

Meliolaceae of Kerala, India — XXI. New species and new records

V. B. HOSAGOUDAR

Microbiology Division, Tropical Botanic Garden and Research Institute, Palode 695 562, Thiruvananthapuram, Kerala, India

This paper gives an account of fourteen species of meliolaceous fungi belonging to the genera : *Amazonia*, *Asteridiella* and *Meliola*. Of these, *Asteridiella diotacanthi*, *A. strobilanthicola*, *Meliola agrostistachydis*, *M. calopogonii*, *M. cannonii*, *M. desmodiimotorii*, *M. devikulamensis*, *M. flemingiicola*, *M. geissaspidis*, *M. mitragynaetubulosae*, *M. spatholobii* and *M. sterculiacearum* are the new species. While, *Meliola oligomera* is reported for the first time from India. *Amazonia daphniphylli* is relocated from the Western Ghats region of Peninsular India. All these species are described and illustrated in detail.

Key words : *Amazonia*, *Asteridiella*, *Meliola*, Ascomycetes, Kerala, India, taxonomy

Amazonia daphniphylli M. S. Patil in Hosag., Patil & Balakr., *J. Econ. Taxon. Bot.* 13 : 76, 1989. (Fig. 1)

Colonies epiphyllous, dense, crustose, upto 2 mm in diameter, widely confluent and cover larger areas.

Hyphae straight to flexuous, branching alternate to rarely opposite at acute angles, closely reticulate and form solid mycelial mat, cells 22-24 × 6-8 μm. Appressoria alternate, antrorse to mostly closely appressed to the hyphae, 22-24 μm long ; stalk cells cylindrical to cuneate, 8-11 μm long ; head cells

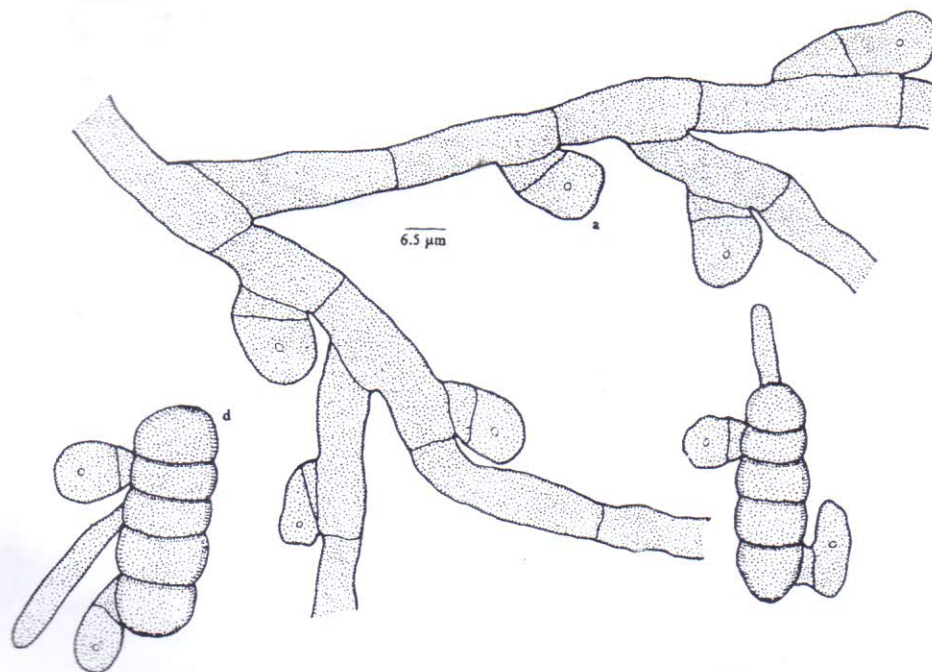


Fig. 1 : *Amazonia daphniphylli* M. S. Patil ; Abbreviations used : a-Appressorium, d-Ascospores

ovate, entire, $12-15 \times 9-11 \mu\text{m}$. Phialides not seen. Perithecia scattered to loosely grouped, hidden in the radiating mycelium, upto $343 \mu\text{m}$ in diameter; ascospores oblong, cylindrical, 4-septate, slightly constricted, $40-42 \times 14-16 \mu\text{m}$.

Material examined : On leaves of *Daphniphyllum neilgherrense* (Wight) Rosenth. (Daphniphyllaceae), Devikulam, Munnar, Idukki, Kerala, January 23, 2003, A. Manojkumar and H. Biju HCIO 44835, TBGT 1072.

Patil in Hosagoudar *et al.* (1989) described this species based on the collection from Kodaikanal, Tamil Nadu. Since colonies in the type material were missing, it was placed under 'species excluded' (Hosagoudar, 1996). The present collection revealed few colonies of this fungus with *Asterostomella daphniphylli* Hosag. & Ravikumar and hence, the revised description has been provided.

Asteridiella diotacanthi V. B. Hosagoudar, H. Biju et A. Manojkumar, sp. nov. (Fig. 2)

Colonies amphigenae, tenues vel tenueter subdensae, patentiae, ad 5 mm diam., confluentes. Hyphae subrectae vel flexuosae, alternatae vel irregulariter acuteque ramosae, laxe vel dense reticulatae, cellulae $22-24 \times 6-8 \mu\text{m}$. Appressoria alternate, antrorsa, subantrorsa vel patentia, $17-24 \mu\text{m}$ longa; cellulae basiliares cylindraceae vel cuneatae, $4-10 \mu\text{m}$ longae; cellulae apicales ovatae vel globosae, plerumque irregulariter angulosae, raro sublobatae vel fortiter lobatae, $12-15 \times 14-18 \mu\text{m}$. Phialides dispersa vel laxe aggregata ad coloniis, ampulliformes, $17-23 \times 7-9 \mu\text{m}$. Perithecia dispersa vel laxe aggregata ad coloniis centralis, globosa, ad $190 \mu\text{m}$ diam., cellulae perithecialis conoideae vel mammiformes, ad $20 \mu\text{m}$ longae; ascosporae oblongae, cylindratae vel leniter ellipsoideae, 4-septatae, constrictae, $36-40 \times 12-16 \mu\text{m}$.

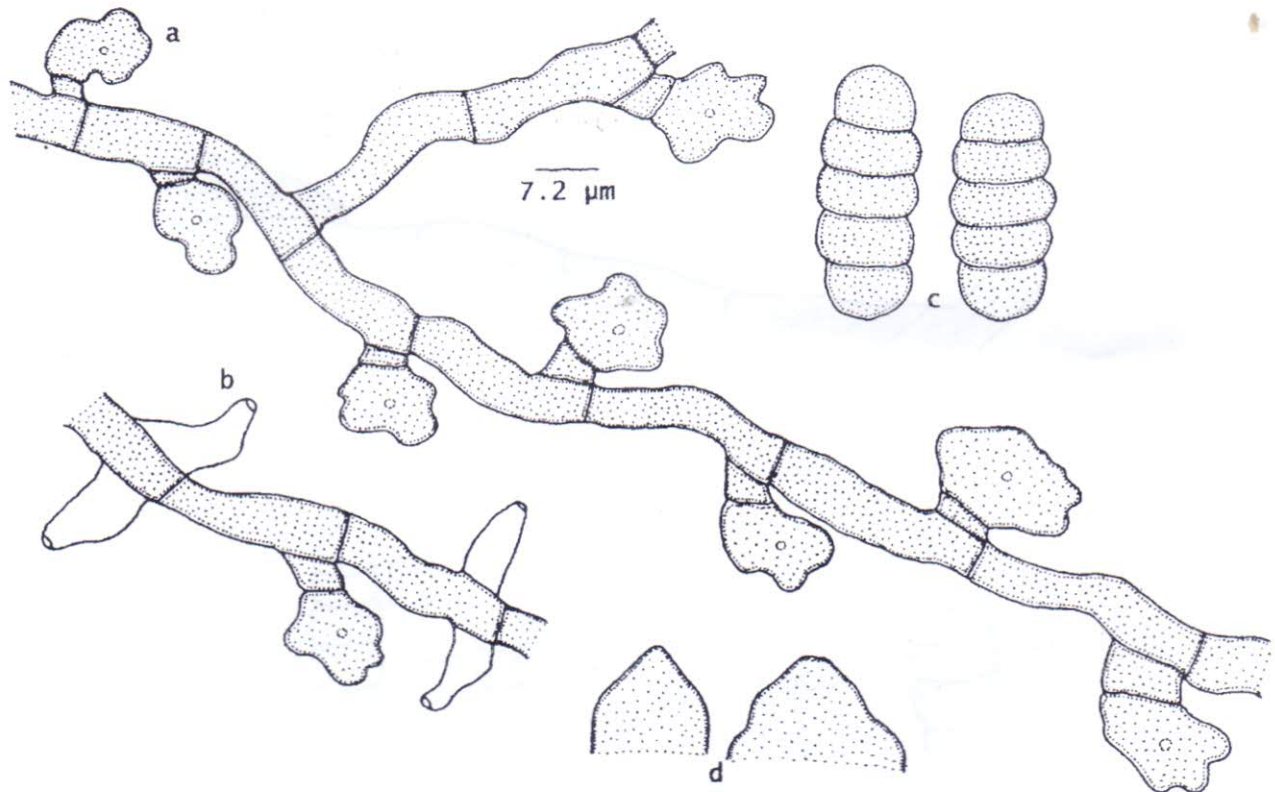


Fig. 2 : *Asteridiella diotacanthi* sp. nov. ; Abbreviations used : a-Appressorium, b-Phialide, d-Ascospores, e-Perithecial wall cells

Colonies amphigenous, thin to thinly subdense, spreading, upto 5 mm in diameter, confluent. Hyphae substraight of flexuous, branching alternate to irregular at acute angles, loosely to closely reticulate, cells 22-24 \times 6-8 μ m. Appressoria alternate, antrorse, subantrorse to spreading, 17-24 μ m long; stalk cells cylindrical to cuneate, 4-10 μ m long; head cells ovate to globose, mostly irregularly angular, rarely sublobate to deeply lobate, 12-15 \times 14-18 μ m. Phialides mixed with appressoria, alternate to opposite, ampulliform, 17-23 \times 7-9 μ m. Perithecia scattered to loosely grouped at the centre of the colonies, globose, upto 190 μ m in diameter, perithecial wall cells conoid to mammiform, upto 20 μ m long; ascospores oblong, cylindrical to slightly ellipsoidal, 4-septate, strongly constricted at the septa, 36-40 \times 12-16 μ m.

Material examined : On leaves of *Diotacanthus* sp. (Acanthaceae), Mannvan shola, Munnar, Idukki,

Kerala, January 21, 2003, H. Biju and A. Manojkumar HCIO 44828, TBGT 1065 (isotype).

Asteridiella diotacanthi differs from *Asteridiella anastomosans* Wint. var. *macilenta* (Wint.) Hansf. and *A. tumbergiae-chrysopidis* (Hansf. & Deight.) Hansf. in having angular to lobate head cells of appressoria (Hansford, 1961). It also differs from *A. phaulopsidis* Hosag. known from the Western Ghats in having thin and spreading colonies and smaller ascospores.

Etymology : Named after the host genus *Diotacanthus*

Asteridiella strobilanthicola V. B. Hosagoudar, H. Biju et A. Manojkumar, sp. nov. (Fig. 3)

Colonies epiphyllae, subdensae vel densae, ad 1 mm diam. Hyphae rectae vel flexuosae, plerumque

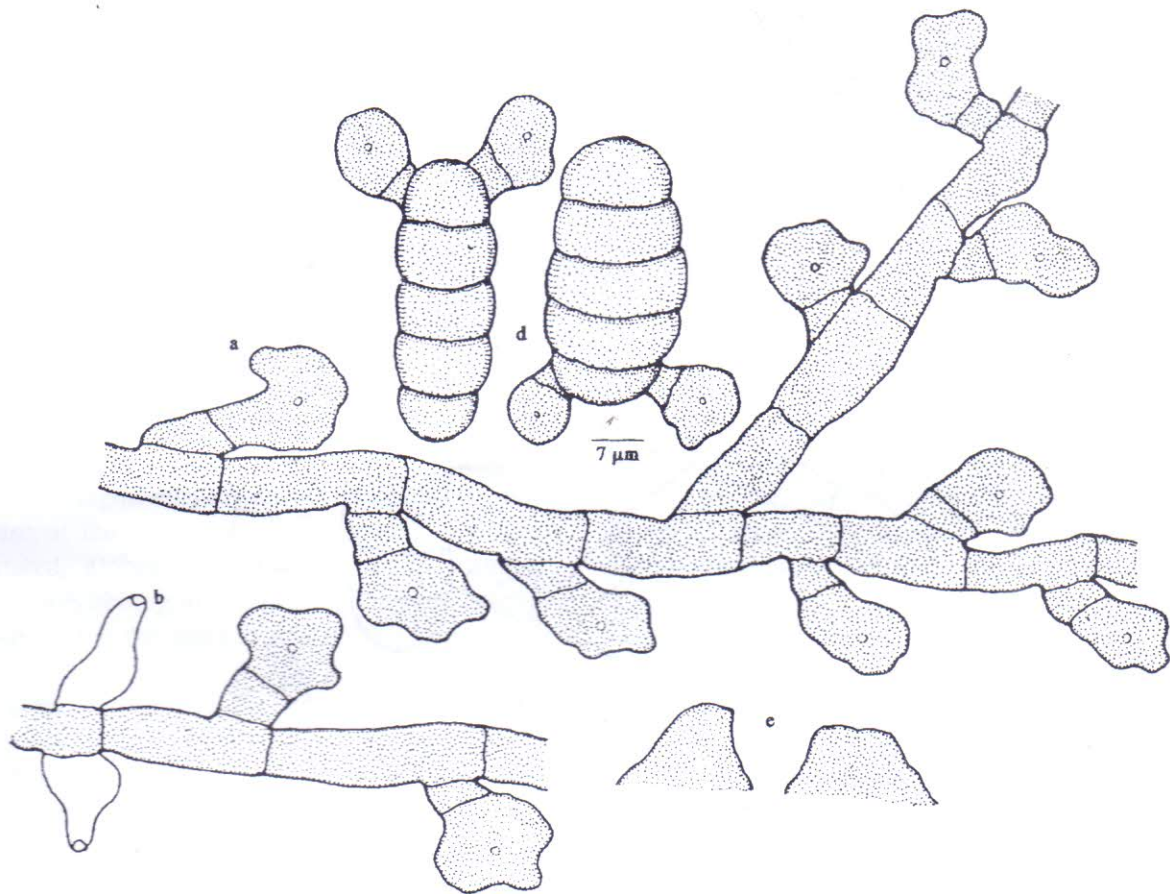


Fig. 3 : *Asteridiella strobilanthicola* sp. nov. : Abbreviations used : a-Appressorium, b-Phialide, d-Ascospores, e-Perithecial wall cells

opposite acuteque vel laxe ramosae, laxe vel dense reticulatae, cellulae $25-32 \times 6-8 \mu\text{m}$. Appressoria alternate, antrorsa, subantrorsa vel retrorsa, $6-11 \mu\text{m}$ longae; cellulae apicales ovatae, globosae, cylindratae, paucae integrae, angularis, sublobatae vel raro fortiter lobatae, $16-18 \times 11-13 \mu\text{m}$. Phialides appressorii mixtus, alternatae vel oppositae, ampulliformes, $16-21 \times 6-8 \mu\text{m}$. Perithecia dispersa vel dense aggregata, globosa, ad $200 \mu\text{m}$ diam.; cellulae peritheciae mammiformes, ad $14 \mu\text{m}$ longae; ascosporae oblongae, cylindratae vel leniter ellipsoideae, 4-septatae, constrictae, $38-42 \times 16-18 \mu\text{m}$.

Colonies epiphyllous, subdensae vel densae, upto 1 mm in diameter. Hyphae Straight or flexuous, branching mostly opposite at acute to wide angles, loosely to closely reticulate, cells $25-32 \times 6-8 \mu\text{m}$. Appressoria alternate, antrorse, subantrorse to retrorse, straight to curved, $24-28 \mu\text{m}$ long; stalk cells cylindrical to cuneate, $6-11 \mu\text{m}$ long; head cells ovate, globose, cylindrical, very few entire, angular, sublobate to rarely deeply lobate, $16-18 \times 11-13 \mu\text{m}$. Phialides mixed with appressoria, alternate to opposite, ampulliform, $16-21 \times 6-8 \mu\text{m}$. Perithecia scattered to loosely grouped, globose,

upto $200 \mu\text{m}$ in diameter, perithecial wall cells mammiform, upto $14 \mu\text{m}$ long; ascospores oblong, cylindrical to slightly ellipsoidal, 4-septate, constricted, $38-42 \times 16-18 \mu\text{m}$.

Material examined : On leaves of *Strobilanthus* sp. (Acanthaceae), Mannvan shola, Mannar, Kerala, January 21, 2002, A. Manojkumar and H. Biju HCIO 44839 (type), TBGT 1076 (isotype).

Based on the Beeli formula 3101.4220, *Asteridiella strobilanthicola* can be compared with *A. tumbergiae* (Stev. and Rold.) Hansf. However, the new species differs from the former in having smaller colonies and most of the head cells of appressoria are sublobate in contrast to entire. It differs from the latter in having only epiphyllous colonies and distantly arranged appressoria (Hansford, 1961).

Etymology : Named after the host genus *Strobilanthus*.

Meliola agrostistachydis V. B. Hosagoudar et G. Rajkumar, sp. nov. (Fig. 4)

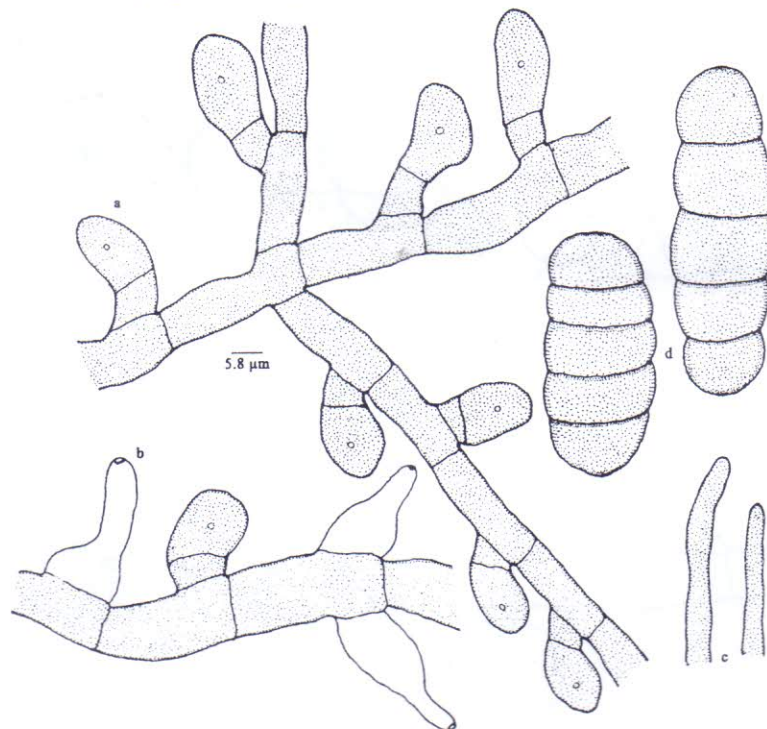


Fig. 4 : *Meliola agrostistachydis* sp. nov. : Abbreviations used : a-Appressorium, b-Phialide, c-Apical portion of mycelial setae, d-Ascospores

Colonies hypophyllae, subdensae vel densae, orbicularis, ad 8 mm diam., maculae coloniis persistentis. Hyphae rectae vel flexuosae, alternate, opposite vel irregulariter acuteque ramosae, laxae vel fortiter reticulatae, cellulae 24-32 × 7-9 µm. Appressoria alternate, ad 2% opposita, antrorsa, subantrorsa vel saepe patentia, racta vel curvula, 16-24 µm longae; cellulae basilares cylindratae vel cuneatae, 4-8 µm longae; cellulae apicales ovatae vel cylindratae, ractae vel raro curvulae, integrae, 11-16 × 11-13 µm. Phialides appressoriis mixtus, alternatae vel opposite, ampulliformes, 25-29 × 7-9 µm. Phialides appressoriis mixtus, alternatae vel opposite, ampulliformes, 25-29 × 7-9 µm. Setae myceliales dispersae, simplices, repentes, rectae, curvulae et non uncinatae, flexuosae, obtusae ad apicem, ad 441 µm longae. Perithecia dispersa, globosa, ad 274 µm diam.; ascosporae oblongae, vel cylindratae, 4-septatae, fortiter constrictae, 52-58 × 20-23 µm.

Colonies hypophyllous, subdensae to densae, scattered, orbicular, up to 8 mm in diameter, infection marks persisted on leaves after removing the colonies. Hyphae straight or flexuous, branching alternate, opposite at irregular to acute angles, loosely reticulate to very closely reticulate, cells 24-32 × 7-9 µm. Appressoria alternate, about 2% opposite, antrorse, subantrorse to often spreading, straight to curved, 16-24 µm long; stalk cells cylindrical to cuneate, 4-8 µm long; head cells ovate to cylindrical, straight to rarely curved, entire, 11-16 × 11-13 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 25-29 × 7-9 µm. Mycelial setae scattered, simple, repent, straight, curved but not uncinatae, flexuous, obtuse at the tip, up to 441 µm long. Perithecia scattered, globose, up to 274 µm in diameter; ascospores oblong to cylindrical, 4-septate, strongly constricted at the septa, 52-58 × 20-23 µm.

Material examined : On leaves of *Agrostistachys brneensis* Becc. (*A. meebolidii* Pax and Hoffm.) (Euphorbiaceae), Chemunji, Bonaccaud, Thiruvananthapuram, Kerala, March 21, 2001, G. Rajkumar HCIO 44869 (type), TBGT 1097 (isotype).

Based on the opposite appressoria and length of the ascospores, this species can be compared with *Meliola excoecariicola* Hansf. but differs from it in having repent and flexuous mycelial setae (Hansford, 1961).

Meliola caplopogonii V. B. Hosagoudar et A. Manojkumar, sp. nov. (Fig. 5)

Colonies epiphyllae, densae, ad 1 mm diam., dense dispersae, saepe confluentes. Hyphae subrectae vel leniter anfractuae, irregulariter acuteque ramosae, laxae vel arte reticulatae, cellulae 22-32 × 6-7 µm. Appressoria alternate, antrorsa, vel subantrorsa, 12-18 µm longa; cellulae basilares cylindratae vel cuneatae, 3-5 µm longa; cellulae apicales globosae, rectae vel curvulae, saepe attenuatae, integrae, 8-11 × 11-13 µm. Phialides mixtus appressoriis, alternatae vel opposite, ampulliformes, 14-16 × 7-9 µm. Setae myceliales paucae, juxta perithecia aggregate, simplices, rectae, acutae ad apicem, ad 300 µm longae.; Perithecia arte dispersa, globosa, verrucosa, ad 120 µm in diam.; ascosporae oblongae, cylindratae vel leniter ellipsoideae, 4-septatae, leniter constrictae, 33-36 × 12-15 µm.

Colonies epiphyllous, densae, up to 1 mm in diameter, closely scattered, often confluent. Hyphae substraight to slightly crooked, branching irregular at acute to wide angles, loosely to closely reticulate, cells 22-32 × 6-7 µm. Appressoria alternate, antrorse to subantrorse, 12-18 µm long; stalk cells cylindrical to cuneate, 3-5 µm long; head cells globose, straight to curved, often attenuated, entire, 8-11 × 11-13 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 14-16 × 7-9 µm. Mycelial setae few, grouped around perithecia, simple, straight, acute at the tip, up to 120 µm in diameter; ascospores oblong, cylindrical to slightly ellipsoidal, 4-septate, slightly constricted, at the septa, 33-36 × 12-15 µm.

Material examined : On leaves of *Calopogonium mucunoides* Desv. (Fabaceae), Kulatharakaitha, Kollayil, Kollam, Kerala, December 27, 2002, A. Manojkumar HCIO 44810 (type), TBGT 1047 (isotype).

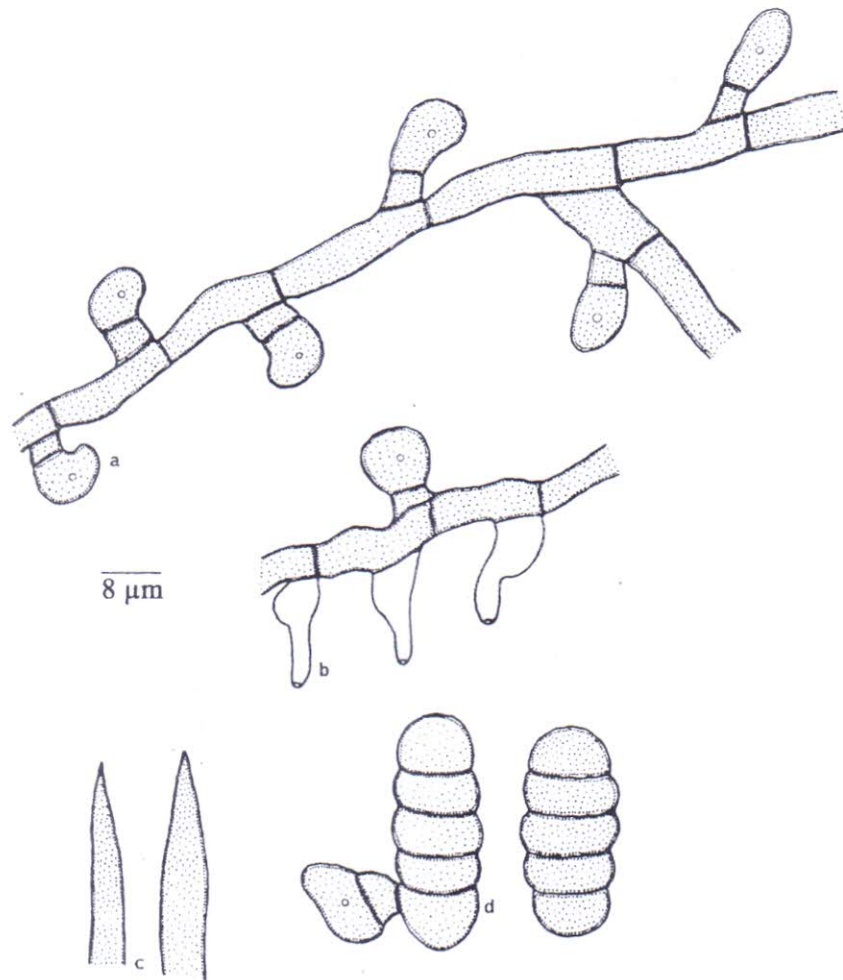


Fig. 5 : *Meliola calopogonii* sp. nov. ; Abbreviations used : a-Appressorium, b-Phialide, c-Apical portion of mycelial setae, d-Ascospores

Based on the simple mycelial setae and alternate appressoria, *Meliola calopogonii* is closer to *M. loncocarpi* Speg. (Hansford, 1961). However, differs from it in having entire head cells of the appressoria and phialides mixed with appressoria.

This host plant is a pubescent creeping herb, introduced from America as a ground cover and also to prevent soil erosion in Rubber and plantations. Now, this plant is running wild (Santapau and Henry, 1984).

Etymology : Named after the host genus *Calopogonium*.

Meliola cannonii sp. nov. (Fig. 6)

Colonies amphigenae, plerumque hypophyllae,

subdensae, ad 2 mm diam., confluentes. Hyphae subrectae, flexuosae vel anfractuae, opposite vel irregulariter acuteque vel laxe ramosae, laxe reticulatae, cellulae $16-20 \times 6-8 \mu\text{m}$. Appressoria alternate, minusve 1% opposita, antrorsa, subantrorsa vel recurvata, $17-26 \mu\text{m}$ longa ; cellulae basilares cylindratae vel cuneatae, $6-10 \mu\text{m}$ longae ; cellulae apicales ovatae, oblongae, integrae vel angularis, attenuatae vel truncatae ad apicem, $11-16 \times 8-12 \mu\text{m}$. Phialides numerosae, appressoriiis, intermixtae, alternatae vel opposite, ampulliformes, $12-20 \times 6-8 \mu\text{m}$. Setae myceliales dispersae vel juxta perithecia aggregate, simplices, rectae, curvulae vel uncinatae, acutae ad apicem, ad $350 \mu\text{m}$ longae. Perithecia dispersa vel laxe aggregata, ad $130 \mu\text{m}$ in diam. ; ascosporae cylindratae, 4-septatae, constrictae, $30-32 \times 12-15 \mu\text{m}$.

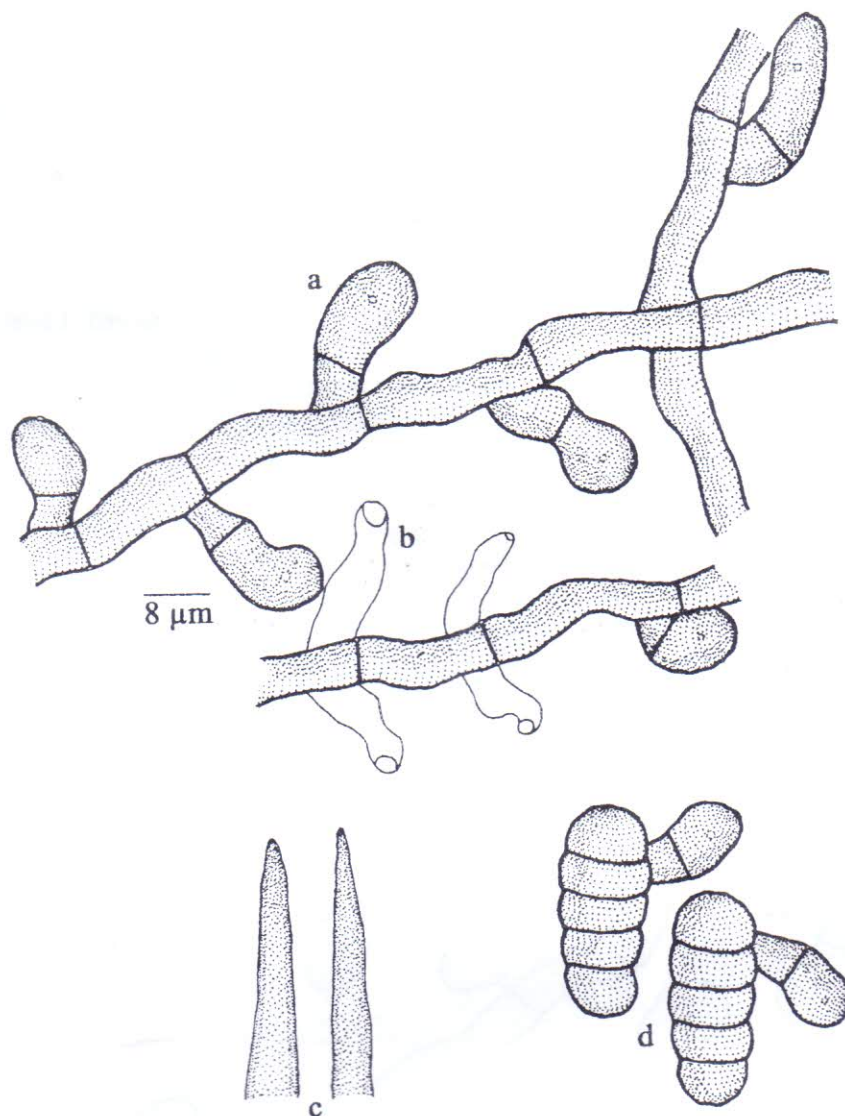


Fig. 6 : *Meliola cannonii* sp. nov. ; Abbreviations used : a-Appressorium, b-Phialide, c-Apical portion of mycelial setae, d-Ascospores

Colonies amphigenous, mostly hypophyllous, subdense, up to 2 mm in diameter, confluent. Hyphae substraight, flexuous to crooked, branching opposite to irregular at acute to wide angles, loosely reticulate, cells $16-20 \times 6-8 \mu\text{m}$. Appressoria alternate, less than 1% opposite, antrorse, subantrorse to recurved, $17-26 \mu\text{m}$ long ; stalk cells cylindrical to cuneate, $6-10 \mu\text{m}$ long ; head cells ovate, oblong, entire to angular, attenuated to truncate at the apex, $11-16 \times 8-12 \mu\text{m}$. Phialides numerous, mixed with appressoria, alternate to opposite, ampulliform, $12-20 \times 6-8 \mu\text{m}$. Mycelial setae scattered to grouped around perithecia, simple, straight, curved to unciniate, acute at the tip, up to $350 \mu\text{m}$ long. Perithecia scattered to loosely

grouped, up to $130 \mu\text{m}$ in diameter ; ascospores cylindrical 4-septate, constricted at the septa, $30-32 \times 12-15 \mu\text{m}$.

Material examined : On leaves of *Strychnos nuxvomica* L. (Strychnaceae), Eanikara, Karakulam, Thiruvananthapuram, Kerala, December 12, 2000, Mrs. H. V. Sharada HCIO 44818 (type), TBGT 389 (isotype).

Based on the morphology of appressoria, *Meliola cannonii* is similar to *M. strychni-multiflorae* Hansf. known on *Strychnos multiflora* from Philippines but differs from it in having closely arranged appressoria, shorter and straight to

uncinate mycelial setae (Hansford, 1961). Based on the uncinete mycelial setae, it can be compared with *M. gamsii* Hosag. and Shibu, but differs from it in having hypophyllous colonies, crooked hyphae and with antrorse appressoria (Hosagoudar & Shiburaj, 2002)

Etymology : This species is named in honour of Dr. P. F. Cannon for his devotion to microfungi.

Meliola desmodii-motorii V. B. Hosagoudar et A. Manojkumar, sp. nov. (Fig. 7)

leniter constrictate, 35-38 × 11-13 μm.

Colonies epiphyllous, subdense to densae, up to 2 mm in diameter, rarely confluent. Hyphae flexuosae to crooked, branching mostly opposite, rarely irregular at wide angles, loosely to closely reticulate, cells 19-43 × 4-7 μm. Appressoria alternate, about 5% opposite, antrorse subantrorse to retrorse, straight to curved, 12-16 μm long; stalk cells cylindrical to cuneate, 3-7 μm long; head cells ovate, globose, straight to curved, entire, often attenuated, 9-11 × 8-10 μm. Phialides many, mixed

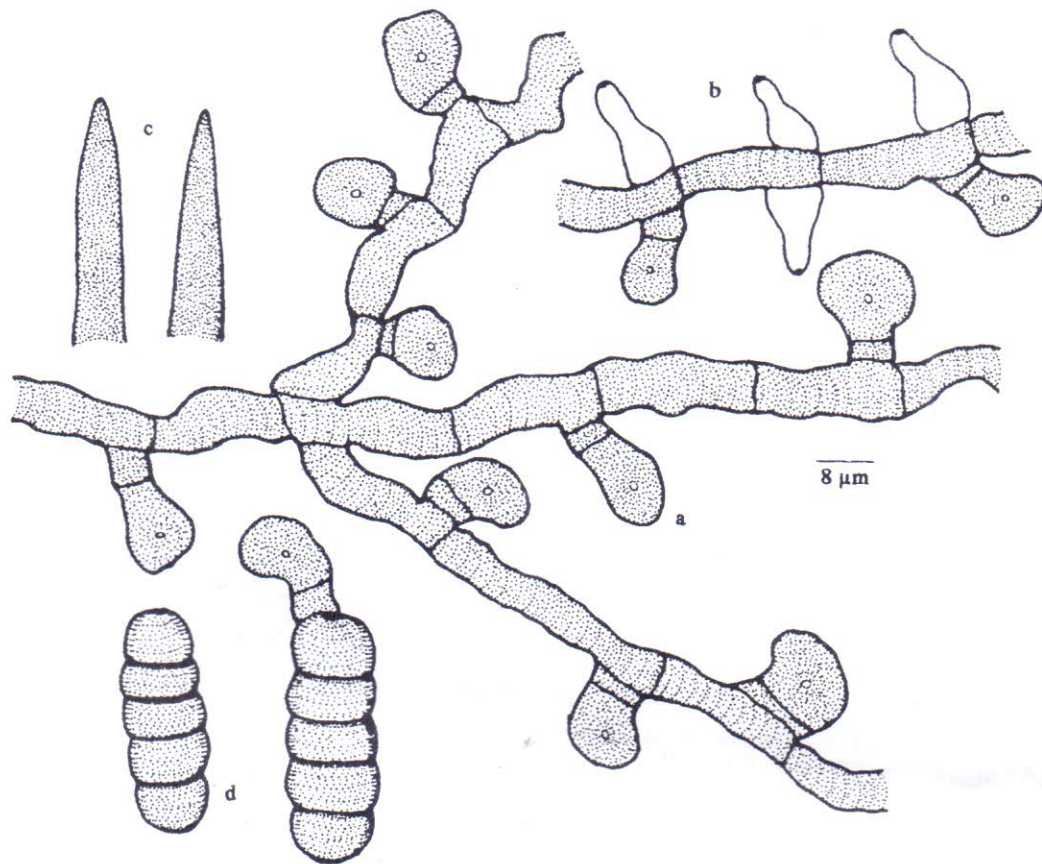


Fig. 7 : *Meliola desmodii-motorii* sp. nov. ; Abbreviations used : a-Appressorium, b-Phialide, c-Apical portion of mycelial setae, d-Ascospores

Colonies epiphyllae, subdensae, vel densae, ad 2 mm diam., raro confluentes. Hyphae flexuosae vel anfractuae, plerumque opposite, raro irregulariter laxe ramosae, laxe vel dense reticulatae, cellulae 19-43 × 4-7 μm. Appressoria alternate, ad 5% opposita, antrorsa, subantrorsa vel retrorsa, recta vel curvula, 12-16 μm longa; cellulae basiliares cylindraceae vel cuneatae, 3-7 μm longa; cellulae

apicales ovatae, globosae, rectae vel curvulae, integrae, saepe attenuatae, 9-11 × 8-10 μm. Phialides numerosae, mixtus appressoriis, alternatae vel opposite, ampulliformes, 12-18 × 6-8 μm. Setae myceliales numerosae, dispersae, simplices, rectae, acutae ad apicem, ad 300 μm longae. Perithecia laxe dispersa, globosa, ad 175 μm diam; ascosporae oblongae, cylindraceae, 4-septatae,

with appressoria, alternate to opposite, ampulliform, $12-18 \times 6-8 \mu\text{m}$. Mycelial setae numerous, scattered, simple, straight, acute at the tip, up to $300 \mu\text{m}$ long. Perithecia loosely scattered, globose, up to $175 \mu\text{m}$ in diameter; ascospores oblong, cylindrical 4-septate, slightly constricted, at the septa, $35-38 \times 11-13 \mu\text{m}$.

Material examined : On leaves of *Desmodium motorium* (Houtt.), Merr. (Fabaceae), Placherry forest, Ranni, Pathanamthitta, Kerala, December 6, 2002, A. Manojkumar HCIO 44807 (type), TBGT 1044 (isotype).

The present species comes under the Beeli formula 3113.3221. Two taxa, namely, *Meliola desmodii* Karst and Roum. var. *heterochaeta* Cif. and *M. desmodii*triquetri Hosag. and Manoj are coming under this formula. *Meliola desmodii* Karst and Roum. is synonymous to *M. bicornis* Wint. and hence it is not tenable (Hansford, 1961). *Meliola desmodii*-*motorii* differs from *M. desmodii*-*triquetri* Hosag. and Manoj. in having epiphyllous colonies and flexuous to crooked hyphae.

Etymology : Named after the host *Desmodium motorium*.

Meliola devikulamensis V. B. Hosagoudar, H. Biju et A. Manojkumar. sp. nov. (Fig. 8)

Colonies epiphyllae, densae, velutinae, ad 2 mm diam., raro confluentes. Hyphae rectae vel subrectae, alternate, opposite vel irregulariter acuteque vel laxe ramosae, laxe vel fortiter reticulatae, cellulae $22-26 \times 8-10 \mu\text{m}$. Appressoria alternate, antrorsa vel subantrorsa, $30-36 \mu\text{m}$ longa; cellulae basillares cylindratae vel cuneatae, $11-13 \mu\text{m}$ longa; cellulae apicales ovatae, oblongae, rectae vel curvulae, angulosae vel irregulariter sublobatae vel lobatae, $17-24 \times 14-20 \mu\text{m}$. Phialides appressoriis mixtus, alternatae vel opposite, ampulliformes, $17-32 \times 8-10 \mu\text{m}$. Setae myceliales dispersae, simplices, rectae, obtusae ad apicem, ad $600 \mu\text{m}$ longae. Perithecia dispersa, vel laxe aggregata, globosa, ad $170 \mu\text{m}$ diam; ascospores oblongae vel ellipsoideae, 4-septatae, constrictae, $58-60 \times 24-26 \mu\text{m}$.

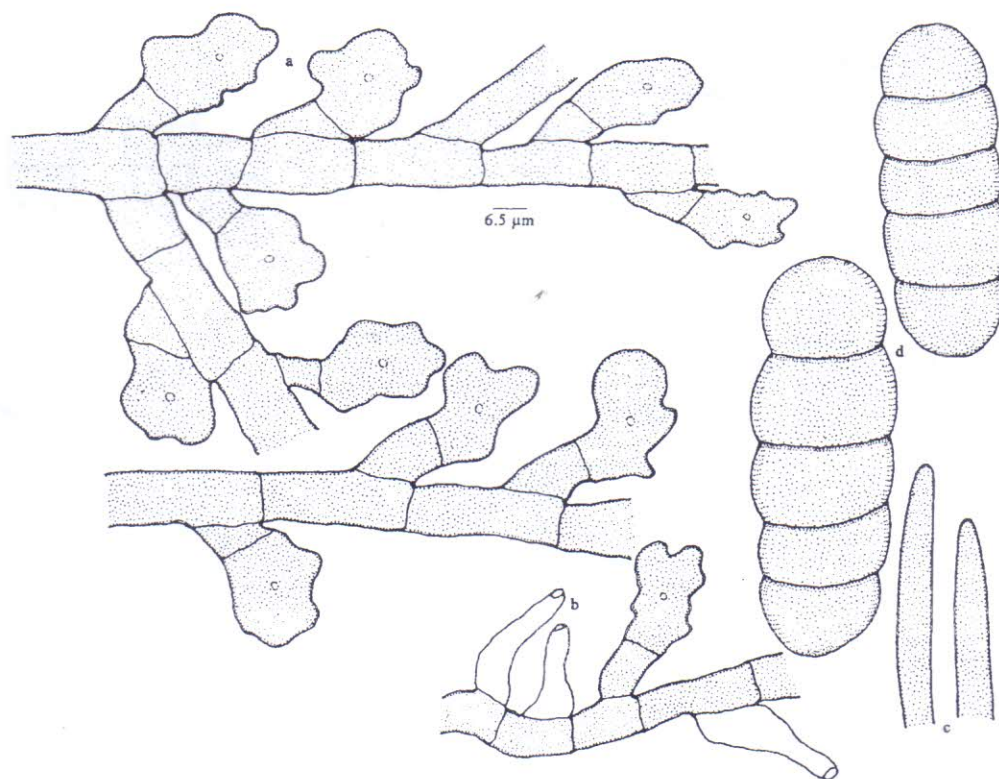


Fig. 8 : *Meliola devikulamensis* sp. nov. : Abbreviations used : a-Appressorium, b-Phialide, c-Apical portion of mycelial setae, d-Ascospores

Colonies epiphyllous, dense, velvety, up to 2 mm in diameter, rarely confluent. Hyphae straight to substraight, branching alternate, opposite to irregular at acute to wide angles, loosely to very closely reticulate, cells $22-26 \times 8-10 \mu\text{m}$. Appressoria alternate, antrorse, subantrorse, $30-36 \mu\text{m}$ long; stalk cells cylindrical to cuneate, $11-13 \mu\text{m}$ long; head cells ovate, oblong, straight to curved, angulose to irregularly sublobate to lobate, $17-24 \times 14-20 \mu\text{m}$. Phialides mixed with appressoria, alternate to opposite, ampulliform, $17-32 \times 8-10 \mu\text{m}$. Mycelial setae scattered, simple, straight, obtuse at the apex, up to $600 \mu\text{m}$ long. Perithecia scattered to loosely grouped, globose, up to $170 \mu\text{m}$ in diameter; ascospores oblong to ellipsoidal, 4-septate, constricted, $58-60 \times 24-26 \mu\text{m}$.

Material examined : On leaves of *Toddalia* sp.

(Rutaceae), Devikulam, Mannar, Idukki, Kerala, January 23, 2003, A. Manojkumar and H. Biju, HCIO 44876 (type), TBGT 1104 (isotype).

Based on the alternate appressoria, entire tip of the mycelial setae and length of the appressoria, this new species can be compared with *Meliola kisubiensis* Hansf. and its four varieties, and *M. macropoda* Sydow. However, *Meliola devikulamensis* differs from all in having angular to lobate head cells of the appressoria (Hansford, 1961).

Etymology : Named after the collection locality.

Meliola flemingiicola V. B. Hosagoudar, P. A. Jose et H. Biju, sp. nov. (Fig. 9)

Colonies epiphyllae, densae, crustosae vel

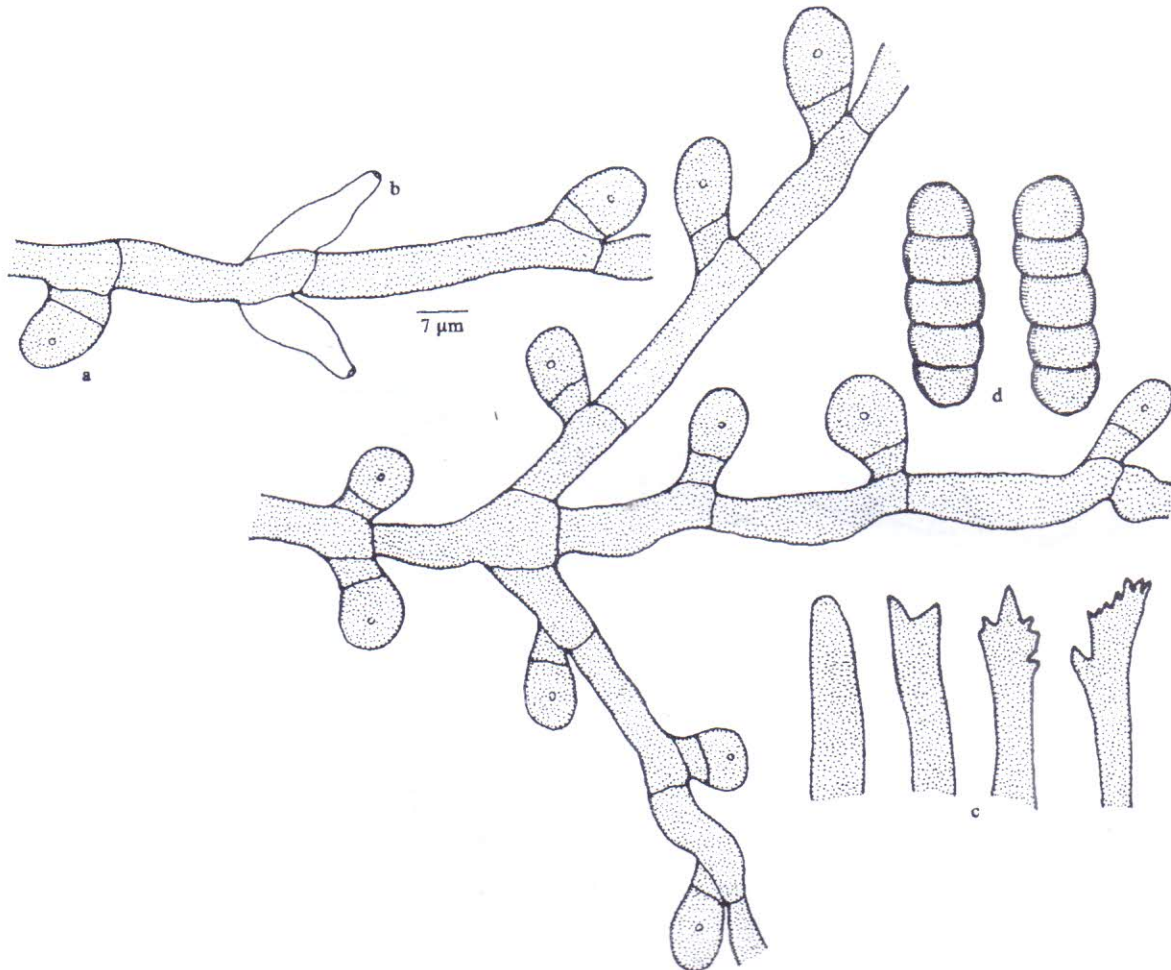


Fig. 9 : *Meliola flemingiicola* sp. nov. : Abbreviations used : a-Appressorium, b-Phialide, c-Apical portion of mycelial setae, d-Ascospores

velutinae, dispersae, ad 2 mm diam., raro confluentes. Hyphae subrectae vel flexuosae, irregulariter acuteque ramosae, laxe vel dense reticulatae, cellulae 17-28 × 6-8 μm. Appressoria alternate, ad 20% opposita, antrorsa, subantrorsa, vel raro recurvata. 12-16 μm longa; cellulae basilares cylindratae vel cuneatae, 3-7 μm longa; cellulae apicales globosae, integrae, raro truncatae ad apicem, 9-11 × 10-12 μm. Phialides appressorii mixtus, alternatae vel oppositae, ampulliformes, 14-21 × 8-10 μm. Setae myceliales dispersae vel cristatae ad apicem, ad 441 μm longae. Perithecia dispersa, vel laxe aggregata, globosa, ad 140 μm diam; ascosporae oblongae vel ellipsoideae, 4-septatae, leniter constrictae, 33-36 × 11-13 μm.

Colonies epiphyllous, dense, crustose to velvety, scattered up to 2 mm in diameter, rarely confluent. Hyphae substraight to flexuous, branching irregular at acute to wide angles, loosely to closely reticulate, cells 17-28 × 6-8 μm. Appressoria alternate, about 20% opposite, antrorse, subantrorse to rarely recurved, 12-16 μm long; stalk cells cylindrical to cuneate, 3-7 μm long; head cells globose, entire, rarely truncate at the apex, 9-11 × 10-12 μm.

Phialides mixed with appressoria, alternate to opposite, ampulliform, 14-21 × 8-10 μm. Mycelial setae scattered to grouped around perithecia, simple, straight, obtuse, dentate to cristate at the apex, up to 441 μm long. Perithecia scattered to loosely grouped, globose, up to 140 μm in diameter; ascospores oblong to cylindrical, 4-septate, slightly constricted, 33-36 × 11-13 μm.

Material examined : On leaves of *Flemingia* sp. (Fabaceae), near staff quarters, Chippanjira, Palode, Thiruvananthapuram, Kerala, January 31, 2003, P. A. Jose HCIO 44829 (type), TBGT 1066 (isotype).

Based on the Beeli formula $31^{1/3}.3222$, *Meliola flemingiicola* can be compared with *M. bicornis* Wint. but differs from it in having longer mycelial setae with obtuse and variously dentate to cristate tip (Hansford, 1961).

Etymology : Named after the host genus *Flemingia*.

Meliola geissaspidis V. B. Hosagoudar, et A. Manojkumar, sp. nov. (Fig. 10)

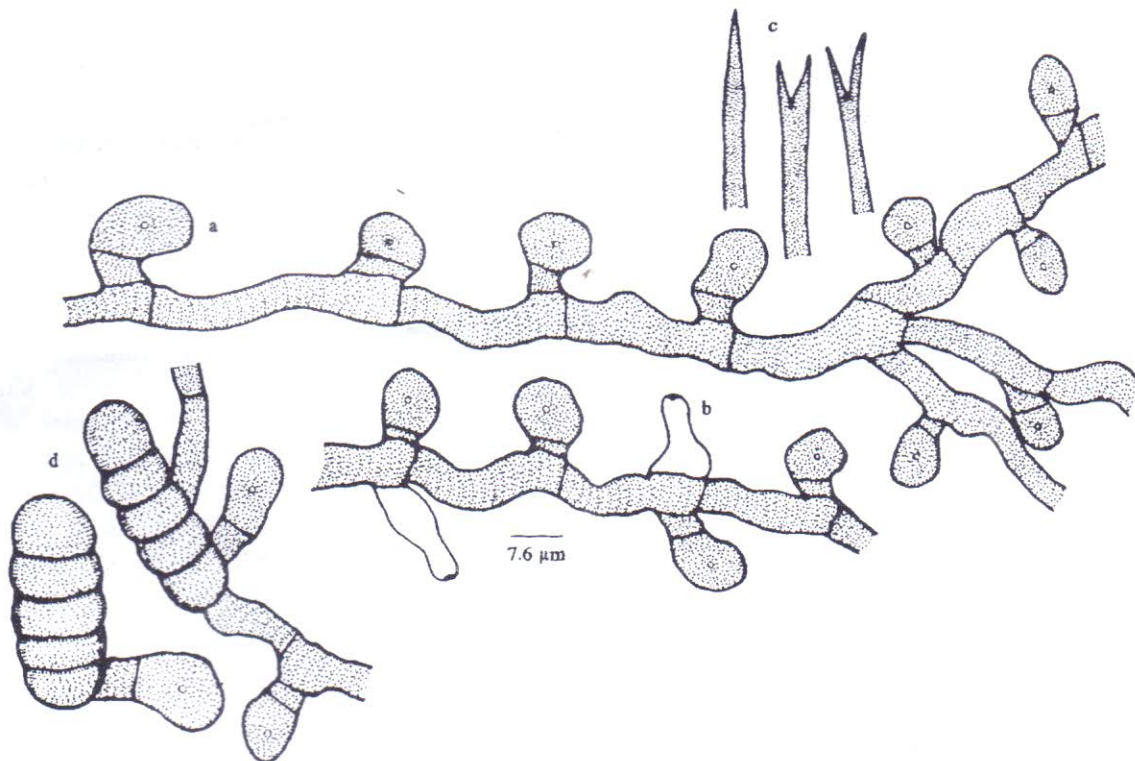


Fig. 10 : *Meliola geissaspidis* sp. nov. ; Abbreviations used : a-Appressorium, b-Phialide, c-Apical portion of mycelial setae, d-Ascospores

Colonies epiphyllous, subdense vel densae, ad 1 mm diam., raro confluentes. Hyphae flexuosae vel anfractuae, alternate, opposite vel irregulariter acuteque vel laxe ramosae, laxe vel arte reticulatae, cellulae 16-23 × 4-7 µm. Appressoria alternate, ad 5% opposita, antrorsa, subantrorsa, vel retrorsa, patentia, 11-16 µm longa; cellulae basillares cylindratae vel cuneatae, 4-7 µm longa; cellulae apicales ovatae, globosae, integrae, rectae vel curvulae, 6-11 × 6-10 µm. Phialides mixtus appressoriis, alternatae vel opposite, ampulliformes, 12-21 × 6-8 µm. Setae myceliales paucae vel numerosae, dispersae, simplices, rectae, flexuosae, acutae vel bifidae ad apicem, ad 343 µm longae. Perithecia dispersa vel laxe aggregata, verrucosa, ad 125 µm diam: cellulae peridiales protrudae; ascosporeae oblongae, cylindratae, 4-septatae, leniter constrictae, 28-38 × 9-13 µm.

Colonies epiphyllous, subdense to dense, up to 1 mm in diameter, rarely confluent. Hyphae flexuous to crooked, branching alternate, opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 16-23 × 4-7 µm. Appressoria alternate, about 5% opposite, antrorse, subantrorse to retrorse, spreading, 11-16 µm long; stalk cells cylindrical to cuneate, 4-7 µm long; head cells globose, entire, straight to curved, 6-11 × 6-10 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 12-21 × 6-18 µm. Mycelial setae few or many, scattered simple, straight, flexuous, acute, bifid to rarely furcate at the tip, up to 343 µm long. Perithecia scattered to loosely aggregated, verrucose, up to 125 µm in diameter, wall cells protruded; ascospores oblong, cylindrical, 4-septate, slightly constricted at the septa, 28-38 × 9-13 µm.

Material examined : On leaves of *Geissaspis cristata* Wight and Arn. (Fabaceae), near railway station, Chenganacherry, Kottayam, Kerala, December 9, 2002, A. Manojkumar HCIO 44806 (type), TBGT 1043 (isotype).

The present species comes under the Beeli formula $31^{1/3}3.3222$. Hence it is similar to *Meliola millettiae-sanagananae* Hansf. and Deight, reported on *Millettia* spp. from Ghana, Congo and Taiwan (Hansford, 1961). However, *Meliola geissaspidis*

differs from it in having only 5% opposite appressoria (in contrast to 15% alternate), head cells of appressoria are ovate to globose (in contrast to oblong to pyriform) and having flexuous mycelial setae (in contrast to straight one).

Etymology : Named after the host genus *Geissaspis*.

Meliola mitragynae-tubulosae V. B. Hosagoudar, et A. Manojkumar, sp. nov. (Fig. 11)

Colonies amphigenae, subdensae vel densae, ad 3 mm diam., confluentes. Hyphae subrectae vel flexuosae plerumque opposite laxe ramosae, laxe vel arte reticulatae, cellulae 24-32 × 6-7 µm. Appressoria alternate, ad 2% opposita, antrorsa vel subantrorsa, raro recurvata, 16-21 µm longa; cellulae basillares cylindratae vel cuneatae, 3-8 µm longa; cellulae apicales ovatae, globosae, integrae, raro leniter attenuatae et late rotundatae ad apicem, integrae, 9-15 × 9-13 µm. Phialides appressoriis intermixtae, alternatae vel opposite, ampulliformes, 16-24 × 6-7 µm. Setae myceliales paucae, simplices, rectae, acutae ad apicem, ad 600 µm longae. Perithecia dispersa, globosa, ad 160 µm diam.; ascosporeae oblongae vel leniter ellipsoideae, 4-septatae, leniter constrictae, 38-40 × 16-18 µm.

Colonies amphigenous, subdense to dense, up to 3 mm in diameter, confluent. Hyphae substraight to flexuous, branching mostly opposite at wide angles, loosely to closely reticulate, cells 24-32 × 6-7 µm. Appressoria alternate, about 2% opposite, antrorse to subantrorse, rarely recurved, 16-21 µm long; stalk cells cylindrical to cuneate, 3-8 µm long; head cells ovate, globose, entire, slightly attenuated but broadly rounded at the apex, entire, 9-15 × 9-13 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 16-24 × 6-7 µm. Mycelial setae few, simple, straight, acute at the tip, up to 600 µm long. Perithecia scattered, globose, up to 160 µm in diameter; ascospores oblong to slightly ellipsoidal, 4-septate, slightly constricted at the septa, 38-40 × 16-18 µm.

Material examined : On leaves of *Mitragyna tubulosa* (Arn.) Hav. (Rubiaceae), in the forest near Kushavoor, Palode, Thiruvananthapuram, Kerala,

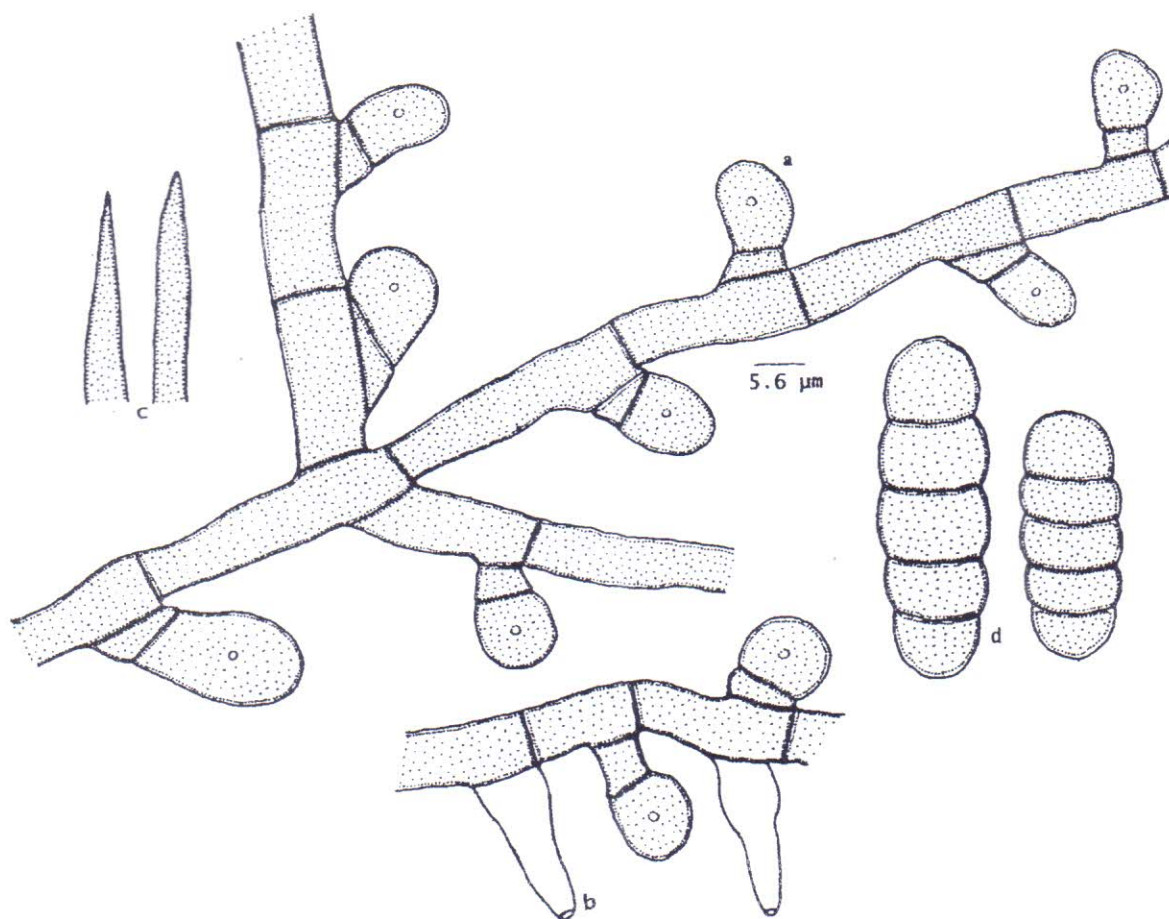


Fig. 11 : *Meliola mitragynae-tubulosae* sp. nov. ; Abbreviations used : a-Appressorium, b-Phialide, c-Apical portion of mycelial setae, d-Ascospores

January 12, 2003, A. Manojkumar HCIO 44817 (type), TBGT 1054 (isotype).

Based on the straight mycelial setae, this species can be compared with *Meliola mitragynae* Sydow and *M. mitregynicola* Deight. and its two varieties known on the host genus *Mitragyna* (Hansford, 1961). *Meliola mitragynae-tubulosae* differs from the former species in having dense colonies, only 2% opposite appressoria and longer mycelial setae. It differs from the latter species and its varieties in having phialides mixed with appressoria and head cells of the appressoria are entire.

Etymology : Named after the host *Mitragyna tubulosa*.

Meliola oligomera Sydow, Ann. Mycol. 15 : 190, 1917 ; Hansford, Sydowia Behi. 2 : 345, 1961.

Meliola reinkingii Sydow, Ann. Mycol. 18 : 98, 1920. (Fig. 12)

Colonies amphigenous, mostly epiphyllous, dense, velvety, up to 5 mm in diameter, confluent. Hyphae substraight to flexuosae, branching alternate to irregular at acute to wide angles, loosely to closely reticulatae, cells 12-23 × 6-7 μm. Appressoria alternate, antrorsa to subantrorsa, straight to rarely curved, 20-31 μm longa ; stalk cells cylindrical to cuneate, 6-13 μm longa ; head cells ovate, globose, angular, sublobate to irregularly lobate, 14-18 × 12-18 μm. Phialides mixed with appressoria, alternatae to opposite, ampulliform, 17-21 × 6-8 μm. Mycelial setae numerous, simple, mostly straight, often curved, acute at the tip, up to 300 μm long. Perithecia scattered to loosely grouped, up to 200 μm in diameter ; ascospores 3-septate, slightly curved during germination, constricted at the

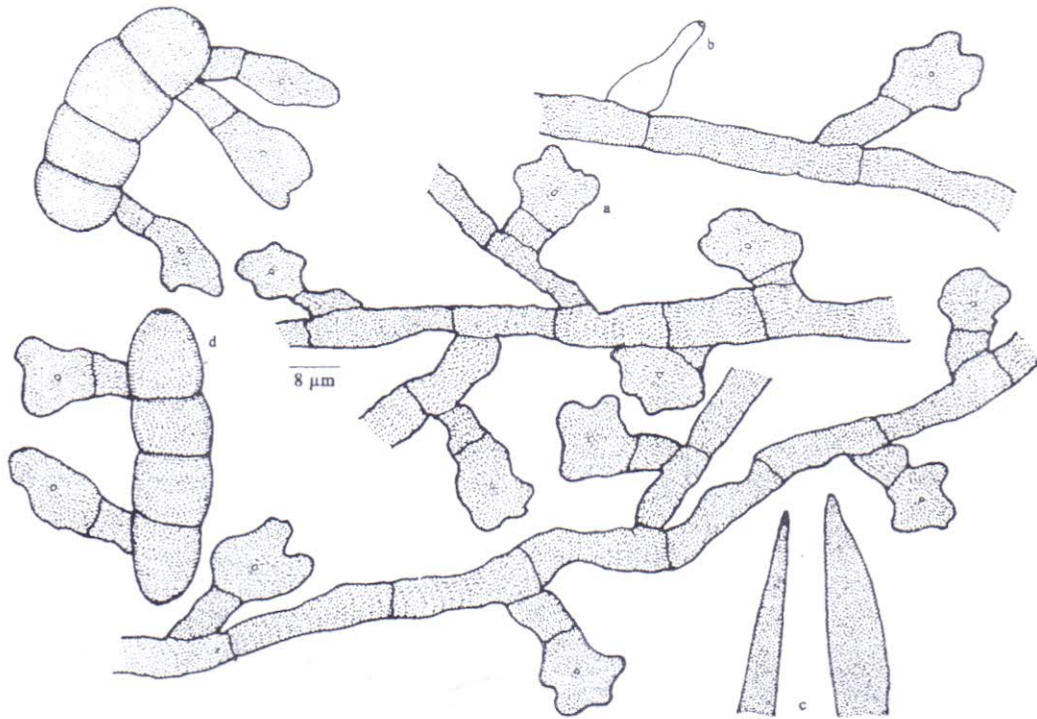


Fig. 12 : *Meliola oligomera* Sydow ; Abbreviations used : a-Appressorium, b-Phialide, c-Apical portion of mycelial setae, d-Ascospores

septa, 44-47 × 14-16 μm.

Material examined : On leaves of *Hippocratea* sp. (Hippocrateaceae), Wyanad-periya, Kerala, December 22, 2002, M. Kamarudeen HCIO 44799, TBGT 1036.

This species differs from *Meliola hippocrateicola* Hansf. and Dieght. in having all alternate appressoria. It was known on *Hippocratea* spp. from Philippines and Sri Lanka and is reported here for the first time India (Bilgrami *et al.* 1991; Hosagoudar, 1996).

In the present collection, there were 4-septate ascospores also. Probably, they belong to different species.

Meliola spatholobii V. B. Hosagoudar, H. Biju et A. Manojkumar, sp. nov. (Fig. 13)

Colonies epiphyllae, subdensae vel densae, ad 5 mm diam., confluentes. Hyphae subrectae vel anfractuae, alternate vel opposite acuteque vel laxe ramosae, laxe vel dense reticulatae. cellulae 24-32 × 6-8 μm. Appressoria alternate, ad 2% opposita,

antrorsa, subantrorsa, vel recurvata, 11-18 μm longa ; cellulae basiliares cylindratae vel cuneatae, 3-8 μm longa ; cellulae apicales globosae, raro ovatae, integrae, rectae vel curvulae, saepe attenuatae et late rotundatae ad apicem, 8-10 × 8-11 μm. Phialides appressoriis intermixtae, alternatae vel opposite, ampulliformes, 16-23 × 8-10 μm. Setae myceliales dispersae, simplices, rectae, saepe curvulae, non uncinatae, acutae ad apicem, ad 441 μm longae. Perithecia dispersa, globosa, ad 150 μm diam. ; ascosporae oblongae vel cylindratae, 4-septatae, constrictae, 35-47 × 14-21 μm.

Colonies epiphyllus, subdense to dense, up to 5 mm in diameter, confluent. Hyphae substraight to crooked, branching alternate to opposite at acute to wide angles, loosely to closely reticulate, cells 24-32 × 6-8 μm. Appressoria alternate, about 2% opposite, antrorse, subantrorse to recurved, 11-18 μm long ; stalk cells cylindrical to cuneate, 3-8 μm long ; head cells globose, rarely ovate, entire, straight to curved, often attenuated and broadly rounded at the apex, 8-10 × 8-11 μm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 16-23 × 8-10 μm. Mycelial setae scattered, simple, straight, often curved, not

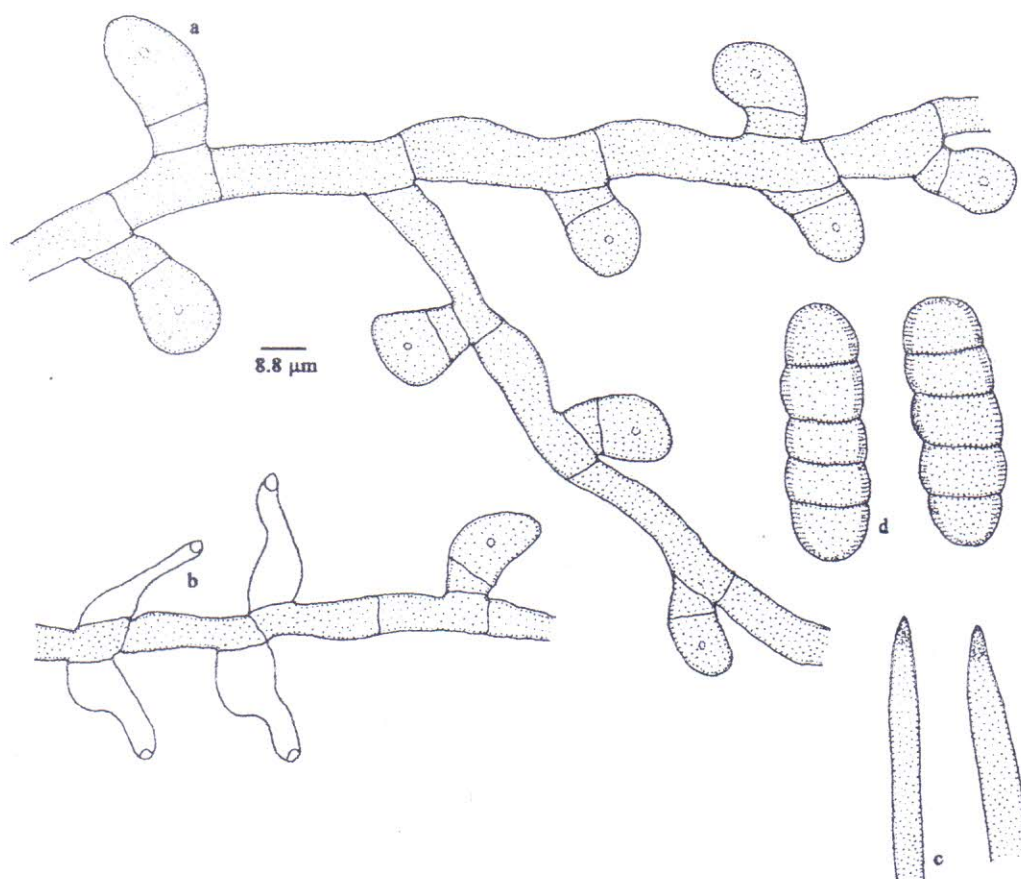


Fig. 13 : *Meliola spatholobii* sp. nov. : Abbreviations used : a-Appressorium, b-Phialide, c-Apical portion of mycelial setae, d-Ascospores

uncinate, acute at the tip, up to 441 μm long. Perithecia scattered, globose, up to 150 μm in diameter; ascospores oblong to cylindrical, 4-septate, constricted at the septa, 35-47 \times 14-21 μm .

Material examined : On leaves of *Spatholobus parviflorus* (Fabaceae), in the forest near Palode, Thiruvananthapuram, Kerala, January 4, 2003, A. Manojkumar HCIO 44895, TBGT 1123.

Meliola erythrinae Sydow and *M. banosensis* Sydow are known on the host genus *Spatholobus* from Java and Philippines. *Meliola spatholobii* differs from the former species in having 2% opposite appressoria and having an entire head cells. It differs from the latter species in having 2% opposite appressoria, phialides mixed with appressoria and having larger ascospores (Hansford, 1961).

Etymology : Named after the host genus *Spatholobus*.

Meliola sterculiacearum V. B. Hosagoudar et M. Kamarudeen, sp. nov. (Fig. 14)

Colonies amphigenae, dense, patentiae, ad 2 mm in diam., confluentes. Hyphae rectae vel subrectae, plerumque opposite acuteque ramosae, laxe vel arte reticulatae et formans solidae, cellulae 14-16 \times 6-8 μm . Appressoria alternate, antrorsa vel arte antrorsa, 12-16 μm longa; cellulae basilares cylindrical vel cuneatae, 3-5 μm longa; cellulae apicales ovatae, globose, integrae, 8-12 \times 9-11 μm longae; cellulae apicales ovatae, globosae, intergrae, 8-12 \times 9-11 μm . longae. Phialides mixtus appressoriis, alternate vel opposite, ampulliformes, 14-16 \times 6-8 μm . Setae myceliales tenuiter dispersae, simplices, rectae, acutae ad apicem, ad 450 μm longae. Perithecia dispersa, globosa, ad 160 μm diam.; ascospores oblongae, ellipsoideae, 4-septatae, constrictae. 36-39 \times 16-18 μm .

Colonies amphigenous, dense, spreading, up to 2 mm in diameter, confluent. Hyphae straight to

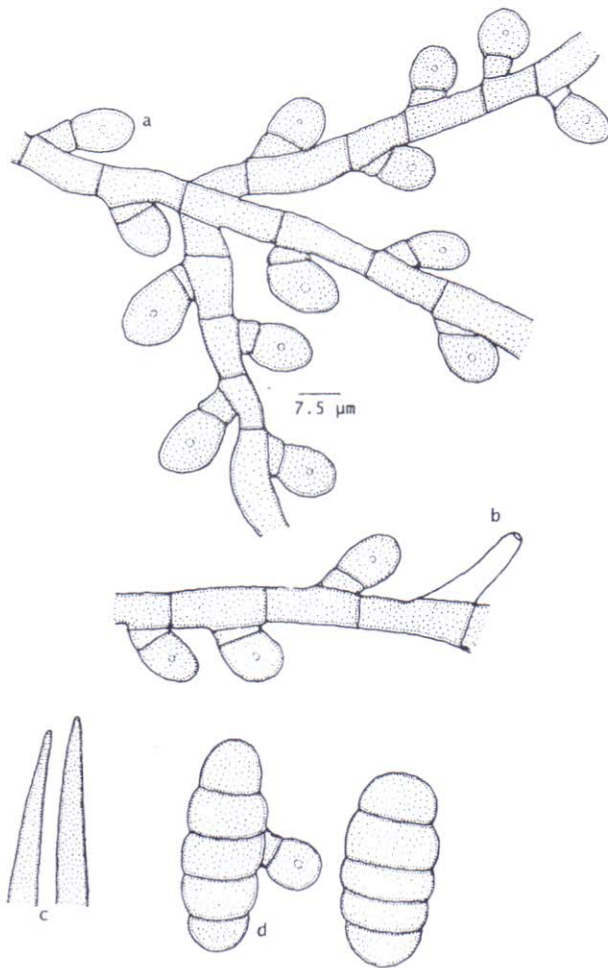


Fig. 14 : *Meliola sterculiacearum* sp. nov.

Abbreviations used : a-Appressorium, b-Phialide, c- Apical portion of mycelial setae, d-Ascospores

substraight, branching mostly opposite at acute angles, loosely to very closely reticulate and form a solid mycelial mat, cells $14-16 \times 6-8 \mu\text{m}$. Appressoria alternate, antrorsa to closely antrorsa, $12-16 \mu\text{m}$ longa : stalk cells cylindrical to cuneate, $3-5 \mu\text{m}$ long ; head cells ovate, globose, entire, $8-12 \times 9-11 \mu\text{m}$. Mycelial setae thinly scattered, simple, straight, acute at the tip, up to $450 \mu\text{m}$ long. Perithecia scattered, globose, up to $160 \mu\text{m}$ in

diameter ; ascospores oblong, ellipsoidal, 4-septate, constricted, $36-39 \times 16-18 \mu\text{m}$.

Material examined : On leaves of *Sterculia* sp. (Sterculiaceae), Wyanad-periya, Kerala, December 22, 2002, M. Kamarudeen HCIO 44786 (type), TBGT 1023 (isotype).

Based on the Beeli formula 3111.3222, this species can be compared with *Meliola melochiae* Hansf. however, differs from it in having dense colonies, straight hyphae, antrorse appressoria and longer mycelial setae. *Meliola sterculiae* Hansf. and Deight. known on *Sterculia tragacantha* from Uganda but *M. sterculiacearum* differs from it in absence of 15% opposite appressoria, having simple setae and smaller ascospores (Hansford, 1961).

Etymology : Named after the host genus *Sterculia*.

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REFERENCES

- Bilgrami, K. S. ; S. Jamaluddin and Rizwi, M. A. 1991. *Fungi of India. List and References*. Today and Tomorrow's Printers & Publishers, New Delhi, pp. 1-798.
- Hansford, C. G. 1961. The Meliolineae. A Monograph. *Sydowia* Beih 2 : 1-806.
- Hosagoudar, V. B. 1996. *Meliolales of India*. Botanical Survey of India, Calcutta, Pp. 363.
- Hosagoudar, V. B. and Shiburaj S. 2002. *Meliola gamsii* sp. nov. from Kerala, India. *Nova Hedvigia* 74 : 411-413.
- Hosagoudar, V. B. Patil, M. S. and Balakrishna, N. P. 1989. Taxonomic notes on Indian Melolaceae. *Journal of Economic and Taxonomic Botany* 13 : 78-82.
- Santapau, H. and Henry A. N. 1984. *A Dictionary of the Flowering plants in India*. CSIR, New Delhi, pp. 198.

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