

## Some new reports of corticioid fungi from Mandi district (Himachal Pradesh)

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(Submitted on October 02, 2021; Accepted on December 22, 2021)

### ABSTRACT

Seven species of the corticioid fungi, *Botryohypochnus isabellinus*, *Dendrothele alliacea*, *Gloeocystidiellum furfuraceum*, *Hyphodontia alutaria*, *H. pallidula*, *Peniophora cinerea* and *Resinicium furfuraceum* are described as new to Mandi district (Himachal Pradesh). Of these, *Gloeocystidiellum furfuraceum* and *Resinicium furfuraceum* are recorded as new for Himachal Pradesh. Genus *Peniophora* is being described for the first time from Mandi district.

**Keywords:** *Basidiomycota*, *Agaricomycetes*, wood rotting fungi, Himalaya

### INTRODUCTION

Corticioid fungi (*Basidiomycota*, *Agaricomycetes*) are characteristic in having hymenomycetous basidiocarp (gymnocarpic), perforate to imperforate parentheses and 2 to 8 spored basidia (Kirk *et al.*, 2008). The sporocarps are mostly adnate, resupinate to sometimes effused-reflexed with smooth, tuberculate, ridged, warted, toothed, merulioid, grandinoid to odontoid to hydroid, irpicoid, poroid or lamellate hymenophore. These fungi are mainly responsible for the decay of wood. During the surveys conducted in the rainy season of the years 2018-2020, some interesting specimens of the corticioid fungi were collected from the different localities of Mandi district (Himachal Pradesh). On the basis of macro and microscopic features and comparison with literature (Eriksson and Ryvarden, 1975, 1976; Eriksson *et al.*, 1978, 1981; Bernicchia and Gorjon, 2010, Dhingra *et al.*, 2014) these specimens have been identified as *Botryohypochnus isabellinus* (Fr.) J. Erikss., *Dendrothele alliacea* (Quél.) P.A. Lemke, *Gloeocystidiellum furfuraceum* (Bres.) Donk, *Hyphodontia alutaria*, (Burt) J. Erikss. *H. pallidula* (Bres.) J. Erikss., *Peniophora cinerea* (Pers.) Cooke and *Resinicium furfuraceum* (Bres.) Parmasto. All the seven species are new records for district Mandi (Himachal Pradesh). It is pertinent to mention here that *Resinicium furfuraceum* and *Gloeocystidiellum furfuraceum* are new for Himachal Pradesh. The genus *Peniophora* is being described for the first time from the study area. The material of the described species has been deposited at the Herbarium Department of Botany, Punjabi University, Patiala (PUN). The colour citations are according to Kornerup and Wanscher (1978).

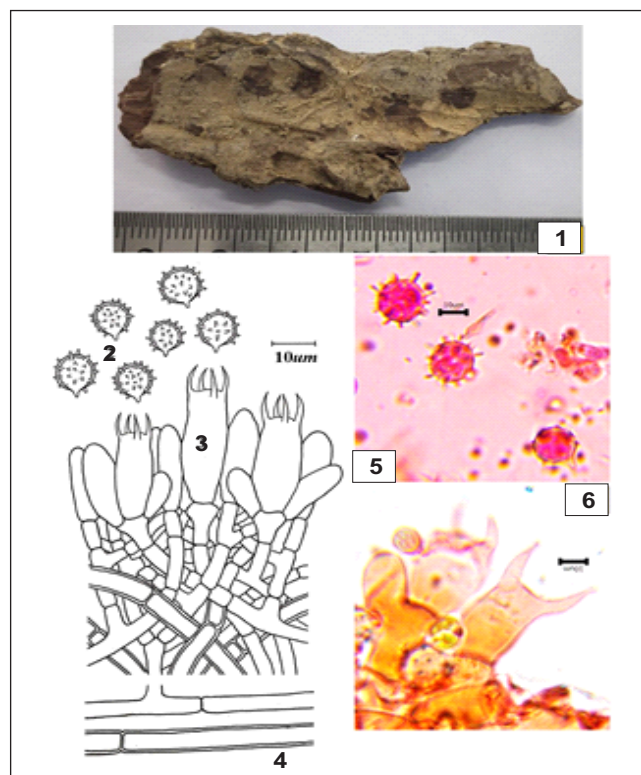
### TAXONOMIC DESCRIPTIONS

***Botryohypochnus isabellinus*** (Fr.) J. Erikss., *Svensk Botanisk Tidskrift* **52** (1): 2, 1958.

- *Thelephora isabellina* Fr., *Epicrisis systematis Mycologici*: 544, 1838. (Figs. 1-6)

Basidiocarp loose, hypochnoid, floccose, up to 200 µm thick

in section; hymenial surface smooth, greyish when fresh, becomes ochraceous on drying; margin paler concolorous to indeterminate. Hyphal system monomitic. Generative hyphae, simple-septate, branched at right angle, loosely interwoven; basal hyphae horizontal to the substrate, up to 8 µm wide, thick-walled; subhymenial hyphae up to 4 µm wide, thin-walled, gradually becoming vertical towards the hymenium. Cystidia none. Basidia 24-30 × 8-11 µm, obovate to subcylindrical, without basal clamp, tetrasporic; sterigmata up to 8 µm long. Basidiospores 7.0-10.0 × 6.6-8.44 µm, globose to subglobose, ornamented with 2-3 µm long numerous spines, inamyloid, cyanophilous.



**Figs. 1-6:** *Botryohypochnus isabellinus* 1. Basidiocarp showing hymenial surface 2. Basidiospores 3. Basidia 4. Generative hyphae 5-6. Photomicrographs showing basidiospores and basidia.

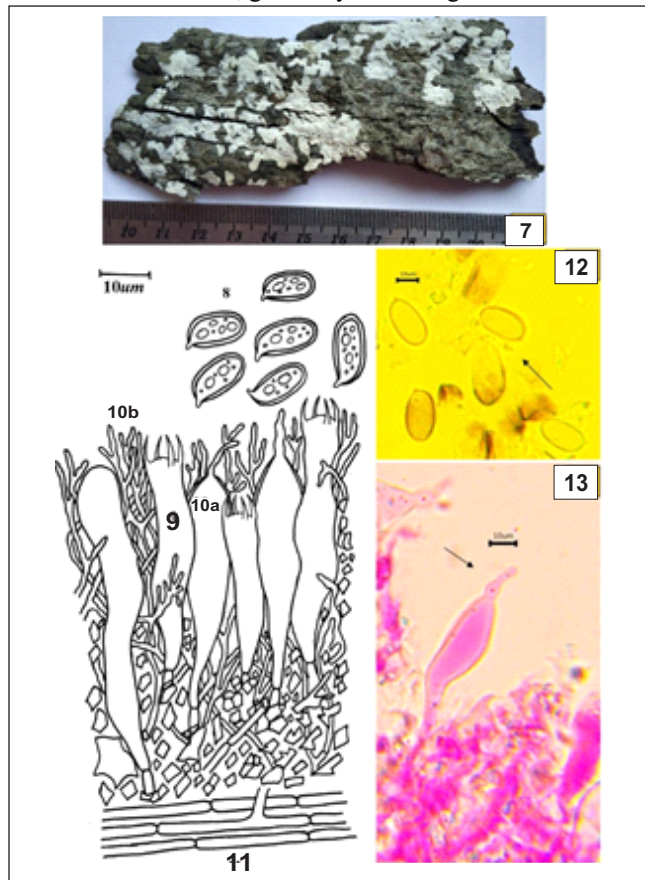
**Collection examined:** India, Himachal Pradesh, Mandi: Keran, on decayed gymnospermous wood, Rajni Devi 11388 (PUN), September 13, 2019.

**Remarks:** *B. isabellinus* is characterized by the presence of cyanophilous, ornamented, globose to subglobose basidiospores and hyphae are branched at right angle. In Himachal Pradesh, this species had previously been reported from district Chamba (Rattan, 1977; Dhingra *et al.*, 2006) and Shimla (Sharma, 2012). However, it is reported for the first time from the study area.

*Dendrothele alliacea* (Quél.) P.A. Lemke, *Persoonia* 3: 366, 1965.

- *Corticium alliaceum* Quél., *Compt. Rend. Assoc. Franç. Avancem. Sci.* 12: 505, 1884. (Figs. 7-13)

Basidiocarp resupinate, adnate, effused, up to 120  $\mu\text{m}$  thick in section; hymenial surface smooth, cracked, chalky white when fresh, becomes greyish white on drying; margin paler concolorous to indeterminate. Hyphal system monomitic. Generative hyphae simple-septate, thin-walled, up to 3  $\mu\text{m}$  wide; basal hyphae parallel to the substrate, less branched; subhymenial hyphae deposited with abundant crystals which dissolves in 5% KOH, gradually becoming vertical and more



**Figs. 7-13:** *Dendrothele alliacea* 7. Basidiocarp showing hymenial surface 8. Basidiospores 9. Basidia 10a. Cystidia 10b. Dendrohyphidia 11. Generative hyphae 12-13. Photomicrographs showing basidiospores and cystidia.

branched towards the hymenium. Dendrohyphidia numerous, irregularly branched, covered with crystalline matter. Cystidia 68-70  $\times$  10-12  $\mu\text{m}$ , clavate, with moniform tip, thick-walled towards the apex. Basidia 34-58  $\times$  8-10  $\mu\text{m}$ , clavate to subcylindrical, thin-walled, without basal clamp, tetrasporic; sterigmata up to 10  $\mu\text{m}$  long. Basidiospores 12-18  $\times$  6-8  $\mu\text{m}$ , subellipsoid to subcylindrical, smooth, thin-walled, apiculate, inamyloid, acyanophilous.

**Collection examined:** India, Himachal Pradesh, Mandi: Kataula, on the bark of *Quercus incana*, Rajni Devi 11390 (PUN), September 9, 2019.

**Remarks:** This species is distinguished on the basis of larger subellipsoid to subcylindrical basidiospores, presence of numerous incrustated dendrohyphidia and apically moniform cystidia. In Himachal Pradesh, earlier it was recorded from district Solan (Dhingra *et al.*, 2014). However, this is a new report for the study area.

*Gloeocystidiellum furfuraceum* (Bres.) Donk, *Fungus* 26: 9, 1956.

- *Hypochnus furfuraceus* Bres., *Fungi Tridentini* 2 (14): 97, 1900. (Figs. 14-20)

Basidiocarp resupinate, effused, easily separable from the substrate, up to 600  $\mu\text{m}$  thick in section; hymenial surface furfuraceous, white to creamish when fresh, becomes pale ochraceous on drying; margin indistinct. Hyphal system monomitic. Generative hyphae septate, clamped, richly branched, up to 3  $\mu\text{m}$  wide; basal hyphae parallel to the



**Figs. 14-20:** *Gloeocystidiellum furfuraceum* 14. Basidiocarp showing hymenial surface 15. Basidiospores 16. Basidia 17. Cystidia 18. Generative hyphae 19-20. Photomicrographs showing basidiospores and cystidia.

substrate, thin-walled; subhymenial hyphae loosely arranged, vertical towards the hymenium. Cystidia 35-50 × 6-12 μm, cylindrical, flexuous, thin-walled, filled with granular contents, sulphopositive. Basidia 21-28 × 5-7 μm, sinuous to clavate, with basal clamp, tetrasporic; sterigmata up to 5 μm long. Basidiospores 4-8 × 5-6 μm, globose to subglobose, echinulate, the spines up to 0.6 μm in length, amyloid, cyanophilous.

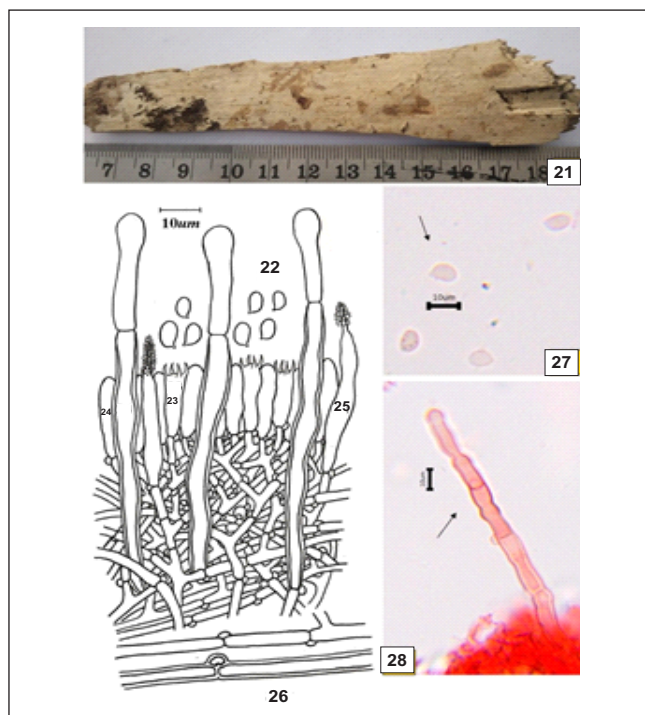
**Collection examined:** India, Himachal Pradesh, Mandi: Murari Devi, on the fallen angiospermous sticks, Rajni Devi 11394 (PUN), September 11, 2019.

**Remarks:** This species is easily recognized by its globose to subglobose, echinulate basidiospores. In India, it is earlier reported from Maharashtra (Ranadive, 2013). However, this is a new report for Himachal Pradesh.

*Hyphodontia alutaria* (Burt) J. Erikss., *Symbolae Botanicae Upsalienses* **16** (1): 104, 1958.

- *Peniophora alutaria* Burt, *Annals of the Missouri Botanical Garden* **12**: 231, 1926. (Figs. 21-28)

Basidiocarp resupinate, adnate, effused, up to 175 μm thick in section; hymenial surface grandinoid, pale ochraceous when fresh, not changing much on drying; margin indeterminate. Hyphal system monomitic. Generative hyphae septate, clamped, thick-walled, up to 6 μm wide; basal hyphae horizontal to the substrate, thin-walled; subhymenial hyphae loosely branched, vertical towards the hymenium. Cystidia of



**Figs. 21-28:** *Hyphodontia alutaria* 21. Basidiocarp showing hymenial surface 22. Basidiospores 23. Basidia 24. Cystidia 25. Lagenocystidia 26. Generative hyphae 27-28. Photomicrographs showing basidiospores and a cystidium.

two kinds: 1) Septate cystidia 100-112 × 6-8 μm, hyphoid, thick-walled, with capitate apex, projecting up to 50 μm out of the hymenium. 2) Lagenocystidia 45-50 × 5-8 μm, thin-walled, abruptly ending in an encrusted needle like part, slightly projecting. Basidia 16-20 × 6-8 μm, clavate to subcylindrical, usually with median constriction, clamped at the base, tetrasporic; sterigmata up to 4 μm long. Basidiospores 4-8 × 2-3 μm, ellipsoid to broadly-ellipsoid, smooth, thin-walled, inamyloid, acyanophilous.

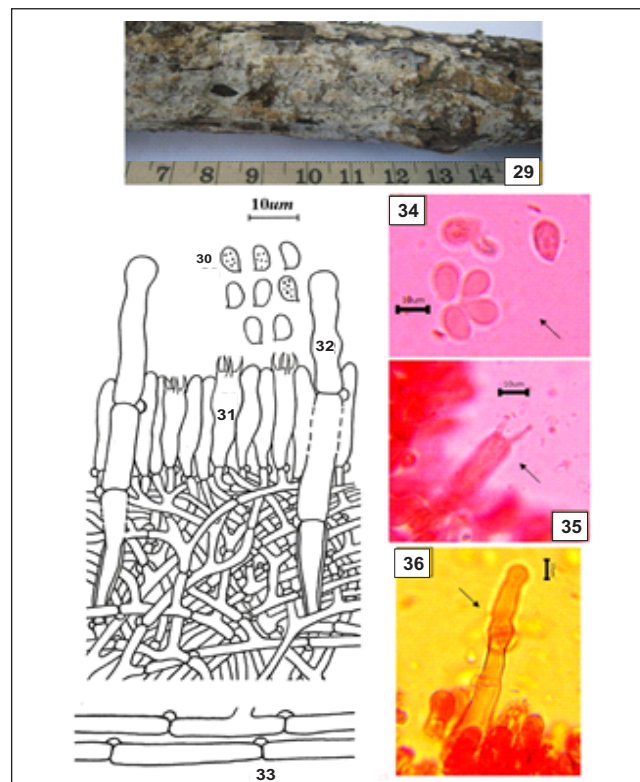
**Collection examined:** India, Himachal Pradesh, Mandi: Kamrunag, on the decayed stump of *Cedrus deodara*, Rajni Devi 11397 (PUN), September 12, 2019.

**Remarks:** *H. alutaria* is recognized by its closely adnate basidiocarps and smaller basidiospores. In Himachal Pradesh, this species had previously been reported from district Chamba (Rattan, 1977; Dhingra *et al.*, 2014), Solan (Rattan, 1977; Dhingra *et al.*, 2014), Kullu and Shimla (Dhingra *et al.*, 2014). However, this is a new record for the study area.

*Hyphodontia pallidula* (Bres.) J. Erikss., *Symb. bot. upsal.* **16** (1): 104, 1958.

- *Gonatobotrys pallidulus* Bres., *Annales Mycologici* **1** (2): 127, 1903. (Figs. 29-36)

Basidiocarp resupinate, adnate, effused, up to 175 μm thick in section; hymenial surface smooth, white to creamish white when fresh, not changing much on drying; margin



**Figs. 29-36:** *Hyphodontia pallidula* 29. Basidiocarp showing hymenial surface 30. Basidiospores 31. Basidia 32. Cystidia 33. Generative hyphae. 34-36. Photomicrographs showing basidiospores, basidium and cystidium.

indeterminate. Hyphal system monomitic. generative hyphae septate, clamped, less branched, thin-walled, up to 5  $\mu\text{m}$  wide; basal hyphae parallel to the substrate, more branched; subhymenial hyphae vertically arranged towards the hymenium. Septocystidia 80-129  $\times$  5-6  $\mu\text{m}$ , hyphoid, slightly thick-walled, numerous, with one or more secondary septa, clamped, apically obtuse or capitate, projecting up to 35  $\mu\text{m}$  out of the hymenium. Basidia 16-21  $\times$  3-4  $\mu\text{m}$ , clavate to subcylindrical with suburniform constriction, with basal clamp, tetrasporic; sterigmata up to 4  $\mu\text{m}$  long. Basidiospores 3-5  $\times$  2-3  $\mu\text{m}$ , ellipsoid to broadly ellipsoid, thin-walled, smooth, with oily contents, inamyloid, acyanophilous.

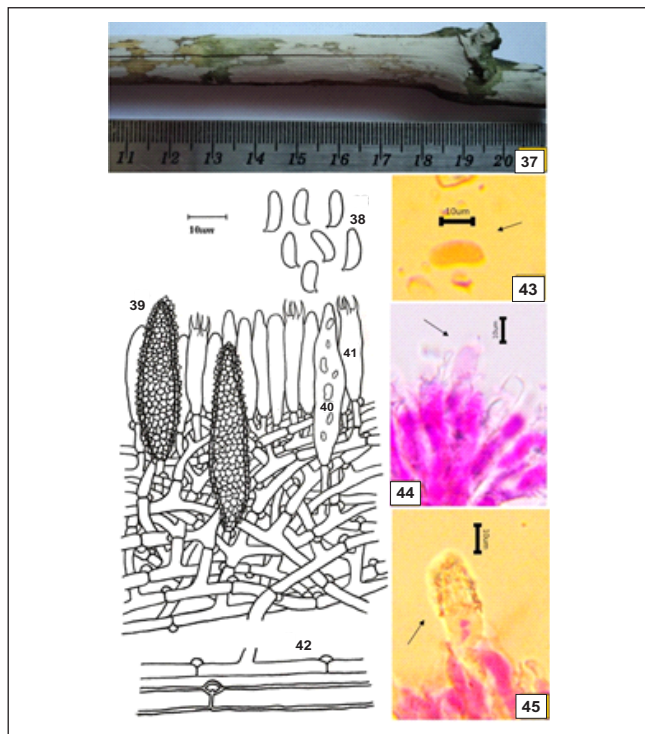
**Collection examined:** India, Himachal Pradesh, Mandi: Kamarunaag, on the bark of angiospermous tree, Rajni Devi 11398 (PUN), September 12, 2019.

**Remarks:** The peculiar feature of this species is its hyphoid, clamped septocystidia. In Himachal Pradesh, earlier it was reported from district Chamba, Kullu (Thind and Rattan, 1976; Rattan, 1977; Dhingra *et al.*, 2014), Shimla, Sirmaur, Solan (Dhingra *et al.*, 2014) and Kangra (Ritu *et al.*, 2016). However, this is a new report for the study area.

*Peniophora cinerea* (Pers.) Cooke, *Grevillea* **8** (45): 20, 1879.

- *Corticium cinereum* Pers., *Neues Magazin für die Botanik* **1**: 111, 1794. (Figs. 37-45)

Basidiocarp resupinate, closely adnate, not easily separable from the substratum, up to 250  $\mu\text{m}$  thick in section; hymenial



**Figs. 37-45:** *Peniophora cinerea* 37. Basidiocarp showing hymenial surface 38. Basidiospores 39. Metuloid cystidia 40. Gloeocystidia 41. Basidia 42. Generative hyphae. 43-45 Photomicrographs showing basidiospores, basidia and metuloid cystidium.

surface smooth, pinkish grey to pinkish violaceous when fresh, not changing much on drying; margin thinning, irregular, indeterminate. Hyphal system monomitic. Generative hyphae, thick-walled, septate, clamped, up to 6  $\mu\text{m}$  wide; horizontal in basal zone; subhymenial hyphae thin-walled, more branched, gradually becoming vertical towards the hymenium. Cystidia of two kinds: 1) Gloeocystidia 22-40  $\times$  5-9  $\mu\text{m}$ , fusiform to subfusiform, thin-walled, with basal clamp, oily content not stained in sulphovanillin. 2) Metuloid cystidia 30-45  $\times$  10-15  $\mu\text{m}$ , conical to subfusiform, thick-walled, with basal clamp, heavily encrusted. Basidia 20-25  $\times$  4-6  $\mu\text{m}$ , clavate to subclavate, thin-walled, with basal clamp, tetrasporic; sterigmata up to 6  $\mu\text{m}$  long. Basidiospores 6-10  $\times$  2-4  $\mu\text{m}$ , allantoid to subcylindrical, smooth, thin-walled, acyanophilous, inamyloid.

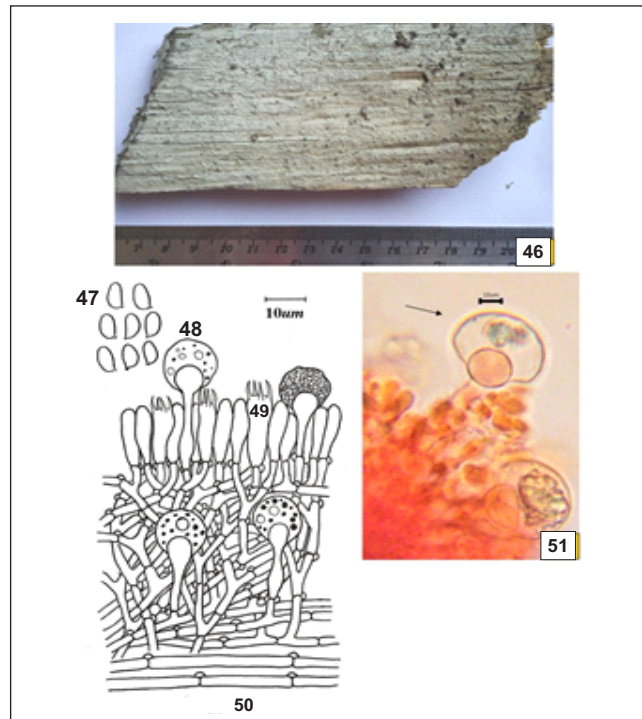
**Collection examined:** India, Himachal Pradesh, Mandi: Maloh, on the fallen angiospermous twigs, Rajni Devi 11399 (PUN), September 12, 2019.

**Remarks:** This species is recognized by its pinkish grey colour, poorly developed subiculum. In Himachal Pradesh, it is earlier reported from district Kullu (Rattan, 1977; Dhingra *et al.*, 2014), Sirmaur and Chamba (Dhingra *et al.*, 2014). However, this is a new report for the study area.

*Resinicium furfuraceum* (Bres.) Parmasto, *Conspectus Systematis Corticiacearum*: 98, 1968.

- *Corticium furfuraceum* Bres., *Mycologia* **17** (2): 69, 1925. (Figs. 46-51)

Basidiocarp resupinate, effused, closely adnate, up to 200  $\mu\text{m}$  thick in section; hymenial surface greyish white when fresh,



**Figs. 46-51:** *Resinicium furfuraceum* 46. Basidiocarp showing hymenial surface 47. Basidiospores 48. Halocystidia 49. Basidia 50. Generative hyphae. 51. Photomicrograph showing halocystidia.

not changing much on drying; margins not differentiated. Hyphal system monomitic, generative hyphae thin-walled, more branched, septate, clamped, up to 2.5 µm thick in section; basal hyphae parallel to the substrate; subhymenial hyphae less branched, gradually becoming vertical towards the hymenium Halocystidia 24-38 × 4-8 µm, cylindrical with wide base, thin-walled, capitate, "halo" part 12-15 µm wide, filled with oily and grainy matter, outer layer forms rounded bladder like structure at the tip. Basidia 16-20 × 5-6 µm, clavate, clamped at the base, tetrasporic; sterigmata up to 5 µm long. Basidiospores 6-8 × 3-4 µm, ellipsoid to cylindrical, smooth, thin-walled, acyanophilous, inamyloid.

**Collection examined:** India, Himachal Pradesh, Mandi: Leda, on the gymnospermous stump, Rajni Devi 11404 (PUN), August 12, 2019.

**Remarks:** This species is characterized by the presence of halocystidia and ellipsoid to cylindrical basidiospores. In India, it is earlier reported from Uttarakhand (Sharma, 2012). However, this is a new record for Himachal Pradesh.

#### ACKNOWLEDGEMENTS

Authors are thankful to the Department of Agriculture, Sri Guru Granth Sahib World University, Fatehgarh Sahib, Punjab, India for providing necessary laboratory facilities and Dr. Gurbal Singh Dhingra (Retired Professor, Department of Botany, Punjabi University, Patiala, Punjab, India) for the authentication of identified taxa. We are also grateful to the Herbarium, Department of Botany, Punjabi University, Patiala (PUN) for providing the accession numbers to the submitted specimens without charging any cost.

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