

The genus *Monodictys* from Himachal Pradesh

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ABSTRACT

Seven species of *Monodictys* S. Hughes (hyphomycete) are described. *Monodictys cerebriformis* (Wallr.) S. Hughes, *M. Melanopa* (Ach.) M.B. Ellis and *M. Paradoxa* (Corda) S. Hughes are being reported for the first time from India, whereas *M. desquamata* K. Rodr., Figueras & Guarro and *M. nitens* (Schwein) S. Hughes constitute a new record for N. W. Himalayas/ Himachal Pradesh.

Keywords Anamorphic fungi, Diversity, Himalayas

INTRODUCTION

The genus *Monodictys* S. Hughes was established in 1958. Fifty six species have been recognized world wide (<http://www.speciesfungorum.org/names/Names.asp>). In India twelve species have been reported (Bilgrami *et al.* 1991, Jamaluddin *et al.*, 2004 and Prasher and Singh, 2014). The genus *Monodictys* is characterized by dictyosporous, solitary, frequently subglobose, pyriform or clavate, verrucose or smooth conidia often constricted at septa (Hughes, 1958; Ellis, 1971). This communication is in continuation with earlier reports on hyphomycetes from North India and N. W. Himalayas (Adamčik *et al.*, 2015; Prasher *et al.*, 2015; Prasher and Verma, 2012a, b; 2014a, b; 2015a, b, c, d, e; 2016). During the survey of saprobic conidial fungi from forests of Himachal Pradesh seven species of *Monodictys* were collected. Of these *M. cerebriformis* (Wallr.) S. Hughes, *M. Melanopa* (Ach.) M.B. Ellis and *M. Paradoxa* (Corda) S. Hughes are being reported for the first time from India, whereas *M. desquamata* K. Rodr., Figueras & Guarro and *M. nitens* (Schwein) S. Hughes constitute a new record for N. W. Himalayas/ Himachal Pradesh.

MATERIALS AND METHODS

Decaying culms, twigs, dead woods and barks were collected in brown paper bags and taken to the laboratory. The specimens were mounted in 4 % KOH, lactophenol and cotton blue 0.01 % in lactophenol (Kirk *et al.*, 2008), and were studied microscopically under a Matrix stereo trinocular microscope (VL-Z60) and transmission microscope (VRS-2f) for macroscopic and microscopic characters. All measurements were taken with the help of Pro MED software. The scanning electron microscopic studies were conducted with a JSM-6100 (JEOL Ltd.) microscope. The material was vacuum-dried in an oven for 24 hours, mounted and sputtered with gold for 60 seconds, and photographed. The specimens were deposited in the herbarium of the Department of Botany, Panjab University, Chandigarh, India (PAN)

TAXONOMY

Monodictys castaneae (Wallr.) S. Hughes, *Can. J. Bot.* **36**: 785 (1958)

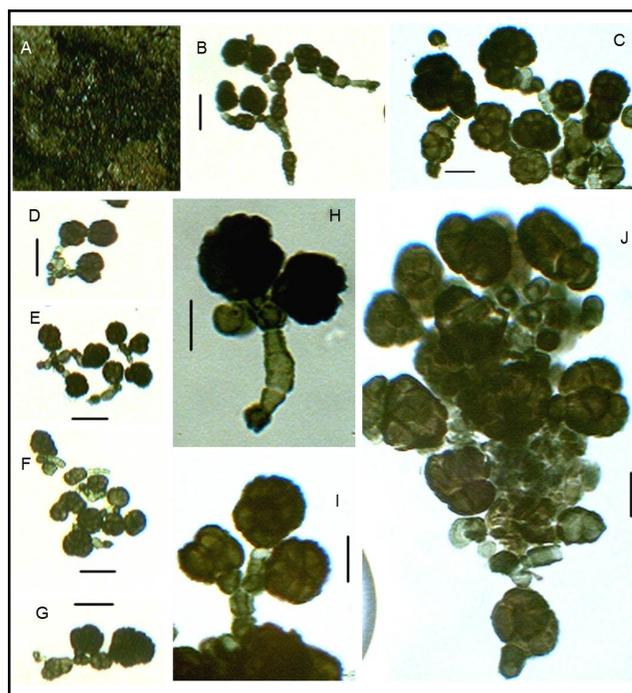
Figs. 1 (A-J).

Colonies on natural substratum lavender to dark grey or black. Mycelium superficial. Stroma none. Setae and hyphopodia absent. Conidiogenous cells monoblastic,

integrated, terminal, determinate, cylindrical, pale brown to brown. Conidia oblong rounded at the ends, pyriform, clavate, subspherical or irregular, mid to dark reddish brown, usually verrucose, basal cell sometimes paler than the others, 12.8-42 × 9-23 μm.

Collection examined: India, Himachal Pradesh, Hamirpur, on fallen twig of unidentified tree, 20 November 2012, Rajnish Kumar Verma, PAN (32765).

Remarks: The description of the above specimen is within the circumscription of *Monodictys castaneae* (Ellis, 1971). This species has already been reported from Mt. Abu, Rajasthan on dead bark from Pune Maharashtra (Panwar and Chouhan, 1979), on *Acacia sphaerocephala*; Chandigarh and Solan on bark of *Psidium guajava* (Bilgrami *et al.*, 1991; Jamaluddin *et al.*, 2004 and Prasher and Singh, 2012; 2015). This constitutes a new record for Hamirpur district of Himachal Pradesh.

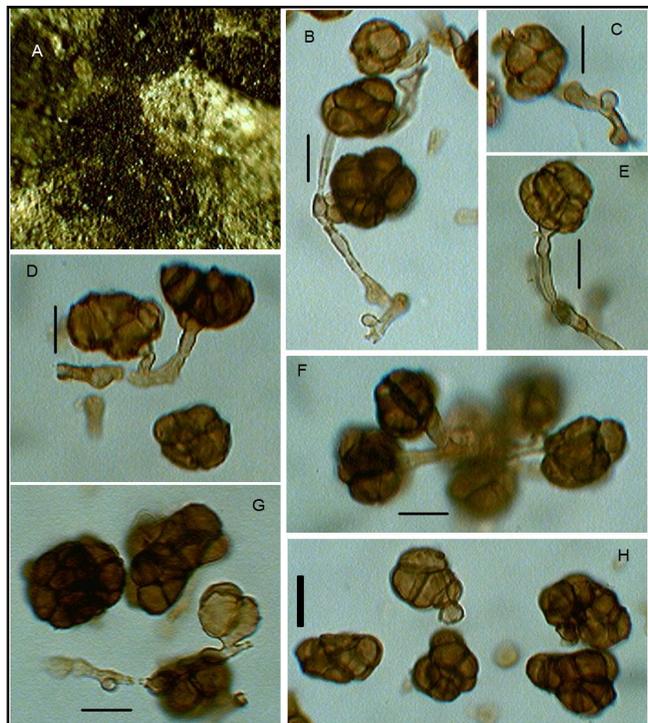


Figs.1 *Monodictys castaneae*: A. Colonies in natural substratum. B-I Conidia attached to Conidiophores. J. Conidia. Scale bars: B, D-G= 20 μm, C, H-J=10 μm.

Monodictys cerebriformis G.Z. Zhao & T.Y. Zhang, *Mycosystema* **23** (3): 325 (2004)

Figs. 2 (A-H).

Colonies on natural substratum effuse, punctiform, brown to dark brown. Mycelium scanty, mostly immersed. Stroma



Figs. 2 *Monodictys cerebriformis*: A. Colonies on natural substratum. B-G. Conidia attached to conidiophores. H. Conidia. Scale bars: B-H= 10 µm.

none. Setae and hyphopodia absent. Conidiophores arising in groups from undifferentiated hyphae, short, 1.5-2.5 µm wide. Conidiogenous cells monoblastic, determinate, terminal, integrated, sometimes inflated just below the conidium, smooth, pale brown, 4-6 × 2-3 µm. Conidia solitary, dry, variable in shape, subglobose, cerebriform or irregularly shaped, brown, smooth, irregularly septate, constricted at septa, 14-21 × 18-28 µm.

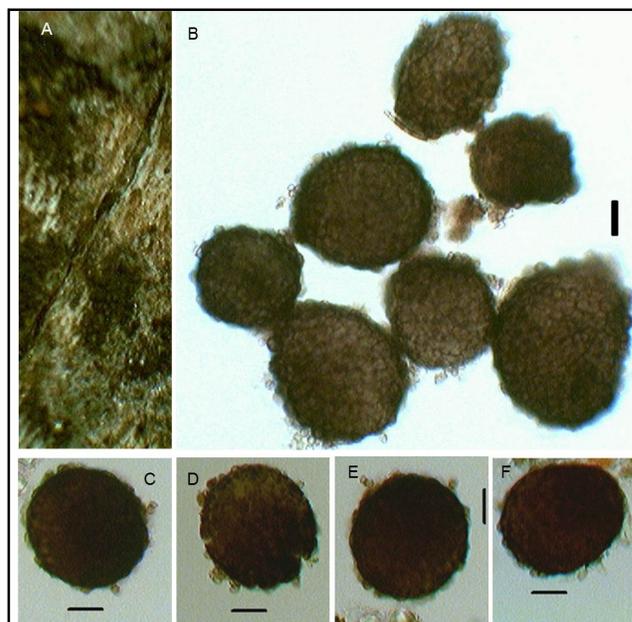
Collection examined: India, Himachal Pradesh, on the way to Kasauli (Solan), on bark of unidentified tree, 5 April 2014, Rajnish Kumar Verma, PAN (32770).

Remarks: The description of the above specimen is within the circumscription of *Monodictys cerebriformis* (Zhao and Zhang, 2004). This is the first report of species from India (Bilgrami *et al.*, 1991 and Jamaluddin *et al.*, 2004).

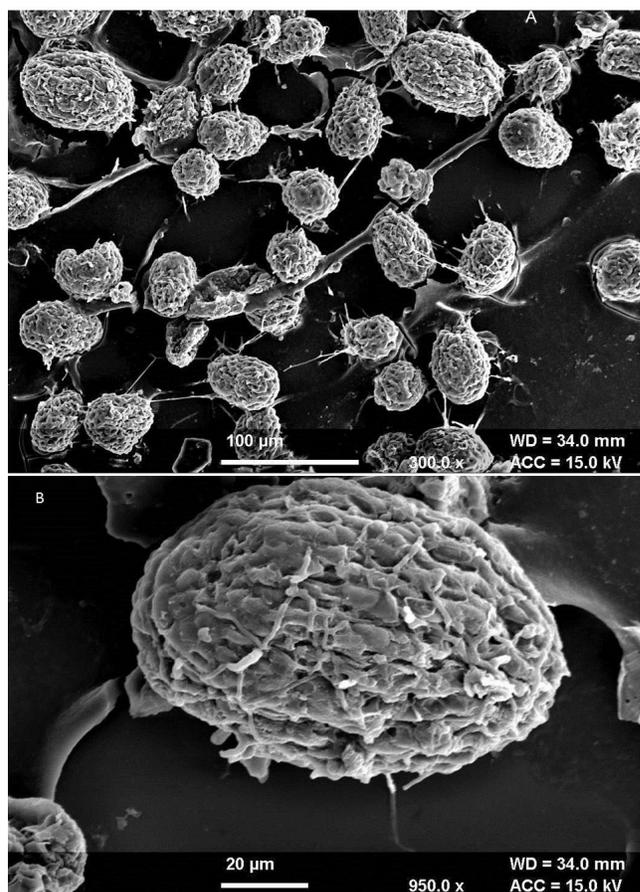
Monodictys desquamata K. Rodr., Figueras & Guarro, in Rodríguez, Figueras, Gené, Mercado & Guarro, *Nova Hedwigia* **72** (12): 203 (2001)

Figs. 3 (A-F), 4(A, B).

Colonies on natural substratum effuse, black. Mycelium all immersed. Stroma none. Setae and hyphopodia absent.



Figs. 3 *Monodictys desquamata*: A. Colonies on natural substratum. B-F. Conidia with superficial cells protruding from the conidial wall. Scale bars B-F= 20 µm.



Figs. 4 *Monodictys desquamata* (SEM): A. Conidia. B. Conidium with superficial cells protruding from the conidial wall. Scale bars A= 100 µm, B= 20 µm.

Conidia muriform, ellipsoidal or subglobose, dark brown, $45\text{--}80 \times 40\text{--}65 \mu\text{m}$; superficial cells protruding from the conidial wall, subglobose to irregular, pale brown, $4\text{--}5 \times 2.7\text{--}3.5 \mu\text{m}$.

Collections examined: India, Himachal Pradesh, on the way to Kasauli (Solan), on bark of unidentified tree, 5 April 2014, PAN (32705); on fallen twig, Jolplakhin (Bilaspur) 10 October 2011, PAN (32707) and on bark of unidentified tree, Una, 28 August 2014, Rajnish Kumar Verma, PAN (32708).

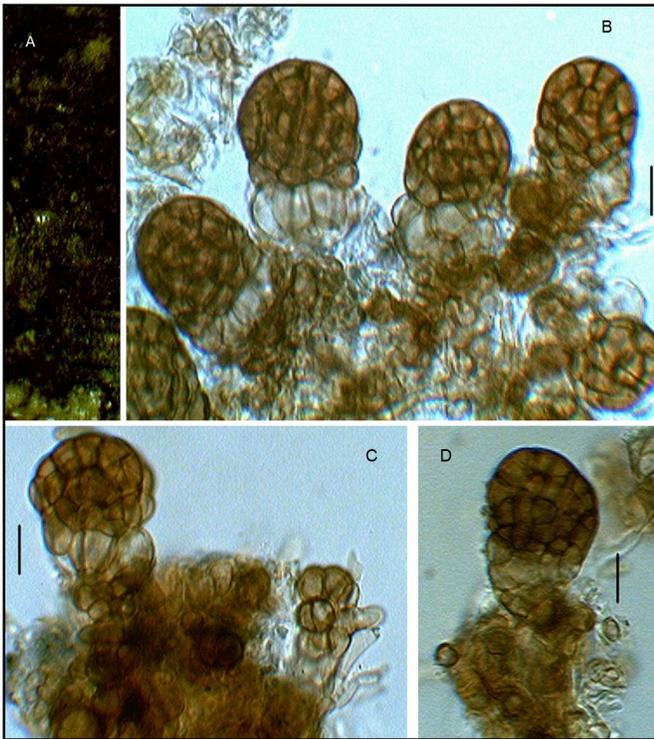
Remarks: The description of the above specimen in its morphology resembles the description of *Monodictys desquamata* (Rodríguez *et al.*, 2001). It has previously been recorded from South Florida, Cuba American continents and Chandigarh India (Rodríguez *et al.*, 2001; Delgado, 2009; Prasher and Singh 2014). It is a new record for Himachal Pradesh/Himalayas.

Monodictys melanopa (Ach.) M.B. Ellis, *More Dematiaceous Hyphomycetes* (Kew): **43** (1976)

Figs. 5 (A-D)

Colonies on natural substratum effuse, punctiform, brown to dark brown. Mycelium scanty, mostly immersed. Stroma none. Setae and hyphopodia absent. Conidia oblong, rounded at the ends, ellipsoidal, obovoid or clavate, lower half pale to mid pale brown, upper half mid to dark brown or blackish, multicellular with regular or more often irregular septation, constricted at septa, $26.45\text{--}46.13 \times 19.53\text{--}27.8 \mu\text{m}$.

Collections examined: India, Himachal Pradesh, on the way Kuthera to Morshingi (Bilaspur), on bark of *Eucalyptus* species, 19 January 2013, PAN (32767) and Kandaghat



Figs.5 *Monodictys melanopa*: A. Colonies on natural substratum. Crush Mount of sporodochia. C. Developing Conidia. D. Conidium. Scale bar: 10 μm .

(Solan), on bark of unidentified tree, 5 April 2014, Rajnish Kumar Verma, PAN (32768).

Remarks: The above described species matches well with the description of *M. melanopa* in morphological details (Ellis, 1976). This species is first time reported from India (Bilgrami *et al.*, 1991 and Jamaluddin *et al.*, 2004)

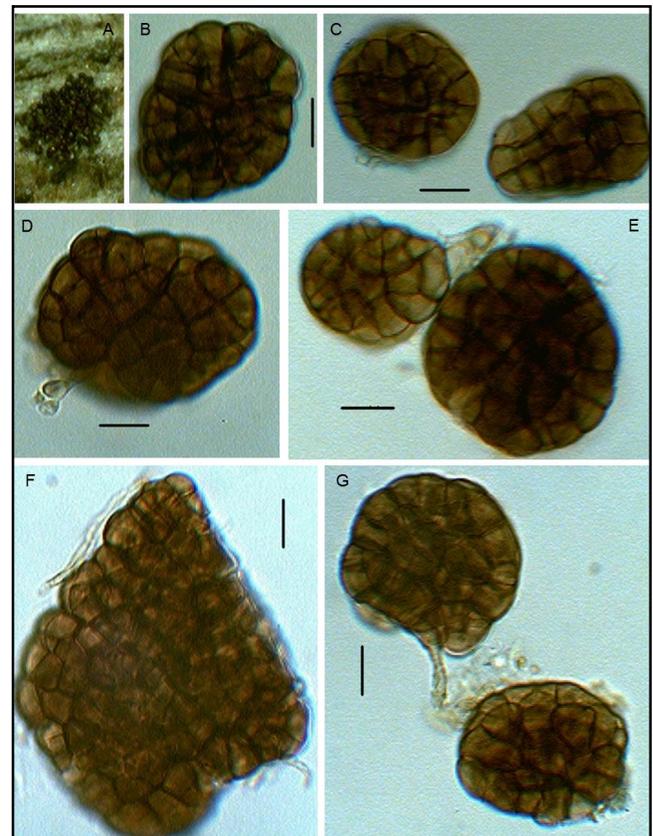
Monodictys nitens (Schwein.) S. Hughes, *Can. J. Bot.* **36**: 786 (1958)

Figs. 6 (A-G)

Colonies on natural substratum effuse with black shining cluster of conidia. Mycelium immersed. Stroma none. Setae and hyphopodia absent. Conidiophores unbranched, straight or flexuous. Conidiogenous cell monoblastic, terminal and determinate. Conidia solitary, dry, acrogenous, subspherical, globose, irregular, constricted at septa $20\text{--}50 \times 24\text{--}60 \mu\text{m}$.

Collections examined: India, Himachal Pradesh, Narkanda (Shimla), on fallen twigs, 2 Oct. 2013, PAN (32771); Solan, on bark of *Eucalyptus* sp., 5 April 2014, PAN (32711) and Kangra, on bark of unidentified tree, 18 November 2011, Rajnish Kumar Verma, PAN (32712).

Remarks: The above description matches well with the description of *M. nitens* as described by Zhao and Zhang (2007). This species has already been reported from Chandigarh (India) on bark of *Polyalthia suberosa* (Prasher and Singh, 2014). This constitutes a new record for Himachal



Figs. 6 *Monodictys nitens*: A. Colonies on natural substratum B-G. Variously shaped conidia. Scale bar: B-G = 10 μm .

Pradesh/Himalayas (Bilgrami *et al.*, 1991; Jamaluddin *et al.*, 2004; Prasher and Singh, 2014).

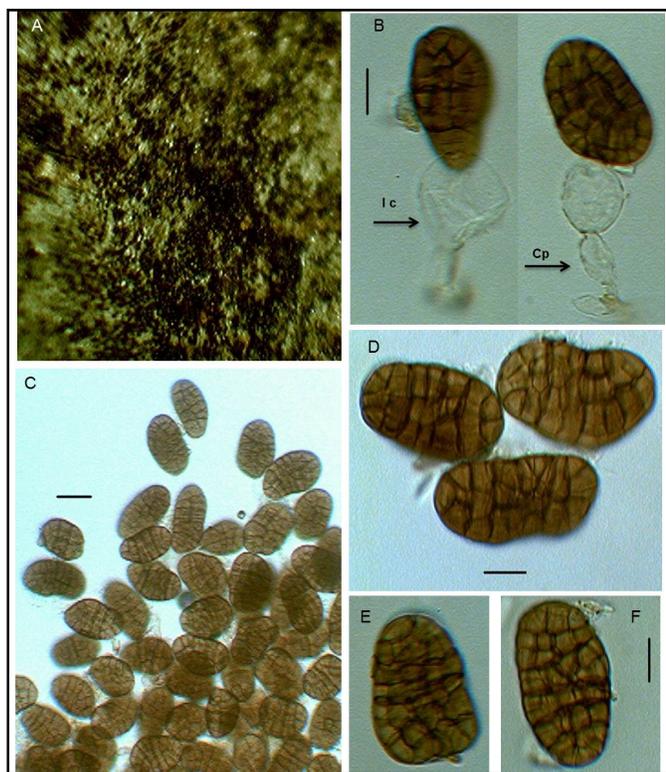
Monodictys paradoxa (Corda) S. Hughes, *Can. J. Bot.* **36**: 786 (1958)

Figs. 7 (A-F)

Colonies on natural substratum effuse, black. Mycelium partly superficial, partly immersed. Stroma none. Setae and hyphopodia absent. Conidiophores arising from small aggregations of hyphae, as short hyaline buds of the mycelial cells, elongating, becoming 2-3 septate; conidiophores when fully developed consisting of inflated cells, up to 23 μm wide, hyaline to pale brown. Conidia dry, solitary, variable in shape, oblong with rounded ends to oval or pyriform, sometimes globose, multicellular with regular or more often irregular septation, constricted at septa, fuscous, and 21-40 \times 15-31 μm . Sometimes one or more of the conidiophores cells may remain attached to the conidium when it is dispersed.

Collections examined: India, Himachal Pradesh, Solan, on bark of *Eucalyptus* sp., 5 April 2014, PAN (32799); Kangra, on bark of unidentified tree, 18 November 2011, PAN (32811) and Sunder Nagar near MLSM College, on bark of *Eucalyptus tereticornis*, 27 September 2013, Rajnish Kumar Verma, PAN (32812).

Remarks: The above described species matches well with the description of *M. paradoxa* as described by Ellis (1971). This species is first time reported from India (Bilgrami *et al.*, 1991; Jamaluddin *et al.*, 2004).



Figs. 7 *Monodictys paradoxa*: A. Colonies on natural substratum. B. Conidiophore (cp) with inflated cells (ic) and conidium. C-F. Conidia. Scale bars: B, D-F = 10 μm , C = 20 μm .

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