

## ***Pseudocercospora bischofigena*, a new cercosporoid fungus from northeastern Uttar Pradesh, India**

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*Pseudocercospora bischofigena* sp. nov., collected on living leaves of *Bischofia javanica* (*Phyllanthaceae*) in northeastern Uttar Pradesh, India, is described, illustrated and compared with *P. bischofiae*, the only other species of *Pseudocercospora* on this host. The new species is distinguished from the latter by its shorter conidiophores and conidia and well-developed stromata.

**Key words:** fungal diversity, foliicolous anamorphic fungi, morphotaxonomy, new species.

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Nový druh *Pseudocercospora bischofigena*, sbíraný na živých listech *Bischofia javanica* (*Phyllanthaceae*) v severovýchodním Uttarpradéši (Indie) je popsán, ilustrován a srovnán s *P. bischofiae*, jediným dalším druhem rodu *Pseudocercospora* známým na tomto hostiteli. Od tohoto druhu se nově popsán liší kratšími konidiofory a konidiemi a dobře vyvinutými stromaty.

### INTRODUCTION

The term cercosporoid fungi is used for an assemblage of dematiaceous hyphomycetes which may be asexual morphs or species with *Mycosphaerella*-like sexual morphs belonging to the *Mycosphaerellaceae*, Ascomycota (Braun et al. 2013). The genus *Pseudocercospora*, one of the largest genera of cercosporoid fungi, was established by Spegazzini (1910) and redefined by Ellis (1971) and Deighton (1976). *Pseudocercospora* is characterised by causing a wide range of necrotic and non-necrotic leaf spots and pigmented conidia and conidiophores without thickened hila and conidiogenous loci (scars) (Crous & Braun 2003, Braun et al. 2013). The subtropical forest (Nichlaur Forest) of northeastern Uttar Pradesh is a biodiversity hotspot of foliicolous fungi in general and phytopathogenic cerco-

sporoid fungi in particular due to diverse climatic conditions and a rich diversity of potential host plants. A large number of species of *Pseudocercospora* have been described from different parts of the world (Crous & Braun 2003). In India, the diversity of *Pseudocercospora* has recently been compiled by Kamal (2010), but new cercosporoid species are still detected, and this communication adds a new species following the discovery of *Pseudocercospora* diversity.

#### MATERIAL AND METHODS

Infected leaf samples were collected in northeastern Uttar Pradesh during the course of a field survey in 2007. Surface scrappings and sections were taken through infection spots and mounted in cotton-blue and a lactophenol mount mixture for microscopic examination. Drawings of conidiophores and conidia were made with the help of a camera-lucida and measurements were carried out with the help of micrometry at 1000× magnification. The holotype has been deposited in the Herbarium Cryptogamiae Indiae Orientalis (HCIO), Indian Agricultural Research Institute (IARI), New Delhi and an isotype is kept in the departmental herbarium of Gorakhpur University (GPU) for further reference. The taxonomic concept is based on the following sources: Cannon & Kirk (2007), Kirk et al. (2008) and Index Fungorum ([www.indexfungorum.org](http://www.indexfungorum.org); accessed 1 April 2013). Detailed descriptions and nomenclatural novelties were deposited in MycoBank ([www.Mycobank.org](http://www.Mycobank.org)).

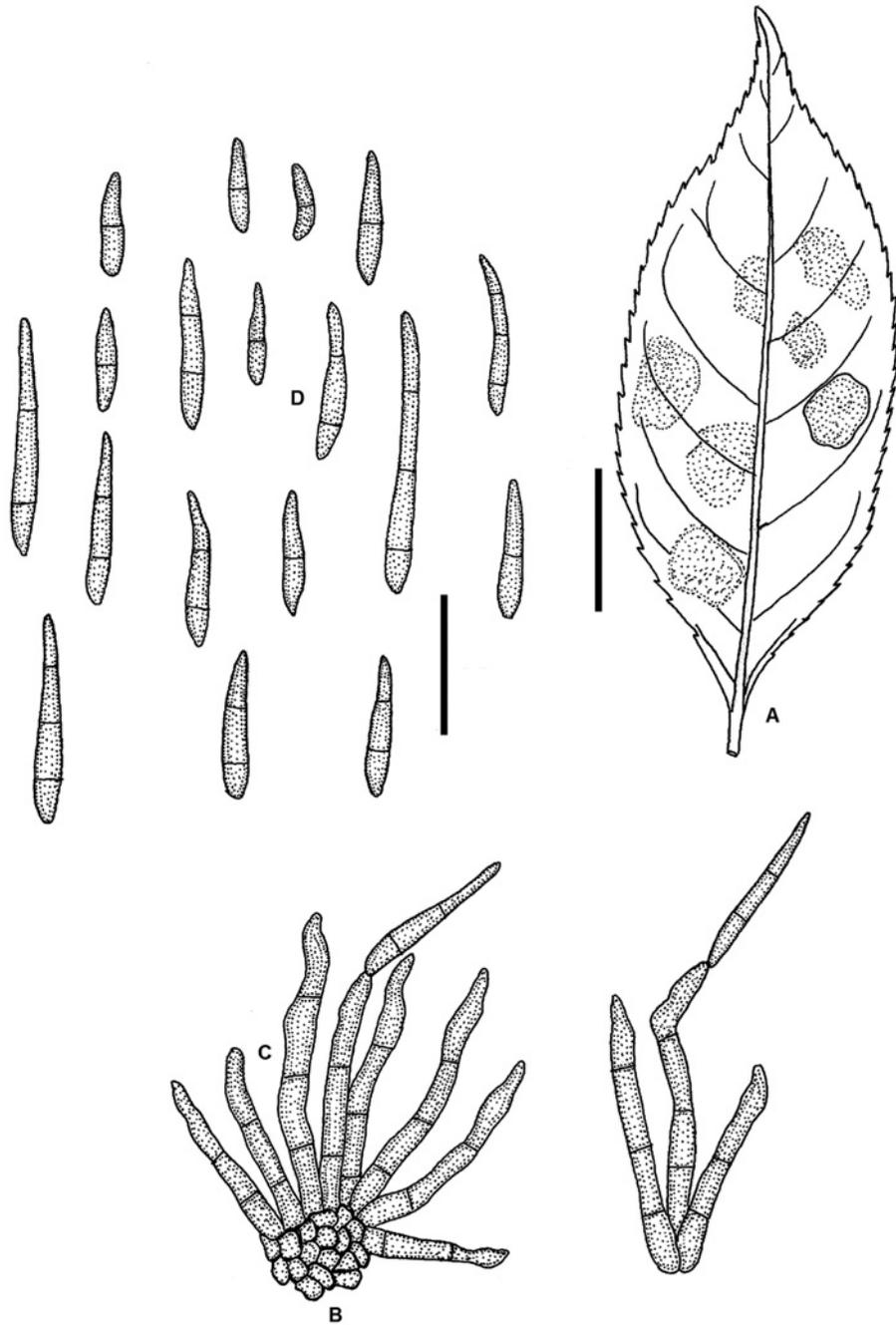
#### RESULTS AND DISCUSSION

***Pseudocercospora bischofigena*** Sham. Kumar & Raghv. Singh, **sp. nov.** Fig. 1  
(MycoBank MB 810280)

Type. India, Uttar Pradesh, town of Mahrajganj, Nichlaul Forest, 27 February 2007, on living leaves of *Bischofia javanica* Blume (*Phyllanthaceae*), coll. Shambhu Kumar, HCIO 48669 (holotype), GPU Herb. No. KSR-293 (isotype).

Etymology. The species epithet *bischofigena* is derived from the host genus.

**Description.** Infection spots hypogenous, circular to irregular, 5–16 mm, light brown. Colonies hyphophyllous, effuse, brown. Mycelium internal. Stromata well-developed, subepidermal, pseudoparenchymatous, 15–55 × 13–18 µm, brown to dark brown. Conidiophores arising in fascicles (3–8), arising from stromata, loosely arranged, macronematous, simple, erect, straight to flexuous, smooth, thin-walled, 2–5-septate, brown to olivaceous brown, 30–55 × 3–5 µm. Conidiogenous cells integrated, terminal, 5–13 × 3–5 µm long, polyblastic, conidiogenous



**Fig. 1.** *Pseudocercospora bischofigena* (holotype, HCIO 48669). A – infection spots (lower leaf surface), B – stroma, C – conidiophores, D – conidia. Scale bars: A = 20 mm; B–D = 20 μm. Del. Shambhu Kumar.

loci unthickened, not darkened. Conidia solitary, dry, acropleurogenous, obclavate or obclavate-cylindrical, straight to curved, 1–3-septate, smooth, thin-walled, light to dark olivaceous, apex obtuse to subacute, base obconically truncate, 0.5–1  $\mu\text{m}$  wide, hila unthickened, not darkened, 10–40  $\times$  2–3.5  $\mu\text{m}$ .

**Discussion.** A literature survey has indicated that there are no records of *Pseudocercospora* on *Bischofia* from India (Kamal 2010). *Pseudocercospora bischofiae* (W. Yamam.) Deighton has been reported from China, Thailand, Tonga, and the USA (Florida) (Guo & Hsieh 1995, Crous & Braun 2003, Farr & Rossman on-line). The occurrence of *P. bischofiae* in Thailand has recently also been published by Phengsintham et al. (2013). Besides the diagnosis by Guo & Hsieh (1995), the material of Yamamoto (11 Nov 1933) was also re-examined, described, and published by Chupp (1954) and Hsieh & Goh (1990). To justify the novelty of the present collection, a detailed morphotaxonomic comparison with *P. bischofiae* is given.

*Pseudocercospora bischofigena* differs from *P. bischofiae* in having well-developed stromata, whereas there are none or less developed stromata in the latter species. Some authors have reported that its stroma is slight (Chupp 1954), small (Hsieh & Guo 1990), absent or only consists of a few brown cells (Guo & Hsieh 1995). Furthermore, *P. bischofigena* has shorter conidiophores (30–55  $\times$  3–5  $\mu\text{m}$  versus 15–70  $\times$  3–5  $\mu\text{m}$  in *P. bischofiae*), and most of all much shorter, cylindrical conidia (10–40  $\times$  2–3.5  $\mu\text{m}$ ) versus obclavate-cylindrical conidia (30–85  $\times$  2.5–5  $\mu\text{m}$ ) in *P. bischofiae*.

The novel species is also comparable with *P. bischofiae* reported from Thailand (Phengsintham et al. 2013). These authors report that the stroma in their collection is present (oval to ellipsoidal, 5–17  $\mu\text{m}$ ), but is less developed than in *P. bischofigena* (15–55  $\mu\text{m}$ ). The conidiophores in *P. bischofiae* are also shorter (9–24  $\times$  2–6  $\mu\text{m}$ ) as compared to *P. bischofigena* (30–55  $\times$  3–5  $\mu\text{m}$ ). The conidia in *P. bischofiae* are longer and have more septa (41–56  $\times$  2–3  $\mu\text{m}$ , 4–6-septate) than in *P. bischofigena* (10–40  $\times$  2–3.5  $\mu\text{m}$ , 1–3-septate). As there is a distinct overlap in range of sizes, the material from Thailand (with smaller, but developed stroma and short conidiophores, but longer conidia) may also represent *P. bischofigena*.

As far as is known, *Pseudocercospora* species are, with a few exceptions, confined to single hosts, several species of a single host genus or at most hosts of closely allied genera (Braun et al. 2013, Crous et al. 2012). *Bischofia* has been included in comprehensive phylogenetic analyses of euphorbiaceous (s. lat.) genera and proved to belong to the isolated, monotypic tribe *Bischofia* within the *Phyllanthaceae* (Wurdack et al. 2004), which means that there are no closely allied genera with potential and comparable *Pseudocercospora* species. Therefore, the present collection is treated as a new taxon at species rank.

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