

Additions to the List of Polypores to India

Brij Bala, Avneet Pal Singh*, Gurpaul Singh Dhingra

Department of Botany, Punjabi University, India

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Abstract Five species of the pileate polypore fungi, *Ganoderma unguatum* (Polyporales, Ganodermataceae), *Gloeophyllum odoratum* (Gloeophyllales, Gloeophyllaceae) *Heterobasidion abietinum* (Russulales, Bondarzewiaceae), *Osmoporus mexicanus* (Gloeophyllales, Gloeophyllaceae) and *Oxyporus ravidus* (Hymenochaetales, Schizoporaceae) are described and illustrated on the basis of basidiocarps collected during the rainy season of the years 2015-2017 from different parts of Doda district (Union Territory of Jammu and Kashmir, India). Of these, the first four species are being described and illustrated for the first time from India, whereas *Oxyporus ravidus* is a new record for Union Territory of Jammu and Kashmir. Being the key wood decayers, these fungi grow in association with both broad-leaved as well as conifer tree species. Of the species described, the basidiocarps of *Ganoderma unguatum* were collected from *Quercus* sp., whereas rest of the four species were growing in association with gymnospermous wood. Among the five species described presently, *Heterobasidion abietinum* is a host specific polypore that grows only in association with wood of *Abies* spp. These polypores are responsible for different types of rot and play a significant role in the recycling of different types of material. Of the described species, *Ganoderma unguatum* *Heterobasidion abietinum* and *Oxyporus ravidus* are reported to cause white rot whereas *Gloeophyllum odoratum* and *Osmoporus mexicanus* are responsible for brown rot.

Keywords Basidiomycota, Poroid Fungi, White Rot, Brown Rot, North Western Himalaya

1. Introduction

Polypores (*Agaricomycetes*, *Basidiomycota*) are characteristic in having annual to perennial, resupinate to effused-reflexed to pileate, sessile to stipitate basidiocarps. These fungi have unilateral hymenium organized inside

tubes which open through pores that can be circular, angular, daedaleoid, lamellate or irregular. In case of pileate members the pilear surface can be smooth, tuberculate, warted, scrupose, tomentose, velutinate, hirsute, hispid, etc. The colour of hymenial and abhymenial surfaces varies from whitish to some shades of yellow, orange, grey, violet, blue or red. These fungi play significant role in the forest ecosystem because of their ability to secrete lignin and cellulose degrading enzymes. Besides their role in recycling of carbon, some of these fungi have also been used in the traditional medicinal system [1].

Jammu division of Union Territory of Jammu and Kashmir, the area under investigation of the present studies, offers a wide range of variation in altitude and climate. The division has about 45.89 % of its geographical area under forest cover. The vegetation can be broadly categorized into subtropical dry evergreen forests (dominated by *Acacia catechu*, *Dalbergia sissoo*, *Eucalyptus* sp., *Dendrocalamus strictus* etc.), sub-tropical pine forests (mainly *Pinus roxburghii*), Himalayan dry temperate forests (*Abies pindrow*, *Acer* sp. *Aesculus indicus*, *Cedrus deodara*, *Juglans regia*, etc.), Himalayan moist temperate forests (*Abies pindrow*, *Cedrus deodara*, *Pinus wallichiana*, *Picea smithiana* etc.), subalpine forests (*Abies pindrow*, *Populus ciliata*, *Betula utilis*, *Rhododendron* spp., *Quercus* spp. etc.) and alpine vegetation (*Berberis* spp., *Geranium*, *Lonicera*, etc.). The variation in altitude, vegetation and climate offer ideal set of conditions for the growth of polypore fungi. The previous workers reported 40 species of the polypore fungi [2, 3, 4, 5, 6, 7] from Jammu and Kashmir.

Keeping in view the variation in geography and climate; diversity of the tree species and few polypore species reported, the present studies were proposed and the localities of Jammu division were surveyed for the collection of polypore basidiocarps. Presently five polypore species i.e. *Ganoderma unguatum* J.D. Zhao & X.Q. Zhang, *Gloeophyllum odoratum* (Wulfen) Imazeki, *Heterobasidion abietinum* Niemelä & Korhonen, *Osmoporus mexicanum* (Mont.) Y.C. Dai & S.H. He, are

described from different areas of Jammu. All of these, except *Oxyporus ravidus* (new for Jammu and Kashmir) are reported for the first time from India.

2. Material and Methods

The polypore basidiocarps were collected during the excursions carried out in various parts of district Doda of Jammu Division in the rainy months (July–September) of years 2014–2017. These basidiocarps were separated carefully from their substratum using a hammer and chisel. The macromorphological details i.e. nature of the basidiocarp, mode of attachment, hymenial and abhymenial surface, margins, etc. were recorded. A piece of the fertile portion of the basidiocarp was used for getting the spore print on a micro slide. After drying (in sun or on an electric drier), the collected basidiocarps were packed in ziplock airtight bags. The micro morphological characters were studied by making preparations in water, 3%/5%/10% KOH, 1% phloxine, 1% Congo red and 1% cotton blue (in distilled water/lactophenol). The cyanophilous and amyloid reaction of different microscopic structures were studied in 1% cotton blue and Melzer's reagent (Iodine 0.5 g, Potassium Iodide 1.5 g, Chloral hydrate 20.0 g and distilled water 20.0 ml) respectively. The line diagrams of the microscopic structures were drawn with the help of a camera lucida mounted on a compound microscope at 100X, 400X, and 1000X magnification. Finally the specimens were identified on the basis of comparison of the description with the literature and online repository [2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16]. The identified specimens were finally submitted to the Herbarium, Department of Botany, Punjabi University, Patiala (PUN) using standard packing protocol.

3. Results

Five polypore species spread over five genera, five families and five orders of *Agaricomycetes* (*Basidiomycota*) are described from Jammu division.

3.1. *Ganoderma ungulatum* J.D. Zhao & X.Q. Zhang, *Acta mycol. sin.*: 19, 1984

Basidiocarp perennial, pileate, sessile, broadly attached, imbricate, unguulate; pilei up to $12 \times 10 \times 9.2$ cm (length \times breadth \times thickness); abhymenial surface non-laccate, sulcate, white when fresh, becoming brownish on drying; hymenial surface poroid, reddish white to brownish white when fresh, not changing much on drying; pores round to angular, 5–6 per mm; dissepiments up to 45 μ m thick; context homogenous, up to 7.5 cm thick, dark brown, with many crustaceous layers; tube layer up to 1.7 cm in depth; margins obtuse, concolorous on both hymenial and abhymenial side, sterile up to 3 mm on hymenial side.

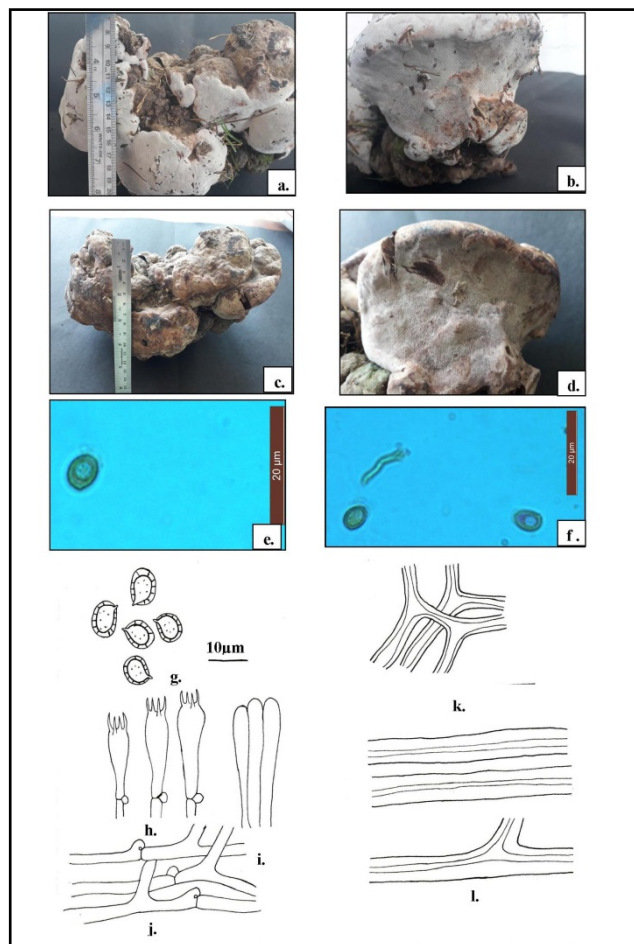


Figure 1 (a-l). *Ganoderma ungulatum*: (a-b) Fresh basidiocarp showing abhymenial and hymenial surface, (c-d) Dry basidiocarps showing abhymenial and hymenial surface, (e-f) photomicrographs showing basidiospores, (g) basidiospores, (h) basidia, (i) cuticular elements (j) generative hyphae, (k) binding hyphae, (l) skeleto-binding hyphae.

Pilear crust subanamixodermis, composed of hyaline, branched, agglutinated generative hyphae and solid, yellow, aseptate, branched or unbranched, skeletal hyphae.

Hyphal System trimitic. Generative hyphae thin-walled, clamped, branched, up to 4 μ m in width. Binding hyphae thick-walled, aseptate, irregularly branched, up to 4.5 μ m in width; skeletobinding hyphae thick-walled, occasionally branched, aseptate, up to 4 μ m in width. **Cystidia** absent. **Basidia** clavate, thin-walled, tetrasterigmate, basally clamped, $11.5\text{--}22 \times 4\text{--}5$ μ m; sterigmata upto 2 μ m in length. **Basidiospores** ovoid to ellipsoid, truncate, with thin, smooth exospores, thick, echinulate endospores, guttulate, acyanophilous, inamyloid, $6\text{--}7.5 \times 3.5\text{--}5.8$ μ m.

Collection examined: Jammu and Kashmir, Doda, Baderwah, Vasuki Naag Mandir Gatha, on *Quercus* branch, Brij Bala 9591(PUN), September 22, 2017.

Remarks: It is characterized by unguulate basidiocarps with non-laccate abhymenial surface and thick, homogenous, dark brown context with many crustaceous layers. Earlier it is reported only from its type locality in

China [8, 13] on a stump of deciduous tree. This is the first report of *G. unguatum* from India.

3.2. *Gloeophyllum odoratum* (Wulfen) Imazeki, Bulletin of the Tokyo Science Museum 6: 75, 1943

- *Boletus odoratus* Wulfen, Collectanea ad botanicam, chemiam, et historiam naturalem spectantia 2: 150, 1788.

Basidiocarp annual, pileate, sessile, broadly attached, unguulate, with anise odour; pilei up to $4.5 \times 2 \times 1.5$ cm; abhymenial surface tomentose, azonate, brown to dark brown when fresh, not changing much on drying; hymenial surface poroid, brown to light brown towards margins when fresh, not changing much on drying; pores angular to sinuous, 6–7 per cm; dissepiments up to 67 μ m thick; context homogenous, brown, up to 1 cm thick; tube layers up to 0.5 cm in depth; margins obtuse, entire, concolorous both on hymenial and abhymenial surface, sterile up to 1 mm on hymenial side.

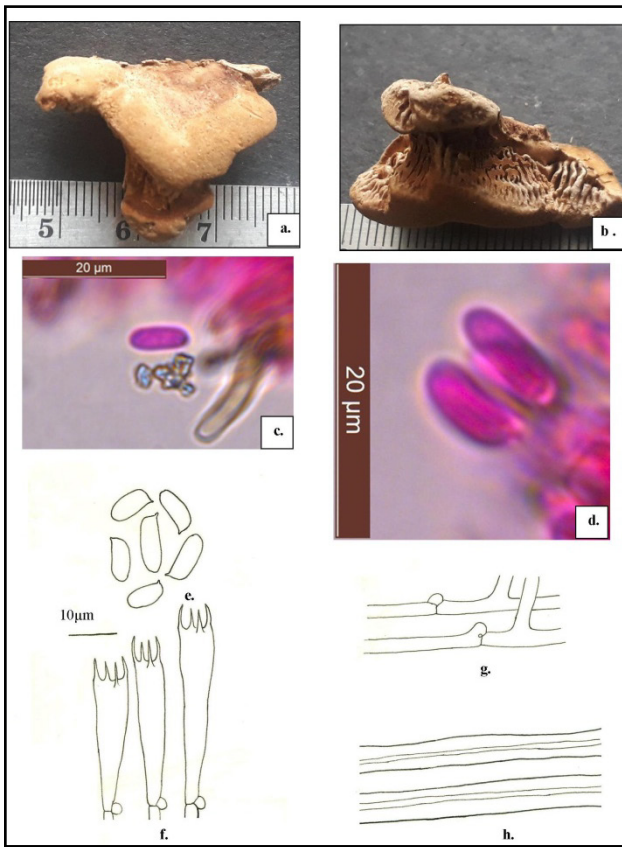


Figure 2(a-h). *Gloeophyllum odoratum*: (a-b) Basidiocarp showing abhymenial surface and hymenial surface, (c-d) photomicrographs showing basidiospores, (e) basidiospores, (f) basidia (g) generative hyphae, (h) skeletal hyphae.

Hyphal System dimitic. Generative hyphae thin- to thick-walled, clamped, branched, up to 4 μ m in width. Skeletal hyphae thick-walled, aseptate, unbranched, pale yellowish, up to 6 μ m in width. **Basidia** clavate, thin-walled, tetrasterigmate, basally clamped, $23\text{--}35 \times 8\text{--}9$ μ m; sterigmata upto 4 μ m in length. **Basidiospores** subcylindrical to cylindrical, thin-walled, acyanophilous,

inamyloid, $7\text{--}12 \times 2\text{--}3.5$ μ m.

Collection examined: Jammu and Kashmir, Doda, Bhaderwah, Jai, on *Picea* stump, Brij Bala 9644 (PUN), September 26, 2015.

Remarks *G. odoratum* is peculiar in having smaller, unguulate pilei with characteristic odour of anise seed. It is earlier known from North and Central Europe [13] and is being described for the first time from India.

3.3. *Heterobasidion abietinum* Niemelä & Korhonen. In: S. Woodw. et al., *Heterobasidion annosum: Biology, Ecology, Impact and Control*: 32, 1998

Basidiocarp annual, pileate, imbricate, dimidiate, applanate; pilei up to $6 \times 4 \times 0.4$ cm; abhymenial surface faintly concentrically zonate, sulcate, white to violet brown when fresh, changing to pale yellow to greyish brown on drying; hymenial surface poroid, white to orange white when fresh, changing to pale yellow on drying; pores round to angular, 2–3 per mm; dissepiments up to 54 μ m thick; context homogenous, pale yellowish, up to 2 mm in thickness; tube layer up to 2 mm in depth; margins acute, entire, curved inside on drying, concolorous on both abhymenial and hymenial surface, sterile up to 1 mm on hymenial surface.

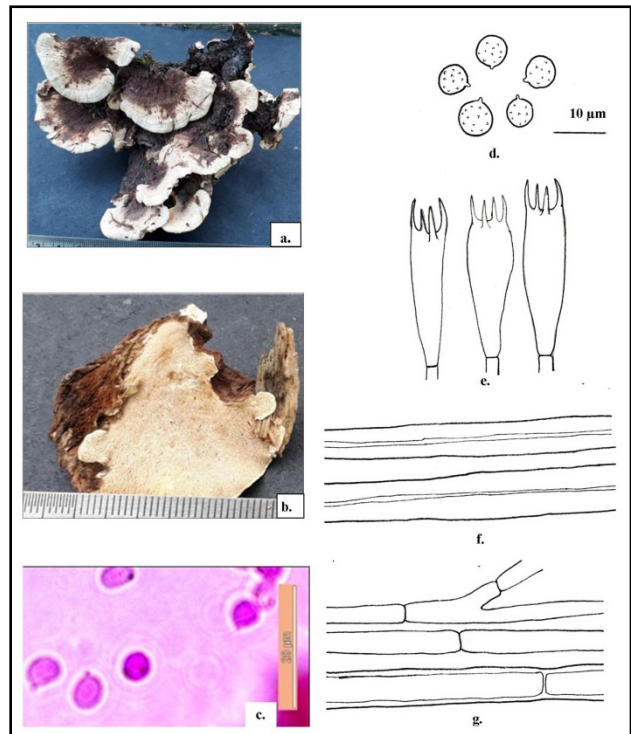


Figure 3(a-g). *Heterobasidion abietinum*: (a-b) Basidiocarp showing abhymenial and hymenial surface, (c) photomicrograph showing basidiospores, (d) basidiospores, (e) basidia, (f) skeletal hyphae, (g) generative hyphae.

Hyphal system dimitic. Generative hyphae thin-walled, simple-septate, branched, up to 5 μ m in width. Skeletal hyphae thick-walled, aseptate, unbranched, up to 6.5 μ m in width. **Basidia** clavate, thin-walled, tetrasterigmate, without basal clamp, $23\text{--}29 \times 7\text{--}8$ μ m; sterigmata up to 4

μm in length. **Basidiospores** subglobose to globose, minutely echinulate, acyanophilous, inamyloid, $5\text{--}6 \times 4\text{--}5 \mu\text{m}$.

Collection examined: Jammu and Kashmir, Doda, Shunushir on *Abies pindrow* stump, Brij Bala 9099 (PUN), September 21, 2016.

Remarks: *H. abietinum* is characteristic in having dimidiate, applanate, basidiocarps with comparatively larger pores and its unique association with *Abies* spp. It is distributed in Central Europe and Russia [9]. This is the first report of *H. abietinum* from India.

3.4. *Osmoporus mexicanus* (Mont.) Y.C. Dai & S.H. He, Mycological Progress 13 (3): 837, 2014. - *Lenzites mexicana* Mont., Annales des Sciences Naturelles Botanique 20: 360, 1843

Basidiocarp annual, pileate, sessile, applanate, broadly attached; pilei up to $8.8 \times 5.4 \times 0.6 \text{ cm}$; abhymenial surface sulcate, zonate, glabrous, greyish to light brown when fresh, not changing much on drying; hymenial surface greyish orange to brown when fresh, not changing much on drying; pores daedeloid to somewhat lamellate, 1–2 per mm; dissepiments up to $80 \mu\text{m}$ thick; context homogenous, dark brown, up to 3 mm

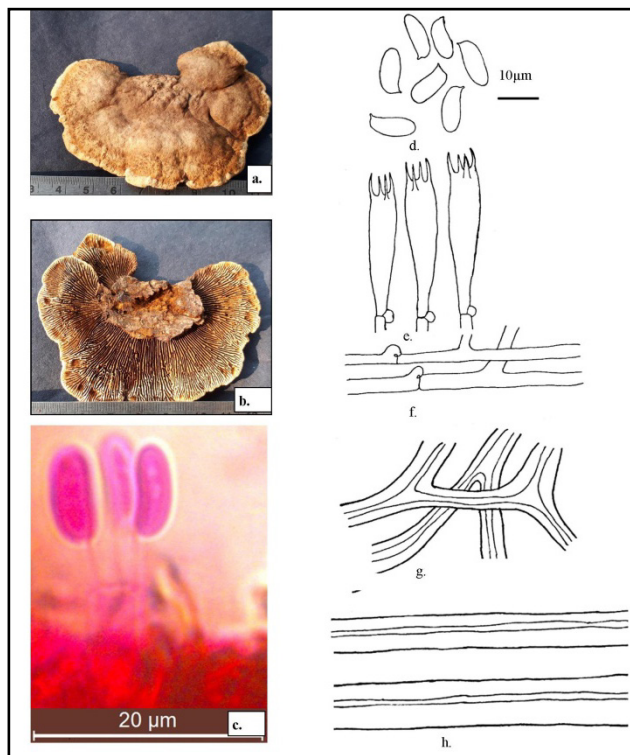


Figure 4 (a-h). *Osmoporus mexicanus*: (a-b) Basidiocarp showing abhymenial and hymenial surface, (c) photomicrograph showing basidiospores attached with basidia, (d) basidiospores, (e) basidia, (f) generative hyphae, (g) binding hyphae, (h) skeletal hyphae.

in thickness; tube layer up to 3mm deep; margins acute, wavy, greyish red to greyish brown on abhymenial surface, pale orange to greyish orange on hymenial surface, sterile

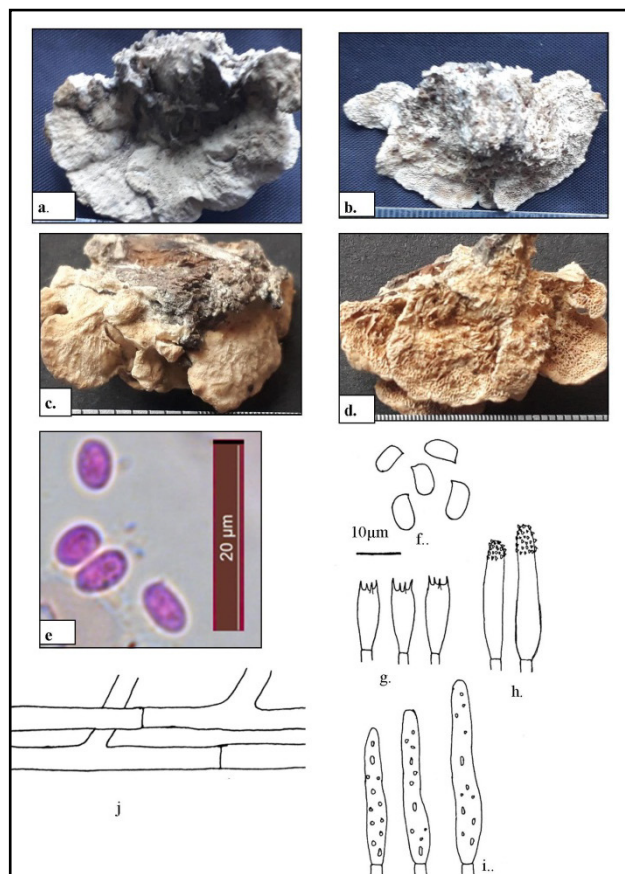
up to 1mm on hymenial side.

Hyphal System trimitic. Generative hyphae thin- to thick-walled, clamped, branched, up to $5 \mu\text{m}$ in width. Binding hyphae thick-walled, branched up to $4.7 \mu\text{m}$ in width. Skeletal hyphae thick-walled, aseptate, unbranched, up to $6 \mu\text{m}$ in width. **Basidia** clavate, basally clamped, thin-walled, tetrasterigmate, up to $20.5\text{--}33 \times 5.5\text{--}7.5 \mu\text{m}$; sterigmata up to $5 \mu\text{m}$ in length. **Basidiospores** cylindrical, slightly curved, smooth, thin-walled, acyanophilous, inamyloid, $9.8\text{--}11 \times 3\text{--}4 \mu\text{m}$.

Collection examined: Jammu and Kashmir, Doda, Bhaderwah, on *Cedrus deodara* stump, Brij Bala 9643 (PUN), September 25, 2016.

Remarks: It is distinct in having pileate basidiocarps with glabrous abhymenial surface, daedeloid to lamellate pores and larger cylindrical basidiospores. As per Mycobank [13] it is distributed in different parts of USA, Mexico and West Indies. Presently it is being described as a new record for India.

3.5. *Oxyporus ravidus* (Fr.) Bondartsev & Singer, Annales Mycologici 39 (1): 63, 1941. - *Polyporus ravidus* Fr., Epicrisis Systematis Mycologici: 475, 1838



Figures 5(a-i). *Oxyporus ravidus* (a-b) Fresh basidiocarp showing abhymenial and hymenial surface (c-d) dry basidiocarp showing abhymenial and hymenial surface, (e) photomicrograph showing basidiospores, (f) basidiospores, (g) basidia, (h) cystidia, (i) gloeocystidia (j) generative hyphae.

Basidiocarp annual, pileate, sessile, imbricate, dimidiate, applanate; pilei up to $2 \times 0.8 \times 0.4$ cm; abhymenial surface azonate, sulcate, orange white when fresh, not changing much on drying; hymenial surface poroid, orange grey when fresh, changing to pale yellow on drying; pores round to angular, 2–3 per mm; dissepiments up to 54 μ m thick; context homogenous, pale yellowish, up to 2 mm in thickness; tube layer up to 2 mm thick; margins acute, entire, concolorous on both abhymenial and hymenial surface, sterile up to 1 mm on hymenial side.

Hyphal system monomitic. Generative hyphae thin-walled, simple-septate, branched, up to 5 μ m in width.

Basidia clavate, thin-walled, tetrasterigmate, without basal clamp, $11.6\text{--}14.5 \times 5.2\text{--}6.3$ μ m; sterigmata up to 2.5 μ m in length. **Cystidia** subcalavate thin-walled, apically encrusted, $25\text{--}32 \times 4\text{--}5$ μ m. **Gloeocystidia** cylindrical to fusiform, thin-walled, with oily contents, arising in subhymenium, often projecting out of the hymenium, $33\text{--}45 \times 6\text{--}10$ μ m. **Basidiospores** ellipsoid, thin-walled, smooth, acyanophilous, inamyloid, $6\text{--}7 \times 3\text{--}4$ μ m.

Collection examined: Jammu and Kashmir, Doda, Shunushir on *Cedrus deodara* stump, Brij Bala 9642(PUN), September 21, 2016.

Remarks: It is characteristic in having large, round to

angular pores, monomitic hyphal system, two types of cystidia and larger, ellipsoid basidiospores. This is first report for the Union Territory of Jammu and Kashmir. It is commonly encountered polypore reported in association with both conifers broad leaved tree species in the temperate Himalayan region [10].

4. Discussion

The diverse climatic conditions of Union Territory of Jammu and Kashmir have attracted mycologists from different parts of India. As a result of their exploration of the union territory previous workers have reported 40 polypore species which are presently grouped under 23 genera, 8 families and 4 orders of *Agaricomycetes* (*Basidiomycota*) [2, 3, 4, 5, 6]. The present studies have added 4 new records for India and one new report for Jammu and Kashmir, thus raising the total number of polypore species from Jammu and Kashmir from 40 to 45 (**Table 1**). It is worth mentioning here that the genus *Osmoporus* is being described for the first time from Jammu and Kashmir based on *O. mexicanus*.

Table 1. List of polypore species reported from Jammu and Kashmir

S. no.	Name of the specie	Host	Systematic position	Locality & Altitude (m)	Reference
1.	<i>Antrodia lenis</i> (as <i>Poria lenis</i>)	Log of <i>Abies</i>	<i>Polyporales</i> , <i>Fomitopsidaceae</i>	Gulmarg, 3747 m	[2],[3]
2.	<i>A. serailis</i>	Gymnospermic log	<i>Polyporales</i> , <i>Fomitopsidaceae</i>	Pahalgam 2740 m	[2],[3]
3.	<i>Bjerkandera adusta</i>	On stump under mixed forest	<i>Polyporales</i> , <i>Meruliaceae</i>	Batote. 1555 m	[3]
4.	<i>Coltricia cinnamomea</i>	Log of <i>Cedrus deodara</i>	<i>Hymenochaetale</i> , <i>Hymenochaetaceae</i>	Patnitop 2024 m	[3]
5.	<i>C. perrenis</i>	Log of <i>Cedrus deodara</i>	<i>Hymenochaetale</i> , <i>Hymenochaetaceae</i>	Sonmarg, 2800	[3]
6.	<i>Dadalea quercina</i>	On stump of <i>Quercus</i>	<i>Polyporales</i> , <i>Fomitopsidaceae</i>	Patnitop 2024 m	[3],[6]
7.	<i>Fomes fomentarius</i>	On coniferous log	<i>Polyporales</i> , <i>Polyporaceae</i>	Bhaderwah, 1613	[3]
8.	<i>Fomitopsis rosea</i>	On coniferous log	<i>Polyporales</i> , <i>Polyporaceae</i>	Bhaderwah, 1613	[3]
9.	<i>F. rufolaccata</i>	On log of <i>Abies pindrow</i> .	<i>Polyporales</i> , <i>Polyporaceae</i>	Gulmarg, 3747	[3]
10.	<i>Ganoderma applanatum</i>	On angiospermous wood.	<i>Polyporales</i> , <i>Ganodermataceae</i>	Pahalgam, 27 40	[3]
11.	<i>G. lucidum</i>	Base of <i>Pinus excelsa</i>	<i>Polyporales</i> , <i>Ganodermataceae</i>	Batote, 1555	[3]
12.	<i>G. resinaceum</i>	Base of <i>Platanus orientalis</i>	<i>Polyporales</i> , <i>Ganodermataceae</i>	Srinagar, 1585	[3],[5]
13.	<i>G. unguatum</i>	Base of <i>Quercus</i> ,	<i>Polyporales</i> , <i>Ganodermataceae</i>	Bhaderwah, 1613	New to India
14.	<i>G. tornatum</i>	Unknown stump	<i>Polyporales</i> , <i>Ganodermataceae</i>	Pahalgam, 27 40	[3]
15.	<i>Gloeophyllum sepiarium</i>	Log of <i>Cedrus deodara</i>	<i>Gloeophyllales</i> , <i>Gloeophyllaceae</i>	Pahalgam, 27 40	[3]
16.	<i>G. subferruginum</i>	Log of <i>Cedrus deodara</i>	<i>Gloeophyllales</i> , <i>Gloeophyllaceae</i>	Gulmarg, 3 747	[3]
17.	<i>G. odoratum</i>	Log of <i>Cedrus deodara</i>	<i>Gloeophyllales</i> , <i>Gloeophyllaceae</i>	Jai, Bhaderwah, 2400.	New to India

18.	<i>Heterobasidium abetinum</i>	On log of <i>Abies</i>	<i>Russulales,</i> <i>Bondarzewiaceae</i>	Shunushir, Bhaderwah, 1613.	New to India
19.	<i>Heterobasidium insularis</i>	On stump of <i>Pinus excelsa</i>	<i>Russulales,</i> <i>Bondarzewiaceae</i>	Batote, 1555	[3]
20.	<i>Incrustoporia nivea</i>	Dead log of <i>Quercus</i>	<i>Polyporales,</i> <i>Polyporaceae</i>	Bhaderwah, 1613.	[3]
21.	<i>Inonotus dryadeus</i>	Stump of <i>Abies</i>	<i>Hymenochaetale,</i> <i>Hymenochaetaceae</i>	Bhaderwah, 1613	[3]
22.	<i>Irpex lacteus</i>	On log of <i>Cedrus deodara</i>	<i>Polyporales,</i> <i>Phanerochaetaceae</i>	Seoj Bhaderwah, 2400.	[3]
23.	<i>I. zonatus</i>	On log of <i>Cedrus deodara</i>	<i>Polyporales,</i> <i>Phanerochaetaceae</i>	Patnitop, 2024	[3]
24.	<i>Junghuhnia collabens</i>	Unknown Stump	<i>Polyporales,</i> <i>Phanerochaetaceae</i>	Batote, 1555.	[3]
25.	<i>Lenzites betulina</i>	On stump of <i>Q. incana</i>	<i>Polyporales,</i> <i>Polyporaceae</i>	Batote, 1555	[3]
26.	<i>Mycoleptonoides aitchisonii</i>	On stump of <i>Cedrus deodara</i>	<i>Polyporales,</i> <i>Phanerochaetaceae</i>	Gulmarg, 3747	[5]
27.	<i>Osmoporus mexicanus</i>	On log of <i>C. deodara</i>	<i>Polyporales,</i> <i>Phanerochaetaceae</i>	Bhaderwah, 1613	New to India
28.	<i>Onnia circinata</i>	Needles and Bark of <i>Pinus excelsa</i>	<i>Hymenochaetale,</i> <i>Hymenochaetaceae</i>	Batote, 1555	[3]
29.	<i>Oxyporus corticola</i> (as <i>Poria corticola</i>)	On stump of <i>Abies</i> .	<i>Hymenochaetales,</i> <i>Schizoporaceae</i>	Gulmarg, 3747	[2],[3]
30.	<i>Oxyporus ravidus</i>	On log of <i>Cedrus deodara</i>	<i>Hymenochaetales,</i> <i>Schizoporaceae</i>	Shunushir, Bhaderwah, 2400	New to India
31.	<i>Phaeolus schwentizii</i>	On base of <i>C. deodara</i>	<i>Hymenochaetale,</i> <i>Hymenochaetaceae</i>	Patnitop, 2024	[3]
32.	<i>Phellinus caryophylli</i>	Stump under <i>Pinus excelsa</i>	<i>Hymenochaetale,</i> <i>Hymenochaetaceae</i>	Batote, 1555	[3]
33.	<i>Phellinus contigus</i>	Stump under mixed forests.	<i>Hymenochaetale,</i> <i>Hymenochaetaceae</i>	Bhaderwah, 1613	[2].[3]
34.	<i>Phellinus linteus</i>	Stump and Base of <i>Pinus excelsa</i>	<i>Hymenochaetale,</i> <i>Hymenochaetaceae</i>	Bhaderwah, 1613	[3]
35.	<i>Phellinus robustus</i>	Stump of <i>Abies</i>	<i>Hymenochaetale,</i> <i>Hymenochaetaceae</i>	Gulmarg, 3747	[3]
36.	<i>Phellinus sanfordii</i>	On angiospermic tree	<i>Hymenochaetale,</i> <i>Hymenochaetaceae</i>	Bhaderwah, 1613	[3]
37.	<i>Phellinus scropsus</i>	Stump of <i>Cedrus deodara</i>	<i>Hymenochaetale,</i> <i>Hymenochaetaceae</i>	Batote, 1555	[3]
38.	<i>Ph. torulosus</i>	On stump of <i>Pinus excelsa</i>	<i>Hymenochaetale,</i> <i>Hymenochaetaceae</i>	Batote, 1555	
39.	<i>Porodaedalea pini</i>	Stump under <i>Pinus excelsa</i>	<i>Hymenochaetale,</i> <i>Hymenochaetaceae</i>	Batote, 1555	[3]
40.	<i>Trametes hirsutus</i> (as <i>Coriolus hirsutus</i>)	On stump under <i>Cedrus deodara</i>	<i>Polyporales,</i> <i>Polyporaceae</i>	Batote, 1555	[3]
41.	<i>Trametes versicolor</i> (as <i>Coriolus versicolor</i>)	On stump of <i>Quercus</i>	<i>Polyporales,</i> <i>Polyporaceae</i>	Batote, 1555	[3]
42.	<i>Trametes zonatus</i> (as <i>Coriolus zonatus</i>)	On twig of <i>Abies</i>	<i>Polyporales,</i> <i>Polyporaceae</i>	Batote, 1555	[3]
43.	<i>Trichaptum abietinum</i> (as <i>Trichaptum abietinus</i>)	On trunk of <i>Berberis</i>	<i>Polyporales,</i> <i>Polyporaceae</i>	Batote, 1555	[3]
44.	<i>T. venusta</i> (as <i>Trichaptum venustum</i>)	Stump of <i>Quercus</i>	<i>Polyporales,</i> <i>Polyporaceae</i>	Batote, 1555	[3]
45.	<i>Wrightoporia lenta</i> (<i>Poria lenta</i>)	On log of <i>Cedrus deodara</i>	<i>Polyporales,</i> <i>Polyporaceae</i>	Bhaderwah, 1613	[3],[4]

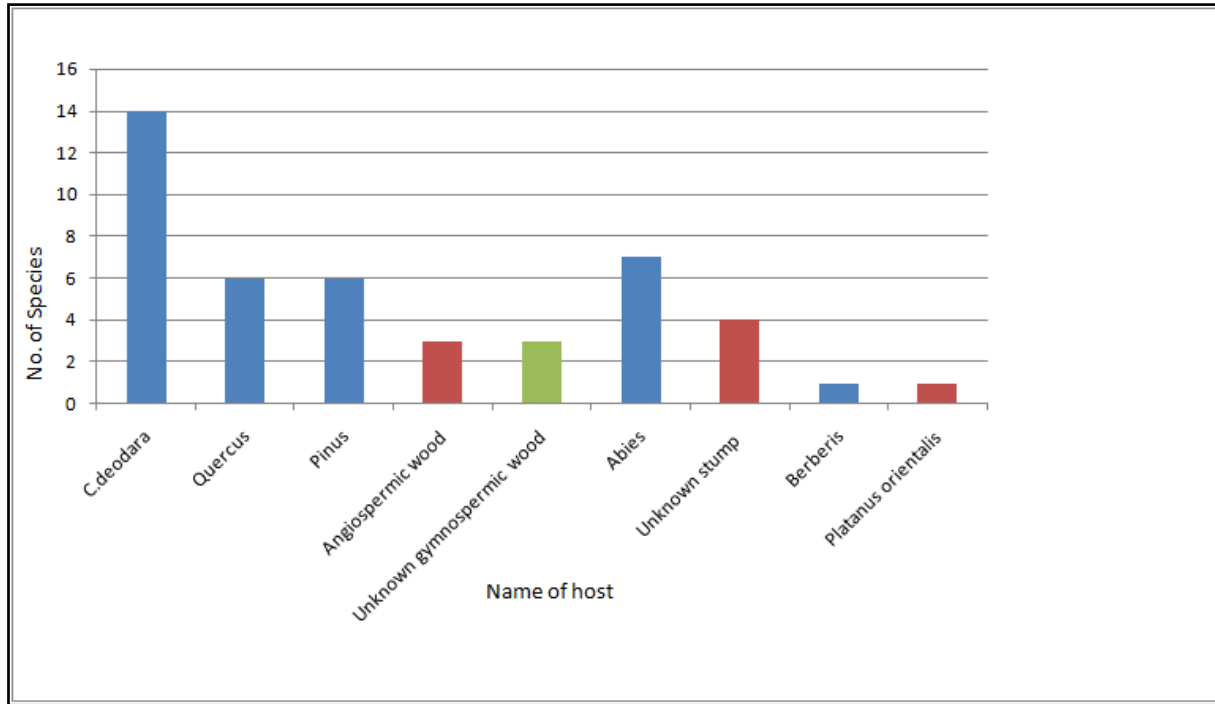


Figure 6. Host distribution of 45 species

Polypore fungi depend mainly on the wooden substrate for their nourishment. These fungi are unique in the ability to decay lignin, cellulose, hemicelluloses, etc. Hence they play a very significant role in recycling of materials. These fungi grow in association with both gymnospermous and angiospermous wood. Of the 45 species described from the study area, 30 species have been reported in association with gymnospermous trees/wood [*Cedrus deodara* (14), *Abies* (7), *Pinus excelsa* (6) and unidentified gymnospermous wood (3)], 11 species have been reported with angiospermous trees/wood [*Quercus* sp. (6), *Berberis aristata* (1), *Platanus orientalis* (1) and unidentified angiospermous wood (3)] and the remaining 4 species have been reported with unknown stumps (Figure 6).

As far as the geographical distribution is concerned, these fungi are dominant in the subtropical (100-1800m) and temperate (1800-3600) regions. Among 45 species reported from the Jammu and Kashmir, 26 have been collected from the sub-tropical region, 13 from the temperate region and remaining 6 from the sub alpine region.

5. Conclusions

In the present scenario of changing climatic conditions it is essential to document the diversity of polypores of comparatively lesser explored Jammu and Kashmir. The knowledge of these fungi can lay a solid foundation for the exploitation of these fungi because of their medicinal importance. The present studies are one step forward in this direction. Further exploration will enrich our

knowledge of these fungi from this diverse area.

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