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Novel fungi from Kodaikanal, Tamil Nadu, India

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Abstract

This paper gives an account of six black mildews. Of these, *Asterina kukkalensis, Meliola cyperacearum, M. hoveniae* and *M. luculiae* are the new species; *Asteridiella solani* var. *kodaikalensis* and *Meliola daviesii* var. *kodaikalensis* are the new varieties illustrated and described in detail.

Keywords: *Asteridiella*, *Asterina*, black mildews, Kodaikanal, India, *Meliola*

INTRODUCTION

Kodaikanal is located in Dindugal district of Tamil Nadu, known as upper Palni hills, situated on the Western Ghats at an altitude of 2,100m with 36740 ha of reserved forests and 4000 ha of reserved lands, comprising dry deciduous to tropical Montane forests, harbours mainly shola forests. The area precipitates more than 1500 mm annually, having temperature ranging from 7° to 24°C. This biodiversity rich area harbours around 3,000 plants (Mathew, 1999). Based on this count, foliicolous fungi (1:6) estimated to occur 18,000 in this area but a finger count fungi are known to us from this area (Hosagoudar *et al.*, 2007). Hence, we have put an effort to bring out the foliicolous fungal flora of the area and of which the following are the interesting novelties presented here.

Taxonomy

Asterina kukkalensis V. B. Hosagoudar, V. Dhivaharan et M.C. Riju, sp. nov. (Fig.1)

Coloniae epiphyllae, subdensae vel densae, dispersae, 2-5 mm diam., confluentes. Hyphae subrectae vel flexuosae, alternate vel opposite acuteque vel laxe ramosae, laxe reticulatae, cellulae 25-35 x 5-7 µm. Appressoria bicellula, alternata, ad 2% opposita, recta vel curvula, 12-15 µm longa; cellulae basilares cylindraceae vel cuneatae, 5-7 µm longae; cellulae apicales ovatae, elongatae vel cylindraceae, globosae, bifidae, sublobatae vel fortiter lobatae, 7-10 x 10-12 µm. Thyriothecia dispersa vel aggregata, orbicularis, ad 137 µm diam., stellatim dehiscentes ad centre, margine crenatae vel fimbriatae, hyphae fringiorum solitariae, flexuosae et appressoria nulla; asci globosi, octospori, ad 40 µm diam.; ascospore conglobatae, 1-septatae, constrictus ad septum, 17-20 x 7-8 µm.

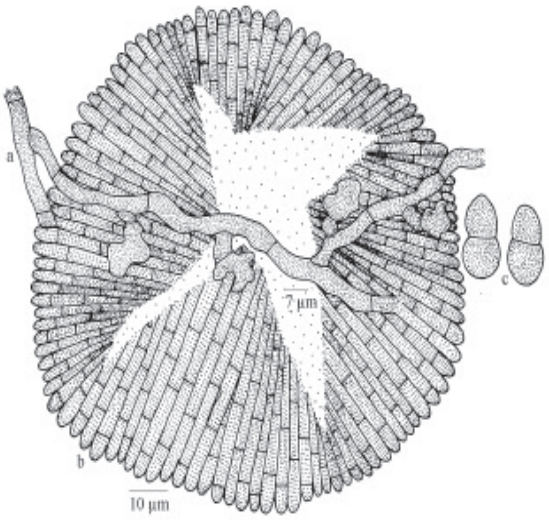

Figure 1. ***Asterina kukkalensis*** sp. nov.

a. Appressoriate mycelium, b. Thyriothecium, c. Ascospores

Colonies epiphyllous, subdense to dense, scattered, 2-5 mm in diameter, confluent and cover entire upper surface of the leaves. Hyphae substraight to flexuous, branching alternate to opposite at acute to wide angles, loosely reticulate, cells 25-35 x 5-7 µm. Appressoria two celled, alternate, about 2% opposite, straight to curved, 12-15 µm long; stalk cells cylindrical to cuneate, 5-7 µm long; head cells ovate, elongated to cylindrical, globose, bifid, sublobate to deeply lobate, 7-10 x 10-12 µm. Thyriothecia scattered to grouped, orbicular, up to 137 µm in diameter, stellately dehisced at the centre, margin crenate to fimbriate, fringed hyphae solitary, flexuous and devoid of appressoria; asci globose, octosporous, up to 40 µm in diameter; ascospores conglobate, 1-septate, constricted at the septum, 17-20 x 7-8 µm.

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Materials examined: On leaves of *Premna* sp. (Verbenaceae), Periyakanal, Kukkal shola forest, Kodaikanal, Tamil Nadu, Nov. 11, 2007, V. Dhivaharan *et al*. TBGT 4447 (holotype). Part of the collection has been deposited in HCIO as isotype.

Asterina pusilla is known on this host genus from Philippines and India (Sydow, 1913; Hosagoudar & Abraham, 2000; Hosagoudar & Sabeena, 2007). However, *Asterina kukkalensis* differs from it in having two celled appressoria.

Asteridiella solani Mc Alpine var. ***kodaikanalensis*** V. B. Hosagoudar, V. Dhivaharan et M.C. Riju, var. nov. (Fig.2)

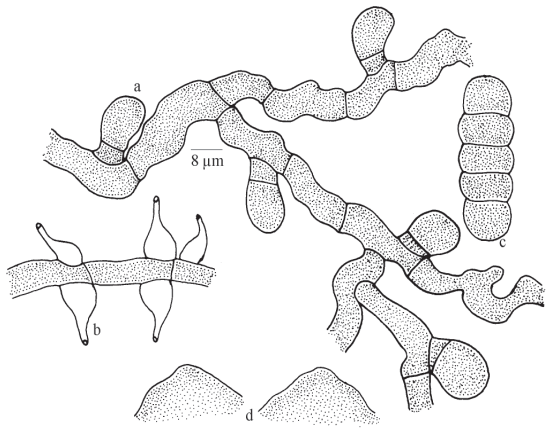

Figure 2. ***Asteridiella solani*** Mc Alpine var. ***kodaikanalensis*** var. nov.
a. Appressorium, b. Phialide, c. Ascospore, d. Perithecial wall cells

Affinis a var. *solani* sed differt phialides producentes in hyphis separatis.

Colonies mostly epiphyllous, scattered, subdense, velvety, up to 2 mm in diameter. Hyphae flexuous, branching alternate at acute to wide angle, closely to loosely reticulate, cells 22-27 x 5-7 µm. Appressoria alternate, straight to curved, subantrorse to closely antrorse, 15-17 µm long; stalk cells cylindrical to cuneate, 5-7 µm long; head cells globose, sub-lobate, slightly angular, entire, 10-12 x 7-10 µm. Phialides borne on a separate mycelial branch, alternate, rarely opposite, ampulliform, 15-17 x 7-10 µm. Perithecia scattered to grouped, up to 225 µm in diameter; perithecial cells larviform, mammiform, 12-15 x 12-17 µm; ascospores 4-septate, cylindrical, 35-43 x 12-15 µm.

Materials examined: On leaves of *Solanum viburnum* (Solanaceae), Periyakanal, Kukkal shola, Kodaikanal, Tamil Nadu, Feb. 2, 2008, V. Dhivaharan *et al*. 4457 (holotype). Part of the collection has been deposited in HCIO as isotype.

Based on the digital formula, morphology of the hyphae and appressoria, the present collection is similar to *Asterina solani* known on *Solanum viride* from New South Wales but the new variety differs from it in having the phialides borne on a separate mycelial branch.

Meliola cyperacearum V. B. Hosagoudar, V. Dhivaharan et M.C. Riju, sp. nov. (Fig.3)

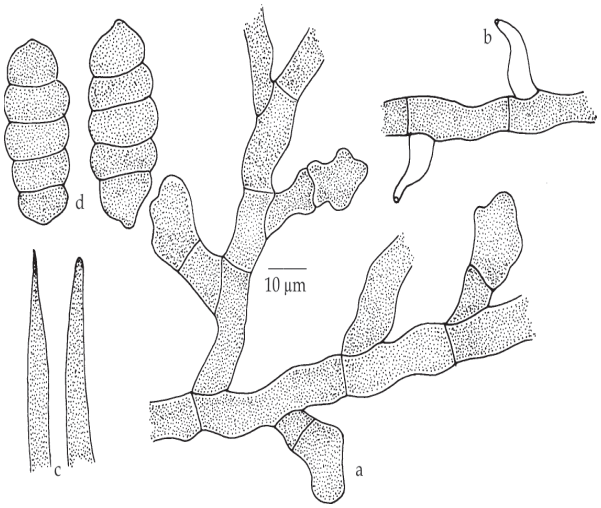

Figure 3. ***Meliola cyperacearum*** sp. nov.

a. Appressorium, b. Phialide, c. Apical portion of the mycelial setae, d. Ascospores

Coloniae amphigenae, densae, velutinae, ad 2 mm diam., confluentes. Hyphae rectae to subrectae, alternate acuteque ramosae, cellulae 20-23 x 7-9 µm. Appressoria alternata, recta vel curvula, 30-35 µm longa; cellulae basilares cylindraceae vel cuneatae, 10-12 µm longae; cellulae apicales cylindraceae, globosae, leniter angularis, sublobatae vel lobatae, saepe truncatae ad apicem, 20-22 x 10-17 µm. Phialides producentes in hyphis separatis, alternatae, ampulliformes, 15-20 x 7-9 µm. Setae myceliales rectae, simplices, acutae vel obtusae ad apicem, ad 360 µm longae. Perithecia dispersa, ad 140 µm diam.; ascosporae obovoideae, 4-septatae, constrictus ad septatae, 35-37 x 12-15 µm.

Colonies amphigenous, dense, velvety, up to 2 mm in diameter, confluent. Hyphae straight to substraight, branching alternate at acute angles, cells 20-23 x 7-9µm. Appressoria alternate, straight to curved, 30-35 µm long; stalk cells cylindrical to cuneate, 10-12 µm long; head cells cylindrical, globose, slightly angular, sublobate to lobate, often truncate at the apex, 20-22 x 10-17 µm. Phialides borne on a separate mycelial branch, alternate, ampulliform, 15-20 x 7-9 µm. Mycelial setae straight, simple, acute to obtuse at the tip, up to 360 µm long. Perithecia scattered, up to 140 µm in diameter; ascospores obovoidal, 4-septate, constricted at the septa, 35-37 x 12-15 µm.

Materials examined: On leaves of *Cyperus* sp. (Cyperaceae), Periyakanal, Kukkal shola forest, Kodaikanal, Tamil Nadu, Jan. 7, 2007, V. Dhivaharan *et al*. TBGT 4391 (holotype). Part of the collection has been deposited in HCIO as isotype.

Based on the angular to sublobate head cells of appressoria and the position of the phialides on a separate mycelial branch, this species can be compared with *Meliola cyperi* Pat. but differs from it in having distinctly shorter mycelial setae (Hansford, 1961). It also differs from *Meliola tibigirica* Hosag. *et al.* in having distinctly lobate head cells of appressoria (Hosagoudar, 2008).

Meliola daviesii Hansf. var. ***kodaikalensis*** V. B. Hosagoudar, V. Dhivaharan et M.C. Riju var. nov. (Fig.4)

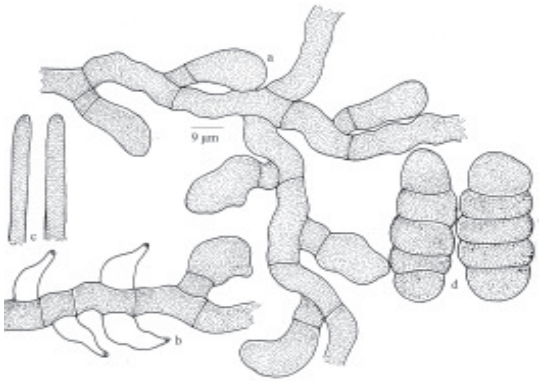

Figure 4. ***Meliola daviesii*** Hansf. var. ***kodaikalensis*** var. nov.
a. Appressorium, b. Phialide, c. Apical portion of the mycelial setae, d. Ascospores

Affinis a var. *daviesii* sed differt phialidis appressoriis mixtus

Colonies epiphyllous, thin, up to 2 mm in diameter, scattered. Hyphae flexuous, branching opposite at wide angles, loosely reticulate, cells 20-30 x 7-10 µm. Appressoria alternate, straight to curved, antrorse to retrorse, 30-32 µm long; stalk cells cylindrical to cuneate, 7-10 µm long; head cells oblong, ovate, rarely globose, entire, 20-25 x 12-17 µm. Phialides mixed with appressoria, opposite, ampulliform, 20-22 x 7-10 µm. Mycelial setae scattered, simple, obtuse at the tip, up to 440 µm long. Perithecia scattered, globose, up to 85 µm in diameter; ascospores oblong, 4-septate, constricted at the septa, 45-47 x 15-20 µm.

Materials examined: On leaves of *Jasminum brevilobum* A. DC. (Oleaceae), Periyakanal, Kukkal shola, Kodaikanal, Tamil Nadu, March, 7, 2007, V. Dhivaharan *et al*. TBGT 4445 (holotype). Part of the collection has been deposited in HCIO as isotype.

Based on the digital formula, nature of the hyphae and morphology of appressoria, the present collection fits well into the assigned species but the new variety differs from it in having phialides borne with appressoria.

Meliola hoveniae V. B. Hosagoudar, V. Dhivaharan et M.C. Riju sp. nov. (Fig.5)

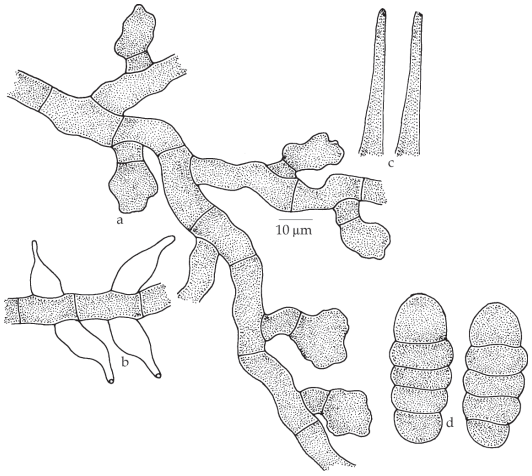

Figure 5. ***Meliola hoveniae*** sp. nov.

a. Appressorium, b. Phialide, c. Apical portion of the mycelial setae, d. Ascospores

Coloniae amphigenae, tenues, 1-2 mm diameter confluentes. Hyphae flexuosae, alternatim acuteque vel laxe ramosae, laxe reticulatae, cellulae 25-27 x 7-9 µm. Appressoria alternata, recta vel curvula, antrorsa vel retrorsa, 24-25 µm longa; cellulae basilares cylindraceae vel cuneatae, 7-10 µm longae; cellulae apicales ovatae, globosae, truncatae vel attenuatae ad apicem, sublobatae, 15-17 x 12-15 µm. Phialides producentes in hyphis separatis, alternatae, unilateralis, oppositae, ampulliformes, 17-22 x 7-10 µm. Setae myceliales juxta perithecia aggregatae, simplices, rectae, acutae vel obtusae ad apicem, ad 360 µm longae. Perithecia dispersa vel connata, globosa, ad 205 µm diam.; ascosporae cylindraceae vel obovoideae, 4-septatae, constrictus ad septatae, 42-45 x 15-17 µm.

Colonies amphigenous, thin, 1-2 mm in diameter confluentes. Hyphae flexuous, branching alternate at acute to wide angles, loosely reticulate, cells 25-27 x 7-9 µm. Appressoria alternate, straight to curved, antrorse to retrorse, 24-25 µm long; stalk cells cylindrical to cuneate, 7-10 µm long; head cells ovate, globose, truncate to attenuated at the apex, sublobate, 15-17 x 12-15 µm. Phialides on borne on a separate mycelial branch, alternate, unilateral, opposite, ampulliform, 17-22 x 7-10 µm. Mycelial setae grouped around perithecia, simple, straight, acute to obtuse at the tip, up to 360 µm long. Perithecia scattered to connate, globose, up to 205 µm in diam.; ascospores

cylindrical to obovoidal, 4-septate, constricted at the septa, 42-45 x 15-17 µm.

Materials examined: On leaves of *Hovenia acerba* Lindl. (Rhamnaceae), Periyakanal, Kukkal shola, Kodaikanal, Tamil Nadu, Oct. 23, 2007, V. Dhivaharan *et al.* 4442 (holotype). Part of the collection has been deposited in HCIO as isotype.

Meliola ziziphi Hansf. &*Meliola krugiodendr* Cif. can be compared with the present species. However, differs from both in having angular and truncate head cells of appressoria (Hansford, 1961).

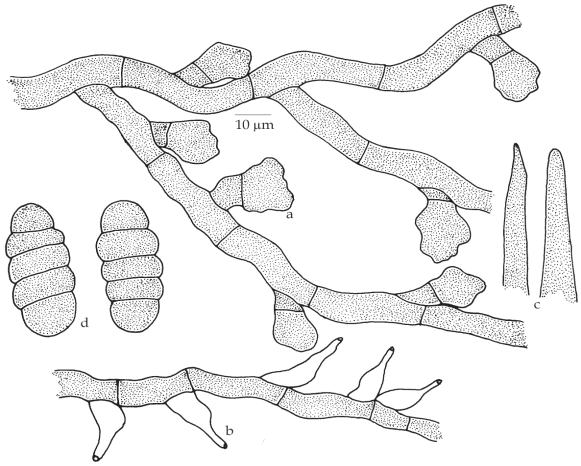

Figure 6. ***Meliola luculiae*** sp. nov.

a. Appressorium, b. Phialide, c. Apical portion of the mycelial setae, d. Ascospores

Meliola luculiae V. B. Hosagoudar, V. Dhivaharan et M.C. Riju sp. nov.(Fig.6)

Coloniae amphigenaes, tenues, dispersa, 1-2 mm diam. Hyphae flexuosae, alternate acuteque vel laxe ramosae, laxe vel arte reticulatae, cellulae 22-30 x 6-7 µm. Appressoria alternata, antrorsa vel subantrorsa, recta vel curvula, 22-25 µm longa; cellulae basilares cylindraceae vel cuneatae, 7-10 µm longae; cellulae apicales cylindraceae, ovatae, angularis vel sublobatae, 15-17 x 10-12 µm. Phialides prodecentes in hyphis separatis, alternatae, oppositae vel unilateralis, ampulliformes, 15-17 x 7-10 µm. Setae myceliales numerousae, juxta perithecia aggregatae, simplices, rectae, obtusae ad apicem, ad 300 µm longae. Perithecia dispersa vel laxe aggregata, ad 190 µm diam.; ascosporae cylindraceae, 4-septatae, constrictus ad septatae, 42-45 x 15-17 µm.

Colonies amphigenous, thin, scattered, 1-2 mm in diameter. Hyphae flexuous, branching alternate at acute to wide angles, loosely to closely reticulate, cells 22-30 x 6-7 µm. Appressoria alternate, antrorse to subantrorse, straight to curved, 22-25 µm long; stalk cells cylindrical to cuneate, 7-10 µm long; head cells cylindrical, ovate, angular to sublobate, 15-17 x 10-12 µm. Phialides borne on a separate mycelial branch, alternate, opposite to unilateral, ampulliform, 15-17 x 7-10 µm. Mycelial setae numerous, grouped around perithecia, simple, straight, obtuse at the tip, up to 300 µm long. Perithecia scattered to loosely grouped, up to 190 µm in diam.; ascospores cylindrical, 4-septate, constricted at the septa, 42-45 x 15-17 µm.

Materials examined: On leaves of *Lucculia grandifolia* Ghose (Rubiaceae), Periyakanal, Kukkal shola, Tamil Nadu, April 4, 2008, V. Dhivaharan *et al.* TBGT 4443 (holotype). Part of the collection has been deposited in HCIO as isotype.

Based on the digital formula 3111. 4221, it is closer to *Meliola mitragynicola* Deight, *M. mitragynicola* var. *leonensis* (Hansf. & Deight.) Deight. and *M. henryi* Hosag. var. *oldenlandiae* Hosag *et al.*, but differs from all in having angular to sublobate head cells of the appressoria and shorter mycelial setae (Hansford, 1961; Hosagoudar, 1996; 2008).

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