



## Diversity, distribution and taxonomy of *Cladosporium* associated with *Celastraceae*

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### Abstract

*Cladosporium hippocrateae* sp. nov., discovered on living leaves of *Hippocratea arborea* (Celastraceae) collected from subtropical forest region of Uttar Pradesh, India is described and illustrated. The species is compared morphologically with *C. subobtectum* another species described on family *Celastraceae*. The novel species is characterized by branched, longer, smooth conidiophores and longer and smooth conidia. A description and nomenclatural details are deposited in MycoBank ([www.Mycobank.org](http://www.Mycobank.org)).

**Key words** – *Celastraceae* – *Cladosporium* – foliicolous hyphomycetes – mycodiversity – new species

### Introduction

The fungus genus *Cladosporium* was established by Link (1816). A review of the history of *Cladosporium* has been given by David (1997). *Cladosporium* (incl. *Heterosporium*) is characterized and distinguished from other *Mycosphaerella* anamorphs by its unique type of conidial scars and conidial hila. *Cladosporium* is one of the largest and most heterogeneous genera of hyphomycetes, currently encompassing more than 772 names (Dugan et al. 2004). The species are cosmopolitan in distribution and commonly encountered in all kinds of habitat. Many of the species are plant pathogenic, i.e., they are causal agents of leaf spots and other lesions (Schubert 2005), or they occur as hyperparasites on other fungi (Heuchert et al. 2005). A monographic revision of *Cladosporium* s. lat. was presented by Bensch et al. (2012). They included a detailed historic overview of *Cladosporium* and allied genera, with notes on the phylogeny, systematics and ecology.

Many novel taxa of *Cladosporium* have been described from India (Bilgrami et al. 1979, 1981, 1991, Butler & Bisby 1954, Jamaluddin et al. 2004, Sarbhoy et al. 1975, 1986, 1996). Recently some new species of *Cladosporium* were added to the Indian mycota from Uttar Pradesh (Kumar et al. 2006, 2007, Singh et al. 2008). During a continuing investigation on micro-fungi from the subtropical forests of Uttar Pradesh, a species with morphological characteristics of the

genus *Cladosporium* was collected on leaves of *Hippocratea arborea* (*Celastraceae*). It was found to be distinct from previously described taxa and, therefore, is proposed as a new species and is described and illustrated in the present paper.

## Materials & Methods

Infected leaf samples were collected from northeastern Uttar Pradesh during the course of a field survey for inventory of foliicolous microfungi. The samples were carried to the laboratory and processed by following standard techniques (Hawskworth 1974, Savile 1962). Surface scrappings and free-hand cut sections were taken through infection spots and mounted in lactophenol cotton blue for microscopic examination. Illustrations were made using a camera-lucida. The type specimen has been deposited in Herbarium Cryptogamiae Indiae Orientalis (HCIO), Indian Agricultural Research Institute (IARI), New Delhi and an isotype in the departmental herbarium (GPU Botanical Herbarium). The morphotaxonomic determination is based on comparison with closely related taxa with the help of current literature. The systematics of the taxa is given in accordance with Cannon & Kirk (2007), Kirk et al. (2008), and the Index Fungorum ([www.indexfungorum.org](http://www.indexfungorum.org); accessed 1 February 2015).

## Results

### Taxonomy

*Cladosporium hippocrateae* H.D. Bhartiya, N. Kumari, Sham. Kumar & R. Singh, **sp. nov.** Fig. 1

MycoBank: 811698; Facesoffungi Number: FoF 00717

Etymology – specific epithet *hippocrateae* derived from the host plant genus.

Infection spots amphigenous, sub-circular to irregular, later coalescing to form large patches, blackish. Colonies amphiphylous, effuse, greyish white. Mycelium external, hyphae branched, septate. Sexual morph: Undetermined. Asexual morph: Stromata absent. Conidiophores arising from external hyphae, single or caespitose, macronematous, mononematous, branched, smooth-walled, 0–8 septate, erect, straight or flexuous, curved, swollen, light olivaceous to olivaceous-brown,  $135\text{--}335 \times 3.5\text{--}6.5 \mu\text{m}$ . Conidiogenous cells integrated, terminal or intercalary, polyblastic, sympodial, cicatrized, bearing thickened conidial scars. Conidia  $6.5\text{--}34 \times 4.5\text{--}6.5 \mu\text{m}$ , dry, holoblastic, acropleurogenous, cylindrical, variable in shape and size, ellipsoidal or oval, 0–5 transversely septate, smooth-walled, apex sub-acute to obtuse, base obconico-truncate to rounded, light olivaceous, hila distinctly thickened, small but clearly protuberant.

Teleomorph – Not observed

Known distribution – India.

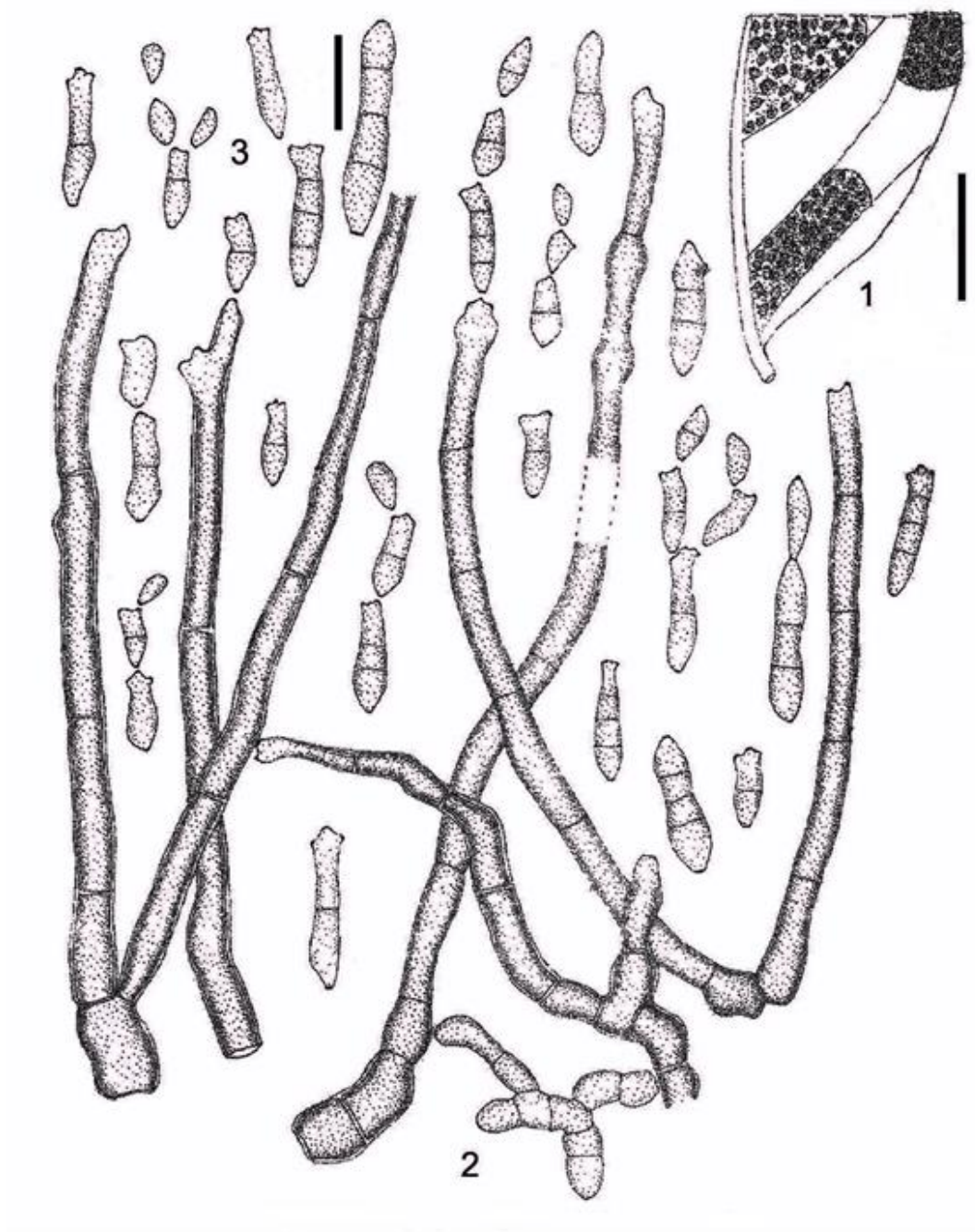
Material examined – India, Uttar Pradesh, Deoria, on living leaves of *Hippocratea arborea* Roxb. (*Celastraceae*), 5 December 1997, Nisha Kumari, HCIO 43144 (holotype), GPU Herb No. 8524 (isotype).

**Table 1 Comparison of *Cladosporium* spp. reported on *Celastraceae***

Species	Conidiophores	Conidia
<i>C. subobtectum</i>	Unbranched, $20\text{--}100 \times 3\text{--}6 \mu\text{m}$ smooth to distinctly verruculose	$5\text{--}28 \times 2.5\text{--}6$ ( $\text{--}8$ ) $\mu\text{m}$ , verruculose
<i>C. hippocrateae</i>	Branched, $135\text{--}365 \times 3.5\text{--}6.5 \mu\text{m}$ , smooth	$6.5\text{--}34 \times 4.5\text{--}8.5 \mu\text{m}$ , smooth

## Discussion

A survey of literature indicated that there was no record of *Cladosporium* on the genus *Hippocratea*. *Cladosporium subobtectum* (Braun & Schubert 2007) was reported on *Euonymus* sp. of family *Celastraceae* from California (USA). Therefore, a comparison of morphological features was made with *C. subobtectum*. The conidiophores are unbranched, shorter ( $20\text{--}100 \times 3\text{--}6 \mu\text{m}$ ) and smooth to verruculose in *C. subobtectum* whereas those of *C. Hippocrateae* are branched, longer ( $135\text{--}365 \times 3.5\text{--}6.5 \mu\text{m}$ ) and smooth. The conidia of *C. hippocrateae* are also longer ( $6.5\text{--}34 \times 4.5\text{--}8.5 \mu\text{m}$ ) and smooth while those of *C. subobtectum* are shorter ( $5\text{--}28 \times 2.5\text{--}6\text{--}8 \mu\text{m}$ ) and verruculose. Therefore, the description of *C. hippocrateae* as a new species is justified.



**Fig. 1** – *Cladosporium hippocrateae*. HClO 43144. 1 Infection spots. 2 Conidiophores. 3 Conidia. – Bars 1 = 20 mm. 2, 3 = 20  $\mu\text{m}$ .

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