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Corticioid fungi new to district Chamba (Himachal Pradesh)

Poonam[1], Avneet Pal Singh[2]* and Gurpaul Singh Dhingra[2]
[1] *Government Post Graduate College, Chamba 176314*
[2] *Department of Botany, Punjabi University, Patiala 147002*
**Corresponding author Email: avneetbot@gmail.com*
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ABSTRACT

Nine species of corticioid fungi i.e. *Cristinia helvetica* (Pers.) Parmasto, *Gloeocystidiellum leucoxanthum* (Bres.) Boidin, *G. porosum* (Berk. & M.A. Curtis) Donk, *Hypochnicium lundellii* (Bourdot) J. Erikss., *Leucogyrophana mollusca* (Fr.) Pouzar, *L. pseudomollusca* (Parmasto) Parmasto, *Peniophora pseudoversicolor* Boidin, *Tomentella subclavigera* Litsch. and *T. viridula* Bourdot & Galzin, new to the district Chamba (Himachal Pradesh) are described and illustrated. Of these, *Leucogyrophana pseudomollusca* and *Peniophora pseudoversicolor* are new records for India and *Gloeocystidiellum leucoxanthum, G. porosum* and *Tomentella viridula* are first reports from the state of Himachal Pradesh.

Keywords: *Basidiomycota, Agaricomycetes*, North Western Himalaya.

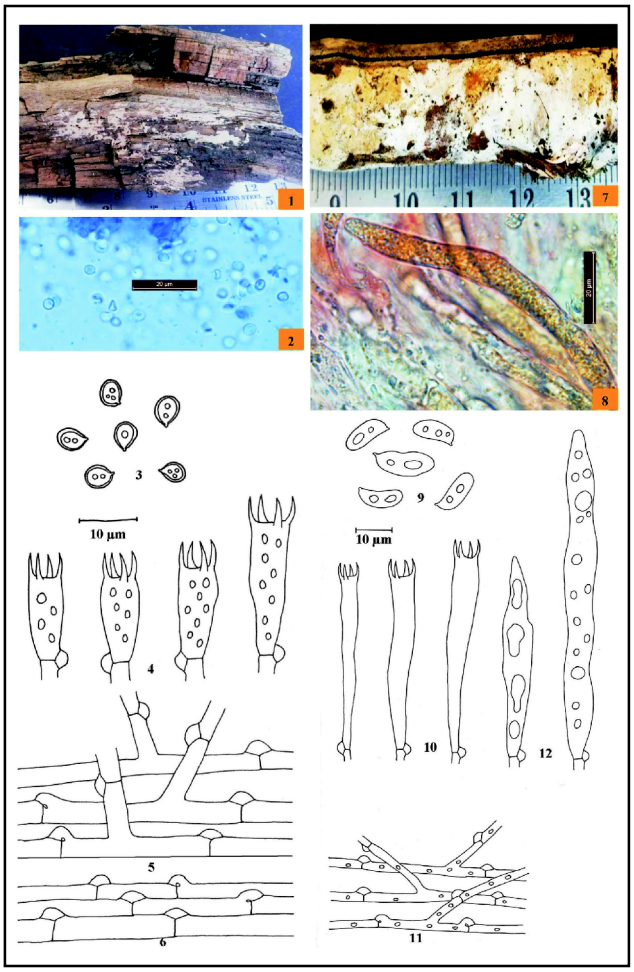
INTRODUCTION

Corticioid fungi are characteristic in having resupinate, effused basidiocarps with gymnocarpic, unilateral hymenium; hymenial surface varying from smooth, ridged, tuberculate, toothed, warted to merulioid, generally varying in colour from different shades of orange, grey or yellow to sometimes more bright shades of blue, red and brown. Earlier, most of these fungi were placed under family *Corticiaceae* of order *Aphyllophorales*, but presently these are classified under various orders of class *Agaricomycetes* (phylum *Basidiomycota*, subphylum *Agaricomycotina*). Nine species namely, *Cristinia helvetica* (Pers.) Parmasto, *Gloeocystidiellum leucoxanthum* (Bres.) Boidin, *G. porosum* (Berk. & M.A. Curtis) Donk, *Hypochnicium lundellii* (Bourdot) J. Erikss., *Leucogyrophana mollusca* (Fr.) Pouzar, *L. pseudomollusca* (Parmasto) Parmasto, *Peniophora pseudoversicolor* Boidin, *Tomentella subclavigera* Litsch. and *T. viridula* Bourdot & Galzin, identified on the basis of macroscopic and microscopic features and comparison with authentic literature (Larsen, 1974; Eriksson and Ryvarden, 1975; 1976; Rattan, 1977; Dhingra, 1985; Dhingra and Rani, 1994; Bhosle *et al.*, 2005; Bernicchia and Gorjón, 2010; Kaur *et al.,* 2010; Ranadive *et al.*, 2011; Kaur, 2012; Prasher and Ashok, 2013; Ranadive, 2013; Devi, 2014 and Dhingra *et al.*, 2014) have been described. All the nine species are first reports from district Chamba (Himachal Pradesh) with *Leucogyrophana pseudomollusca* and *Peniophora pseudoversicolor* being new records for India and *Gloeocystidiellum leucoxanthum, G. porosum* and *Tomentella viridula* are new to the state of Himachal Pradesh. All the specimens have been deposited at the Herbarium, Department of Botany, Punjabi University, Patiala (PUN).

TAXONOMIC DESCRIPTIONS

1. *Cristinia helvetica* (Pers.) Parmasto, *Conspectus Systematis Corticiacearum*: 48, 1968. - *Hydnum helveticum* Pers., *Mycologia Europaea* **2**: 184, 1825. **Figs. 1-6**

Basidiocarp resupinate, effused, adnate, up to 240 µm thick in section; hymenial surface grandinioid, orange white when fresh, greyish orange on drying; margins fibrillose, concolorous, or indeterminate. Hyphal cordons present in the subiculum and margins. Hyphal system monomitic. Generative hyphae subhyaline, smooth, closely septate, clamped, thin-walled; basal hyphae up to 5 µm wide, parallel



Figs. 1-6. *Cristinia helvetica*: 1. Basidiocarp showing hymenial surface; 2. Photomicrograph showing basidiospores; 3. Basidiospores; 4. Basidia; 5. Generative hyphae; 6. Hyphal cordons.
7-12. *Gloeocystidiellum leucoxanthum*: 7. Basidiocarp showing hymenial surface; 8. Photomicrograph showing gloeocystidia; 9. Basidiospores; 10. Basidia; 11. Generative hyphae; 12. Gloeocystidia.

to the substrate, less branched; subhymenial hyphae up to 4 µm wide, vertically oriented, richly branched. Hyphal cordons usually unbranched, up to 12 µm wide, individual hyphae up to 4 µm wide, septate, clamped. Basidia 14-24 × 3.3-4.9 µm, clavate to subclavate, 4-sterigmate, thin-walled, with basal clamp and cyanophilous granules; sterigmata up to 5 µm long. Basidiospores 3.8-4.9 × 3.3-3.8 µm, obovate to subglobose, thick-walled, smooth, cyanophilous, inamyloid.

Collection examined: India, Himachal Pradesh, Chamba, Manimahesh, Tosh ka goth, on *Pinus roxburghii* log, Poonam 8842(PUN), September 04, 2016.

Remarks: *C. helvetica* is peculiar in having closely septate, clamped, generative hyphae, distinct hyphal cordons in subiculum and cyanophilous granules in the basidia. It is being described for the first time from district Chamba. The earlier reports from India include Rattan (1977) from district Kullu (Himachal Pradesh) and Prasher and Asshok (2013) from Uttarakhand.

2. *Gloeocystidiellum leucoxanthum* (Bres.) Boidin, *Publs Mus. natn. Hist. nat.*: 122, 1957. - *Corticium leucoxanthum* Bres., *Fungi Tridentini* **2**(11-13): 57, 1898. **Figs. 7-12**

Basidiocarp resupinate, effused, adnate, up to 400 µm thick in section; hymenial surface smooth when fresh, cracked on drying, orange white to greyish yellow when fresh, orange white to pale orange to greyish orange to brownish orange on drying; margins fibrillose, paler concolorous, or indeterminate. Hyphal system monomitic. Generative hyphae up to 3 µm wide, subhyaline, smooth, septate, clamped, thin-walled, with oily contents; basal hyphae parallel to the substrate, less branched; subhymenial hyphae vertically oriented, richly branched. Gloeocystidia 56-95 × 7.5-9.5 µm, tubular to subfusiform, sinuous, thin-walled, with oily contents positive to sulphovanillin, with basal clamp. Basidia 49-57 × 4.4-7.7 µm, narrowly clavate, 4-sterigmate, thin-walled, with basal clamp; sterigmata up to 5 µm long. Basidiospores 12.5-16.7 × 5.3-7.3 µm, suballantoid, thin-walled, smooth, acyanophilous, amyloid.

Collection examined: India, Himachal Pradesh, Chamba, Pangi, Sural valley, on angiospermous sticks, Poonam 8846(PUN), September 13, 2016.

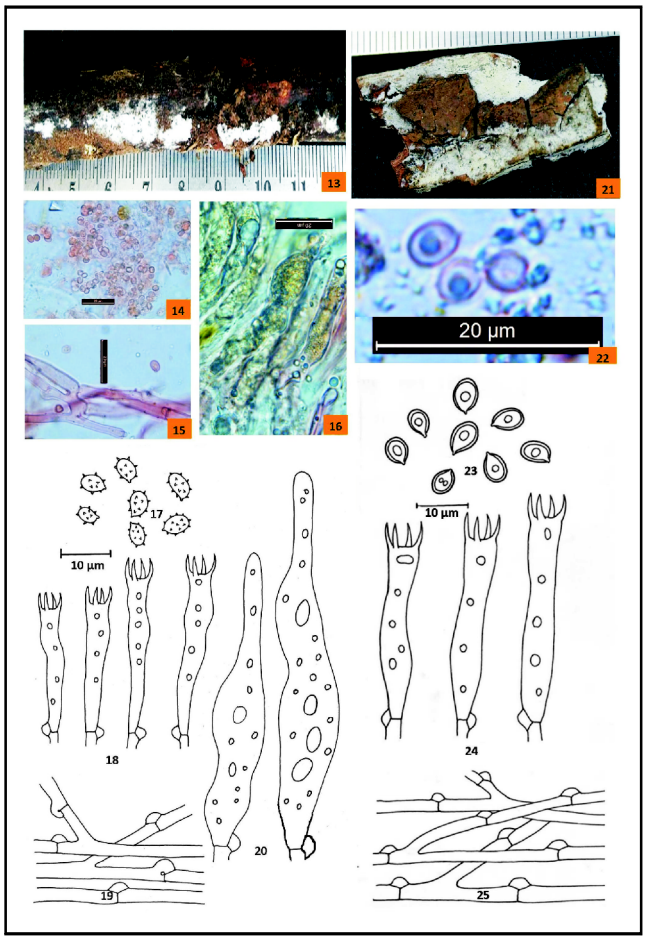
Remarks: The salient features of *G. leucoxanthum* are basidiocarps being cracked on drying, presence of tubular to subfusiform gloeocystidia and smooth, suballantoid, amyloid basidiospores. It is a new record for the state of Himachal Pradesh and has earlier been listed from Maharashtra (Ranadive *et al.*, 2011).

3. *Gloeocystidiellum porosum* (Berk. & M.A. Curtis) Donk, *Mededelingen van de Nederlandse Mycologische Vereeniging*. **18-20**: 156, 1931. - *Corticium porosum* Berk. & M.A. Curtis, *Annals and Magazine of Natural History* **3**: 211, 1879. **Figs. 13-20**

Basidiocarp resupinate, effused, adnate, up to 280 µm thick in section; hymenial surface smooth, orange white when fresh, orange white to pale orange on drying; margins fibrillose, paler concolorous. Generative hyphae up to 2.7 µm wide, subhyaline, smooth, septate, clamped, thin-walled; basal hyphae parallel to the substrate, less branched; subhymenial hyphae vertically oriented, richly branched. Gloeocystidia 61-79 × 11-12 µm, tubular to subfusiform, sinuous, thin-walled, with oily contents positive to sulphovanillin, with basal clamp. Basidia 25-34 × 3.3-6.3 µm, narrowly clavate with oily contents, 4-sterigmate, thin-walled, with basal clamp; sterigmata up to 4.8 µm long. Basidiospores 4.3-6.3 × 2.5-3.8 µm, ellipsoid, thin-walled, verrucose, acyanophilous, amyloid.

Collection examined: India, Himachal Pradesh, Chamba, Pangi, Sural valley, on sticks of *Betula utilis*, Poonam 8845(PUN), September 13, 2016.

Remarks: *G. porosum* differs from *G. leucoxanthum* in having smaller, verrucose basidiospores and is being recorded for the first time from the state of Himachal Pradesh. Earlier it has been listed/described from Maharashtra (Bhosle *et al.*, 2005; Ranadive *et al.*, 2011 and Ranadive, 2013) and Uttarakhand (Devi, 2014).



Figs. 13-20. *Gloeocystidiellum porosum*: 13. Basidiocarp showing hymenial surface; 14-16. Photomicrographs showing 14. Basidiospores; 15. Generative hyphae and basidiospores; 16. Gloeocystidia; 17. Basidiospores; 18. Basidia; 19. Generative hyphae; 20. Gloeocystidia. **21-25. *Hypochnicium lundellii*:** 21. Basidiocarp showing hymenial surface; 22. Photomicrograph showing basidiospores; 23. Basidiospores; 24. Basidia; 25. Generative hyphae.

4. *Hypochnicium lundelli* (Bourdot) J. Erikss., *Symbolae Botanicae Upsalienses* **16**(1): 101, 1958. - *Corticium lundellii* Bourdot, *Svensk Botanisk Tidskrift* **43**: 56, 1949. **Figs. 21-25**

Basidiocarp resupinate, effused, adnate, up to 280 µm thick in section; hymenial surface smooth, greyish white when fresh, yellowish white to yellowish grey on drying; margins pruinose, paler concolorous. Hyphal system monomitic. Generative hyphae subhyaline, smooth, septate, clamped, thin-walled; basal hyphae up to 3.5 µm wide, parallel to substrate, less branched; subhymenial hyphae up to 2.2 µm wide, vertically oriented, richly branched. Basidia 34-42 × 6-6.6 µm, clavate to subclavate, sinuous, with oily contents, 4-sterigmate, thin-walled, with basal clamp; sterigmata up to 5.5 µm long. Basidiospores 5.5-7.7 × 4.5-5 µm, ellipsoid to ovoid, thick-walled, smooth, cyanophilous, inamyloid.

Collection examined: India, Himachal Pradesh, Chamba, Manimahesh, Tosh ka goth, on log of *Cedrus deodara*, Poonam 8848(PUN), September 04, 2016.

Remarks: *H. lundelli* is characteristic in having ellipsoid to ovoid, thick-walled, smooth, cyanophilous basidiospores and is a new record for the study area. Previously it has been reported from district Shimla (Rattan, 1977 and Dhingra *et al*., 2014).

5. *Leucogyrophana mollusca* (Fr.) Pouzar, *Česká Mykol*. **12**: 33, 1958. - *Merulius molluscus* Fr., *Systema Mycologicum* **1**: 329, 1821. **Figs. 26-30**

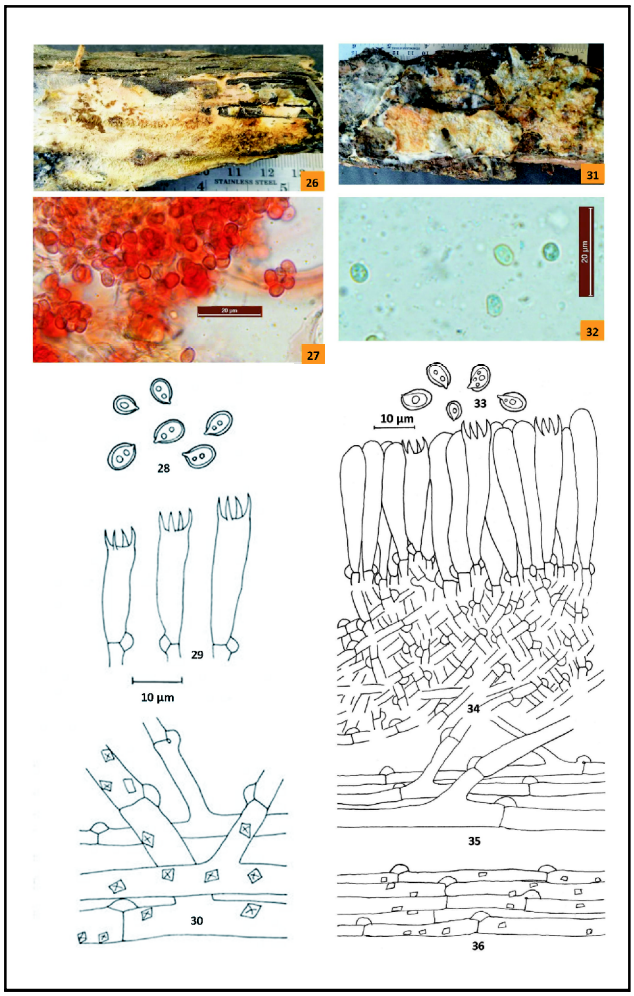
Basidiocarp resupinate, effused, loosely adnate, up to 400 µm thick in section; hymenial surface merulioid when fresh, reticulate on drying, orange white to pale orange to greyish orange to brownish orange when fresh, not changing much on drying; margins irregular, paler concolorous, or indeterminate. Hyphal system monomitic. Generative hyphae subhyaline, septate, clamped, thin-walled; basal hyphae up to 7.5 µm wide, parallel to the substrate, less branched, encrusted with double pyramidic crystals; subhymenial hyphae up to 4 µm wide, vertically oriented, richly branched, smooth. Basidia 20-27 × 5.5-6.6 µm, clavate, 4-sterigmate, thin-walled, with basal clamp; sterigmata up to 5 µm long. Basidiospores 4.9-6.7 × 3.7-4.9 µm, ellipsoid to ovoid, thick-walled, smooth, cyanophilous, inamyloid.

Collection examined: India, Himachal Pradesh, Chamba, Pangi, Saichu, on stump of *Pinus roxburghii*, Poonam 8843(PUN), September 11, 2016.

Remarks: *L. mollusca* has loosely adnate basidiocarp and ellipsoid to ovoid, thick-walled basidiospores. It has earlier been described from district Kullu and Solan by Rattan (1977) and Kaur (2012), respectively. However, it is the first report of this species from district Chamba.

6. *Leucogyrophana pseudomollusca* (Parmasto) Parmasto, *Eesti NSV Teaduste Akadeemia Toimetised*. **16**: 386, 1967. - *Merulius pseudomolluscus* Parmasto, *Bot. issled.* **II**: 212, 1962. **Figs. 31-36**

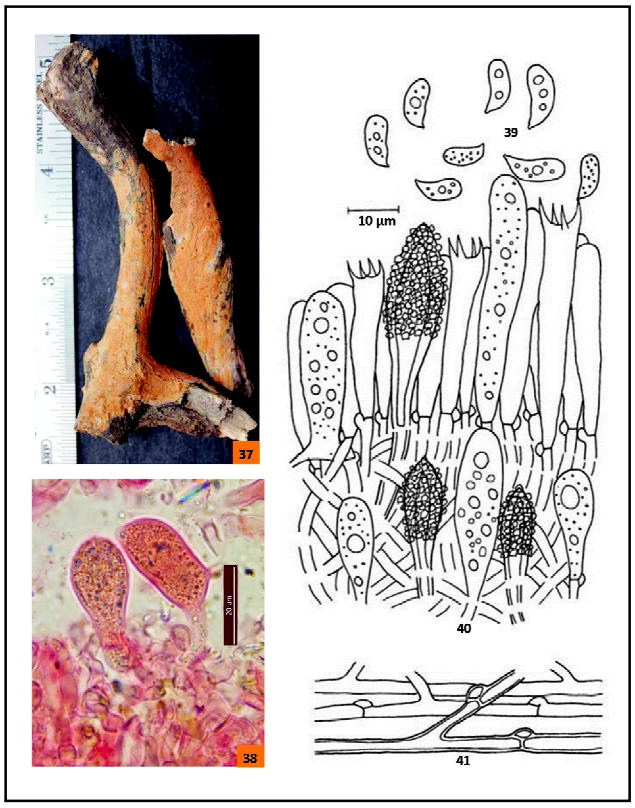
Basidiocarp resupinate, effused, adnate, up to 480 µm thick in section; hymenial surface reticulately folded when fresh, smooth to reticulate on drying, orange white to pale orange to



Figs. 26-30. ***Leucogyrophana mollusca*:** 26. Basidiocarp showing hymenial surface; 27. Photomicrograph showing basidiospores; 28. Basidiospores; 29. Basidia; 30. Generative hyphae.
31-36. *Leucogyrophana pseudomollusca*: 31. Basidiocarp showing hymenial surface; 32 Photomicrograph showing basidiospores; 33. Basidiospores; 34. Reconstruction showing a portion of hymenium and subhymenium; 35. Generative hyphae; 36. Hyphal cordon.

greyish orange when fresh, greyish orange to brownish orange on drying; margins fibrillose, paler concolorous. Hyphal cordons present. Hyphal system monomitic. Generative hyphae subhyaline, smooth, septate, clamped; basal hyphae up to 7.5 µm wide, parallel to the substrate, less branched, thick-walled; subhymenial hyphae up to 3 µm wide, vertically oriented, richly branched, thin-walled. Hyphal cordons branched, up to 27 µm wide; individual hyphae up to 5 µm wide, encrusted. Basidia 27-34 × 6-6.7 µm, narrowly clavate, 4-sterigmate, thin-walled, with basal clamp; sterigmata up to 5.5 µm long. Basidiospores 5.5-7.7 × 3.8-4.9 µm, ellipsoid to ovoid, thick-walled, smooth, cyanophilous, inamyloid.

Collection examined: India, Himachal Pradesh, Chamba, Pangi, Saichu, on stump of *Pinus roxburghii*, Poonam 8847(PUN).



Figs. 37-41. ***Peniophora pseudoversicolor*****:** 37. Basidiocarp showing hymenial surface; 38. Photomicrograph showing gloeocystidia; 39. Basidiospores; 40. Reconstruction showing a portion of hymenium and subhymenium; 41. Generative hyphae.

Remarks: *L. pseudomollusca* differs from *L. mollusca* in having branched hyphal cordons, absence of crystals on generative hyphae and is being described for the first time from India. Previous reports in the world are from Estonia, Finland, Sweden and Norway (Mycobank, 2017).

7. *Peniophora pseudoversicolor* Boidin, *Bulletin Mensuel de la Société Linnéenne de Lyon* **34**: 162, 1965. **Figs. 37-41**

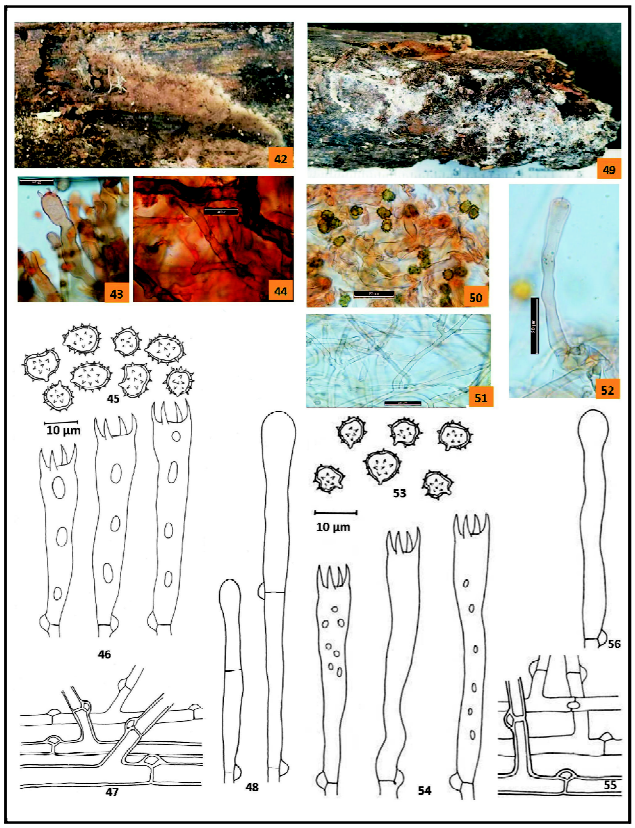
Basidiocarp resupinate, effused, adnate, up to 280 µm thick in section; hymenial surface smooth to somewhat tuberculate, cracked, reddish orange to orange when fresh, not changing much on drying; margins fibrillose to indeterminate, whitish. Hyphal system monomitic. Generative hyphae septate, clamped; basal hyphae up to 4 µm wide, parallel to the substrate, less branched, light brown, thin- to somewhat thick-walled; subhymenial hyphae up to 3 µm wide, vertically oriented, richly branched, subhyaline, thin-walled. Cystidia of 2 types. (i) Gloeocystidia 34-52 × 8.9-9.5 µm, cylindrical to fusiform to vesicular, thin-walled, with oily contents positive to sulphovanillin, with basal clamp. (ii) Metuloids 31-45 × 6-9.5 µm, conical, thick-walled, heavily encrusted, with basal clamp. Basidia 27-45 × 5.5-6.1 µm, subclavate, 4-sterigmate, thin-walled, with basal clamp; sterigmata up to 5.6 µm long. Basidiospores 8-12 × 3-4.5 µm, allantoid to suballantoid, thin-walled, smooth, acyanophilous, inamyloid.

Collection examined: India, Himachal Pradesh, Chamba, Udaipur, on *Adhathoda vesica* sticks, Poonam 7648(PUN), September 06, 2015.

Remarks: *P. pseudoversicolor* is unique in having clamped generative hyphae, two types of cystidia i.e. metuloids and gloeocystidia, subclavate basidia and allantoid to suballantoid basidiospores. It is known earlier from Belgium, Caucasus, Estonia, France, Germany, Italy, Portugal, Slovenia and Spain (Mycobank, 2017). Here, it is being described for the first time from India.

8. *Tomentella subclavigera* Litsch., *Bulletin de la Société Mycologique de France* **49**: 57, 1933. **Figs. 42-48**

Basidiocarp resupinate, effused, adnate, up to 240 µm thick in section; hymenial surface smooth, granulose under lens, light brown to brown when fresh, greyish brown to dark brown on drying; margins byssoid, brownish grey to light brown, or indeterminate. Hyphal system monomitic. Generative hyphae septate, clamped; basal hyphae up to 7 µm wide, parallel to the substrate, less branched, dark brown to golden brown, somewhat thick-walled; subhymenial hyphae up to



Figs. 42-48. ***Tomentella subclavigera*****:** 42. Basidiocarp showing hymenial surface; 43-44. Photomicrophotographs showing 43. Basidia; 44. Generative hyphae; 45. Basidiospores; 46. Basidia; 47. Generative hyphae; 48. Cystidia.

49-56. ***Tomentella viridula*****:** 49. Basidiocarp showing hymenial surface; 50-52. Photomicrographs showing 50. Basidiospores; 51. Generative hyphae; 52. Cystidium; 53. Basidiospores; 54. Basidia; 55. Generative hyphae; 56. Cystidium.

3.5 µm wide, vertically oriented, richly branched, subhyaline to pale yellow, thin-walled. Cystidia 62-114 × 6.5-11 µm, hyphoid with expanded apex, sometimes clamped, thin-walled. Basidia 50-64 × 11-12 µm, subclavate, sinuous, 4-sterigmate, thin-walled, with basal clamp and oily contents; sterigmata up to 7.8 µm long. Basidiospores 8-12 × 3-4.5 µm, globose to subglobose to broadly ellipsoid to irregular, thick-walled, aculeate, acyanophilous, inamyloid.

Collection examined: India, Himachal Pradesh, Chamba, Pangi, Sural valley, on angiospermous sticks, Poonam 8841(PUN), September 13, 2016.

Remarks: *T. subclavigera* is being described for the first time from the study area. The earlier reports of this species are from district Solan by Kaur *et al*. (2010) and Kaur (2012), a mention of which has also been made by Prasher and Ashok (2013) and Dhingra *et al*. (2014).

9. *Tomentella viridula* Bourdot & Galzin, *Bulletin de la Société Mycologique de France* **40**(2): 144, 1924. **Figs. 49-56**

Basidiocarp resupinate, effused, adnate, up to 240 µm thick in section; hymenial surface smooth, orange white to pale orange when fresh, not changing much on drying; margins fibrillose, whitish to paler concolorous. Hyphal system monomitic. Generative hyphae, septate, clamped; basal hyphae up to 4.5 µm wide, parallel to the substrate, less branched, dark brown to golden brown, thick-walled; subhymenial hyphae up to 3.5 µm wide, vertically oriented, richly branched, subhyaline to pale yellow, thin-walled. Cystidia 46-56 × 6.5-7.7 µm, subcapitate to capitate, sinuous, thin-walled, with basal clamp. Basidia 46-60 × 7-7.7 µm, clavate to subclavate, somewhat sinuous, 4-sterigmate, thin-walled, with basal clamp and oily contents; sterigmata up to 5.6 µm long. Basidiospores 6.5-8.3 × 6-8 µm, subglobose to globose to irregular, thick-walled, aculeate, acyanophilous, inamyloid.

Collection examined: India, Himachal Pradesh, Chamba, Pangi, Sural valley, on *Betula utilis* sticks, Poonam 8844(PUN), September 13, 2016.

Remarks: It differs from *T. subclavigera* in having subcapitate to capitate cystidia and is being described for the first time from the state of Himachal Pradesh. Previously it has been reported from Uttarakhand (Devi, 2014).

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