

ADDITIONS TO MELIOLALES OF INDIA

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ABSTRACT

This paper gives an account of seven new meliolaceous fungi collected from Kerala State belonging to three genera, namely, *Amazonia dikesinghii*, *Asteridiella amomi*, *Meliola aganopes*, *M. cayratiae*, *M. cipadessae*, *M. mesuae* and *M. sanjappae*. They have been described and illustrated in detail.

Keywords : New, Black mildews, *Amazonia*, *Asteridiella*, *Meliola*, Kerala, India.

INTRODUCTION

During a survey of the foliicolous fungi, authors have made several collections in the Western Ghats region of Kerala State. Of these, the following seven new species collected from Peppara and Neyyar Wildlife Sanctuaries in Thiruvananthapuram and Vazhachal forest range of Thrissur districts, respectively, have been presented here.

TAXONOMY

1. *Amazonia dikesinghii* Hosag., J. Thomas & D.K. Agarwal sp. nov. (Fig. 1).

Typus: On leaves of *Pogostemon travancoricus* Bedd. (Lamiaceae), Athirumala, Peppara Wildlife Sanctuary, Thiruvananthapuram, Kerala March 2, 2008, *Jacob Thomas* HCIO 49045 (holotype), TBGT 3311 (isotype).

Coloniae epiphyllae, densae, ad 3 mm diam., dispersae. Hyphae subrectae vel flexuosae, alternate vel raro opposite acuteque ramosae, fortiter reticulatae et teges mycelialis solidus, cellulae 6-13 × 6-8 µm. Appressoria alternata vel unilateralis, recta vel curvula, antrorsa vel arte antrorsa et saepe hyphis appressus, 12-17 µm longa; cellulae basillares cylindratae vel cuneatae, 3-5 µm longae; cellulae ovatae vel globosae, integrae, 12-16 × 11-16 µm. Phialides producentes in hyphis separatis, alternatae vel oppositae, conoideae vel ampulliformes, 8-11 × 6-8 µm. Perithecia depresso-globosa, ad 200 µm diam.; ascospores oblongae vel ellipsoideae, 4-septatae, constrictae ad septatae, 35-40 × 12-18 µm.

Colonies epiphyllous, dense, up to 3 mm in diameter, scattered. Hyphae substraight to flexuous, branching alternate to rarely opposite at acute angles, very closely reticulate to form a solid mycelial mat, cells 6-13 × 6-8 µm. Appressoria alternate to unilateral, straight to curved, antrorse to closely antrorse and often appressed to the hyphae, 12-17 µm long; stalk cells cylindrical to cuneate, 3-5 µm long; head cells ovate to globose, entire, 12-16 × 11-16 µm. Phialides born on a separate mycelial branches, alternate to opposite, conoid to ampulliform, 8-11 × 6-8 µm. Perithecia flattened-globose, up to 200 µm in diameter; ascospores oblong to ellipsoidal, 4-septate, constricted at the septa, 35-40 × 12-18 µm.

There are no other species of the genus *Amazonia* on the members of Lamiaceae (Hansford, 1961; Hu & al., 1996, 1999; Hosagoudar, 1996, 2008; Hosagoudar & al., 1997; Hosagoudar & Agarwal, 2008).

This species is named in honour of Dr. D. K. Singh, Botanical Survey of India for his contributions to Botany.

2. *Asteridiella amomi* Hosag., J. Thomas & D.K. Agarwal sp. nov. (Fig. 2).

Typus: Kombe, Neyyar Wildlife Sanctuary, Thiruvananthapuram, Kerala, March 4, 2008, *Jacob Thomas* & al. HCIO 48834 (holotype), TBGT 3210 (isotype).

Coloniae amphigenae, densae, subvelutinae, ad 4 mm diam., confluentes. Hyphae subrectae vel leniter anfractuae, opposite vel irregulariter acuteque vel laxae ramosae, laxae reticulatae, cellulae 19-36 × 7-10 µm.

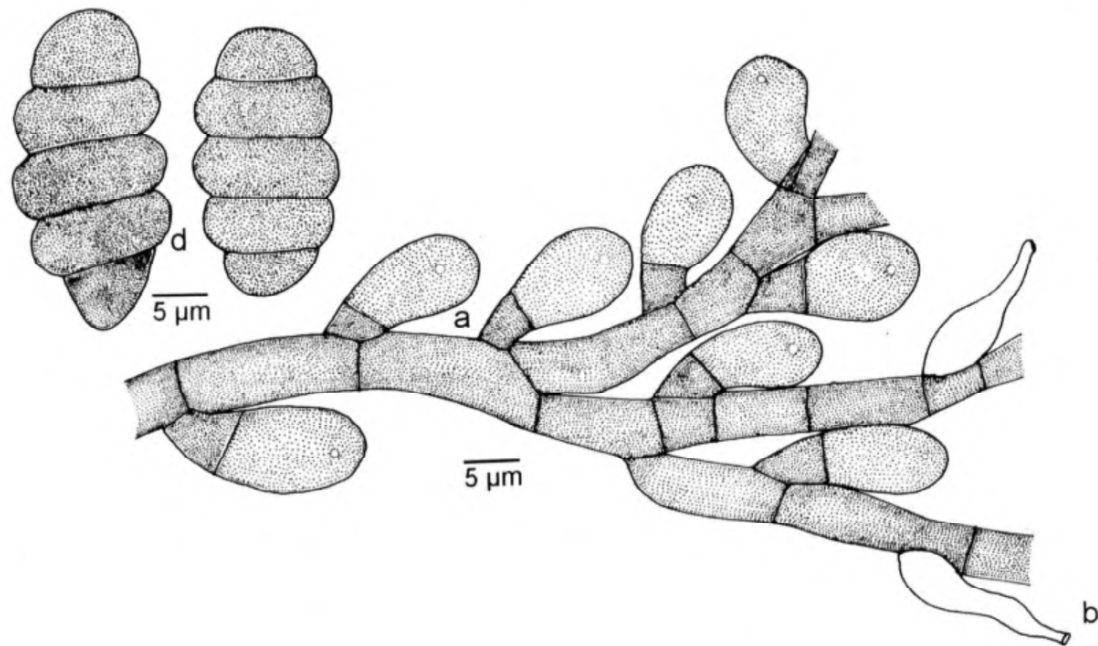


Fig. 1. *Amazonia dikesinghii* : a. Appressorium; b. Phialide; d. Ascospores.

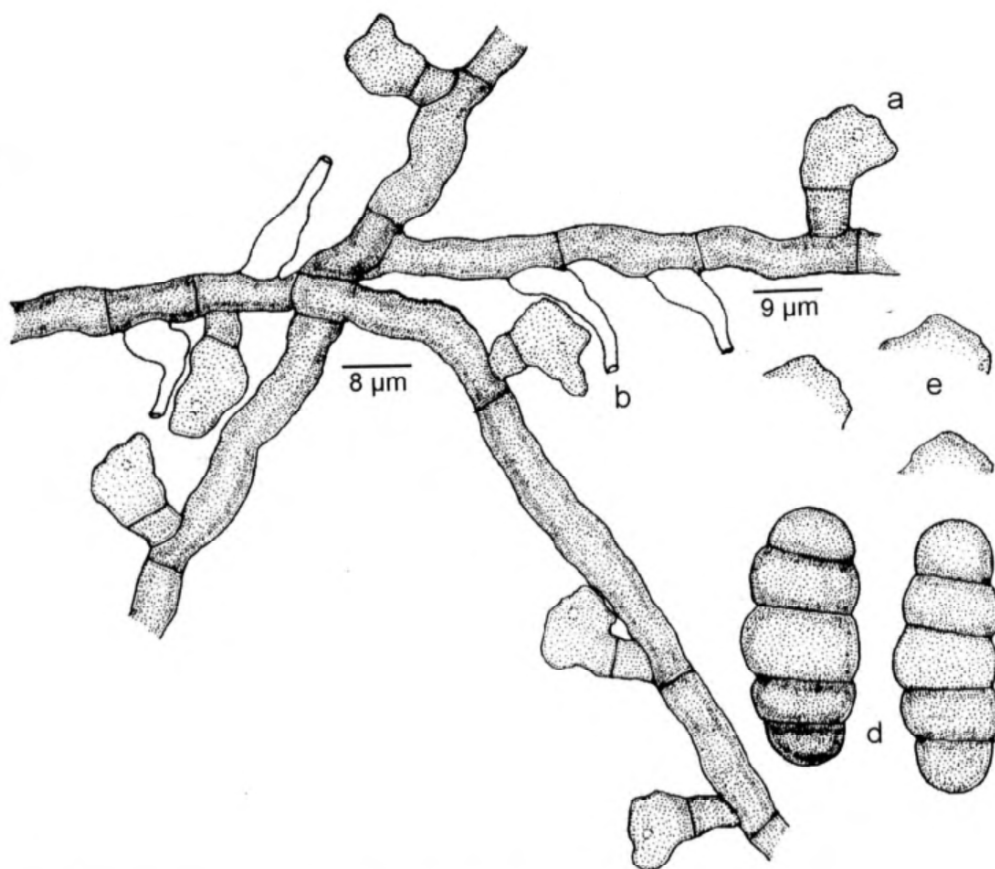


Fig. 2. *Asteridiella amomi* : a. Appressorium; b. Phialide; d. Ascospores; e. Perithecial wall cells.

Appressoria alternata et unilateralis, recta vel curvula, antrorsa vel patentia, 21-29 μm longa; cellulae basillares cylindratae vel cuneatae, 9-12 μm longae; cellulae apicales ovatae, globosae, angularis vel sublobatae, 12-18 $\times$ 9-15 μm . Phialides appressorii mixtus, alternatae vel oppositae, ampulliformes, 19-26 $\times$ 4-7 μm . Perithecia dispersa, ad 100 μm diam.; cellulae peritheciales conoideae vel mammiformes, 9-14 $\times$ 9-12 μm longae; ascospores ellipsoideae, 4-septatae, constrictus ad septatae, 36-41 $\times$ 14-17 μm .

Colonies amphigenous, dense, subvelvety, up to 4 mm in diameter, confluent. Hyphae substraight to slightly crooked, branching opposite to irregular at acute to wide angles, loosely reticulate, cells 19-36 $\times$ 7-10 μm . Appressoria alternate and unilateral, straight to curved, antrorse to spreading, 21-29 μm long; stalk cells cylindrical to cuneate, 9-12 μm long; head cells ovate, globose, angular to sublobate, 12-18 $\times$ 9-15 μm . Phialides mixed with appressoria, alternate to opposite, ampulliform, 19-26 $\times$ 4-7 μm . Perithecia scattered, up to 100 μm in diameter; perithecial cells conoid to mammiform, 9-14 $\times$ 9-12 μm long; ascospores ellipsoidal, 4-septate, constricted at the septa, 36-41 $\times$ 14-17 μm .

Other materials examined: On leaves of *Amomum subulatum* Roxb. (Zingiberaceae), Athirumala, Peppara Wildlife Sanctuary, Thiruvananthapuram, Kerala, March 4, 2008, Jacob Thomas & al. HCIO, TBGT 3209. Two species of the genus *Asteridiella*, namely, *A. costi* (Stev.) Hansf. and *A. parasitica* (Stev.) Hansf. are known on *Costus* sp. from Panama and Ecuador, respectively. However, *Asteridiella amomi* differs from both the species in having broader mycelial cells, longer appressoria with entire to lobate head cells. Further, this forms the first record of meliolaceous fungus on the genus *Amomum* (Hansford, 1961).

3. *Meliola aganopes* Hosag., J. Thomas & D.K. Agarwal sp. nov. (Fig. 3).

Typus: On leaves of *Aganope thyrsiflora* (Benth.) Polh. (Fabaceae), Vazhachal, Thrissur, Kerala, Aug. 21, 2007, Jacob Thomas & al. HCIO 49016 (holotype), TBGT 3271 (isotype).

Coloniae epiphyllae, subdensae, crustosae, ad 4 mm diam., confluentes. Hyphae rectae, oppositae acuteque vel subacuteque ramosae, laxae reticulatae, cellulae 24-46 $\times$ 4-7 μm . Appressoria alternata, ad 1% opposita, antrorsa vel patentia, recta vel curvula, 14-19 μm longa; cellulae basillares cylindratae vel cuneatae, 2-5 μm longae; cellulae apicales ovatae vel oblongae, integrae, rotundatae ad apicem, 9-15 $\times$ 7-10 μm . Phialides appressorii mixtus, alternatae vel oppositae, ampulliformes, 14-22 $\times$ 6-8 μm . Setae myceliales numerosae, dispersae, rectae, simplices, acutae vel dentatae ad apicem, ad 740 μm longae. Perithecia dispersa, verrucosa, ad 170 μm diam.; ascospores cylindratae vel oblongae, 4-septatae, constrictus ad septatae, 33-38 $\times$ 12-15 μm .

Colonies epiphyllous, subdense, crustose, up to 4 mm in diameter, confluent. Hyphae straight, branching opposite at acute to subacute angles, loosely reticulate, cells 24-46 $\times$ 4-7 μm . Appressoria alternate, about 1% opposite, antrorse to spreading, straight to curved, 14-19 μm long; stalk cells cylindrical to cuneate, 2-5 μm long; head cells ovate to oblong, entire, rounded at the apex, 9-15 $\times$ 7-10 μm . Phialides mixed with appressoria, alternate to opposite, ampulliform, 14-22 $\times$ 6-8 μm . Mycelial setae fairly numerous, scattered, straight, simple, acute to dentate at the tip, up to 740 μm long. Perithecia scattered, verrucose, up to 170 μm in diam.; ascospores cylindrical to oblong, 4-septate, constricted at the septa, 33-38 $\times$ 12-15 μm .

Based on the digital formula 31¹/₃.3223, *Meliola aganopes* is similar to *M. teramni* var. *milletiae* Hosag. reported on *Milletia rubiginosa* from the Western Ghats region of Tamil Nadu (Hosagoudar & Goos, 1991; Hosagoudar, 1996). However, *Meliola aganopes* differs from it in having typically ovate to oblong head cells of appressoria with appreciable number of mycelial setae.

4. *Meliola cayratiae* Hosag., J. Thomas & D.K. Agarwal sp. nov. (Fig. 4).

Typus: On leaves of *Cayratia pedata* (Lam.) A.L.Juss. ex Gagnepain (Vitaceae), Pongalappara, Neyyar Wildlife Sanctuary, Thiruvananthapuram, Kerala, March 1, 2008, Jacob Thomas HCIO 48840 (holotype), TBGT 3216 (isotype), TBGT 3217.

Coloniae epiphyllae, densae, velutinae, dispersae, ad 2 mm diam.. Hyphae rectae vel undulatae, oppositae acuteque vel laxae ramosae, arte reticulatae et formans rete mycelialis, cellulae 12-22 $\times$ 7-12 μm . Appressoria opposita, ad 20% alternata vel unilateralis, dense positus, plerumque antrorsa, raro patentia, recta vel leniter curvula, 16-22 μm longa; cellulae basillares cylindratae vel cuneatae, 2-5 μm longae; cellulae apicales ovatae vel oblongae, cylindratae, integrae, leniter angularis, saepe truncatae ad apicem, 14-19 $\times$ 9-15 μm . Phialides

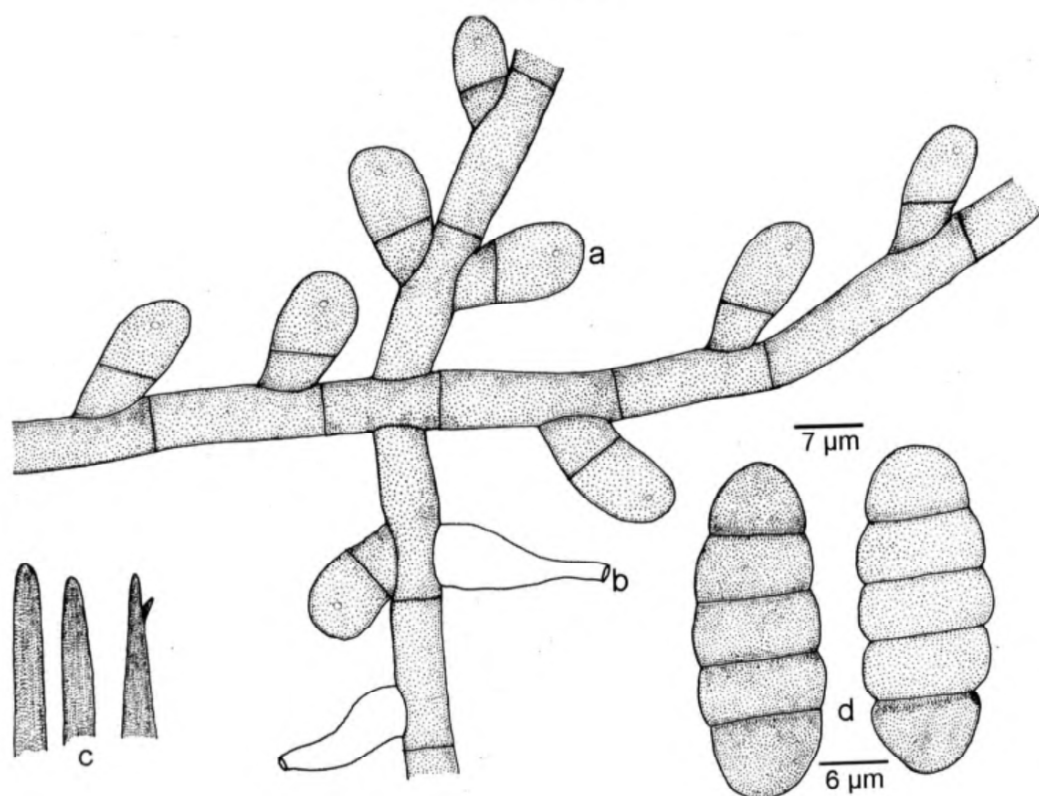


Fig. 3. *Meliola aganopes* : a. Appressorium; b. Phialide; c. Apical portion of the mycelial setae; d. Ascospores.

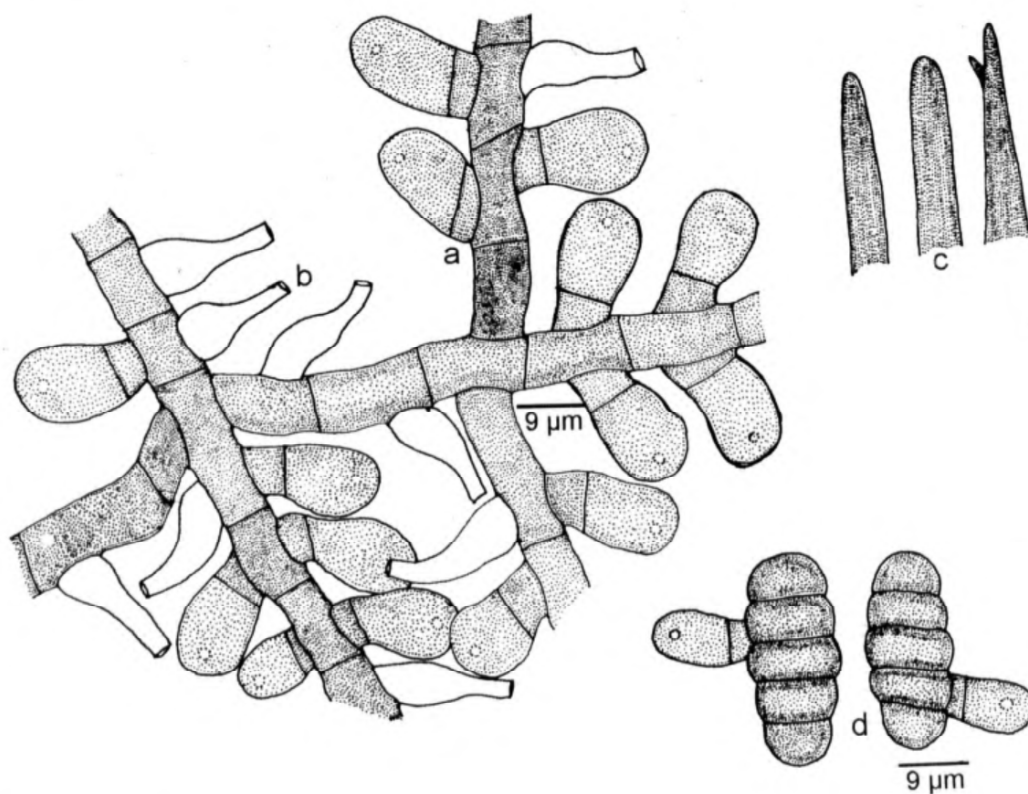


Fig. 4. *Meliola cayratiae* : a. Appressorium; b. Phialide; c. Apical portion of the mycelial setae; d. Ascospores.

appressoriis mixtus, alternatae to oppositae, ampulliformes, $16-22 \times 7-10 \mu\text{m}$. Setae myceliales circa perithecia aggregatae, rectae, simplices, obtusae vel late rotundatae ad apicem, ad $520 \mu\text{m}$ longae. Perithecia dispersa, verrucosa, ad $240 \mu\text{m}$ diam.; ascospores cylindraceae vel subellipsoideae, 4-septatae, constrictus ad septatae, $38-43 \times 14-17 \mu\text{m}$.

Colonies epiphyllous, dense, velvety, scattered, up to 2 mm in diameter. Hyphae straight to undulate, branching opposite at acute to wide angles, closely reticulate to form a mycelial mat, cells $12-22 \times 7-12 \mu\text{m}$. Appressoria opposite, about 20% alternate to unilateral, very closely placed, mostly antrorse, rarely spreading, straight to slightly curved, $16-22 \mu\text{m}$ long; stalk cells cylindrical to cuneate, $2-5 \mu\text{m}$ long; head cells ovate to oblong, cylindrical, entire, slightly angular, often truncate at the apex, $14-19 \times 9-15 \mu\text{m}$. Phialides mixed with appressoria, alternate to opposite, ampulliform, $16-22 \times 7-10 \mu\text{m}$. Mycelial setae grouped around perithecia, straight, simple, obtuse to broadly rounded at the tip, up to $520 \mu\text{m}$ long. Perithecia scattered, verrucose, up to $240 \mu\text{m}$ in diam.; ascospores cylindrical to subellipsoidal, 4-septate, constricted at the septa, $38-43 \times 14-17 \mu\text{m}$.

Based on the digital formula 3113.4233, it is similar to *Meliola bakeri* Sydow (Hansford, 1961; Hosagoudar, 1997; Hosagoudar & Agarwal, 2008) but differs from it in having mycelial setae grouped around perithecia with broadly obtuse tip. Often sterile mycelia emerged from the base of the perithecia.

5. *Meliola cipadessae* Hosag., J. Thomas & D.K. Agarwal sp. nov. (Fig. 5).

Typus: On leaves of *Cipadessa bacciferra* (Roth) Miq. (Meliaceae), Bonoccord, Peppara Wildlife Sanctuary, Thiruvananthapuram, Kerala, March 6, 2008, Jacob Thomas HCIO 48871 (holotype), TBGT 3247 (isotype).

Coloniae epiphyllae, tenues, velutinae, dispersae, ad 2 mm diam., confluentes, mixtus colonies *Aserina cipadessae*. Hyphae rectae vel subrectae, opposite acuteque ramosae, arte reticulatae, cellulae $16-26 \times 6-8 \mu\text{m}$. Appressoria alternata, recta vel curvula, antrorsa vel patentia, $16-21 \mu\text{m}$ longa; cellulae basilares cylindracea vel cuneata, $4-8 \mu\text{m}$ longa; cellulae apicales rectae vel curvulae, ovatae, globosae, cylindracea, integrae, $11-16 \times 6-10 \mu\text{m}$. Phialides appressoriis mixtus, alternatae vel oppositae, ampulliformes, $12-19 \times 6-8 \mu\text{m}$. Setae myceliales dispersae vel juxta perithecia aggregatae, simplices, rectae, acutae vel obtusae ad apicem, ad $550 \mu\text{m}$ longae. Perithecia aggregata, verrucosa, ad $210 \mu\text{m}$ diam.; ascospores obovoideae vel cylindracea, 4-septatae, constrictus ad septatae, $32-35 \times 12-15 \mu\text{m}$.

Colonies epiphyllous, thin, velvety, up to 2 mm in diameter, confluent, mixed with the colonies of *Aserina cipadessae*. Hyphae straight to substraight, branching opposite at acute angles, closely reticulate, cells $16-26 \times 6-8 \mu\text{m}$. Appressoria alternate, straight to curved, antrorse to spreading, $16-21 \mu\text{m}$ long; stalk cells cylindrical to cuneate, $4-8 \mu\text{m}$ long; head cells straight to curved, ovate, globose, cylindrical, entire, $11-16 \times 6-10 \mu\text{m}$. Phialides mixed with appressoria, alternate to opposite, ampulliform, $12-19 \times 6-8 \mu\text{m}$. Mycelial setae scattered to grouped around perithecia, simple, straight, acute to obtuse at the tip, up to $550 \mu\text{m}$ long. Perithecia grouped, verrucose, up to $210 \mu\text{m}$ in diameter; ascospores obovoidal to cylindrical, 4-septate, constricted at the septa, $32-35 \times 12-15 \mu\text{m}$.

Based on the digital formula 3111.3233, it can be compared with *Meliola togoensis* Hughes var. *angulata* Hughes known on *Trichilia prieuriana* from Gold Coast. However, differs from it in having shorter appressoria with entire head cells. Further, this is the first report of the genus *Meliola* on this host genus *Cipadessa* (Hansford, 1961; Hosagoudar, 1997; Hosagoudar & Agarwal, 2008).

6. *Meliola mesuae* Hosag., J. Thomas & D.K. Agarwal sp. nov. (Fig. 6).

Typus: On leaves of *Mesua ferrea* L. (Clusiaceae), Kombe, Bonoccord, Peppara Wildlife Sanctuary, Thiruvananthapuram, Kerala, Feb. 28, 2008, Jacob Thomas HCIO 49074 (holotype), TBGT 3329 (isotype).

Coloniae amphigenae, plerumque epiphyllae, densae, ad 4 mm diam., raro confluentes. Hyphae straight, opposite acuteque vel laxae ramosae, laxae vel arte reticulatae, cellulae $15-26 \times 6-9 \mu\text{m}$. Appressoria alternata, ad 2% opposita, dense posita, antrorsa vel subantrorsa, recta vel curvula, $17-29 \mu\text{m}$ longa; cellulae basilares cylindracea vel cuneatae, $4-13 \mu\text{m}$ longae; cellulae apicales ovatae vel globosae, integrae, raro angularis, $11-20 \times 13-18 \mu\text{m}$. Phialides appressoriis mixtus, alternatae vel oppositae, ampulliformes, $13-26 \times 6-9 \mu\text{m}$. Setae myceliales paucae, rectae, simplices, acutae ad apicem, ad $280 \mu\text{m}$ longae. Perithecia dispersa, verrucosa, ad $180 \mu\text{m}$ diam.; ascospores cylindracea vel ellipsoideae, 4-septatae, leniter constrictus ad septatae, $37-42 \times 17-20 \mu\text{m}$.

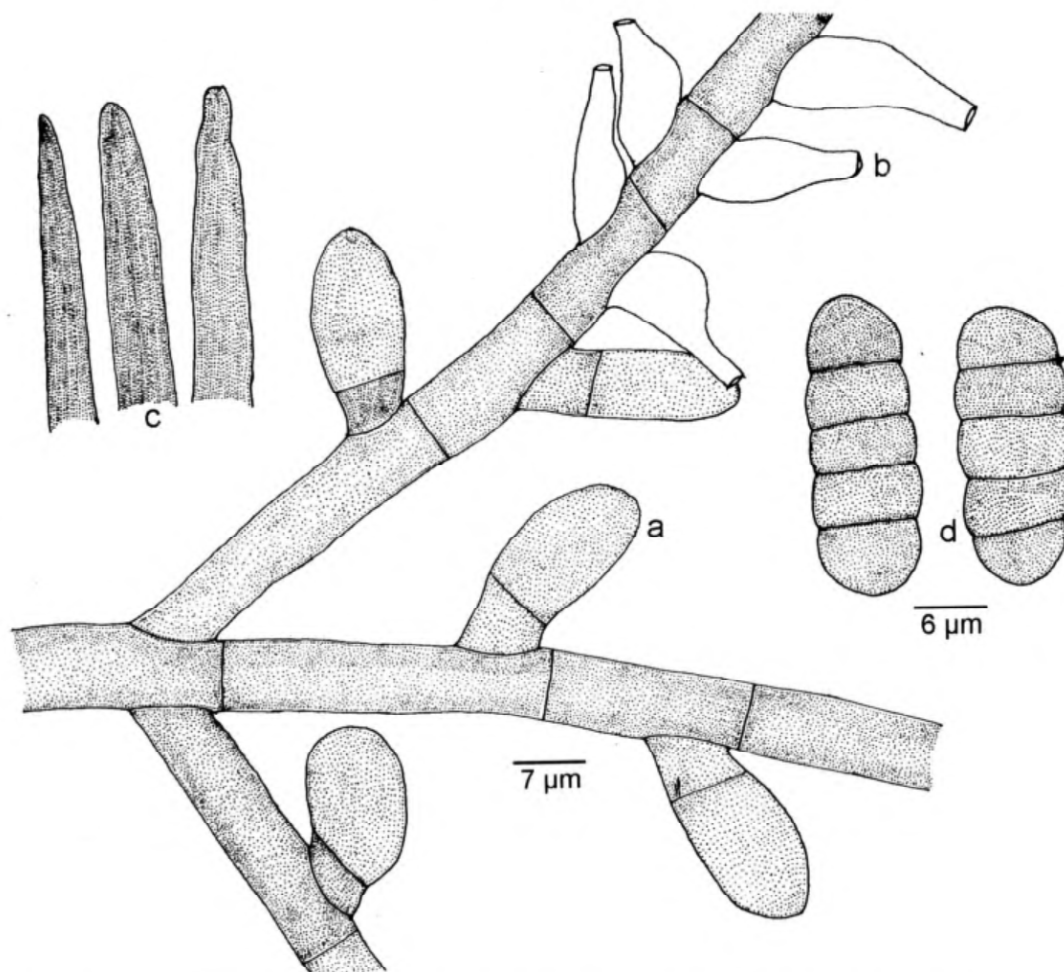


Fig. 5. *Meliola cipadessae* : a. Appressorium; b. Phialide; c. Apical portion of the mycelial setae; d. Ascospores.

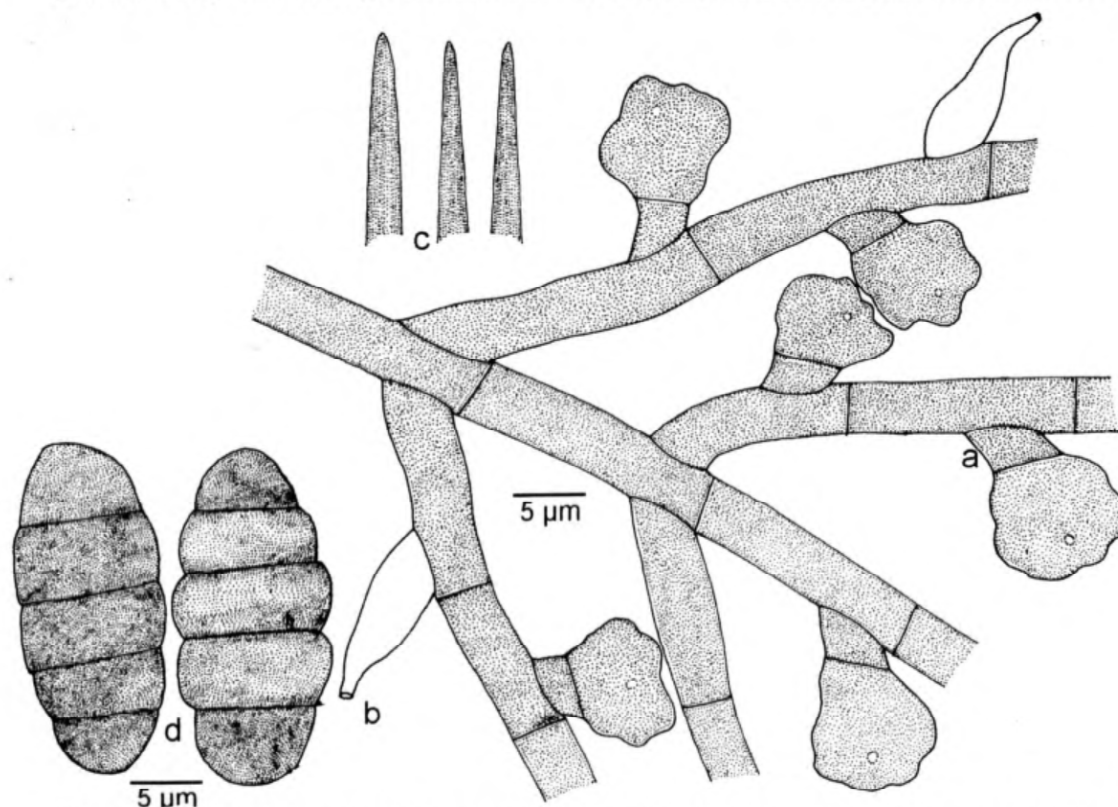


Fig. 6. *Meliola mesuae* : a. Appressorium; b. Phialide; c. Apical portion of the mycelial setae; d. Ascospores.

Colonies amphigenous, mostly epiphyllous, dense, up to 4 mm in diameter, rarely confluent. Hyphae straight, branching opposite at acute to wide angles, loosely to closely reticulate, cells $15-26 \times 6-9 \mu\text{m}$. Appressoria alternate, about 2% opposite, closely arranged, antrorse to subantrorse, straight to curved, $17-29 \mu\text{m}$ long; stalk cells cylindrical to cuneate, $4-13 \mu\text{m}$ long; head cells ovate to globose, entire, rarely angular, $11-20 \times 13-18 \mu\text{m}$. Phialides mixed with appressoria, alternate to opposite, ampulliform, $13-26 \times 6-9 \mu\text{m}$. Mycelial setae few, straight, simple, acute at the tip, up to $280 \mu\text{m}$ long. Perithecia scattered, verrucose, up to $180 \mu\text{m}$ in diameter; ascospores cylindrical to ellipsoidal, 4-septate, slightly constricted at the septa, $37-42 \times 17-20 \mu\text{m}$.

Based on the angular head cells of the appressoria, this species can be compared with *Meliola clusiae* Stev. known on *Clusia* spp. from Porto Rico and Surinam but differs from it in having regularly antrorse appressoria, possessing few mycelial setae and having smaller ascospores (Hansford, 1961; Hosagoudar, 1996, 2008; Hosagoudar & al., 1997; Hosagoudar & Agarwal, 2008).

7. *Meliola sanjappae* Hosag., J. Thomas & D.K. Agarwal sp. nov. (Fig. 7).

Typus: On leaves of *Semecarpus travancorica* Bedd. (Anacardiaceae), Kombe, Neyyar Wildlife Sanctuary, Thiruvananthapuram, Kerala, Mar. 5, 2008, *Jacob Thomas* HClO 49043 (holotype), TBGT 3298 (isotype).

Coloniae epiphyllae, densae, velutinae, ad 4 mm diam., dispersa. Hyphae rectae, opposite laxae ramosae, arte reticulatae et formans rete myceliales, cellulae $17-35 \times 10-13 \mu\text{m}$. Appressoria alternata, ad 5% opposita, antrorsa vel retrorsa, recta vel curvula, $20-24 \mu\text{m}$ longa; cellulae basilares cylindratae vel cuneatae, $4-10 \mu\text{m}$ longae; cellulae apicales cylindratae vel clavatae, curvulae, integrae, truncatae, angularis vel raro sublobatae, $16-22 \times 9-16 \mu\text{m}$. Phialides appressoriiis mixtus, alternatae vel oppositae, ampulliformes, $11-16 \times 8-11 \mu\text{m}$. Setae myceliales dispersae, saepe numerosae, simplices, rectae, dichotomous ramosae, ramosum prima ad $250 \mu\text{m}$ longae, primus radii ad $70 \mu\text{m}$ longae, primus secundary ad $5 \mu\text{m}$ longae, acutae vel dentatae ad apicem, ramorum reflexae. Perithecia dispersa, verrucosa, ad $180 \mu\text{m}$ diam.; ascosporae obovoideae vel subellipsoideae, 4-septatae, constrictus ad septatae, $44-50 \times 20-23 \mu\text{m}$.

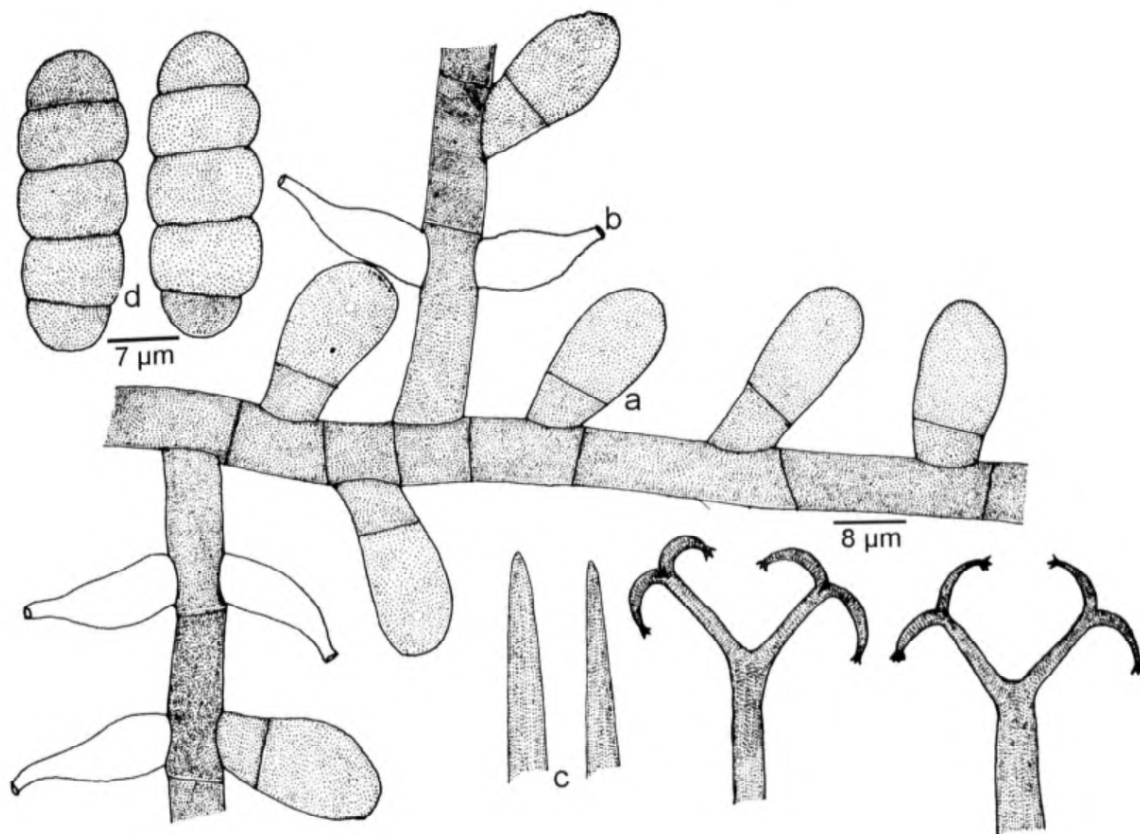


Fig. 7. *Meliola sanjappae* : a. Appressorium; b. Phialide; c. Apical portion of the mycelial setae; d. Ascospores.

Colonies epiphyllous, dense, velvety, up to 4 mm in diameter, scattered. Hyphae straight, branching opposite at wide angles, closely reticulate and form a mycelial net, cells $17-35 \times 10-13 \mu\text{m}$. Appressoria alternate, up to 5% opposite, antrorse to retrorse, straight to curved, $20-24 \mu\text{m}$ long; stalk cells cylindrical to cuneate, $4-10 \mu\text{m}$ long; head cells cylindrical to clavate, curved, entire, truncate, angular to rarely sublobate, $16-22 \times 9-16 \mu\text{m}$. Phialides mixed with appressoria, alternate to opposite, ampulliform, $11-16 \times 8-11 \mu\text{m}$. Mycelial setae scattered, fairly numerous, simple, straight, dichotomously branched, up to $250 \mu\text{m}$ long up to first branching, first ray up to $70 \mu\text{m}$ long, second ray up to $5 \mu\text{m}$ long, acute to dentate at the tip, branches reflexed. Perithecia scattered, verrucose, up to $180 \mu\text{m}$ in diameter; ascospores obovoidal to subellipsoidal, 4-septate, constricted at the septa, $44-50 \times 20-23 \mu\text{m}$.

Meliola tapiriae Stev. & Tehon and *M.brachydenta* Sydow var. *dammeri* Hansf. are the two taxa reported on *Tapiria* sp. and *Rhus villosa* from British Guiana and Uganda having dichotomously branched mycelial setae. However, the new species differs from both in having alternate and opposite appressoria and differ in ascospore measurements (Hansford, 1961; Hosagoudar, 1996; Hosagoudar & al. 1997; Hosagoudar & Agarwal, 2008).

This species is named in honour of Dr. M. Sanjappa, Director, Botanical Survey of India for his contribution to Fabaceae.

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भारत के मेलिओलेल्स में परिवर्धन

वी बी होसगौडार, जैकब थामस एवं डी के अग्रवाल

सार संक्षेप

इस शोधपत्र में केरल राज्य से संग्रह किए गए तीन वंशों के अंतर्गत सात नये मेलिओलेसिसअस कवक; यथा एमेजोनिआ डिकेसिंहई, एस्टेरिडिएला एमोमी, मेलिओला एगेनोपिस, मेलिओला केरेटिएड, मेलिओला सिपेडेसेड, मेलिओला मेसुएड एवं मेलिओला संजप्पाई का विस्तृत अभिलेख एवं चित्रांकण है।