

Aquatic Fungi from Buldhana District (M.S., India) – III: Genus *Triadelfhia*

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Abstract: The present paper deals with three species of the genus *Triadelfhia* viz., *Triadelfhia diversa* Tzean and J.L. Chen, *Triadelfhia inquinans* (Sacc.) S. Hughes and Pirozynski and *Triadelfhia uniseptata* (Berk. and Broome) P.M. Kirk encountered on submerged wood from freshwater habitats. The first two species are new records for the fungi of India and latter species is an addition to fungi of Maharashtra state. The data provides information on the distribution of these fungi in India, apart from description and illustrations. Key is provided for identification of *Triadelfhia* species recorded from India.

Keywords: Freshwater, submerged wood, Mitosporic fungi, Wan River, Maharashtra

1. Introduction

The genus *Triadelfhia* was introduced by Shearer and J.L. Crane (1971) with *Triadelfhia heterospora* as its type species. The genus is characterized by having, *Colonies*: slow- or moderately slow growing on agar media, brown to dark brown. *Mycelium*: submerged hyphae hyaline, septate, branched and sometimes anastomosing, aerial hyphae generally absent. *Conidiogenous cells*: arising from undifferentiated hyphae, hyaline or pale brown, flask-shaped, fusiform, cylindrical or clavate, solitary or agglomerated in sporodochium-like structure, mostly with determinate growth and producing one apical conidium. *Conidia*: blastic, of at least 2 (sometimes 5) forms in every species: (a-type) cylindrical, brownish, 1-2-septate; (b-type) clavate, dark brown, uniseptate; (c- and d-type) obclavate to acicular with a narrow long tip, hyaline or yellowish brown, multiseptate; (e-type) allantoid, hyaline or pale yellowish, 0-3-septate; sometimes also (f-type) obovate to broadly ellipsoidal, pale brown, unicellular.

Previous studies on the genus *Triadelfhia* from India were made by Udaiyan and Manian (1991), Panwar, and Chouhan (1977), Venkateshwarlu et al. (1996) and Manoharachary et al. (2001). However, *T. centroseptata* described by Venkateshwarlu et al. is invalid species (Mycobank, Assessed on 15 June, 2015). The genus is represented by nine species (Tzean and Chen, 1989; Manoharachary et al., 2001). The present paper deals with occurrence of three species of the genus *Triadelfhia* viz., 1) *Triadelfhia diversa* Tzean and Chen, 2) *Triadelfhia inquinans* (Sacc.) S. Hughes and Pirozynski, and 3) *Triadelfhia uniseptata* (Berk. and Broome) P.M. Kirk in freshwater habitats, which are described and illustrated in the present paper. Key for all species of *Triadelfhia* reported from India is provided for identifications.

2. Materials and Methods

Samples of various submerged woody debris supporting freshwater fungi were collected randomly during 2008-09 from different lentic and lotic habitats from Buldhana district (Maharashtra state). The samples were placed in plastic bags and sealed well in order to avoid moisture

loss. On returning to the laboratory, samples with debris and fouling organisms were washed thoroughly with running tap water. Surface fouling organisms were scrapped off, following rinsing in tap water. The samples were incubated in plastic boxes and kept moist by spraying with distilled water and periodically examined for the presence of fungal growth using a stereomicroscope. Permanent voucher slides of fungi were prepared according to the method "double cover glass" provided by Volkmann-Kohlmeyer and Kohlmeyer (1996). Identifications of isolated species were confirmed with the help of Tzean and Chen (1989), Constantinescu and Samson (1982), and Kirk (1983). Reports of fungi studied were confirmed with the help of Bilgrami et al. (1991) and Jamaluddin et al. (2004).

3. Systematic Account

1) *Triadelfhia diversa* Tzean & J.L. Chen
Mycologia, **81**: 630 (1989).

Colonies: on natural substratum thinly effuse, grey white to dark brown. *Mycelium*: septate, branched, partly superficial but mostly submerged. *Conidiogenous cells*: hyaline, smooth, borne directly on the mycelium, solitary or agglomerate to caespitose, forming sporodochia-like structures, flask shaped, cylindrical, doliform, macronematous, holoblastic, monoblastik, determinate, 3-6 x 3-4 µm. *Conidia*: acrogenous, solitary, dry, of five different forms; a-type) cylindrical, straight or slightly curved, 13-24 x 4-8 µm, 1-2-septate; septa covered with 2 µm bands; wall smooth; tip and central cells brown, basal cell hyaline or pale brown, tip rounded and base rounded or truncate, 1.5-3 µm wide, rarely with inconspicuous pore; b-type) broadly clavate, 11-15 x 6-8 µm, with one transverse septum near the base, covered with a dark 2 µm band; wall smooth; tip cell brown, basal cell hyaline or pale brown to brown, with truncate base 2-4 µm wide; c-type) obclavate, 4-6-septate, 15-26 x 6-7 µm; end cells hyaline or pale brown, acicular, basal cell subhyaline to pale brown, truncate, central cells pale brown to brown, often with 1-1.5 µm dark bands at the septa; d-type) allantoid or reniform, hyaline or pale brown, 1-septate, smooth, thin-walled, 8-16 x 3-5 µm; and e-type) obovate,

pale brown, unicellular, smooth, 6-10 x 4-6 µm; hilum inconspicuous; base truncate.

Habitat: On submerged wood; Wan River (Sangrampur, Dist.- Buldhana), 28May2009; Leg., V.R. Patil

Remarks:- The descriptions and measurements of the present specimen are completely agreed with that of *Triadelfhia diversa* Tzean and J.L. Chen (1989). Therefore, it is assigned to that species. It is being reported for the first time from India.

2) *Triadelfhiain inquinans* (Sacc.) S. Hughes & Piroz.
Can. J. Bot., **50**: 2524 (1972).
= *Dicoccum inquinans* Sacc., *Michelia*, **1**: 264 (1878).

Mycelium: an almost continuous dark-brown layer is formed over the substrate, composed of yellowish to brown, 2-7 µm wide, septate, mostly collapsed and disintegrated hyphae and of isolated or agglomerated conidia. **Conidia:** of five different forms on the natural substrate: (a-type) - cylindrical, pale brown, 12-16 x 3-4(4.5) µm, with (1-)2-septa, wall smooth, rounded at both ends, basal hilum inconspicuous; (b-type) - clavate, brown, (12)15-17(-19) x 4-5(-6) µm, with one (occasionally two) more or less medium septa, the transverse septum appearing 1.2-2 µm wide, wall smooth, 0.3 µm thick, tip rounded, base truncate, 2.5-3.5 µm wide; (c-type) - obclavate, yellowish brown, 3-5-septate, wall smooth, thin, end cells hyaline, acicular (21-45 x 1 µm), base truncate, 2.5 µm wide, 2-3.5 µm wide; 35-70 x 4-5 µm (incomplete conidia measure 13-23 x 4-5 µm; Constantinescu and Samson, 1982); (d-type) - ellipsoidal to obclavate, straight or curved, pale to dark brown, 35-40 x 7-9 µm (incomplete conidia measure 17-24 x 7-9 µm; Constantinescu and Samson, 1982); septa 3-5(-8), not thickened when young but with the median one obscured by a 3-5 µm wide dark band when mature, wall smooth, end cell acicular (8-10 x 1-2 µm), basal cell paler, base truncate; (f-type) – not observed.

Habitat: On submerged wood; Wan River (Sangrampur, Dist.- Buldhana), 28May2009; Leg., V.R. Patil

Remarks: The descriptions and measurements of the present specimen are completely agreed with that of *Triadelfhiain inquinans* (Sacc.) S. Hughes & Piroz. (1972). Therefore, it is assigned to that species. It is being reported for the first time from India.

3) *Triadelfhia uniseptata* (Berk. & Broome) P.M. Kirk
Trans. Br. Mycol. Soc., **80**: 464 (1983).
≡ *Sporidesmium uniseptatum* Berk. and Br., *Ann. Mag. Nat. Hist.*, ser. **33**: 360 (1859).
≡ *Dicoccum uniseptatum* (Berk. and Broome) Sacc., *Syll. Fung.*, **4**: 342 (1886).
≡ *Trichocladium uniseptatum* (Berk. and Broome) S. Hughes & Piron., *Can. J. Bot.*, **50**: 2526 (1972).
≡ *Dicoccum apiosporum* Sacc., *Nuovo G. bot. ital.*, **22**: 71: (1975), fide Hughes and Pirozynski, 1972.
≡ *Polyschema bicellularis* Shearer, *Mycotaxon*, **14**: 91 (1982).

Colonies: thinly effuse blackish brown to black, often inconspicuous. **Mycelium:** partly superficial but mostly immersed in the substratum, composed of hyaline to very pale brown cells sometimes forming a limited mycelium. **Conidiogenous cells:** gregarious to caespitose, borne directly on the mycelium, ampulliform to globose, holoblastic, monoblastic, determinate, 5-10 µm high, 3.5-4.5 µm wide, or up to 5 µm diam. **Conidia:** acrogenous, solitary, dry, obovoid to broadly obovoid, 1-septate near the base, constricted at the septum, upper cell dark brown and thick-walled, lower cell brown and thin-walled, smooth, 12-15 µm long, 7-10 µm wide at the broadest point, with a small unthickened scar at the base.

Habitat: On submerged wood; Wan River (Sangrampur, Dist.- Buldhana), 28May2009; Leg., V.R. Patil

Distribution in India:- *Tamil Nadu:* On wood test blocks submerged in a cooling tower system (as *Dicoccum uniseptatum* (Berk. and Br.) Sacc., Udaiyan and Manian, 1991); *Maharashtra:* On submerged wood (Present work).

Remarks: The descriptions and measurement of the present specimen are completely agreed with that of *Triadelfhiain uniseptatum* (Berk and Broome) P.M. Kirk (1983). Therefore, it is assigned to that species. It is being reported for the first time from India.

Key to the species of *Triadelfhia* from India:

1. At least one form of broadly obclavate, fusiform, or ellipsoidal, multiseptate conidia present
..... 2
- 1'. Not as above
..... *T. uniseptatum*
- 2 (1). Allantoid or reniform conidia absent
..... 3
- 2'. Allantoid or reniform conidia present
..... 4
- 3 (2). Only a- and b-types of conidia present
..... *T. corticola*
- 3'. Five types of conidia: a-, b-, c-, d-, and f-types present
..... *T. inquinans*
- 4 (2'). Clavate conidia present
..... *T. diversa*
- 4'. Clavate conidia absent
..... *T. heterospora*

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Legends

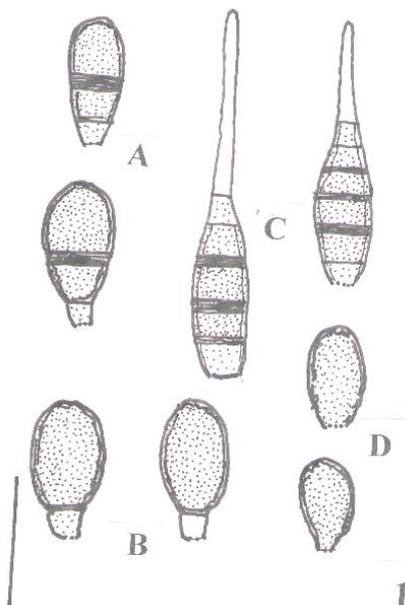


Figure 1: *Triadelphia diversa*: Conidia, A-a typr, B-b type, C-d type, D-f type (bar- 20 µm).

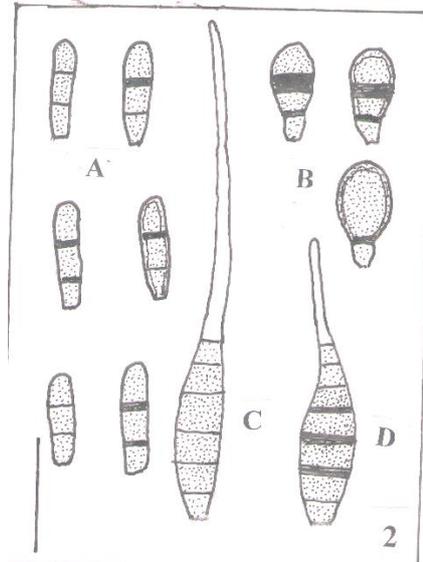


Figure 2: *Triadelphia inquinans*: Conidia, A-a type, B-b type, C-c type, D-d type (bar- 20 µm).

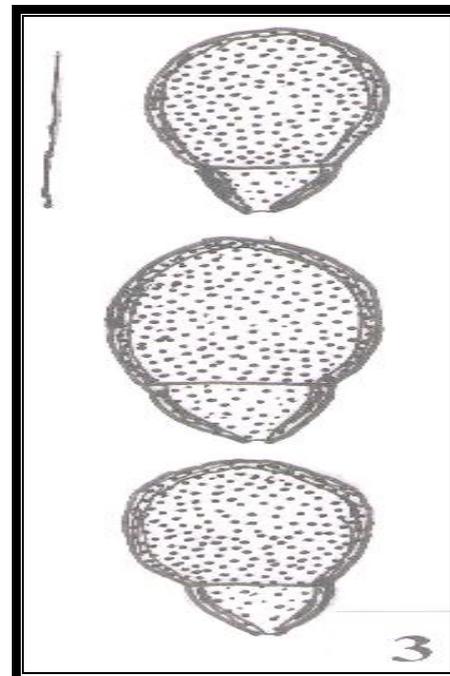


Figure 3: *Triadelphia uniseptata*: Conidia (bar- 10 µm)