5(1): 29 (1889)

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

**Distinguishing characters:** Fruit body 10-15cm, annual, depressed from above, irregular, warty and then smooth, concentrically zoned. Margin paler. Stem 2-3cm, bulbous. Pore surface first yellowish, bruising brown, then brown. Tubes 0.5-1mm deep, pores angular, 0.5-3mm in diameter. Flesh brown. Spores ellipsoid, smooth, 3.5-4.5x5-7µm in diameter, non-amyloid. Hyphal system monomitic.

**Habit/Habitat:** On soil, usually in fused group.

**Season:** June- July.

**Occurrence:** Harcho, District Astore, alt 3457m, N=35°30, E=74°52.

**Ethnic uses/Importance:** It causes brown cubical decay, especially in old trees. Inedible.

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

**Synonymy:**

*Boletus fomentarius* L., Sp. pl. 2: 1176 (1753)

*Agaricus fomentarius* (L.) Lam., *Encycl. Méth. Bot.*, (Paris) 1(1): 50 (1783)

*Polyporus fomentarius* (L.) Fr., *Syst. mycol.*, (Lundae) 1: 374 (1821)

*Placodes fomentarius* (L.) Quél., *Enchir. Fung.*, (Paris): 171 (1886)

*Ochroporus fomentarius* (L.) J. Schröt., in Cohn, *Krypt.-Fl. Schlesien*(Breslau) 3.1(25-32): 486 (1888)

*Scindalma fomentarium* (L.) Kuntze, *Revis. gen. pl.*, (Leipzig) 3(2): 518 (1898)

*Ungulina fomentaria* (L.) Pat., *Essai Tax. Hyménomyc.*, (Lons-le-Saunier): 102 (1900)

*Elfvingia fomentaria* (L.) Murrill, *Bull. Torrey bot. Club.* 30(5): 298 (1903)

*Elfvingiella fomentaria* (L.) Murrill, *North. Polyp.*, (1914)

*Pyropolyporus fomentarius* (L.) Teng, *Chung-kuo Ti Chen-chun*, [*Fungi of China*]: 763 (1963)

**Distinguishing character:** Fruit body 14-17cm, perennial, laterally attached, club shaped, surface pale gray to gray-brown. Margin rounded and light coloured. Tubes arranged in layers, each layer 2-6mm thick. Pores minute, rounded, with thick walls which are whitish at first then brownish. Flesh dry and hard, light brown. Spores 14-15x5-7µm in diameter, cylindrical, smooth, colourless.

**Season:** throughout the year.

**Occurrence:** Dashkin, District Astore, alt 2486m, N=35°28, E=74°46.

**Ethnic uses/Importance:** Inedible. Causes intensive white timber rot, decomposing the wood into minute lamellae and threads.

**Habit/habitat:** Solitary on the dead woods.

**Polyporus squamosus** (Huds.) Fr., *Syst. mycol.* (Lundae) 1: 343 (1821)

**Synonymy:**

*Boletus squamosus* Huds., *Fl. Angl., Edn.*, 2 2: 626 (1778)

*Polyporus squamosus* (Huds.) Fr., *Syst. mycol.* (Lundae), 1: 343 (1821) f. *squamosus*

*Polyporellus squamosus* (Huds.) P. Karst., *Meddn Soc.*

*Fauna Flora fenn.*, 5: 38 (1879) f. *squamosus*

*Polyporellus squamosus* (Huds.) P. Karst., *Meddn Soc.*

*Fauna Flora fenn.*, 5: 38 (1879)

*Polyporellus squamosus* (Huds.) P. Karst., *Meddn Soc.*

*Fauna Flora fenn.*, 5: 38 (1879) subsp. *Squamosus*

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

*Melanopus squamosus* (Huds.) Pat., *Essai Tax.*

*Hyménomyc. (Lons-le-Saunier)*: 80 (1900)

*Favolus squamosus* (Huds.) A. Ames, *Annls mycol.*,

11(3): 241 (1913)

*Bresadolia squamosa* (Huds.) Teixeira, *Revista Brasileira de Botânica*, 9(1): 43 (1986)

**Distinguishing characters:** Fruit body semicircular, cap 4-8cm, first slightly convex then flattened, becomes irregular, covered with brown scales, whitish between the scales, margin slightly in-rolled. Stem short brownish-black at base, lateral, 2-4cm, tapering slightly downward. Tubes 0.7mm deep, cream, decurrent. Pores 0.01-0.02mm, irregularly angular. Flesh white-cream, leathery, and tough. Spores elongated, smooth, 4.5-6x10-12µm in size (Fig. 1 E-H).

**Season:** July- August.

**Occurrence:** It was collected from Manimark, District Astore, alt 3586m, N=35°25, E=74°40.

**Ethnic uses/Importance:** Inedible.

**Habit/Habitat:** Usually solitary. On old woods.

**Previous report from Pakistan:** On living and dead trees of *Juglans regia* in Shogran, Kaghan (Sultana & Qureshi, 2007).

**Royoporus badius** (Pers.) A.B. De, *Mycotaxon*, 65: 471 (1997)

**Synonymy:**

*Boletus badius* Pers., *Syn. meth. fung. (Göttingen)*, 2: 523 (1801)

*Grifola badia* (Pers.) Gray, *Nat. Arr. Brit. Pl.* (London), 1: 644 (1821)

*Polyporus badius* (Pers.) Schwein., *Trans. Am. phil. Soc., New Series*, 4(2): 155 (1832)

*Polyporellus badius* (Pers.) Imazeki, *Colored Illustrations of Mushrooms of Japan, Vol. 2* (Osaka): 136 (1989)

**Distinguishing characters:** Cap 4-8cm, first convex, then flattened, often markedly smooth. Stem 2-8cm, fairly slender at first, finely downy. Pore surface at first white-cream, then buff. Tubes 0.3mm deep, white-cream, decurrent. Pores 4-5mm, rounded. Flesh white-cream. Spores ellipsoid, smooth, 5-8x3-4µm in size. Cystidia absent. Hyphal system dimitic (Fig. 1 A-D).

**Habit/Habitat:** In small trooping groups, on dead broad-leaved trees.

**Season:** April-May.

**Occurrence:** Specimens were collected from Rama forest, District Astore, alt 2711m, N=35°29, E=74°47.

**Ethnic uses/Importance:** Inedible.

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

**Synonymy:**

*Boletus versicolor* L., Sp. pl. 2: 1176 (1753)

*Poria versicolor* (L.) Scop., Fl. carniol., Edn 2 (Wien) 2: 468, 592 (1772)

*Agaricus versicolor* (L.) Lam., Encycl. Méth. Bot. (Paris) 1(1): 50 (1783)

*Agarico-subversicolor* (L.) Paulet, *Traité sur les Champignons Comestibles, Atlas 2*: 1-476 (1793)

*Polyporu sversicolor* (L.) Fr., *Observ. mycol.* (Havniae) 2: 260 (1818)

*Sistotrema versicolor* (L.) Tratt., *Fungi austr. exsicc.* 2: 55 (1830)

*Polystictus versicolor* (L.) Fr., *Nova Acta R. Soc. Scient. upsal., Ser. 3* 1(1): 86 (1851)

*Hansenia versicolor* (L.) P. Karst., *Meddn Soc. Fauna Flora fenn.* 5: 40 (1879)

*Bjerkandera versicolor* (L.) P. Karst., *Acta Soc. Fauna Flora fenn.* 2(no. 1): 30 (1881)

*Coriolus versicolor* (L.) Quél., *Enchir. fung.* (Paris): 175 (1886)

*Microporus versicolor* (L.) Kuntze, *Revis. gen. pl.* (Leipzig) 3(2): 497 (1898)

**Distinguishing characters:** Fruit body 3-7cm wide, 1-2cm thick; overall fruit bodies 12-8cm, concentrically zoned, white in colour. Surface mostly brown. Pore surface at first white then cream. Tubes 0.05-0.1mm deep, white or cream in colour. Pores 3-5mm, angular. Spores cylindrical, smooth, 1.5-3x5-6µm in size, non-amyloid. Cystidia absent. Hyphal system trimitic.

**Habit/Habitat:** Dense groups of overlapping fruit bodies laterally attached to the trunks of broad-leaved trees.

**Season:** June-July.

**Occurrence:** Jalalabad, District Gilgit, alt 2048, N=36°70, E=74°40.

**Ethnic uses/importance:** Inedible; causing decay of tree trunks.

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