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A new species of *Ectendomeliola* (Meliolales, Meliolaceae) from Western Ghats, India

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A new species of the fungus *Ectendomeliola* parasitic on the leaves of *Cullenia exarillata* from Southern Western Ghats of Kerala State, India has been described and illustrated here in detail. This is the first species report of the fungus *Ectendomeliola* grow as phylloplane associate on host family Malvaceae. Only two species of *Ectendomeliola* are described so far hence this is the third species reported.

Key words: Ascomycetes, Black mildew, Sordariomycetes

INTRODUCTION

Black mildews are fungi mostly inhabits on leaves. They appear to cause mild pathogenic effect on host plants (Hosagoudar 2008, 2013; Hongsanan *et al.* 2015). The spreading of black mycelium on lamina of leaves causes physiological stress. The order Meliolales comprises two families Meliolaceae and Armatellaceae (Hosagoudar 2013; Hyde *et al.* 2020). Meliolaceae members are predominantly ectophytes. The genus *Ectendomeliola* Hosagoudar and Agarwal belongs to the family Meliolaceae characteristically develop brown mycelium with ectophytic and endophytic appressoria (Hosagoudar and Agarwal 2006). The genus comprises two species *E. walsurae* Hosag. and Agarwal infecting *Walsura trifolia* (A. Juss.) Harms (Meliaceae) and *E. otonephelii* Hosag. & Archana infecting *Otonephelium stipulaceum* (Bedd.) Radlk. (Sapindaceae) are endemic to Western Ghat region of Kerala state in India (Hosagoudar 2008).

During the exploration of foliicolous fungi in Goodrical Reserve Forest of Ranni forest division, Pathanamthitta, Kerala State, *Cullenia exarillata* A. Robyns (Malvaceae) was found infected with the black mildew fungus. The forest is tropical evergreen rain forest, lies between 76°45'–77°30' E and 14°45'–15°15' N at an altitudinal range of 100 to 1400 m., temperature

ranges from 17–25°C and the average annual rain fall is 2,086 mm (Menon 2006).

The host *C. exarillata* is endemic to Western Ghats; its fruits are known as a staple food for the endangered and endemic primate, the Lion-tailed Macaque (*Macaca silenus*).

MATERIALS AND METHODS

Black mildew fungi are predominantly foliicolous and rarely infect the soft stems and tender shoots. From the field, blackish spots on living leaves were observed and selected macroscopically with a hand lens (5×). Such infected leaves and tender twigs of plants were collected separately in sterilized polythene bags. While collecting the infected plant parts, field notes were made regarding their pathogenicity symptoms, nature of colonies, nature of infection, locality, geographical and climatic conditions. For each collection separate field number was given. Photographs were taken for the identification of host plant. Later a part of these infected plant parts was pressed, dried and mounted herbarium sheets for future reference. Specimens were deposited in regional herbarium of Mar Thoma College, Thiruvalla (MTCHT).

Permanent slides were prepared, labelled and used for morpho-taxonomic studies. Free hand sections of fresh specimen were taken to study the characteristics of endophytic mycelium.

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Binocular compound microscope Olympus (CX21ILED) with Mag Vision image analyser software was used for studying and measuring the different structures mycelium. The macro and micro-morphological characters of the specimens were noted, and the detailed taxonomic description was written. Biometric data is based on at least 10 measurements of mycelial structures. Description and illustration of the newly described species was submitted to Myco Bank, for future studies.

Taxonomy

Ectendomeliola cullii J. Thomas, N. Mathew & G. N. Gokul *sp. nov.* (Figs. 1 & 2). Myco Bank No: 839865

Etyymology:—named after the host genus.

Type:—INDIA. Kerala: Pathanamthitta, Ranni forest division, Goodrical range, Moozhiyar, on the leaves of *Cullenia exarillata* A. Robyns (Malvaceae), 18 August 2017, Nisha Mathew. MTCHT 154 (holotype); MTCHT 155 (isotype).

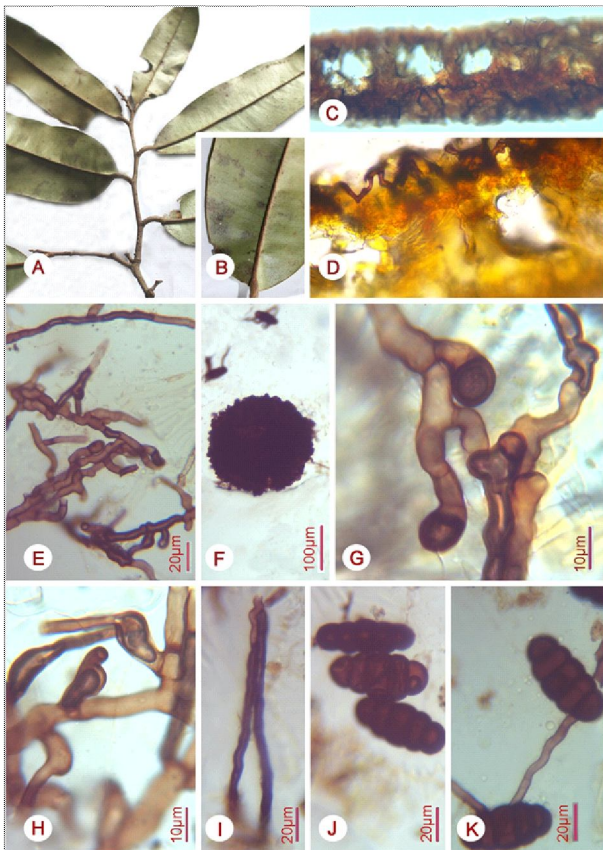


Fig. 1: *Ectendomeliola cullii*. A & B. Colonies on abaxial side of leaves. C & D. Cross section of infected leaf showing innate mycelium below abaxial epidermis. E. Surface mycelium with appressoria and phialides. F. Perithecium. G. Hyphae with appressoria. H. Hyphae with phialides. I. Mycelial setae. J. Mature ascospores. K. Germinating ascospores. Photographs by N. Mathew & G. N. Gokul.

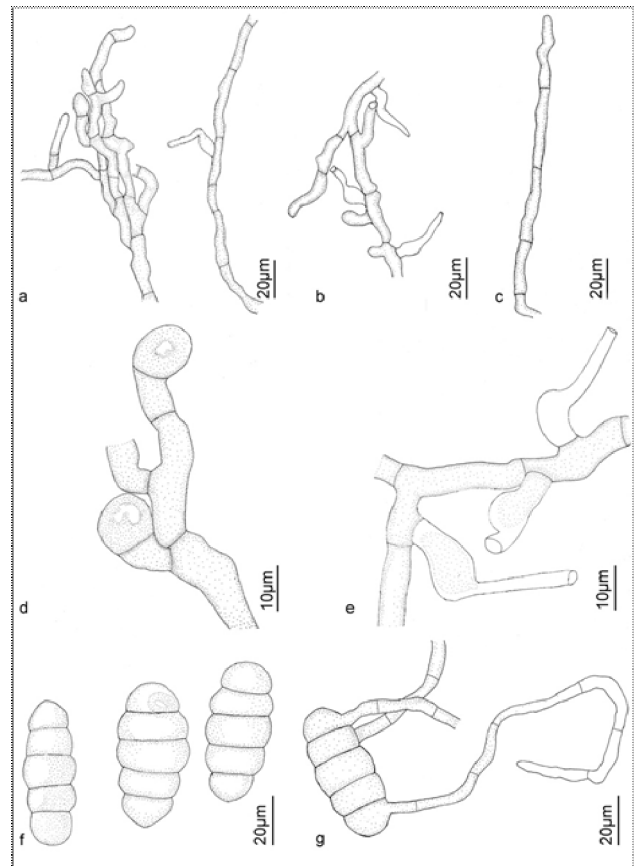


Fig. 2: *Ectendomeliola cullii*. a & b. Surface mycelium with appressoria and phialides. c. Mycelial seta. d. Hypha with appressoria. e. Hypha with phialides. f. Mature ascospores. g. Germinating ascospores. Illustration by N. Mathew & G. N. Gokul.

Colonies hypophylous, thin, scattered up to 6mm in diameter, often confluent. Hyphae substraight to crooked, branching irregular at acute angles, loosely or closely reticulate, cells 30–45 × 5–7 μm. **Appressoria** few, ectophytic and endophytic, innate appressoria intra-epidermal, often in mesophyll, two-celled, 10–20 μm; stalk cells cylindrical to cuneate, 5–10 μm long; head cell ovate, globose, entire 8–10.5 × 7–11 μm. **Phialides** many, curved, long-necked, ampulliform, 21–46 × 5.5–8 μm. **Mycelial setae** few, simple, straight to curved, flexuous, acute to obtuse at the tip, up to 380 μm long. **Perithecia** superficial, scattered, globose, ostiolate, up to 245 μm in diameter. **Ascospore** oblong, cylindrical, 4-septate, constricted at the septa, 49–62 × 19–27 μm.

Notes:— All genera under Meliolaceae are ectophytic except *Endomeliola* Hughes & Pirozynski and *Ectendomeliola* Hosagoudar & Agarwal. Hughes and Pirozynski (1994) reported the new genus *Endomeliola* with type species

Table 1: Comparison of measurements (μm) of mycelial structures in species of *Ectendomeliola*

Features	<i>E.walsurae</i>	<i>E.otonephelii</i>	<i>E.cullisp.nov.</i>
Size of Cells	16–24 × 6–12	11–29 × 4–7	30–43 × 5–7
Length of appressoria	11–16	11–24	10–20
Size of phialides	8–12 × 6–8	9–22 × 6–8	21–46 × 5.5–8
Length of mycelial setae	250	412	380
Diameter of perithecia	125	126	245
Size of ascospores	36–45 × 12–14	35–42 × 11–15	49–62 × 19–27

Endomeliola dingleyae Hughes and Pirozynski infecting *Coprosma robusta* Raoul (Rubiaceae) from New Zealand. The genus is characterised by the presence of immersed hyphopodiate hyphae which is branched, brown and grow intercellular in the mesophyll tissue of the host. The presence of setae is not reported on *Endomeliola*. Till date no species other than *E. dingleyae* is listed in Index Fungorum under the genus *Endomeliola*. Hosagoudar and Agarwal (2006) reported the new genus *Ectendomeliola* from India with designating *E.walsurae* infecting *Walsura trifolia* (Meliaceae) as the type species.

Ectendomeliola differs from *Endomeliola* in having mycelial setae which is superficial, acute to furcate at the apex. The phialides of *Ectendomeliola* are long, unicellular and scattered in distribution whereas Hughes and Pirozynski (1994) reported the phialides of *Endomeliola* are short, sessile, erect ampulliform, superficial and develop in groups on superficial stromata and occasionally on ascotal walls. The presence or absence of setae in species has been taken as a key character in delimiting various genera under Meliolaceae (Hosagoudar 2008, 2013; Hongsanan *et al.* 2015). In this specimen mycelial setae are present and phialides are long, unicellular, mostly superficial and rarely viewed in lower mesophyll cavities and their distribution on hyphae is irregularly scattered to alternate. Hence the present collection with endophytic hyphae can be treated as *Ectendomeliola*.

The size of hyphal cells, phialides, ascospores; length of appressoria, mycelial setae and the diameter of perithecia of the specimen differ significantly from the measurements of two reported

species of *Ectendomeliola* (Table 1). In the present collection mycelial setae are simple, straight to curved, flexuous and acute to obtuse at the tip. Few setae are uncinata in *E. walsurae*. The mycelial setae of *E. otonephelii* are straight to uncinata and dentate to furcate at the apex. Hence this collection is proposed as a new species of *Ectendomeliola*.

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