

## A new species of lichenicolous fungus *Epiclادonia* from India

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### ABSTRACT

A new species of lichenicolous fungus *Epiclادonia heterodermiae* characterized by superficial conidiomata arising in stromata on the apothecial disc of *Heterodermia*, with 0-(2) septate, hyaline, narrowly ellipsoid, conidia ( $9-10 \times 2-2.5 \mu\text{m}$ ) with 1-2 guttules is described as new to science from India. A key to so far known species of this genus is also provided.

**Keywords:** *Heterodermia*, parasite, secondary fungi

### INTRODUCTION

The lichenicolous fungal genus *Epiclادonia* D. Hawksw. belonging to anamorphic ascomycetes is characterized by dark brown to black coloured pycnidia with pycnidial wall of intertwined hyphae (*textura intricata*), lacking conidiophores, holoblastic conidiogenous cells, hyaline, subcylindrical to narrowly ellipsoid, 0-1 septate conidia and parasitic nature.

The genus is so far represented by four species across the world (*E. lapponica* Ihlen, *E. sandstedei* (Zopf) D. Hawksw., *E. simplex* D. Hawksw. and *E. stenospora* (Harmand) D. Hawksw. [Hawksworth 1981; Lawrey and Diederich 2016]. Except *E. lapponica* which colonize *Pleospidium chlorophanum* (Wahlenb.) Zopf, rest of the three species infect lichen genus *Cladonia*.

In continuation with our studies on lichenicolous mycota of India (Joshi *et al.* 2015a,b; 2016a,b,c; 2017) we encountered a sample of *Heterodermia* heavily infected by a lichenicolous fungi which falls in the overall circumscription of genus *Epiclادonia*. The novel species is described here in detail and is compared with other known species of this genus. Besides this, a key to so far known species of this genus from the world is also provided.

### METHODOLOGY

The sample was collected from Narayan Ashram, Pithoragarh district, Uttarakhand. Macroscopical examination was carried out using a dissecting microscope (OLYMPUS SZ2-ILST) and microscopical studies of handmade sections were made using a CX21iLEDFS1 microscope. All the measurements were taken from mounts made in tap water. The specimen has been deposited in the herbarium of CSIR-National Botanical Research Institute (LWG).

### TAXONOMY

*Epiclادonia heterodermiae* Y. Joshi, Falswal, R. Joshi sp. nov.

**Fig. 1. A-E**

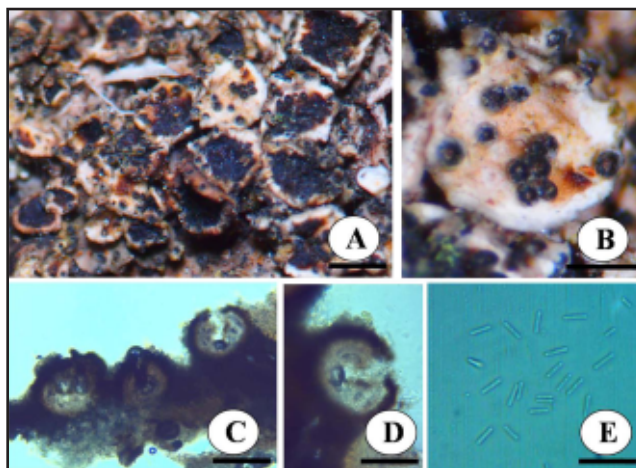
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**DIAGNOSIS:** Similar to *E. lapponica* in having erumpent, cupulate and eustromatic pycnidia, but differs in having different host (*Heterodermia*) and simple to 2 septate, larger conidia  $9-10 \times 2-2.5 \mu\text{m}$ .

**HOLOTYPE:** India: Uttarakhand, Pithoragarh district, Narayan Ashram, 29°58'173" N, 80°39'311" E, alt. 2566 m, on *Heterodermia* colonizing twigs of *Quercus leucotrichophora*, 15 Oct. 2016, Shashi Upadhyay, K. Bisht, K. C. Sekar and V. Pant, 17-026943 (LWG 35494 dated 26/05/17).

**ETYMOLOGY:** Named after the host lichen *Heterodermia* on which this fungus was found growing.

**DESCRIPTION:** Conidiomata pycnidial, arising directly on the apothecial disc; evenly scattered, aggregated into stromata, erumpent and cupulate, black, 100-150  $\mu\text{m}$  diam.; ostiole clearly delimited in younger pycnidia, depressed, circular, (12-)20-30(-38)  $\mu\text{m}$  diam., centre appearing subhyaline due to conidial mass, irregular in shape in older pycnidia; pycnidial wall continuous, distinctly delimited from the host tissue, brown to dark brown, 15-18  $\mu\text{m}$  thick, wall throughout composed of densely interwoven moderately thick walled hyphae. Conidiophores absent. Conidiogenous cells holoblastic, arising directly from the pycnidial wall, subcylindrical to elongate ampuliform, hyaline, smooth walled. Conidia numerous, formed at the apex of the conidiogenous cells, arising singly, not catenate, bacilliform, with rounded ends, hyaline, 0(-2) septate, 1-2 guttules, thin



**Fig. 1** (A-E): Perithecia of *Epiclادonia heterodermiae* colonizing apothecial disc of *Heterodermia* (Scale = 1 mm). B- Close up view of *E. heterodermiae* (Scale = 1 mm). C- Perithecia in stroma (Scale = 20  $\mu\text{m}$ ). D- A single perithecium (Scale = 20  $\mu\text{m}$ ). E- Conidia (Scale = 10  $\mu\text{m}$ ).

and smooth walled,  $9-10 \times 2-2.5 \mu\text{m}$  ( $n=20$ ).

**HOST AND DISTRIBUTION:** The fungus was collected from Pithoragarh district of Uttarakhand and was confined to the apothecial disc of *Heterodermia* which was growing on the twigs of *Quercus leucotrichophora* at an altitude of 2566 m.

#### REMARKS

The fungus is characterized by its superficial conidiomata arising in stromata on the apothecial disc of *Heterodermia*, with 0(-2) septate, hyaline, narrowly ellipsoid, conidia measuring ( $9-10 \times 2-2.5 \mu\text{m}$ ) having 1-2 guttules. In view of the unique features of the fungus, a new species *E. heterodermiae* has been proposed which differs from *E. sandstedei* (Zopf) D. Hawksw. and *E. simplex* D. Hawksw. by not forming any distinct galls on the host thallus, eustromatic nature of pycnidia, 0(-2) septate conidia and a different host (*Heterodermia*). However, eustromatic and cupulate nature of pycnidia in the new taxon somewhat confuses it with *E. lapponica* which differs from the newly named taxon in having simple and smaller conidia [ $5-7(-9) \times (1.5-2-3 \mu\text{m})$ ] and different host (*Pleopsidium chlorophanum*). *E. stenospora* (Harmand) D. Hawksw., another known species of this genus differs from it in having thin ( $7-15 \mu\text{m}$ ), hyaline pycnidial wall, cymbiform conidia and a different host (*Cladonia*).

#### Artificial key to so far known *Epicladonia* species

- 1a) Pycnidia eustromatic and cupulate ..... 2
- 1b) Pycnidia neither eustromatic nor cupulate ..... 3
- 2a) Growing on *Pleopsidium chlorophanum*; pycnidia larger ( $(200-300-600 \mu\text{m})$ ); conidia aseptate, eguttulate,  $5-7(-9) \times (1.5-2-3 \mu\text{m})$  ..... *E. lapponica*
- 2b) Growing on *Heterodermia*; pycnidia smaller ( $100-150 \mu\text{m}$ ); conidia aseptate to septate, guttulate,  $9-10 \times 2-2.5 \mu\text{m}$  ..... *E. heterodermiae*
- 3a) Pycnidia mainly less than  $100 \mu\text{m}$  diam., immersed, brown only immediately around the ostiole..... 4
- 3b) Pycnidia  $100-175 \mu\text{m}$  diam, erumpent and becoming almost superficial, the exposed parts all brown; forming galls; conidia simple, subcylindrical, rounded at the apex,  $8.5-11(-12) \times 2.5-3(-3.5) \mu\text{m}$  ..... *E. simplex*
- 4a) Conidia predominantly 1-septate, subcylindrical to narrowly ellipsoid, apex always rounded,  $(7.5-9-12(-14) \times (2.5-3-4 \mu\text{m})$ ; usually forming galls.....*E. sandstedei*
- 4b) Conidia predominantly simple, subcylindrical to almost cymbiform, apex often attenuated,  $7.5-11 \times 3-3.5 \mu\text{m}$ ; not forming galls..... *E. stenospora*

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