



Hyphomycetes diversity of Himachal Pradesh-II

I. B. Prasher, Sushma and Rajnish Kumar Verma*

Mycology and Plant Pathology Laboratory, Department of Botany, Panjab University
Chandigarh, 160014

*Corresponding author: vermarajnish1985@gmail.com

| Received: 23 February 2016 | Accepted: 22 May 2016 |

ABSTRACT

Pseudospiropes subuliferus (Corda) M. B. Ellis, *Fusariella obstipa* (Pollack) Hughes, *Gyrothrix circinata* (Berk. & Curt.) Hughes, *Stachybotrys echinata* (Rivolta) G. Sm and *Stachybotrys levispora* (Subram.) Yong Wang bis, K.D. Hyde, McKenzie, Y.L. Jiang & D.W. Li, in Wang, Hyde, McKenzie, Jiang, Li & Zhao collected from the forests of Himachal Pradesh are being described and illustrated.

Key Words: Anamorphic fungi, Diversity, Himalayas.

INTRODUCTION

Himachal Pradesh is rich reservoir of hyphomycetes diversity. Many species and records have been published in past (Adamčík et al. 2015, Gautam 2014, Prasher et al. 2015, Prasher and Singh 2015, Prasher & Verma 2012a, b, 2014a, b, 2015a, b, c, d, e). During the survey of saprobic conidial fungi five interesting hyphomycetes viz. *Pseudospiropes subuliferus*, *Fusariella obstipa*, *Gyrothrix circinata*, *Stachybotrys echinata* and *Stachybotrys levispora* were collected. *Pseudospiropes subuliferus* reported for the first time from India (Bilgami et al. 1991 and Jamaluddin et al. 2004).

MATERIALS AND METHODS

Decaying culms, leaves, twigs, cut stumps, bark and dead wood were collected into separate Khakhi bags and brought to the laboratory. The specimens were mounted on glass slides either in 4% KOH or Lactophenol Kirk et al. (2008). The specimens were studied microscopically under Matrix stereo trinocular microscope (VL-Z60) and transmission

microscope (VRS-2f) for macroscopic and microscopic characters. All the measurements were taken with the help of Pro MED software. The specimens have been deposited in herbarium of Department of Botany, Panjab University (PAN).

RESULTS

Pseudospiropes subuliferus (Corda) M. B. Ellis.

Fig. 1 (A-E)

Colonies on natural substratum effuse, dark blackish brown to black hairy. Seate and hyphopodia absent. Conidiophores macronematous, mononematous, scattered unbranched, erect, straight or flexuous, subulate, septate, with the septa often close together, thick-walled, dark brown becoming lighter in colour towards the apex where there are usually a number of small, dark scars, up to 100 µm long, tapering to 1–3 µm at the apex. Conidia dry, acropleurogenous, cylindrical to clavate, 1–5 (mostly 3) septate, hyaline or subhyaline, smooth, 8.5–18 µm long, 3–4 µm thick in the broadest part.

Collection examined: India, Himachal Pradesh, Bilaspur, on dead culms of bamboo, 7 March, 2012, Rajnish Kumar Verma PAN (32766), on fallen twigs of unidentified tree, Hamirpur, 1 November 2013, Sushma PAN (31509)

Remarks: This species has been first time reported from India (Bilgami et al. 1991 and Jamaluddin et al. 2004)

Fusariella obstipa (Pollack) Hughes. **Fig. 2 (A-E)**

Colonies on natural substratum compact, black. Mycelium immersed. Stroma none. Setae and hyphopodia absent. Conidiophores semi-macronematous, branched, flexuous, colourless, smooth. Conidia developing in basipetal succession and frequently hanging together in slipped chains,

bent or flexuous, often fusiform pointed at the apex blunt at the base but sometimes cylindrical, usually smooth, brown in colour, blackish brown to black in mass, 1–3 (mostly 3) septate, $14.41\text{--}22.39 \times 5\text{--}6.6 \mu\text{m}$.

Collection examined: India, Himachal Pradesh, Hamirpur on fallen twigs, 19 November 2012. Rajnish Kumar Verma 32764 (PAN), on dead and decaying twigs of unidentified tree, Hamirpur, 2 November 2013 Sushma 31505 (PAN).

Remarks: This species has already been recorded from Solan District of Himachal Pradesh and other places from India, but constitute a new record for Hamirpur district (Bilgami et al. 1991 and Jamaluddin et al. 2004).



Fig. 1. *Pseudospirospira subuliferus* A Colony on substrate B,C. Conidiophores D. Developing conidia attached to conidiophore E. Conidia. Scale bar B-E = 10 μm

Gyrothrix circinata (Berk. & Curt.) Hughes, 1958, Can. J. Bot., **36**: 771. **Fig. 3 (A-G).**

Colonies on natural substratum punctiform dark brown to black, 1–5 mm. diameter Stroma present. Setae 67–147 μm high, trunk 4 μm thick just above the basal swelling, repeatedly branched, dark brown or olivaceous brown, brown or paler towards

the the end of branches, verrucose. Conidiophores micronematous, repent, flexuous subhyaline to pale olivaceous brown smooth. Conidiogenous cells polyblastic, discrete, hyaline or subhyaline, 8 μm long, 3–4 μm thick at the base. Conidia straight or slightly curved, hyaline, aseptate, $12\text{--}15 \times 1.5\text{--}1.8 \mu\text{m}$.

Collection examined: India, Himachal Pradesh, Dharamshala (Kangra), on angiospermic leaves, 19 November 2011, Rajnish Kumar Verma, PAN

(30322) on fallen leaves Bilaspur, 18 August 2013 Sushma PAN 31504.

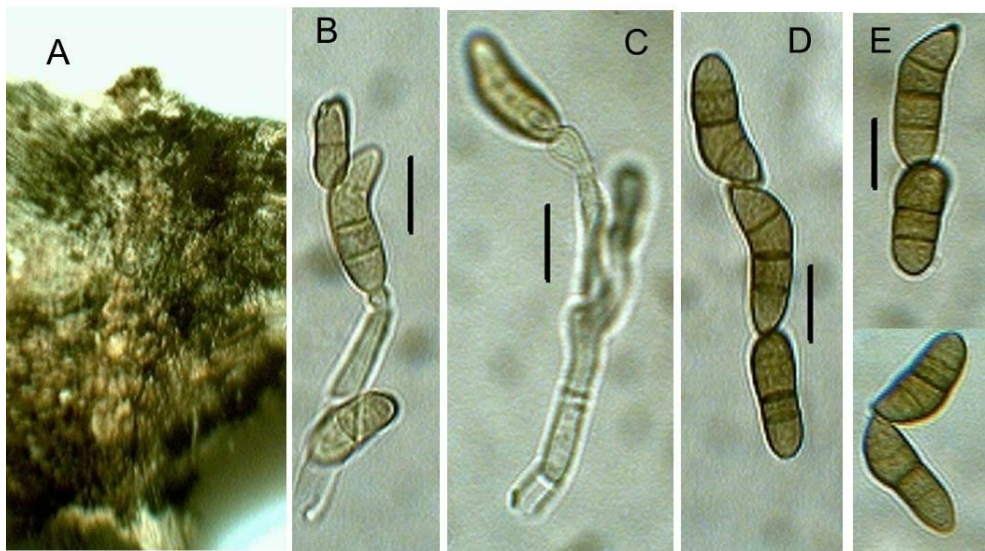


Fig. 2. *Fusariella obstipa* A. Colonies on natural substrate B,C. conidiophores with attached conidia. D. Conidia in chain. E. Conidia Scale Bar B-E = 10 μ m.

Remarks: The species has already been reported from Kullu, Solan and Mandi districts of Himachal Pradesh, but constitute a new record for Kangra district of Himachal Pradesh (Bilgrami et al. 1991 and Jamaluddin et al. 2004).

Stachybotrys echinata (Rivolta) G. Sm., *Trans. Br. mycol. Soc.* **45**(3): 392 (1962) **Fig. 4(A-F).**

= *Cephalotrichum echinatum* (Rivolta) Toro, *Scient. Surv. P. Rico* **8**(2): 224 (1932)

= *Haplographium echinatum* (Rivolta) Sacc., *Syll. fung.* (Abellini) **4**: 307 (1886)

= *Memnoniella aterrima* Höhn., *Centbl. Bakt. ParasitKde*, Abt. II **60**: 16 (1923) [1924]

= *Memnoniella echinata* (Rivolta) Galloway, *Trans. Br. mycol. Soc.* **18**(2): 165 (1933)

= *Penicillium echinatum* Rivolta, in Torino & Speirani, *Dei parassiti vegetali.*: 451 (1873)

Colonies on natural substratum effuse, black, velvety or powdery. Mycelium partly superficial or partly immersed. Stroma none. Setae and hyphopodia absent. Conidiophores macronematous, mononematous sometimes branched swollen at the apex, grey to black, often covered with dark granules, basal cell of conidiophores is hyaline to subhyaline $65\text{--}100 \times 3\text{--}4 \mu\text{m}$. Phialides mostly in groups of 4–8, $6.0\text{--}7.8 \mu\text{m}$ long and $3\text{--}4.5 \mu\text{m}$ wide. Conidia catenate, acrogenous, simple, spherical to subspherical sometimes slightly flattened dorsoventrally $3.5\text{--}5 \mu\text{m}$ in diameter.

Collection examined: India, Himachal Pradesh Una, on Rachis of *Phoenix* species, 28 August 2014, Rajnish Kumar Verma, PAN (32510), on fallen twig Hamirpur, 2 November 2013 Sushma PAN (31507).

Remarks: The species has already been reported from various localities from India as *Memnoniella echinata*, but first time reported from Una and Hamirpur districts of Himachal Pradesh (Bilgrami et al. 1991, Jamaluddin et al. 2004 and Prasher & Singh 2015).

Stachybotrys levispora (Subram.) Yong Wang bis, K.D. Hyde, McKenzie, Y.L. Jiang & D.W. Li, in Wang, Hyde, McKenzie, Jiang, Li & Zhao, *Fungal Diversity* **71**: 57 (2015) **Fig. 5 (A-G).**

= *Memnoniella levispora* Subram., *J. Indian bot. Soc.* **33**: 40 (1954)

Colonies on natural substratum effuse, black, velvety or powdery. Mycelium partly superficial or partly immersed. Stroma none. Setae and hyphopodia absent. Conidiophores macronematous, mononematous unbranched swollen at the apex, grey to black, and subhyaline towards the apex, $50 \mu\text{m}$ long $3\text{--}3.5 \mu\text{m}$ wide. Phialides in groups of 6–8, $5.5\text{--}7 \mu\text{m}$ long and $3.5\text{--}4.5 \mu\text{m}$ wide. Conidia catenate, acrogenous, simple, smooth, often hemispherical $4\text{--}6.2 \mu\text{m}$ in diameter.

Collection examined: India Himachal Pradesh Mandi on fallen twigs of unidentified tree, 18 November 2012, Rajnish Kumar Verma PAN (32511), on dead and decaying twigs of unidentified tree., Hamirpur 1 November 2013 Sushma PAN (31503).

Remarks: This species has already been reported from various parts of the country but constitute a new record for Mandi and Hamirpur districts of Himachal Pradesh (Bilgrami et al. 1991, Jamaluddin et al. 2004, Prasher & Singh 2015 and Gond et al. 2013)

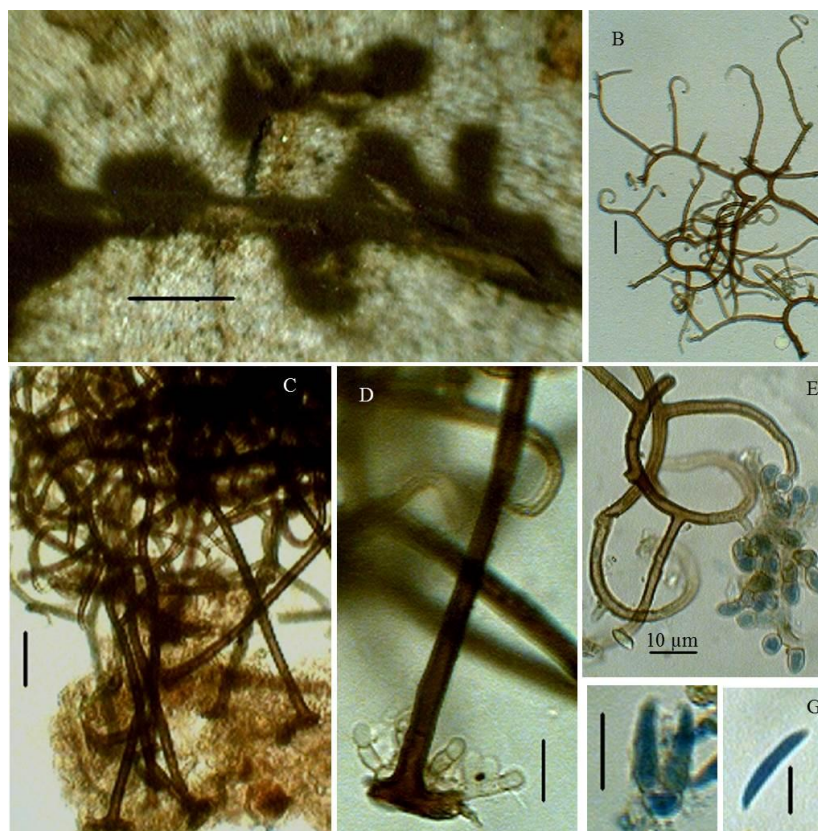


Figure 3 *Gyrothrix circinata* **A.** Colonies on natural substratum **B.** Coiled setae **C.** Setae attached to substratum **D-E.** Setae with conidiophore **F.** Conidiogenous cell **G.** Conidium. Scale bars A= 2 mm, B, C= 20 μm, D-F =10μm, G= 5μm

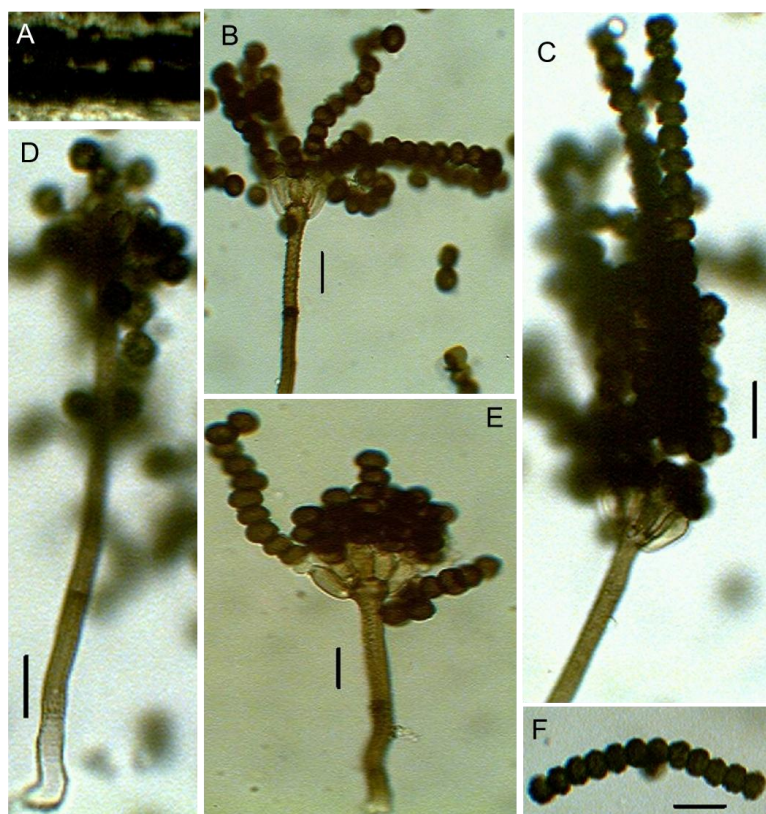


Fig. 4. *Stachybotrys echinata* **A.** Colonies on substratum **B-E.** Conidia in chains attached to phialides on conidiophore **F.** Conidia in chain Scale bar; A = 1 mm; B-D = 10 μm

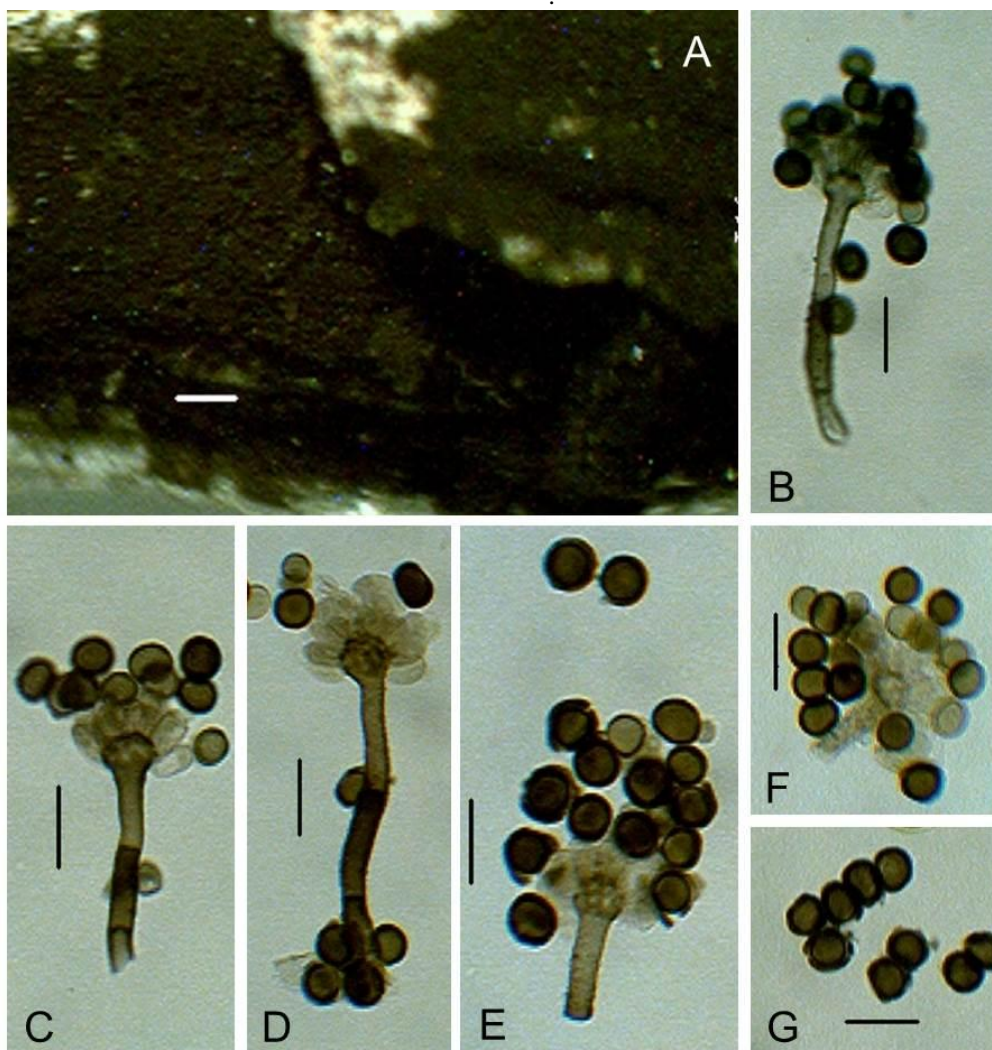


Fig. 5. *Stachybotrys levispora* A. Colony on substrate B-F. Conidiophores with phialides and conidia G. conidia. Scale bar A = 500 µm, B-G = 10 µm.

ACKNOWLEDGEMENT

The authors are thankful to Ministry of Environment and Forests, Government of India for the financial assistance (vide letter no. 14/26/2008-ERS/RE dt. 06.06.2010), UGC (SAP, DRS III) and Chairperson Department of Botany Panjab University Chandigarh for providing infrastructural and laboratory facilities.

REFERENCES

- Adamčík S, Cai L, Chakraborty D, Chen X-H, Cotter H Van T, Dai D-Q, Dai, Y-C, Das K, Deng C, Ghobad-Nejhad M, Hyde KD, Langerm E, Deepna Latha KP, Liu F, Liu S, Liu T, Lv W, Lv S-X, Machado AR, Pinho DB, Pereira OL, Prasher IB, Rosado AC, Qin J, Qin W-M, Verma RK, Wang Q, Yang Z-L, Yu X-D, Zhou L-W and Buyck B. (2015) Fungal Biodiversity Profiles 1-10. Cryptogamie, Mycologie. 36 (2): 121-166. <http://dx.doi/10.7872/crym/v36.iss2.2015.1>
- Bilgrami KS, Jamaluddin and Rizwi MA. 1991. Fungi of India List and References. Today and tomorrow's Printers & Publishers, New Delhi, India.
- Ellis MB. 1971. Dematiaceous Hyphomycetes. Commonwealth Mycological Institute, Kew, UK
- Ellis MB. 1976. More Dematiaceous Hyphomycetes. Commonwealth Mycological Institute, Kew, UK.
- Gautam AK. 2014. *Fusicladium ahmadii* on *Pyrus pashia*: a new record for Indian mycobiota from Himachal Pradesh. Plant Pathology & Quarantine 4(2): 86-89, Doi 10.5943/ppq/4/2/1
- Gond AK, Patel R, Patel S, Jamaluddin and Pandey AK. (2013) New record of *Memnoniella levispora* Subram on *Ficus carica* L from

- India. Journal on New Biological Reports 2(3): 272-274.
- Jamaluddin, MG Goswami and Ojha BM. 2004. Fungi of India 1989-2001. Scientific Publishers, Jodhpur, India.
- Kirk PM, Cannon PF, Minter DW and Stalpers JA. 2008. Dictionary of the Fungi. 10th edn. CAB International, Wallingford, UK
- Prasher IB and Singh G. 2014. Anamorphic fungi new to shivaliks- Northwest India. Journal on New Biological Reports. 3(2): 141-145.
- Prasher IB and Singh G. 2015. New and interesting Hyphomycetes from North-Western Himalayas. Kavaka 44: 83-86.
- Prasher IB and Verma RK. 2015c. Some new and interesting Hyphomycetes from North Western Himalayas, India. Nova Hedwigia. 100(1-2) 269-277. http://dx.doi.org/10.1127/nova_hedwigia/2014/2015
- Prasher IB and Verma RK. 2012a. Two Hyphomycetes New to Himalayas. Plant Sciences Feed. 2(8): 122-124.
- Prasher IB and Verma RK. 2012b. *Periconia* species new to North Western Himalaya. Journal on New Biological Reports. 1(1):01-02.
- Prasher IB and Verma RK. 2014a. Hyphomycetes new to N.W. Himalayas and Siwaliks, in Ahluwalia AS and Gaur, R. (Eds) *Science, Technology and Environment*, Panjab University, Chandigarh. 37-41.
- Prasher IB and Verma RK. 2014b *Taeniolina echinata*- A new species of hyphomycetes (anamorphic) fungus from North India. Kavaka. 43:11-13
- Prasher IB and Verma RK. 2014b. Four interesting Hyphomycetes from Himachal Pradesh. Journal on New Biological Reports. 3(3): 159 – 166.
- Prasher IB and Verma RK. 2015a. Hyphomycetes from Himachal Pradesh, India. Journal on New Biological Reports. 4(1): 70-75
- Prasher IB and Verma RK. 2015b. Two new species of *Dictyosporium* from India. Phytotaxa. 204 (3): 193–202. <http://dx.doi.org/10.11646/phytotaxa.204.3.2>
- Prasher IB and Verma RK. 2015d. Two new species of *Acroconidiella* from India. Journal on New Biological Reports. 4(2): 111-114.
- Prasher IB and Verma RK. 2015e . *Neosporidesmium appendiculatus* sp. nov. from North– Western India. Mycological Progress. 14: 87. <http://dx.doi.org/10.1007/s11557-015-1112-5>
- Prasher IB, Singh KJ and Verma RK. 2015. Some interesting hyphomycetes from Himachal Pradesh, India. Journal on New Biological Reports. 4(1): 89 –92
- Wang Y, Hyde KD, McKenzie EHC, Jiang Y-L, Li D-W and Zhao D-G. 2015. Overview of *Stachybotrys (Memmoniella)* and current species status. Fungal Diversity. 71 (1): 17-83.