Foliicolous fungi of Wayanad District in Kerala State, India

V.B. Hosagoudar & A. Sabeena

Journal of Threatened Taxa
July 2014 | Vol. 6 | No. 7 | Pages: 5909–6052 | Date of Publication: 19 July 2014

CONTENTS

Journal of Threatened Taxa | www.threatenedtaxa.org | 19 July 2014 | 6(7): 5909–6052

Foliicolous fungi of Wayanad District in Kerala State, India

V.B. Hosagoudar [1] & A. Sabeena [2]

[1&2] Jawaharlal Nehru Tropical Botanic Garden and Research Institute, Thiruvananthapuram, Kerala 695562, India
[1] vbhosagoudar@rediffmail.com (corresponding author), [2] asabeenarasheed@gmail.com

ISSN
Online 0974-7907
Print 0974-7893

OPEN ACCESS

Abstract: This comprises an account of the 580 foliicolous fungal collections collected along with the host leaves of 220 host plants belonging to 70 families of flowering plants from Wayanad District resulted in recording 175 fungal species distributed among 29 fungal genera, belonging to black mildews, Meliolales: namely, *Amazonia* (6), *Appendiculella* (1), *Armatella* (6), *Asteridiella* (12), *Irenopsis* (7), *Meliola* (96); Meliolinaceae: *Meliolina* (1); Asterinales: Asterinaceae: *Asterina* (47), *Asterolibertia* (1), *Ishwaramyces* (1), *Meliolaster* (1), *Prillieuxina* (2), *Asterostomella* (1), *Asterostomula* (1), *Mahanteshamyces* (1), Lembosiaceae: *Echidnodella* (1), *Lembosia* (2), Schiffnerulaceae: *Questieriella* (2), *Sarcinella* (4), *Schiffnerula* (9); Phyllachoraceae: *phyllachora* (5); Hyphomycetes: *Acrodictys* (1), *Spiropes* (3), *Ampullifera* (1), *Passalora* (1), *Colemaniella* (1), *Acremoniula* (1); Other Ascomycetes: *Leptosphaerulina* (1), *Rehmidothis* (1).

Keywords: Foliicolous fungi, India, taxonomy, Western Ghats.

DOI: http://dx.doi.org/10.11609/JoTT.o3658.5909-6052

Editor: B. Shivaraju, Bengaluru, India.

Date of publication: 19 July 2014 (online & print)

Manuscript details: Ms # o3658 | Received 03 August 2013 | Final received 08 December 2013 | Finally accepted 05 February 2014

Citation: Hosagoudar, V.B. & A. Sabeena (2014). Foliicolous fungi of Wayanad District in Kerala State, India. *Journal of Threatened Taxa* 6(7): 5909–6052; http://dx.doi.org/10.11609/JoTT.o3658.5909-6052

Copyright: © Hosagoudar & Sabeena 2014. Creative Commons Attribution 4.0 International License. JoTT allows unrestricted use of this article in any medium for non-profit purposes, reproduction and distribution by providing adequate credit to the authors and the source of publication.

Funding: Jawaharlal Nehru Tropical Botanic Garden & Research Institute, Palode, Thiruvananthapuram, Kerala, India

Competing Interest: The authors declare no competing interests.

Author Contribution: VBH has identified the fungi and AS has studied and helped in the preperation of the manuscript.

Author Details: V.B. Hosagoudar has been working on the taxonomy of foliicolous fungi for nearly four decades; A. Sabeena has been working on the same topic since eight years.

Acknowledgements: We are grateful to Dr. P.G. Latha, Director, JNTBGRI, Palode for the facilities.

INTRODUCTION

Wayanad, the 12th district in Kerala State, was formed from Kozhikode and Kannur Districts on 01 November 1980, with Kalpetta as its district head quarters. It has an area of 2132km^2, located towards north-east of Kerala, 11^{0}27'–15^{0}58'N & 75^{0}47'–70^{0}27'E (Image 1), stands on the southern tip of the Deccan Plateau and has a glory of majestic rugged terrain of the Western Ghats, having lofty ridges interspersed with dense forest, tangled with jungles and deep valleys, located at an altitude ranging from 700–2100 m. The name Wayanad originated from Mayakshetra (Maya's land). It is also known as Vayal (paddy fields) and Naad (land), a land of paddy fields. Since large area of the district is covered by forest and is a hilly terrain, the district is with least population.

According to archaeological evidence, the Wayanad forests have been inhabited for more than 3,000 years. Historians are of the view that human settlement existed in these parts for at least 3,000 years. Much evidences of new stone age civilization can be seen in the hills throughout the present day Wayanad District. The two caves of Ampukuthimala, with pictures on their walls and pictorial writings, speak volumes of a bygone civilization. The recorded history of this district exists only from the 18th century onwards. In ancient times, this land was ruled by the Rajas of the Veda Dynasty. In later days, Wayanad came under the rule of the Pazhassi Raja Dynasty of ancient Kottayam. When Hyder Ali became the ruler of Mysore, he invaded Wayanad and brought it under his sway. In the days of Tippu Sultan, Wayanad was restored to the Kottayam royal dynasty. But Tippu handed over the entire region of northern Kerala to the British, signing the treaty of Srirangapattana with British army officer and colonial administrator Cornwallis. This was followed by fierce and internecine encounters between the British and Pazhassi Raja of Kottayam. When the Raja was driven to the wilderness of Wayanad, he organised the war-like Kurichiya tribals into a sort of people's militia and engaged the British in several guerrilla type encounters. In the end, the British could get only the dead body of the Raja, who committed suicide in the forest. Thus, Wayanad fell into the hands of the British and with it came a new era. The British authorities opened up the plateau to cultivation of tea and other cash crops by constructing roads across the dangerous slopes of Wayanad, to Kozhikode and Thalassery. Later, they extended these new roads to the cities of Mysore and Ooty through Gudalur. Settlers emigrated from all parts of Kerala and the fecund lands proved a veritable goldmine with incredible yields of cash crops. When the State of Kerala came into being in November 1956, Wayanad was part of Kannur District. Later, southern Wayanad was added to Kozhikode District. In order to fulfill the aspirations of the people of Wayanad for development, North Wayanad and South Wayanad were carved out and joined together to form the present district of Wayanad. This district consists of three taluks: Vythiri, Mananthavady and Sultan's Battery.

There are tribal populations in the area who still practice age-old customs and rituals and live a nomadic life. Some of the tribal populations include Paniyas, Adiyas, Kattunayakan, Kurumans and Kurichiyans. It is the district with the highest share in the adivasi population (about 36%) of Kerala. Wayanad also has a large settler population. The Jains from Karnataka came in the 13th century. The Hindu Nairs from Kottayam-Kurumbranadu, in Kannur District, made an entry in the 14th century and established their feudal system. They were followed by Muslims. There were large scale migrations from southern Kerala in the early 1940s. Christians came in the 1950s from Travancore region. In the last few decades there was a complete marginalisation of the indigenous people. Alienated from their land, exploited by the settlers and neglected by the state, their struggle for rights to the land has so far been unsuccessful.

Forest Types

The flora of Wayanad are characteristic of the Western Ghats and the plantation crops grown in the cool climate. A major portion of the district is covered by coffee. Trees of the wild type like rose-wood, anjili (*Artocarpus*), mullumurikku (*Erythrina*), several species of cassia and many other nondescript varieties are still preserved here and there, to give shade to the coffee plants. These trees give a sembalance of wilderness to the landscape of Wayanad. In a majority of coffee plantations, the age-old species are replaced by the silver-oak which is suited to the cold climate. This tree grows quickly and its cultivation is widespread among coffee plantations for shade and for giving support to pepper. It is used for the Plywood Industry and thus is economical to the farmers. *Eucalyptus grandis*, a shorter variety of eucalyptus, whose fragrant smell suffuses the very air around it, is cultivated on a large scale in certain parts of the district. *Eucalyptus* oil is extracted on commercial basis from its leaves. Of the 20,864ha of reserve forest, the major portion is teak plantation. Areca nut palms and jack trees are also grown here. Tea is grown as an industry in large estates. The soil and climate of Wayanad are suitable for horticulture

on commercial basis. For promoting the cultivation of vegetables and raising of orchards, the Kerala Agricultural University is running a Regional Agricultural Research Station at Ambalavayal. With the clearing of forests, the diverse and bustling animal life, characteristic of the forests of Western Ghats, has vanished from Wayanad. One can still see the Bonnet Macaque, Slender Loris, mongooses, Jungle Cats, squirrels, jackals, hares, etc., in the limited forest areas. The world's largest venomous snake, the King Cobra is also found here. Elephant, bear and other wild animals from the neighbouring wild life sanctuaries of Karnataka and Tamil Nadu, stray into the Begur forest range and the forests around Muthanga, which is 20km away from the town of Sulthan Bathery. Karapuzha Dam near Menangadi 10km, Banasura Sagar Dam 20km from Vythiri. Today large game is found only in region that border with Karnataka and Tamil Nadu. Here there is one of the largest concentrations of wild Asiatic Elephants in whole world. Tiger, Bison, Sambhar, Spotted Deer, Boar, Leopard, Wild Dog and other Large Mammals are also present in fairly decent numbers. Wayanad Wildlife Sanctuary is the core forest region of this district. The native Adivasis mainly consist of various sects like Paniyas, Kurumas, Adiyars, Kurichyas, Ooralis, Kattunaikkans, etc.

This district comprises: west coast tropical semi-evergreen forests, southern moist mixed deciduous forest, southern dry mixed deciduous forests and moist bamboo brakes and this rich forest has been protected in the form of Wayanad Wildlife Sanctuary, harbouring more than 2000 flowering plant species and the present work on the foliicolous fungi forms the first of its kind for the this area.

Mountains

Chembra Peak (2,100m), Banasura Peak (2,073 m), Bramhagiri (1,608m) are some of the important mountains in the district.

Rivers

The Kabini River, one of the three east flowing rivers of Kerala, is an important tributary of the Kaveri River. Almost the entire Wayanad District is drained by Kabini and its three tributaries, the Panamaram, Mananthavady, and Kalindy rivers. The Banasura Sagar Dam is built on one of the tributaries of the Kabini River.

Climate

The distance from the mean sea level and the amount of forest cover creates a pleasant climate in the region. Generally the year is divided into four seasons; cold weather (December–February) hot weather (March–May) south-west monsoon (June–September) and north-east monsoon (October–November). During the hot weather the temperature goes up to a maximum of 35^0C (95^0F) and during the cold weather the temperature goes down to 07^0C (45^0F). The greater temperature variation in the last 5–6 years is in the range of 18^0C (64^0F)–28^0C (82^0F). The average rainfall is 2,500mm per year.

Economy

Wayanad is 3.79% urbanised. Agriculture, is the main stay of the economy. Coffee, tea, cocoa, pepper, plantain and vanilla are the main crops. Besides these cash crops, the most important crop in the district is rice.

Key to groups

1. Produce black mycelial colonies on the host surface .....Black mildews
1. Not so.....2
2. Produce tar spots.....Phyllachoraceae
2. Not so.....3
3. Produce yellow rust pustules on the host surface.....Rust fungi
3. Not so.....4
4. Produce superficial perithecia which are attached to host surface.....*Leptospharulina*
4. Persist only in conidial form.....Hyphomycetes

BLACK MILDEWS

These are the ectophytic, black colony forming fungi belong to different groups

Key to the groups of Black Mildews

1. Produce thick, black, woolly colonies on the lower surface of the leaves.....Meliolinaceae
1. Always not so.....2
2. Produce two-celled appressoria and often phialides, ascomata perithecial.....Meliolales
2. Produce 1-2-celled appressoria, phialides absent, ascomata thyriothecium.....3
3. Thyriothecia dehisce stellately or vertically, anamorph mostly pycnothyrial.....Asterinales
3. Thyriothecia dissolve at the centre, anamorph polymorphic, e.g, *Sarcinella*, *Questieriella*, etc..... .....Schiffnerulaceae

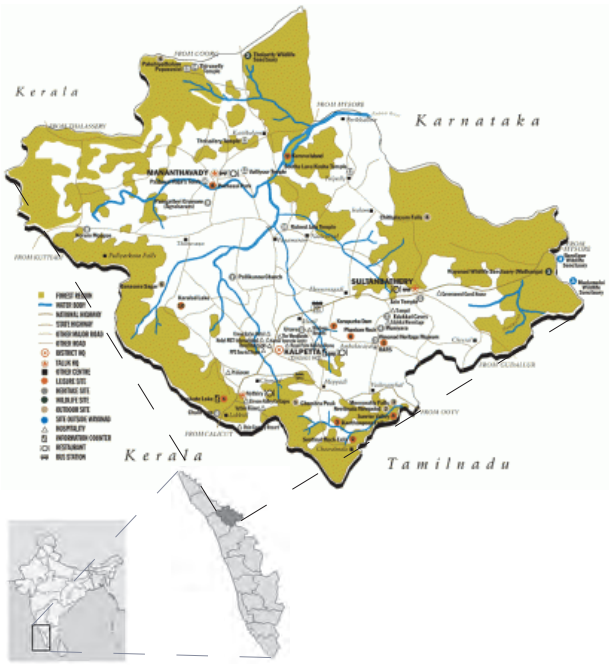


Image 1. Wayanad District map. (Source: District Tourism Promotion Council, Wayanad (DTPC))

Image 2. Evergreen forest

Image 3. Hill shola forest

MELIOLALES

Meliolales Gaumann ex Hawksworth & O. Eriksson, Systema Ascomycetum 5: 142, 1986; Hosag., Meliolales of India 2: 28, 2008; Hosag. & Agarwal, Taxonomic studies of Meliolales. Identification Manual, p. 3, 2008.

Parasites on vascular plants. Mycelium mostly superficial, appressoriate. Appressoria mostly two celled, rarely many celled. Phialidic (in Meliolaceae), phialides unicellular. Ascomata flattened-globose to globose, ± ostiolate, peridium smooth, surface cells protruded, often supplemented with setae and or appendages; asci born on basal hymenium, unitunicate, 2-8 spored, clavate to cylindrical, evanescent; ascospores 1-4 septate, brown at maturity.

TYPE FAMILY: MELIOLACEAE

Key to the families

1. Ascospores 1-2-septate .....Armatellaceae
1. Ascospores 3-4-septate .....Meliolaceae

ARMATELLACEAE

Armatellaceae Hosag., Sydowia 55: 162, 2003; Hosag., Meliolales of India 2: 28, 2008; Hosag. & Agarwal, Taxonomic studies of Meliolales. Identification Manual, p. 3, 2008.

Leaf parasites, ectophytes, mycelium with appressoria, phialides absent, mycelial setae absent. Perithecia on superficial hyphae, globose, verrucose; asci 4-8-spored; ascospores 1-2-septate, brown at maturity.

Type genus: *Armatella* Theiss. & Sydow

The family Armatellaceae includes the genera: *Armatella* and *Basavamyces* but the present study includes the former genus.

MELIOLACEAE

Meliolaceae Martin ex Hansf., Mycol. Pap. 15: 23, 1946; Hosag., Meliolales of India 2: 29, 2008; Hosag. & Agarwal, Taxonomic studies of Meliolales. Identification Manual, p. 4, 2008.

Parasitic on vascular plants; mycelium mostly superficial; appressoriate, phialidic. Ascomata flattened-globose to globose, ± ostiolate, peridium with conoid cells, larviform and striated appendages, or with repent or strong setae. Asci unitunicate, 2-4-spored, clavate to cylindrical, evanescent; ascospores 3-4-septate, brown at maturity.

Type genus: *Meliola* Fries

Key to the genera of Meliolaceae

1. Perithecia flattened-globose, hidden in the radiating mycelium .....*Amazonia*
1. Perithecia globose, discrete, not hidden in the radiating mycelium.....2
2. Mycelial setae present.....*Meliola*
2. Mycelial setae absent.....3
3. Perithecial setae and larviform appendages present 4
3. Both perithecial setae and larviform appendages absent.....*Asteridiella*
4. Only perithecial setae present.....*Irenopsis*
4. Only larviform appendages present.....*Appendiculella*

Digital formula

After the generic level confirmation, a specific formula called the Beeli's Formula (digital formula) is used for the identification up to species level. Beeli Formula consists of eight digits. The first four digits before the stop (left side to the stop) represent the morphological characters like ascospore septation, presence or absence and the nature of the perithecial setae or appendages, presence or absence and the nature of the mycelial setae and the arrangements of appressoria, respectively. The second four digits, after the stop, represent the measurements such as length and breadth of ascospores, diameter of perithecia and length of mycelial setae, respectively. The species having both simple and dentate setae is denoted by ⅓, while species having straight and uncinate setae are designated as ½. The Beeli Formula is modified here to accommodate the genus *Armatella* having one septate ascospores.

MORPHOLOGY (first four digits from left)

1. Normal septation of ascospores
    1. 1-septate
    2. 3-septate
    3. 4-septate

2. Perithecia
    1. Without setae or appendages
    2. With larviform, horizontally striated appendages
    3. With uncinate or coiled setae
    4. With straight setae

3. Mycelial setae (often on perithecia and from subiculam)
    1. Absent
    2. Simple
    3. Simple, entire, uncinate or coiled
    4. Dentate or shortly furcate (up to 30µm)
    5. Branched (branches more than 30µm)

4. Appressoria
    1. Alternate or unilateral (less than 1% opposite)
    2. Regularly opposite
    3. Both opposite and alternate

II. MEASUREMENTS (second four digits from the full stop)

5. Maximum ascospore length
    1. Up to 20 µm
    2. 21–30 µm
    3. 31–40 µm
    4. 41–50 µm
    5. 51–60 µm
    6. More than 60µm long

6. Maximum ascospore width
    1. Up to 10µm
    2. 11–20 µm
    3. 21–30 µm
    4. More than 31µm

7. Maximum diameter of perithecia
    1. Up to 100µm
    2. 101–200 µm
    3. 201–300 µm
    4. More than 301µm

8. Maximum length of mycelial setae
    1. Up to 300µm
    2. 301–500 µm
    3. 501–1000 µm
    4. More than 1000µm
    5. Absent.

The treatment of species and varieties consists of the original citation of the correct name, citation of the world monograph and Indian monographs, relevant synonyms (if any) based on the monographs of Hansford (1961) and Hosagoudar (1996). The citation is followed by the description based on the present collections, which are deposited in TBGT (Tropical Botanic Garden and Research Institute, Thiruvananthapuram), HCIO (Herbarium Cryptogamae Indiae Orientalis), New Delhi and at STET Herbarium, Mannargudi, Tamil Nadu. At the end of the description of each taxon, notes have been provided regarding their identification and distribution. Line drawings have been provided to the studied taxa.

The genus *Amazonia*

Amazonia Theiss., Ann. Mycol. 11: 499, 1913.

Actinodothis Sydow & Sydow, Philippine J. Sci. 9**:** 174, 1914.

Meliolaster Doidge, Trans. Royal Soc. South Africa 8: 123, 1920 (*non Meliolaster* Hohnel).

Amazoniella Bat. & Maia, Broteria 29: 73, 1960.

Mycelium superficial, brown, septate, branched, appressoriate. Perithecia borne under radiating mycelium, wall radial, shield like, non-ostiolate to ostiolate, hemispherical, inner wall pale, thin. Asci 2-4 spored, evanescent; ascospores brown, 3-4 septate.

Type: *A. psychotriae* (P. Henn.) Theiss.

Amazonia flacourtiae Hosag., Siddappa & Udaiyan, Nova Hedwigia 56:193, 1993; Hosag., Meliolales of India, p. 68, 1996. (Fig. 1).

Materials examined: TBGT 5947, 30.ix.2007, on leaves of *Flacourtia* sp. (Flacourtiaceae), Padinharathara, coll. M.C. Riju.

Colonies amphigenous, thin to subdense, up to 2mm in diameter, confluent. Hyphae substraight to flexuous, branching opposite at acute angles, loosely reticulate, cells 12.5–22x6–9.5 µm. Appressoria alternate, straight, rarely curved, antrorse, 15.5–25 µm long; stalk cells cuneate, 3–6.5 µm long; head cells ovate, entire, 12.5–20.5x8–14 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 15.5–22x6–9.5 µm. Perithecia flattened-globose, scattered, up to 124µm in diameter; ascospores obovoidal, 4-septate, strongly constricted at the septa, 34–46.5x12.5–18.5 µm.

Amazonia goniothalami Hosag., Rajkumar, C.K. Biju & Abraham, Mycotaxon 72: 431, 2001; Hosag., Zoos' Print J. 21:2322, 2006; Hosag., Meliolales of India 2: 187, 2008. (Fig. 2).

Materials examined: HCIO 44801, TBGT 1038, 26.xii.2002, on leaves of *Goniothalamus wyanadensis* (Bedd.) Bedd. (Annonaceae), Chandanathode, coll. M. Kamarudeen & P.A. Jose.

Colonies predominantly hypophyllous, subdense to dense, up to 5mm in diameter, confluent. Hyphae straight, branching alternate to opposite at acute angles, loosely to closely reticulate, cells 9–16x6–8 µm. Appressoria alternate, antrorse to closely antrorse, straight, 18–26 µm long; stalk cells cylindrical to cuneate, 6–8 µm long; head cells ovate, oblong to cylindrical, entire, 12–15x8–12 µm. Phialides not seen. Perithecia flattened-globose, radiating, up to 160µm in diameter; ascospores oblong to ellipsoidal, 4-septate, constricted at the septa, 44–48x20–23 µm.

This is the only record of the genus *Amazonia* on the members of the family Annonaceae (Hansford 1961; Hosagoudar 1996; Hosagoudar et al. 1997).

Amazonia gordoniicola Hosag., C.K. Biju & Abraham, Nova Hedwigia 80: 467, 2005; Hosag., Meliolales of India 2: 87, 2008. (Fig. 3).

Materials examined: HCIO 43677, TBGT 330, 16.iv.1999, on leaves of *Gordonia* sp. (Theaceae), Banasuran mala, coll. C.K. Biju.

Colonies mostly epiphyllous, subdense, up to 3mm diam., confluent. Hyphae straight to substraight, branching in alternate to opposite position at acute angles, loosely reticulate, cells 19–24x5–7 µm. Appressoria alternate, about 1% opposite, antrorse to subantrorse, 12–20 µm long; stalk cells cylindrical to cuneate, 3–5 µm long; head cells ovate, rarely oblong to globose, entire, rarely angular to truncate at the apex, 9–15x9–13 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 16–20x6–8 µm. Perithecia scattered, in radiating hyphae, up to 150µm diameter; ascospores oblong to rarely slightly ellipsoidal, 4-septate, constricted at the septa, 35–37x15–17 µm.

The similar *A. toquian* Petrak is known on *Ternstroemia toquian* (Theaceae) from the Philippines. Contrasting with *A. toquian***,** this species has loosely reticulate mycelia, numerous appressoria, and 4-septate smaller ascospores (Hansford 1961).

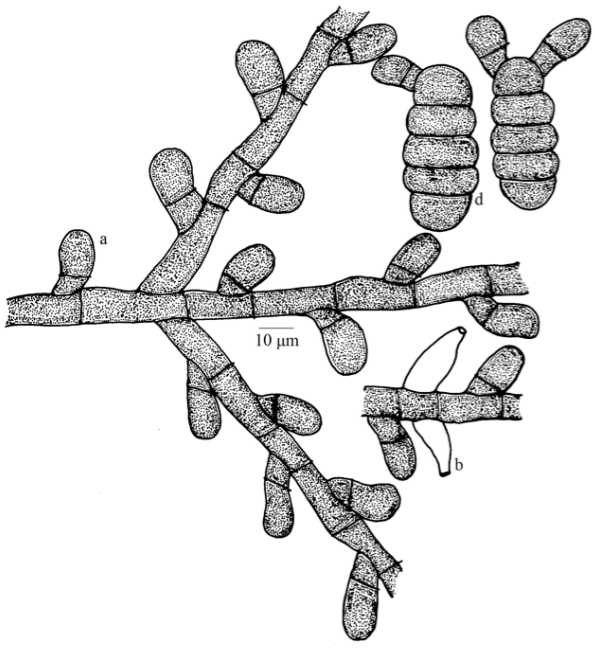


Figure 1. *Amazonia flacourtiae*
a - Appressorium; b - Phialide; d - Ascospores

Amazonia peregrina Sydow & Sydow, Ann. Mycol. 15: 238, 1917; Hansf., Sydowia Beih. 2:507, 1961; Hosag. & Goos, Mycotaxon 36: 236, 1989; 42:126, 1991; Hosag., Meliolales of India, p.74, 1996.

Meliola peregrina Sydow & Sydow, Philippine J. Sci. 8: 479, 1913. (Fig. 4).

Materials examined: HCIO 50329, TBGT 4246, 31.x.2007, on leaves *Maesa indica* (Roxb.) DC. (Myrsinaceae), 10th Mile, Banasura sagar, coll. V.B. Hosagoudar et al.

Colonies amphigenous, mostly hypophyllous, crustaceous, up to 2mm in diameter, confluent. Hyphae straight to undulating, branching alternate to opposite at acute angles, closely reticulate, forming solid mycelial mat and impart thalloid appearance, cells 13–16.6x6–8 µm. Appressoria alternate to unilateral, very closely arranged, antrorse, straight to curved, 13–16.5 µm long; stalk cells cuneate, 3.5–5 µm long; head cells globose, entire, 10–13x10–11.5 µm. Phialides mixed with appressoria, alternate, ampulliform, 13–16.5x6.5–8 µm. Perithecia mostly aggregated, flattened-globose, glabrous, black, up to 281µm in diameter; ascospores cylindrical to obovoidal, 4-septate, constricted at the septa, 36–43x13–16 µm.

This species mostly occurs on the leaves infected with *Meliola groteana* Sydow but can be easily distinguished by its crustose colonies.

Amazonia syzygii Hosag. in Hosag. & Goos, Mycotaxon 36: 236, 1989; 42:126, 1991; Hosag., Dayal & Goos, Mycotaxon 46: 202,1993; Hosag., Meliolales of India, p.74, 1996. (Fig. 5).

Materials examined: HCIO 49847, TBGT 3999, 12.ii.2009, on leaves of *Syzygium* sp. (Myrtaceae), Wayanad, coll. Jacob Thomas et al.

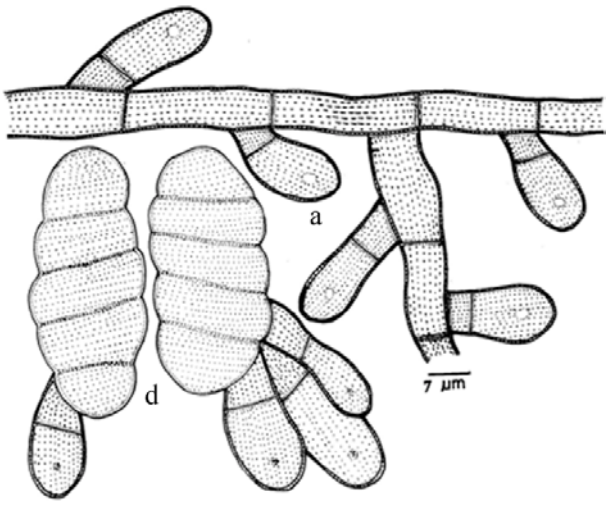


Figure 2. *Amazonia goniothalami*
a - Appressorium; d - Ascospores

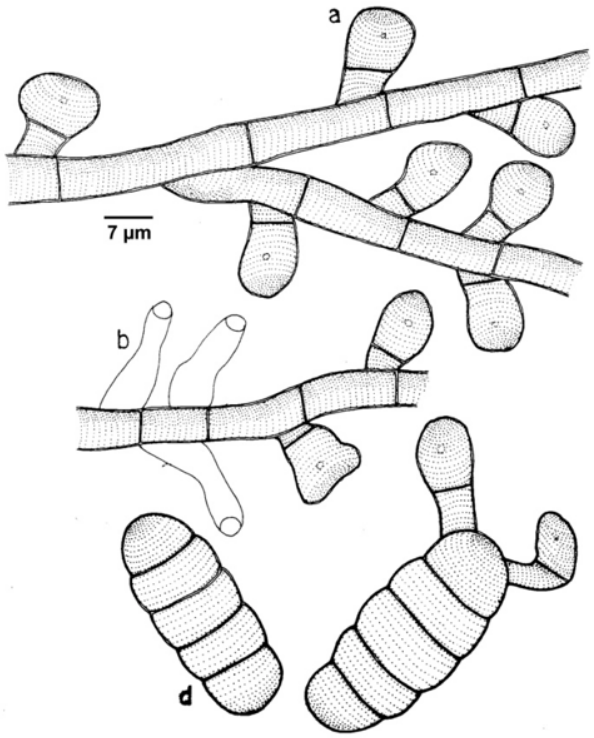


Figure 3. *Amazonia gordoniicola*
a - Appressorium; b - Phialide; d - Ascospores

Colonies amphigenous, subdense, crustose to slightly velvety, up to 2mm in diameter, rarely confluent. Hyphae substraight to slightly undulate, branching mostly opposite at wide angles, closely reticulate, cells 16–20x6–8 µm. Appressoria alternate, straight, antrorse to spreading, 18–20 µm long; stalk cells cylindrical to cuneate, 4–8 µm long; head cells ovate to subglobose, entire, 10–14x8–10 µm. Phialides mixed with appressoria, opposite to alternate, conoid to ampulliform, 20–24x8–10 µm. Perithecia flattened-globose, scattered to grouped, up to 180µm in diameter; ascospores obovate, 4-septate, slightly constricted at the septa, 44–48x16–20 µm.

Amazonia vaccinii Hosag., C.K. Biju & Abraham, Nova Hedwigia 80: 468, 2005; Hosag., Meliolales of India 2: 87, 2008. (Fig. 6).

Materials examined: HCIO 43603, TBGT 289, 20.xi.1998, on leaves of *Vaccinium* sp. (Vacciniaceae), Banasuran mala, coll. C.K. Biju.

Colonies amphigenous, mostly epiphyllous, thin to subdense, up to 5mm diameter, confluent. Hyphae straight to substraight, branching in opposite to unilateral position at acute angles, loosely to closely reticulate,

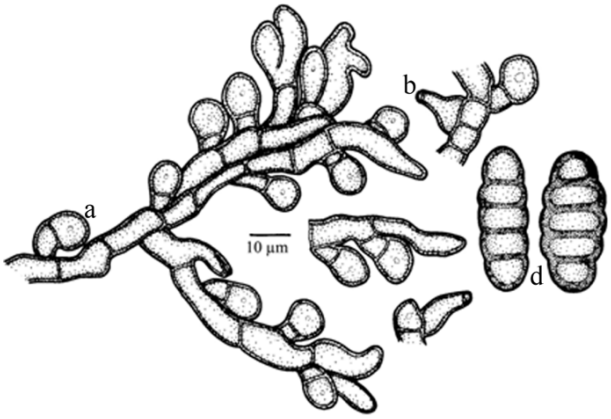


Figure 4. ***Amazonia peregrina***
a - Appressorium; b - Phialide; d - Ascospores

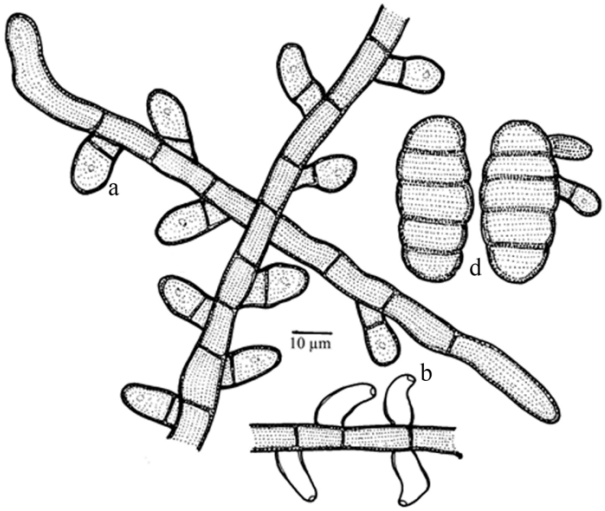


Figure 5. ***Amazonia syzygii***
a **- Appressorium; b - Phialide; d - Ascospores**

cells 12–28x6–8 µm. Appressoria alternate, straight to slightly curved, antrorse to spreading, 14–18 µm long; stalk cells cuneate, 4–7µm long; head cells oblong to globose, straight to slightly curved, entire to sublobate, 9–13x8–10 µm. Phialides mixed with appressoria but apparently on separate mycelial branches, alternate to opposite, ampulliform, 14–23x6–8 µm. Perithecia hidden in the radiating mycelium, flattened-globose, fringed hyphae appressoriate, up to 120µm diameter; ascospores oblong, 4-septate, constricted at the septa, 33–37x14–16 µm.

The similar *A. kakachiana* Hosag. is known on *Vaccinium leschenaultii* var. *zeylanicum* (Ericaceae) from the southern Western Ghats of peninsular India. Contrasting with *A. kakachiana,* has 4-septate ascospores (Hosagoudar, 1996).

The genus *Appendiculella*

Appendiculella Hohn. in Sitz. K. Akad. Wiss. Wien, Math.-naturw. Kl. 128: 556, 1919.

Irene Stev., Ann. Mycol. 25: 420, 1927 (non Irene Theiss. & Sydow, 1917).

Mycelium superficial, brown, septate, branched, appressoriate. Perithecia globose, discrete, ± ostiolate, larviform and striated appendages present; asci 2-4 spored; ascospores brown 3-4 septate.

Type: *A. calostroma* (Desm.) Hohn.

Appendiculella calostroma (Desm.) Hohnel in Sitzb. K.Akad. Wissen. Wien. Math. Naturw. KI. 138:556, 1919; Kapoor, Indian Phytopathol. 20: 151, 1967; Kar & Maity, Norw. J. Bot. 19: 248, 1972; Hosag., Meliolales of India, p. 77, 1996

Meliola calostroma (Desm.) Hohnel, Ann. Mycol. 15:363, 1917.

Irene calostroma (Desm.) Hohnel, Ann. Mycol. 16:213, 1918.

Meliola rubicola Henn., Hedwigia 43: 140, 1904.

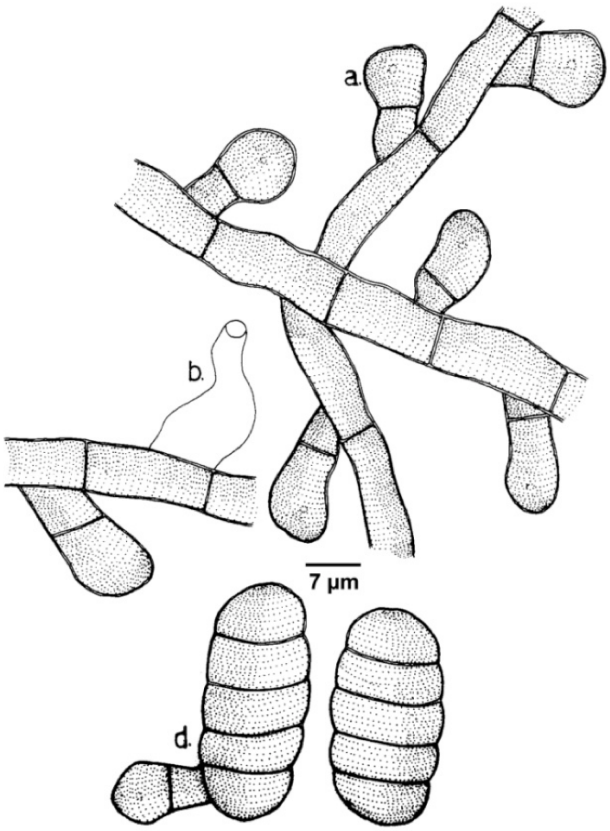


Figure 6. ***Amazonia vaccinii***
a - Appressorium; b - Phialide; d - Ascospores

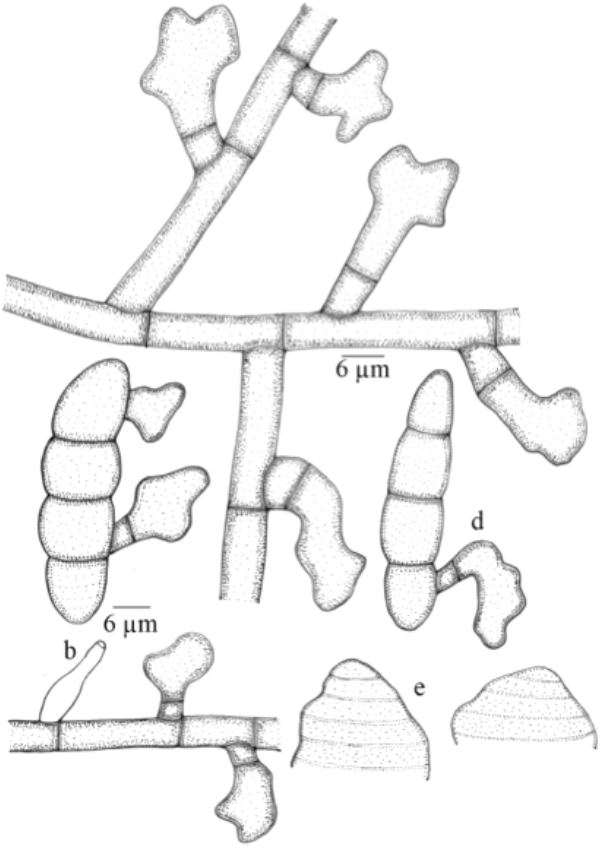


Figure 7. ***Appendiculella calostroma***
a - Appressorium; b - Phialide; d - Ascospores; e - Perithecial appendages

Irenina rubi Stev. & Rold. var. *angulosa* Stev. & Rold., Philippine J. Sci. 56: 52, 1935.

Irenopsis crataegi Bose, Indian Phytopathol. 13:144, 1962. (Fig. 7).

Materials Examined: TBGT 5691, 23.xii.2007, on leaves of *Rubus ellipticus* Smith (Rosaceae), Banasuran mala, coll. M.C. Riju.

Colonies amphigenous, mostly epiphyllous, dense, crustose, up to 2mm in diameter. Hyphae mostly straight, branching mostly opposite at wide angles, loosely reticulate, cells 37–50x6–8 µm. Appressoria alternate, antrorse to spreading, 24–28 µm long; stalk cells cylindrical to cuneate, 9–12.5 µm long; head cells globose, irregularly sublobate, 12–15.5x18–25 µm. Phialides mixed with appressoria, opposite to alternate, conoid to ampulliform, 18–28x9–12.5 µm. Perithecia mostly grouped at the centre of the colony, up to 300µm in diameter; perithecial appendages many, cylindrical to conoid, twisted, rounded at the apex, 49–95x18–25 µm; ascospores ellipsoidal, mostly curved, 3-septate, slightly constricted at the septa, 40–43.5x15–18 µm.

The genus *Armatella*

Armatella Theiss. & Sydow, Ann. Mycol. 13: 235, 1915; 15: 410, 1917. Arx, Fungus (Wageningen) 28: 1, 1958. Verona & Benedek, Mycopath. Mycol. appl. 18: pl. 6, 115, 1961; Muller & Arx, Beitr. Krypt. Der schweiz 2: 882, 1962; Katumoto, Bull. Fac. Agric. Yamaguti Univ. 13: 291, 1962; Hosag., J. Econ. Taxon. Bot. 15: 195, 1991.

Armata Yamam., Sci. Rep. Hyago Univ. Agric., Agric. Biol. Ser. 3: 89, 1958.

Artallendea Bat. & Maia, Atas Inst. Micol. Univ. Recife 1: 221, 1960; Katumoto, Bull. Fac. Agric. Yamaguti Univ. 13: 291, 1962.

Mycelium superficial, brown, septate, branched, appressoriate. Perithecia globose, non-ostiolate or ostiolate, thick walled, verrucose. Mycelial setae, perithecial setae and perithecial appendages lacking. Asci usually 4–8 spored; ascospores typically brown (initially hyaline, later turn brown) and one septate at maturity.

Type: *A. litseae* (P. Henn.) Theiss. & Sydow

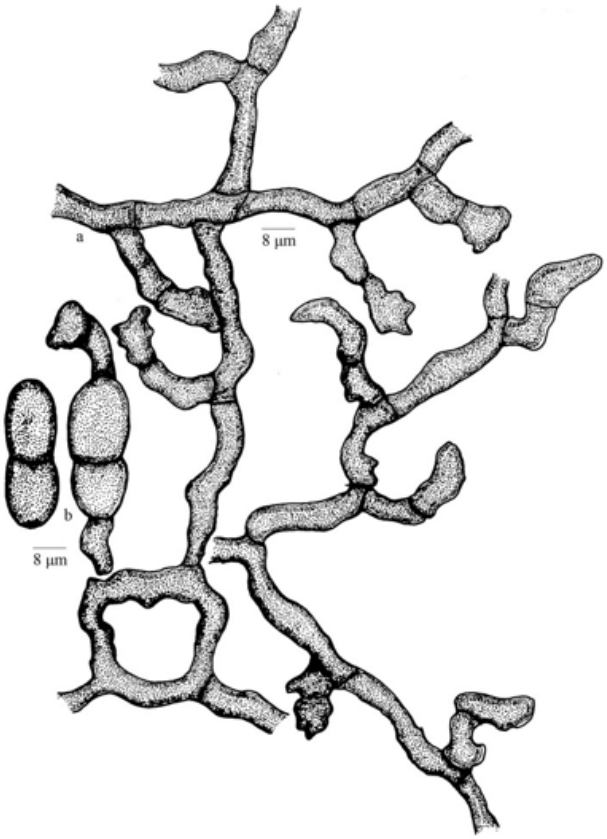


Figure 8. ***Armatella apollonigena***
a - Appressoriate mycelium; b - Ascospores

Armatella apollonigena Hosag. & Sabeena, J. Threatened Taxa 5(13): 4805, 2013**.**

Material examined: TBGT 6536 (holotype), PBL 129 (isotype), 30.xi.2007, on leaves of *Apollonias* sp. (Lauraceae), Padinharathara, Puducherry Kadavu, coll. M.C. Riju.

Colonies amphigenous, thin to subdense, up to 3mm in diameter, confluent. Hyphae flexuous to crooked, branching irregular at acute to wide angles, form loosely and irregularly reticulate mycelial net, cells 35–45×5–7 µm. Appressoria alternate, rarely opposite, straight to variously curved, antrorse to subantrorse, 12–32 µm long; stalk cells cylindrical, often gibbous, 5–12 µm long; head cells ovate, oblong, straight to curved, mostly entire, but rarely sinuate, 7–20x7–12 µm. Perithecia scattered, up to 350µm in diameter; perithecial wall cells mammiform, up to 17µm long; ascospores oblong, uniseptate, slightly constricted at the septum, 32–37x10–12 µm, wall smooth.

There are 16 species of the genus *Armatella* are known on the members of family Lauraceae. Of these, *Armatella apolloniadis* (Hosagoudar et al. 2005) is known on this host from the Western Ghats region of Kerala State. However, *Armatella apollonigena* differs from *Armatella apaolloniadis* Hosag. et al. in having unicellular basal cells of the appressoria, entire to sublobate and globose to oblong head cells in contrast to globose angular to sublobate ones (Hosagoudar 2008). Ascospores germinated by producing appressoria from the apical portion of each cells but no symptom of collapsing cells.

Armatella balakrishnanii Hosag., J. Econ. Taxon. Bot. 15: 196, 1991; Hosag., Sarbhoy, Agarwal & Khan, Mycotaxon 56: 348, 1995; Hosag. & Abraham, J. Mycopathol. Res. 38: 2, 2000; J. Econ. Taxon. Bot. 25: 562, 2001; Hosag., Zoos' Print J. 21: 2323, 2006; Hosag., Meliolales of India 2:103, 2008 (Fig. 9).

Materials examined: 28.xii.2008 HCIO 50580, TBGT 4495, on leaves of *Cinnamomum malabatrum* (Burm.f.) Blume (Lauraceae), 16th mile, Padinharathara, M.C. Riju; HCIO 50578, TBGT 4497 14.ii.2009, Tirunelly, coll. M.C. Riju.

Colonies hypophyllous, thin, spreading, up to 8mm in diameter. Hyphae smooth walled, crooked, branching alternate to irregular at acute angles, closely reticulate, cells 9–25x4–7 µm. Appressoria alternate, antrorse to reflexed, 15–115 µm long; stalk cells aseptate to several septate, straight to tortuous, 3–103 µm long; head cells globose, narrowly ovate, angular, entire, 9–13x10–12 µm. Perithecia scattered, globose, verrucose, up to 115µm in diam.; ascospores ellipsoidal, mostly aseptate but few ascospores septate, cells unequal, 43–50x18–22 µm.

Multiseptate basal cells, entire head of the appressoria and the ascospores not constricted at the septum are the characters of this taxon.

Armatella cinnamomicola Hansf., Reinwardtia 3: 87, 1954; Hosag. & Goos, Mycotaxon 36: 237, 1989; Hosag., J. Econ. Taxon. Bot. 15: 197, 1991; Hosag., Sarbhoy, Agarwal & Khan, Mycotaxon 56: 349, 1995; Hosag. & Balakr., J. Econ. Taxon. Bot. 19: 363, 1995; Hosag. & Abraham, J. Mycopathol. Res. 38: 2, 2000; J. Econ. Taxon. Bot. 25: 563, 2001; Hosag., J. Econ. Taxon. Bot. 29: 435, 2005; Zoos' Print J. 21: 2323, 2006; Meliolales of India 2:107, 2008 (Fig. 10).

Materials examined: HCIO 45293, TBGT 1331 16.x.2001, on leaves of *Cinnamomum malabatrum* (Burm.f.) Blume (Lauraceae), Wayanad, coll. M. Kamarudeen; HCIO 49648, TBGT 3890, 17.ix.2008, Periya, coll. M. Harish & P.J. Robin; HCIO 49205, TBGT 3444, 14.ii.2009, Tirunelly, coll. Jacob Thomas et al.;

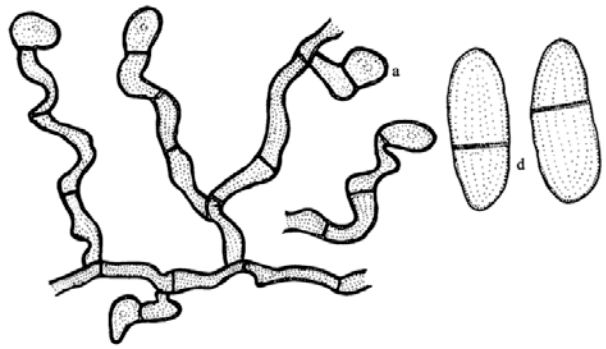


Figure 9. ***Armatella balakrishnanii***
a - Appressoriate mycelium; d - Ascospores

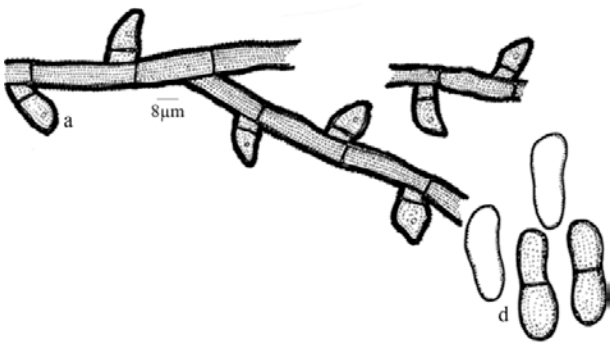


Figure 10. ***Armatella cinnamomicola***
a - Appressoria,;d - Ascospores

HCIO 49813, TBGT 3965, 16.ii.2009, Periya, coll. Gireesh et al.

Colonies epiphyllous, thin to subdense, crustose, up to 4 mm in diameter, confluent. Hyphae crenulated, straight to substraight, branching alternate to irregular at acute angles, loosely reticulate, cells 15–40x6–9 µm, outer wall crenulated except the growing tips. Appressoria alternate, antrorse to spreading, straight to curved, 16–23 µm long; stalk cells cylindrical to cuneate, 4–6 µm long; head cells ovate, broadly conoid, rarely globose, 13–20x8–13 µm, outer wall crenulated. Perithecia seated on tortuous ex appressoriate mycelia, scattered, globose, up to 215µm in diameter; ascospores initially hyaline, continuous, oblong with rounded ends, dumbbell shaped, mature ascospores 1-septate with mostly equal cells, cinnamon brown to dark brown, 23–30x10–13 µm, germinating cells enlarge to form appressoria and the other one empties and collapses.

External surface of both hyphae and appressoria are crenulated.

Armatella cryptocaryae Hosag., J. Econ. Taxon. Bot. 15: 198, 1991; Sarbhoy, Agarwal & Khan, Mycotaxon 56: 350, 1995; Hosag. C.K. Biju & Abraham, J. Econ. Taxon. Bot. 25: 298, 2001; Hosag., J. Econ. Taxon. Bot. 29: 436, 2005; Hosag., Zoos' Print J. 21: 2323, 2006; Hosag., Meliolales of India 2: 108, 2008 (Fig. 11).

Materials examined: HCIO 44698, TBGT 979, 6.ii.2002, on leaves of *Litsea coriacea* (Heyne ex Meissner) Hook.f. (Lauraceae), Chandanathode, coll. M. Kamarudeen; HCIO 45097, TBGT 1152, 21.iv.2003, *L. deccanensis* Gamble, Periya, coll. G. Rajkumar & P. A. Jose; HCIO 49814, TBGT 3966, 16.ii.2009, *Phoebe* sp. (Lauraceae), TBGT 6267, 5.xi.2009, Gurukulam Botanic Garden, coll. A. Sabeena & M.C. Riju.

Colonies epiphyllous, thin, crustose, up to 2mm in diameter. Hyphae smooth walled, straight to substraight, branching alternate to irregular at acute angles, loosely reticulate, cells 12–19x4–7 µm. Appressoria alternate, antrorse to spreading, 15–25 µm long; stalk cells single celled, cylindrical to cuneate, 3–7 µm long; head cells ovoid, conoid, slightly angular, entire, outer wall crenulated, 12–19x9–13 µm. Perithecia scattered, seated on exappressoriate mycelium, up to 140µm in diameter; ascospores ellipsoidal, 1-septate, brown, 31–37x12–13 µm.

Only apical cells of the appressoria are crenulated.

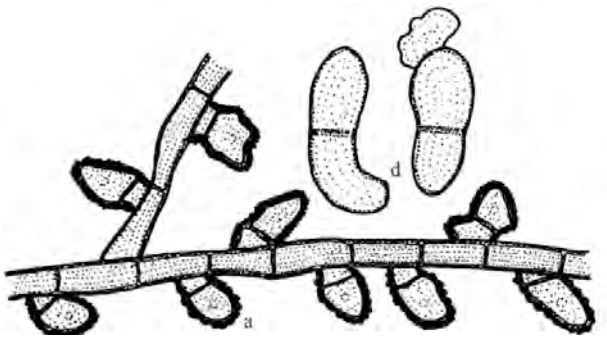


Figure 11. ***Armatella cryptocaryae***
a - Appressoriate mycelium; d - Ascospores

Armatella katumotoi Hosag., Sydowia 40: 113, 1987; J. Econ. Taxon. Bot. 15: 199, 1991; Hosag. & Abraham, J. Econ. Taxon. Bot. 25: 564, 2001; Hosag., J. Econ. Taxon. Bot.29: 436, 2005; Meliolales of India 2:111, 2008 (Fig. 12).

Materials examined: HCIO 44273, TBGT 678, 9.i.2002, on leaves of *Persea macrantha* (Nees) Kosteerm. (*Machilus macrantha* Nees) (Lauraceae), Wayanad, coll. M. Kamarudeen; HCIO 44811, TBGT 1048, 27.xii.2002, *Persea* sp., Periya, coll. M. Kamarudeen & P.A. Jose; HCIO 49868, TBGT 4020, 16.ii.2009, *Litsea* sp. (Lauraceae), Periya, coll. Harish et al.

Colonies hypophyllous, thin, scattered, diffused, up to 5mm in diameter. Hyphae smooth walled, flexuous to crooked, branching alternate to irregular at acute angles, loosely reticulate, cells 15–46x4–6 µm. Appressoria alternate, variously curved, 18–46 µm long; stalk cells aseptate to several septate, flexuous to crooked, 6–40.5 µm long; head cells ovate to globose, entire to stellately lobate, 6–13x12–16 µm. Perithecia scattered, seated on exappressoriate mycelium, verrucose, up to 217µm in diameter; ascospores brown, ellipsoidal, 1-septate, 28–31x12–15 µm.

Multiseptate basal cells and lobate head cells of the appressoria distinguishes this species.

Armatella litseae (P. Henn.) Theiss. & Sydow, Ann. Mycol. 13: 235, 1915; Hansf. & Thirum., Farlowia 3: 286, 1984; Kar & Maity, Norway J. Bot. 19: 250, 1972; Hosag. J. Econ. Taxon. Bot. 15: 200, 1991; Yanxing, Yousheng, Bin & Guangzheng, Flora Fungorum Sinicorum 4: 48, 1996; Hosag. & Abraham, J. Econ. Taxon. Bot. 25: 565, 2001; Hosag., C.K. Biju & Abraham, J. Mycopathol. Res. 40: 192, 2002; Hosag., J. Econ. Taxon. Bot. 29: 436, 2005; Zoos' Print J. 21: 2324, 2006; Hosag., Meliolales of India 2:113, 2008.

Dimerosporium litseae P. Henn., Bot. Jahrb. Syst. 32: 42, 1903.

Artallendea cinnamomi Bat. & Maia, Atas Inst. Micol. Recife 1: 222, 1960 (Fig. 13).

Materials examined: TBGT 6176, 4.xi.2009, on leaves of *Cinnamomum malabathrum* (Burm.f.) Blume (Lauraceae), Padinharathara, coll. A. Sabeena & M.C. Riju.

Colonies hypophyllous, thin, crustaceous, up to 6mm in diameter, rarely confluent. Hyphae smooth walled, substraight to undulate, branching mostly alternate at wide angles, loosely reticulate, cells 16–30x6–8 µm. Appressoria alternate, about 5% opposite, antrorse, straight to curved, 15–20 µm long; stalk cells single celled, cylindrical to cuneate, 3–6 µm long; head cells globose, stellately sublobate, 11–13x15–16 µm. Perithecia seated on tortuous exappressoriate mycelium, scattered, verrucose, up to 300mm in diameter; ascospores initially hyaline and continuous, oblong with rounded ends, dumb bell shaped, matured spores 1-septate with unequal cells, 30–36x11–13 µm. During germination, one cell of the spore enlarges to produce appressorium and the other empties into it and collapses.

Globose and lobate head cells of the appressoria are the characters of this taxon.

The genus *Asteridiella*

Asteridiella McAlpine, Proc. Linn. Soc. New South Wales, p. 38, 1897.

Irene Theiss. & Sydow, Ann. Mycol. 15: 194, 1917 (*non Irene* Stev., 1927).

Irenina Stev., Ann. Mycol. 25: 411, 1927.

Mycelium superficial, brown, septate, branched, appressoriate, mycelial setae absent. Perithecia globose, discrete, ± ostiolate, without setae and appendages, conoid cells projecting and are non-striated; asci 2-4-spored, evanescent; ascospores brown, 3-4 septate.

Type: *A. solani* McAlpine

Asteridiella americana Hansf., Sydowia 10:51, 1957; Sydowia 2:529. 1961; Patil & Thite, J. Shivaji Univ.18:220, 1978; Hosag., Nova Hedwigia 47:537, 1988; Meliolales of India, p.79, 1996 (Fig. 14).

Materials Examined: HCIO 49641, TBGT 3883, 19.ii.2008, on leaves of *Linoceira malabarica* Wall. ex G. Don (Oleaceae), Periya, coll. M. Harish & P.J. Robin.

Colonies epiphyllous, dense, crustose, up to 2mm in diameter. Hyphae substraight to undulate, branching opposite to irregular at acute angles, loosely to closely reticulate, cells 15–34x6–9 µm. Appressoria alternate, mostly antrorse, rarely recurved, 30–37µm long; stalk cells cylindrical to cuneate, 6–9 µm long; head cells ovate, globose, deeply and irregularly lobate, 24–28x18–24 µm. Phialides mixed with appressoria, conoid to ampulliform, 18–31x9–12.5 µm. Perithecia scattered to loosely aggregated, up to 155µm in diameter; perithecial cells conoid to mammiform, up to 22µm long; ascospores obovoidal, 4-septate, constricted at the septa, 40–43.5x15–18.6 µm.

Ascospores in the present collection are considerably smaller as against reported (43–49x20–23 µm) (Hansford 1957).

Asteridiella combreti (Stev.) Hansf. var. ***leonensis*** Hansf., Sydowia Beih. 20: 160, 1961; Hosag. & Goos,

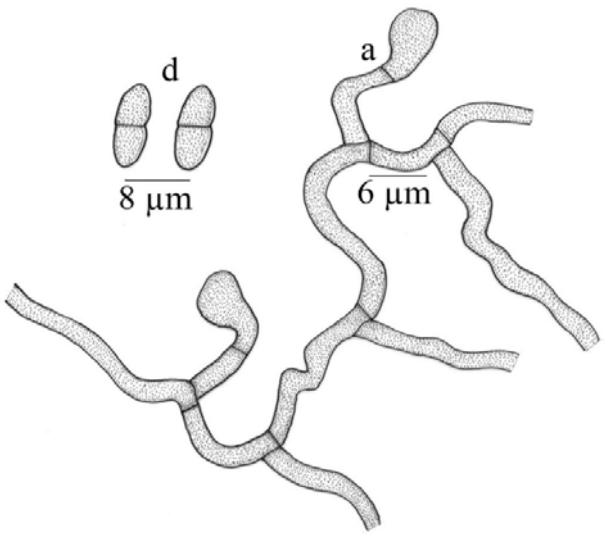


Figure 12. *Armatella katumotoi*
a - Appressoriate mycelium; d - Ascospores

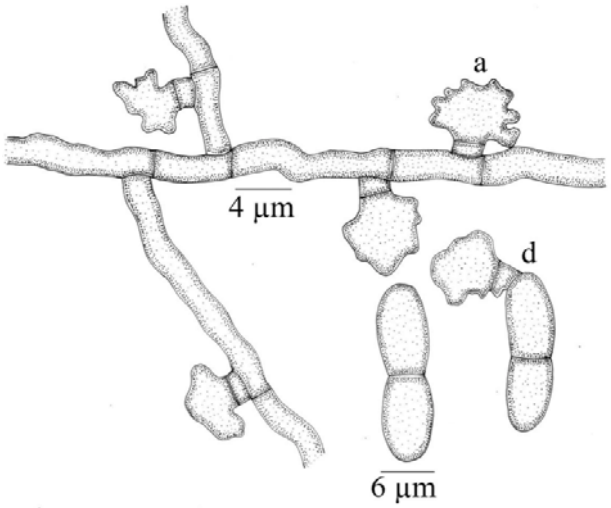


Figure 13. *Armatella litseae*
a - Appressoriate mycelium; d - Ascospores

Mycotaxon 36: 238, 1989; Hosag., Meliolales of India, p 83, 1996 (Fig. 15).

Materials examined: HCIO 50861, TBGT 4778; HCIO 50863, TBGT 4780; HCIO 50867, TBGT 4784; HCIO 50869, TBGT 4786, 5.xi.2009, on leaves of *Terminalia* sp. (Combretaceae), Gurukulam Botanic Garden, Periya, coll. A. Sabeena & M.C. Riju; HCIO 45253, TBGT 1291, 7.iii.2001, Combretaceae member, Periya, coll. G.Rajkumar & P.A. Jose

Colonies epiphyllous, subdense, up to 4mm in diameter, confluent. Hyphae substraight to undulate, branching alternate to opposite at wide angles, loosely reticulate, cells 21–34x6–8 µm. Appressoria alternate, straight, antrorse, 19–27 µm long; stalk cells cylindrical to cuneate, 6–8 µm long; head cells globose, entire, angular, 11–18x11–16 µm. Phialides borne on a separate mycelial branch, opposite, ampulliform, 13–25x4–8 µm, tip twisted and variously bent. Perithecia scattered, verrucose, up to 185µm in diam.; perithecial cells mammiform, 8–11 µm long; ascospores obovoidal, 4-septate, constricted at the septa, 35–42x11–18 µm.

Perithecia were widely opened at the centre

Asteridiella elaeocarpi-tuberculati Hosag., Crypt. Bot. 2/3: 183, 1987; Hosag., Meliolales of India, p.87, 1996(Fig. 16).

Materials examined: HCIO 48035, TBGT 2818, 7.xii.2006, on leaves of *Elaeocarpus tuberculatus* Roxb. (Elaeocarpaceae), Mylattumala, coll. M. Harish V. Gireesh Kumar & K. Anilkumar.

Colonies epiphyllous, subdense, up to 2mm in diameter, confluent. Hyphae substraight to undulate, branching opposite at wide angles, loosely reticulate, cells 31–36x4–6.5 µm. Appressoria alternate, straight to curved, antrorse, 18–28 µm long; stalk cells cylindrical to cuneate, 6–9.5 µm long; head cells globose, ovate, truncate at the apex, entire, 16–18.5x12–15.5 µm. Phialides borne on a separate mycelial branch, mostly opposite, ampulliform, 18–25x6–9.5 µm. Perithecia scattered, seated on exappressoriate mycelia, globose, up to 124µm in diameter; perithecial cells conoid, curved, acute at the apex, up to 15µm long; ascospores obovoidal, 4-septate, slightly constricted at the septa, 40–46.5x15–18.5 µm.

Asteridiella formosensis (Yamam.) Hansf., Sydowia 10: 48, 1957; Sydowia Beih. 2: 686, 1961; Hosag. & Goos, Mycotaxon 36: 240, 1989; 42: 128, 1991; Hosag., Kaveriappa, Raghu & Goos, Mycotaxon 51:109, 1994; Hosag, Meliolales of India, p. 90, 1996.

Irene formosensis Yamam., Trans. Nat. Hist. Soc. Taiwan 31: 15, 1941.

Meliola formosensis (Yamam.) Cif., Mycopathologia

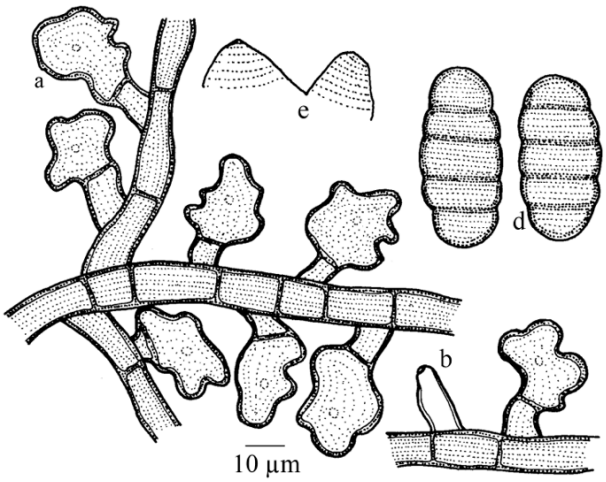


Figure 14. *Asteridiella americana*
a - Appressorium; b - Phialide; d - Ascospores; e - Perithecial wall cells

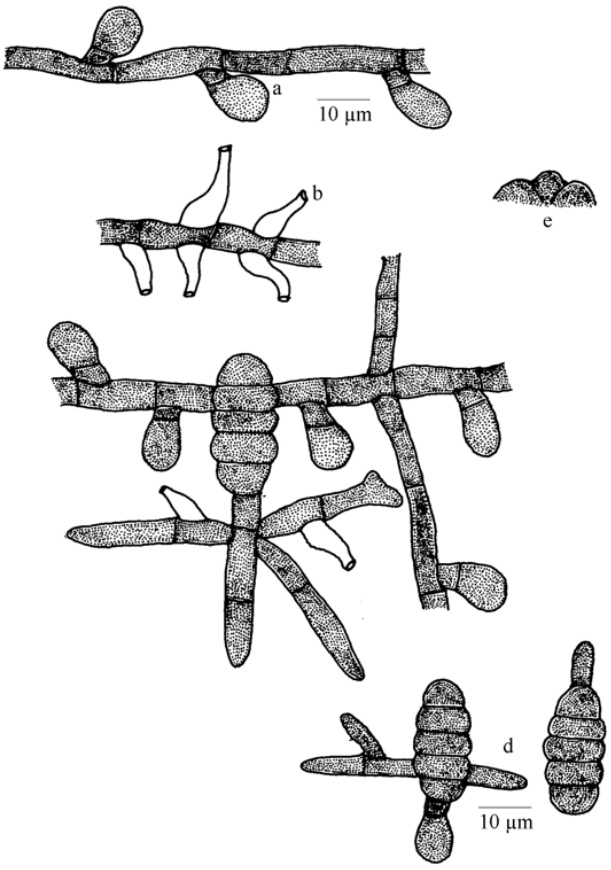


Figure 15. *Asteridiella combreti* var. *leonensis*
a - Appressorium; b - Phialide; d - Ascospores; e - Perithecial wall cells

7: 87, 1954 (non Yamam., 1941). (Fig. 17).

Materials examined: HCIO 48178, TBGT 2914, 10.xi.2010, on leaves of *Callicarpa* sp. (Verbenaceae), 16th mile, Padinharathara, coll. M.C. Riju; HCIO 50831, TBGT 4748, 4.xi.2009, *Callicarpa arborea*, Padiharathara, coll. M.C. Riju & A. Sabeena.

Colonies epiphyllous, thin, smooth, up to 4mm in diameter, confluent. Hyphae substraight to undulate, branching alternate at wide angles, loosely reticulate, cells 28–43x6–8 µm. Appressoria alternate, straight to curved, antrorse, spreading, 24–36 µm long; stalk cells cuneate to cylindrical, 8–12 µm long; head cells ovate, clavate, entire to sublobate, 17–23x11–16 µm. Phialides born on a separate mycelial branch, mostly opposite, rarely unilateral, often two phialides borne very closely on a single mycelial cell, ampulliform, 10–18x6–8 µm. Perithecia scattered, up to 216µm in diameter; perithecial wall cells obtusely conoid, 6–10 µm long; ascospores ellipsoidal, 4-septate, constricted at the septa, middle cell slightly larger, 41–46x20–26 µm.

These collections slightly differed from the species description in having smaller perithecial cells.

Asteridiella glycosmidis Hosag., C.K. Biju & Abraham, Nova Hedwigia 80: 478, 2005; Hosag., Meliolales of India 2: 134, 2008 (Fig. 18).

Materials examined: HCIO 43607, TBGT 292, 16.iv.1999, on leaves of *Glycosmis pentaphylla* (Retz.) DC. (*G. cochinchinensis sensu* Gamble) (Rutaceae), on the way to Manandawadi, coll. C.K. Biju; HCIO 44628, TBGT 910, 23.ix.2002, Tirunelly, coll. K. Vijayakumar.

Colonies amphigenous, crustose, up to 1mm diameter, rarely confluent. Hyphae substraight, branching in irregular position at acute angles, loosely to closely reticulate, sometimes form solid mycelial mat, cells 9–15x3–5 µm. Appressoria alternate, antrorse to closely antrorse, 14–23 µm long; stalk cells cylindrical to cuneate, 4–10 µm long; head cells straight to curved, ovate, cylindrical to globose, rarely entire, sublobate to deeply and irregularly lobate, 14–23x7–9 µm. Phialides mixed with appressoria, numerous in some colonies, alternate to opposite, ampulliform, 14–23x7–9 µm. Perithecia not matured, up to 100µm diameter; ascospores oblong to cylindrical, 4-septate, constricted at the septa, 38–42x14–16 µm.

The colonies of this taxon were mixed with the colonies of *Meliola cadigensis* Yates. var. *glycosmidis* (Kapoor) Hosag. *Asteridiella glycosmidis* is close to *A. trachylaena* (Sydow) Hansf. in having lobate head cells of the appressoria but differs from it in having shorter appressoria and smaller ascospores (Hansford 1961). It also differs from *A. acronychiae* Hu in having lobate

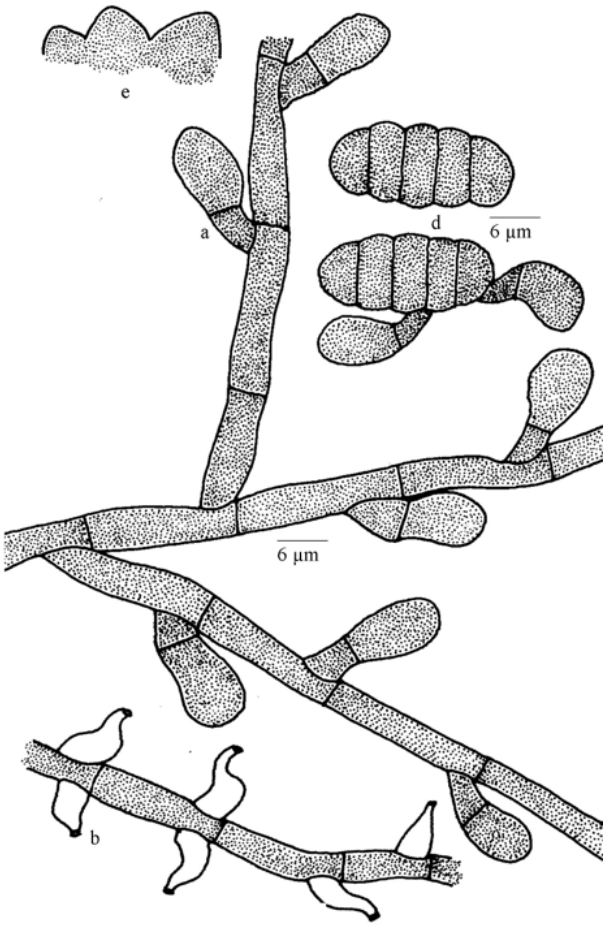


Figure 17. *Asteridiella formosensis*
a - Appressorium; b - Phialide; d - Ascospores; e - Perithecial wall cells

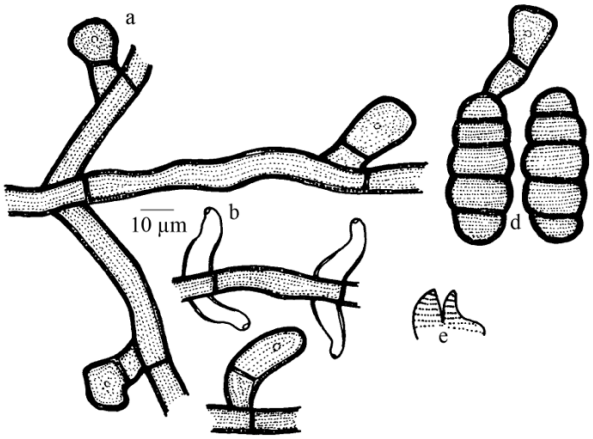


Figure 16. *Asteridiella elaeocarpi-tuberculati*
a - Appressorium; b - Phialide; d - Ascospores; e - Perithecial wall cells

head cells of appressoria and smaller ascospores (Hu et al. 1996, 1999).

Asteridiella micheliae Hosag., Archana & Agarwal, Indian Phytopath. 60: 237, 2007; Hosag., Meliolales of India 2: 139, 2008 (Fig. 19).

Material examined: HCIO 51047, TBGT 4964, 27.xii.2008, on leaves of *Michelia champaka* L. (Magnoliaceae), Puthuserrykadavu, Wayanad, coll. M.C. Riju; HCIO 49973, HCIO 47370, TBGT 4125, 14.iii.2007, 16th mile, Padinharathara, coll. M.C. Riju.

Colonies epiphyllous, thin, up to 4mm in diameter. Hyphae substraight, branching alternate to opposite at wide angles, loosely reticulate, cells 19–22x3–5µm. Appressoria alternate, antrorse, mostly straight, 13–14 µm long; stalk cells cylindrical to cuneate, 5–6 µm long; head cells ovate, oblong, angular to sublobate, 8–10x6–8 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 12–13x4–5 µm. Perithecia scattered, globose, up to 145µm in diameter; perithecial wall cells mammiform, obtuse at the tip, up to 20µm long; ascospores obovoidal to slightly cylindrical,

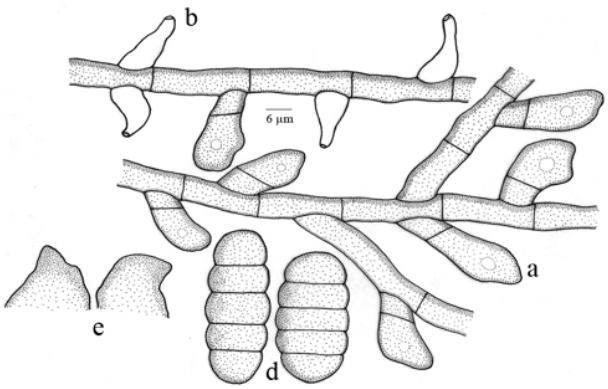


Figure 19. ***Asteridiella micheliae***
a - Appressorium; b - Phialide; d - Ascospores; e - Perithecial wall cells

4-septate, constricted at the septa, 20–29x10–12 µm.

It differs from *Asteridiella crustacea* (Speg.) Hansf. and *Asteridiella werdernannii* Hansf. in having distinctly smaller ascospores and shorter appressoria (Hansford, 1961).

Asteridiella millettiicola **sp. nov.**

V.B. Hosagoudar & G.R. Archana (Fig. 20).
(urn:lsid:indexfungorum.org:names: 809136)

Material examined: HCIO 50888 (holotype), TBGT 4805 (isotype), 14.ii.2009, on leaves of *Millettia* sp. (Fabaceae), Tirunelly, coll. Girish Kumar et al.

Colonies hypophyllous, subdense, up to 3mm in diameter, confluent. Hyphae substraight to flexuous, branching mostly opposite at acute to wide angles, loosely to closely reticulate, cells 12–31 x 4-6.5 µm. Appressoria alternate, straight to curved, antrorse to subantrorse, 20–37 µm long; stalk cells, 1–2 septate, cylindrical to

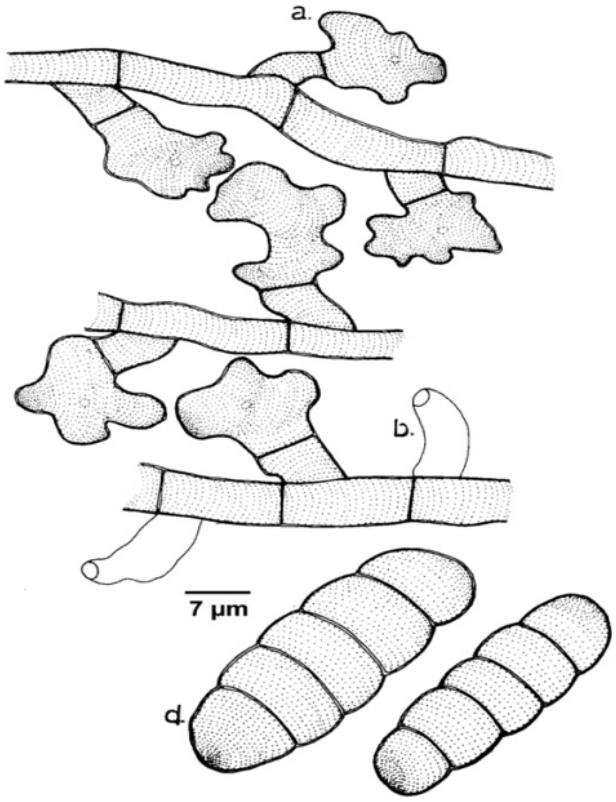


Figure 18. ***Asteridiella glycosmidis***
a - Appressorium; b - Phialide; d - Ascospores

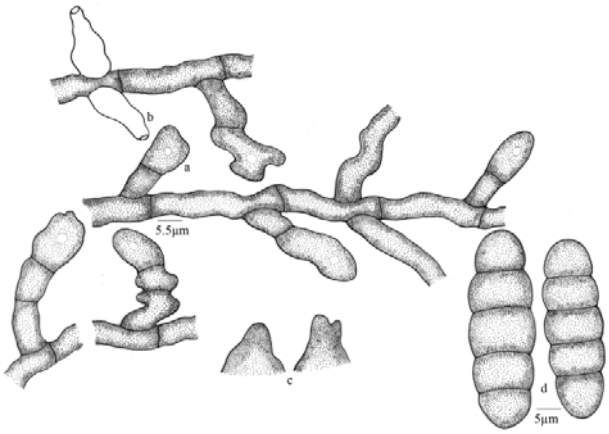


Figure 20. ***Asteridiella millettiicola*** **sp. nov.**
a - Appressorium; b - Phialide; c - Perithecial wall cells; d - Ascospores

cuneate in case of unicellular, while, straight, crooked to variously curved in case of multicellular, 4–27.5 µm long; head cells straight to variously curved, ovate, oblong, entire to angular, sublobate to lobate, 16–21x9–16 µm. Phialides mixed with appressoria, opposite to unilateral, ampulliform, 12–24x6–8 µm. Perithecia scattered, up to 112µm in diameter, perithecial wall cells conoid, mammiform, up to 16µm long; ascospores obovoidal, 4-septate, slightly constricted at the septa, 40–43x17–21 µm.

Etymology: Named after the host genus.

This species differs from *Asteridiella millettiae* Hosag. et al. in having straight to flexuous hyphae; having 1–2 septate stalk cells of the appressoria (Hosagoudar 2008).

Asteridiella phaulopsidis Hosag., Zoos' Print J. 21: 2462, 2006; Hosag., Meliolales of India 2: 144, 2008 (Fig. 21).

Materials examined: HCIO 50607, TBGT 4524; HCIO 50609,TBGT 4526, 5.xi.2009, on leaves of *Phaulopsis micranthus* (Acanthaceae), Gurukulam Botanical Garden, Periya, coll. M.C. Riju & A. Sabeena.

Colonies epiphyllous, dense, up to 1mm in diameter, often confluent. Hyphae substraight to flexuous, branching alternate to irregular at acute angles, loosely to closely reticulate, cells 16–25x5–7 µm. Appressoria alternate, antrorse to closely antrorse, 16–20 µm long; stalk cells cylindrical to cuneate, 3–10 µm long; head cells ovate to globose, entire, angular to stellately lobate, 9–12x9–11 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 16–19x5–7 µm. Perithecia scattered to loosely grouped, globose, up to 125µm in diameter; perithecial wall cells conoid, projected, up to 13µm long; ascospores oblong to ellipsoidal, 4-septate, slightly constricted at the septa, 30–36x11–13 µm.

Based on the Beeli formula 3101. 3220, *Asteridiella phaulopsidis* can be compared with *A. thumbergiae-chrysopsidis* (Hansf. & Deight.) Hansf. known on *Thunbergia chrysops* from Sierra Leone but differs from it in having shorter appressoria with stellately lobate head cells and perithecial wall cells are conoid in contrast to mammiform (Hansford 1961).

Asteridialla scolopiae Hosag. Meliolales of India, p104, 1996 (Fig. 22).

Materials examined: HCIO 43609, TBGT 294, 14.iv.1999, on leaves of *Scolopia crenata* (Wight & Arn.) Clos (Flacourtiaceae), Chembra peak, coll. C.K. Biju.

Colonies amphigenous, dense, crustose, up to 3mm in diameter, scattered, rarely confluent. Hyphae straight to substraight, branching mostly opposite at acute angles, loosely to closely reticulate, cells 12–15.5x5–9 µm. Appressoria alternate, about 1% opposite in loosely reticulated colonies while about 5% opposite in densely reticulated colonies, antrorse, 15-28 µm long; stalk cells cuneate, 3–12.5 µm long; head cells globose, ovate, oblong, mostly entire, rarely angular, 12–15.5x9–12.5 µm. Phialides mixed with appressoria, opposite to alternate, ampulliform, 15–18.8x5–7 µm. Perithecia scattered, up to 186µm in diameter; perithecial cells mammiform, straight to curved, up to 22µm long; ascospores obovoidal, 4-septate, strongly constricted at the septa, 43–47x17–19 µm.

This species is close to *Asteridiella deightonii* Hansf. in having few opposite appressoria but differs from it in having substraight hyphae, entire to angular head cells of appressoria and smaller ascospores.

Asteridiella symploci-microphyllae Hosag. & Sabeena, Bioscience Discovery 2(1): 117, 2011; Hosag., J. Threatened Taxa 5(6): 4008, 2013 (Fig. 23).

Material examined: HCIO 50636, TBGT 4553, 1.xi.2007, on leaves of *Symplocos macrophylla* Wallich ex DC. (Symplocaceae), Banasuramala, coll. A. Chandraprabha.

Colonies amphigenous, subdense, up to 3mm in diameter, confluent. Hyphae straight to substraight, branching opposite to unilateral at acute to wide angles, loosely to closely reticulate, cells 17–32x6–8 µm. Appressoria alternate to unilateral, antrorse to subantrorse, 15–20 µm long; stalk cells cylindrical to cuneate, 2–7 µm long; head cells globose to ovate, entire, 10–15x10–12 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 15–25x5–10 µm. Perithecia scattered, up to 240µm in diameter.; perithecial wall cells conoid to mammiform, up to 50µm long; ascospores cylindrical, 4-septate, constricted at

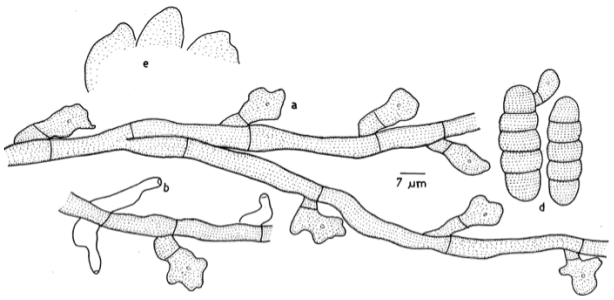


Figure 21. ***Asteridiella phaulopsidis***
a - Appressorium; b - Phialide; d - Ascospores; e - Perithecial wall cells

the septa, 32-40 x 15-17µm.

Asteridiella vivekananthanii Hosag., Sydowia 40: 114, 1987; Hosag. & Goos, Mycotaxon 42: 120, 1991; Hosag., Kaveriappa, Raghu & Goos, Mycotaxon 51: 110, 1994, Hosag., Meliolales of India, p.105, 1996 (Fig. 24).

Materials examined: HCIO 43610, TBGT 295, 18.xi.1998, on leaves of *Clerodendrum viscosum* Vent (Verbenaceae), Chembra peak, coll. C.K. Biju; HCIO 49225, TBGT 3464, 16.ii.2009, Periya, coll. Jacob Thomas et al.

Colonies epiphyllous, subdense to dense, up to 4mm in diameter, confluent. Hyphae flexuous to crooked, branching alternate to irregular at acute angles, very closely reticulate, cells 15.5–18.5x4–6.5 µm. Appressoria alternate to unilateral, straight to mostly curved, antrorse to spreading, 16–31 µm long; stalk cells cylindrical to cuneate, 3–12.5 µm long; head cells ovate, globose, entire to angulose, 15–18.5x12–15.5 µm; few appressoria 46–50 µm long and stalk cells 1-septate, 15–18.5 µm long. Phialides few, mixed with appressoria, opposite to alternate, conoid to ampulliform, 15–31x6–12.5 µm. Perithecia scattered, up to 250µm in diameter; perithecial wall cells conoid to mammiform, up to 22µm long; ascospores obovoidal, 4-septate, slightly curved, 31–37x12.5–18.5 µm.

This species was mixed with *Meliola clerodendricola* Henn.

Asteridiella wyanadensis Hosag., C.K. Biju & Abraham, Nova Hedwigia 80: 479, 2005; Hosag., Meliolales of India 2: 152, 2008 (Fig. 25).

Materials examined: HCIO 43611, TBGT 329, 4.iv.1999, on leaves of *Mallotus* sp. (Euphorbiaceae), Chembra, coll. C.K. Biju.

Colonies hypophyllous, thin, up to 3mm diameter. Hyphae flexuous, branching alternate to opposite at acute to wide angles, loosely to closely reticulate, cells 15–30x5–8 µm. Appressoria alternate, antrorse to subantrorse, 11–20 µm long; stalk cells cylindrical to cuneate, 3–6 µm long; head cells ovate to globose, entire, rarely angular, 8–13x9–13 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 16–20x4–6 µm. Perithecia scattered, immature, up to 120µm diam.; ascospores oblong, 4-septate, constricted at the septa, 33–36x12–15 µm.

This species is close to *Asteridiella phyllanthi* (Deight.) Hansf. known on *Phyllanthus wildennannii* from Sierra Leone. However, differs from it in having flexuous hyphae, absence of opposite appressoria and

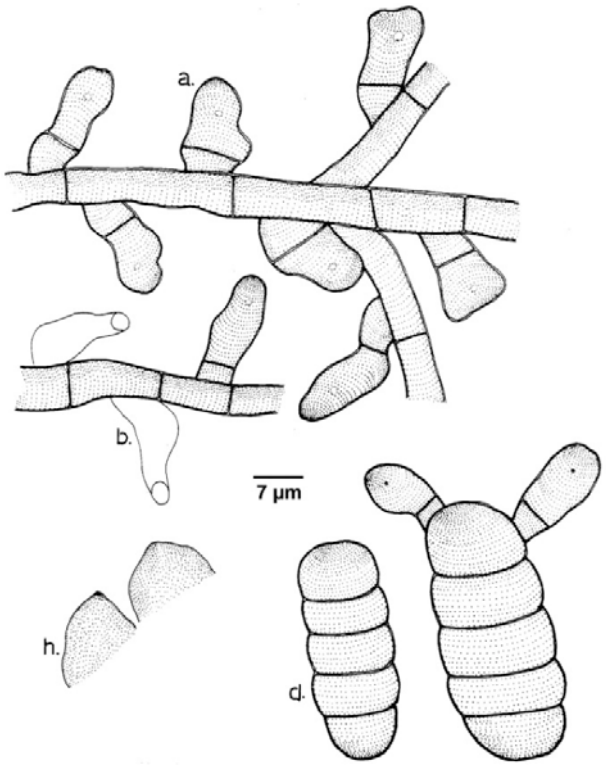


Figure 22. ***Asteridialla scolopiae***
a - Appressorium; b - Phialide; d - Ascospores; h - Perithecial wall cells

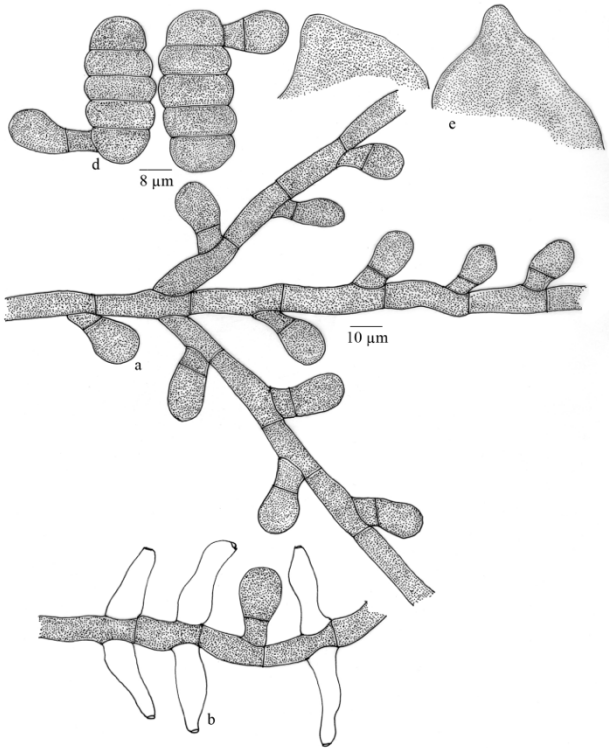


Figure 23. ***Asteridiella symploci-microphyllae***
a - Appressorium; b - Phialide; d - Ascospores; e - Perithecial wall cells

having ovate and entire head cells of appressoria.

The genus *Irenopsis*

Irenopsis Stev., Ann. Mycol. 25: 411, 1927; Hansf., Sydowia Beih 2: 25, 1961; Hosag., Meliolales of India, p.107, 1996; Meliolales of India 2: 162, 2008; Hosag. & Agarwal, Taxonomic Studies of Meliolales. Identification manual, p. 121, 2008.

Mycelium superficial, brown, septate, branched, appressoriate, mycelial setae absent. Perithecia globose, descrete, ± ostiolate, with prominent, dark-brown setae, larviform appendages absent; asci 2-4 spored, evanescent; ascospores brown, 3-4 septate.

Type: *I. tortuosa* (Wint.) Stev.

Irenopsis benguetensis Stev. & Rold. ex Hansf., Sydowia 26: 311, 1963; Hosag. & Goos, Mycotaxon 36: 242, 1989; Hosag., Meliolales of India, p. 107, 1996.

Irenopsis benguetensis Stev. & Rold., Philippine J. Sci. 56: 49, 1935; Hansf., Sydowia Beih. 2: 321, 1961(*nom. invalid*.).

Meliola benguetensis (Stev. & Rold.) Cif., Mycopathologia 7:87, 1954 (*non* Stev. & Rold., 1935) (Fig. 26, Image 4).

Materials examined: HCIO 44790, TBGT 1027, 27.xii.2002, on leaves of *Ficus exaspirata* Vahl. (Moraceae), Periya, coll. M. Kamarudeen & P.A. Jose; HCIO 49998, TBGT 4150, 18.ix.2008, on *Ficus* sp., Tirunelly, coll. P.J. Robin et al.; HCIO 50739, TBGT 4656, 6.xi.2009, Padinharathara, coll. A. Sabeena & M.C. Riju.

Colonies amphigenous, mostly epiphyllous, subdense to dense, up to 4mm in diameter, rarely confluent. Hyphae straight to undulate, branching alternate at acute angles, loosely to closely reticulate, cells 16–36x4–10 µm. Appressoria alternate, antrorse to subantrorse, spreading, 26–36 µm long; stalk cells cylindrical to cuneate, 9–17 µm long; head cells globose, subangulose to irregularly sublobate, 14–22x12–20 µm. Phialides mixed with appressoria and also born on a separate mycelial branch, alternate, ampulliform, 16–24x7–10 µm. Perithecia scattered to aggregated, verrucose, up to 140µm in diameter; perithecial setae 4–8, straight, spreading, dark-brown at base and pale brown towards the apex, obtuse and mostly straight at the tip, up to 160µm long and 7–10 µm thick; ascospores ellipsoidal, 4-septate, constricted at the septa, 36–43x16–26 µm.

This is the only species on the host genus *Ficus* in the Western Ghats of Peninsular India (Hosagoudar, 1996).

Irenopsis hiptages Yamam. var. ***indica*** Hosag. & Sabeena, J. Threatened Taxa 5 (6): 4011, 2013; Hosag., J. Threatened Taxa 5(6): 4015, 2013 (Fig. 27).

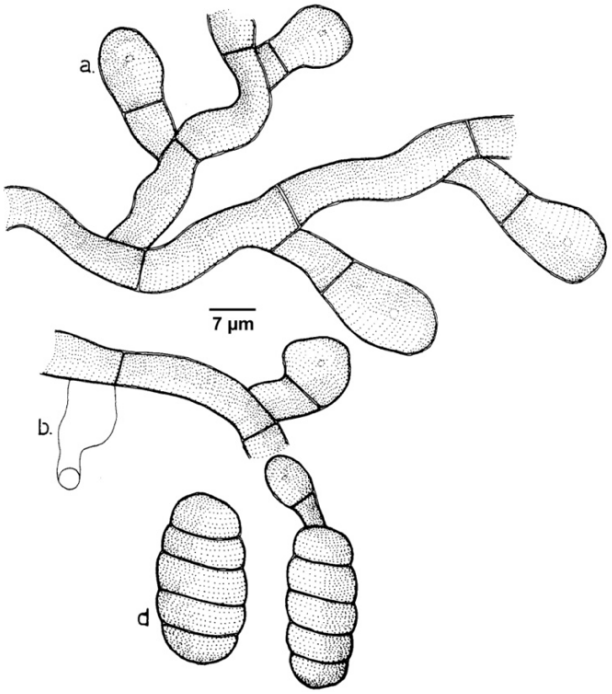


Figure 24. *Asteridiella vivekananthanii*
a - Appressorium; b - Phialide; d - Ascospores

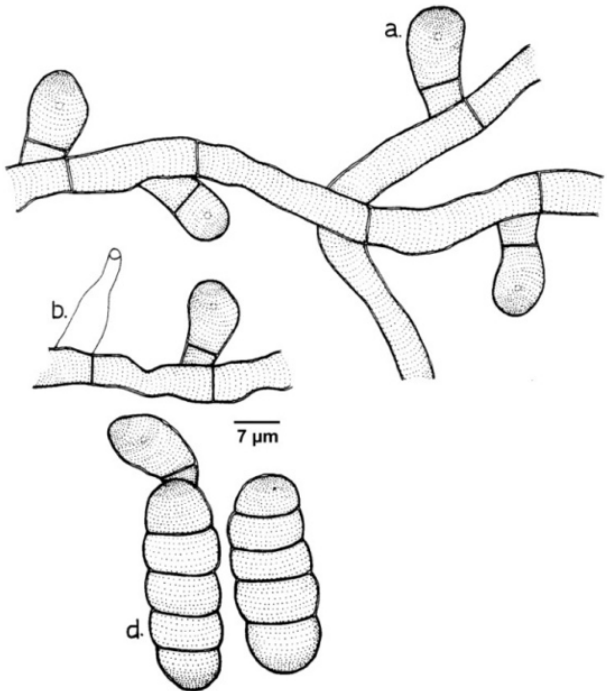


Figure 25. *Asteridiella wyanadensis*
a - Appressorium; b - Phialide; d - Ascospores

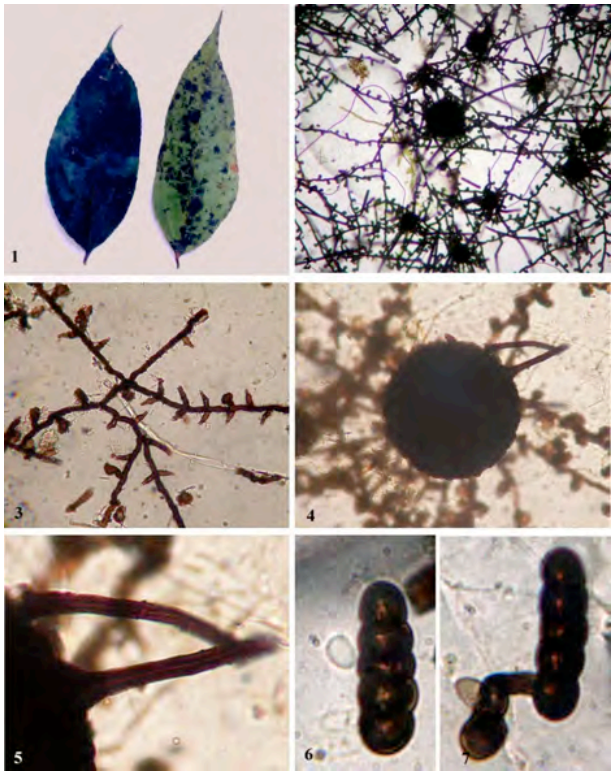


Image 4. *Irenopsis benguetensis*
1 - Infected leaves of *Ficus tinctoria* ssp. *parasitica*; 2 - Colony with perithecia; 3 - Appressoriate mycelium with phialides; 4 - Perithecium; 5 - Perithicial setae; 6 - Ascospore; 7 - Germinating ascospore

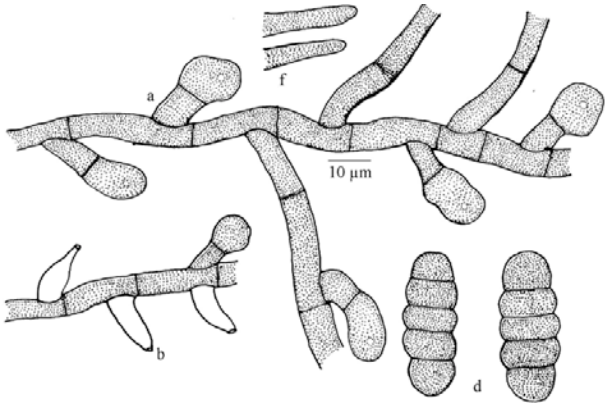


Figure 26. *Irenopsis benguetensis*
a - Appressorium; b - Phialide; d - Ascospores; f - Apical portion of the perithecial setae

Materials examined: TBGT 5747, 18.ix2008, on leaves of *Hiptage* sp. (Malphigiaceae), Thirunelli, coll. P.J. Robin et al.

Colonies amphigenous, subdense, up to 3mm in diameter, confluent. Hyphae straight to substraight, branching opposite at acute to wide angles, loosely reticulate, cells 17–25x6–8 µm. Appressoria alternate, unilateral to 3–4% opposite, antrorse to subantrorse, 22–30 µm long; stalk cells cylindrical to cuneate, 5–10 µm long; head cells ovate, entire, mostly angular to rarely sublobate, 15–20x12–17 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 15–25x7–10 µm. Perithecia scattered, up to 190µm in diameter; perithecial setae simple, straight, obtuse at the tip, up to 117µm long; ascospores cylindrical, 4-septate, constricted at the septa, 47–55x17–22 µm. This is the only taxon known on this host genus from the Western Ghats region.

Irenopsis molleriana (Wint.) Stev., Ann. Mycol. 25: 437, 1927; Hansf., Sydowia Beih. 2: 184, 1961; Hosag., Sarbhoy, Agarwal & Khan, Mycotaxon 56: 354, 1995; Hosag., Abraham & Crane, Mycotaxon 71: 151, 1999; Hosag., C.K. Biju & Abraham, J. Econ. Taxon. Bot. 25: 299, 2001; Hosag., Meliolales of India 2: 168, 2008.

Meliola molleriana Wint., Hedwigia 25: 98, 1886.

Meliola (*Irenina*) *procera* Cif., Ann. Mycol. 36: 219, 1938 (Fig. 28).

Materials examined: HCIO 50742, TBGT 4659, 4.xi.2009, on leaves of *Hibiscus furcatus* Roxb. ex DC. (Malvaceae), Padinharathara, coll. A. Sabeena & M.C. Riju.

Colonies epiphyllous, thin, subvelvety, up to 4mm in diameter, rarely confluent. Hyphae substraight to undulate, branching mostly opposite at acute to wide angles, loosely reticulate, cells 21–41x6–7 µm. Appressoria alternate, antrorse to spreading, straight to curved, 14–22 µm long; stalk cells cylindrical to cuneate, 2–5 µm long; head cells ovate, subglobose, entire, subangular to slightly sublobate, 9.6–16.8x9–17 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 14–24x4–7 µm. Perithecia scattered to loosely grouped, verrucose, up to 170µm in diameter; perithecial setae, 10–16 in number, simple, straight to slightly flexuous, septate, smooth, obtuse to subacute at the tip, up to 106µm long; ascospores obovoidal, 4-septate, slightly constricted at the septa, 33–38x12–17 µm.

The present collections show a slight variation from the type species in having longer appressoria and shorter ascospores. Kapoor (1967) assigned *Irenopsis* species parasitic on *Triumfetta bartramia* to this taxon (Hosagoudar 1996).

Irenopsis sidae (Rehm) Hughes var. ***indica*** Hosag. & Manoj., Zoos' Print J. 18: 1000, 2002; Hosag., Meliolales of India 2: 168, 2008 (Fig. 29).

Materials examined: HCIO 50743, TBGT 4660; HCIO

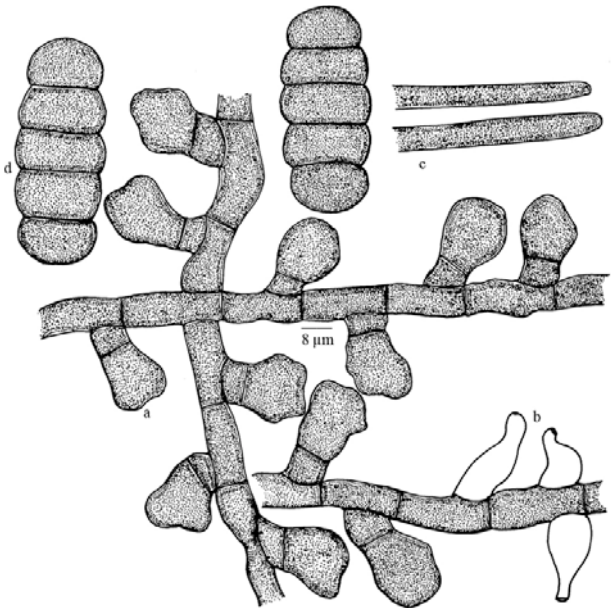


Figure 27. ***Irenopsis hiptages*** **var.** ***indica***
a - Appressorium; b - Phialide; c - Apical portion of the perithecial setae; d - Ascospores

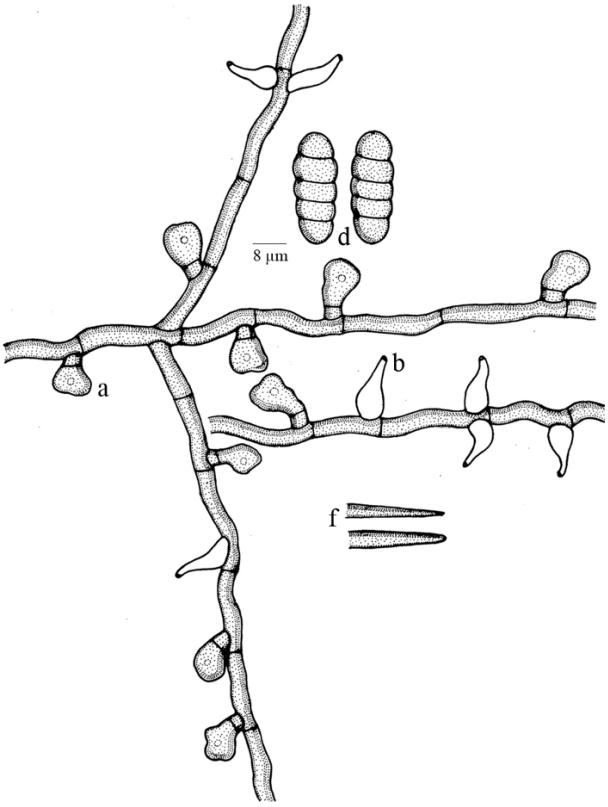


Figure 29. ***Irenopsis sidae*** **var.** ***indica***
a - Appressorium; b - Phialide; f - Apical portion of the perithecial; d - Ascospores

50741, TBGT 4658, 6.xi.2009, on leaves of *Sida* sp. (Malvaceae), Padinharathara, coll. A. Sabeena & M.C. Riju.

Colonies amphigenous, mostly epiphyllous, subdense to dense, up to 2mm in diameter, confluent. Hyphae straight to flexuous, branching alternate, opposite to irregular at acute angles, loosely to closely reticulate, cells 22–29x7–9 µm. Appressoria alternate, about 5% opposite, antrorse, subantrorse to rarely retrorse, 14–18 µm long; stalk cells cylindrical to cuneate, 3–6 µm long; head cells ovate to globose, entire, angular to truncate at the apex, straight to curved, 9–13x8–10 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 14–18x6–8 µm. Perithecia scattered, globose, up to 150µm in diameter; perithecial cells slightly projected; perithecial setae 0–12 in numbers, simple, straight, acute at the apex, deep brown, septa not visible, up to 125µm long; ascospores oblong, 4-septate, slightly constricted at the septa, 30–32x11–13 µm.

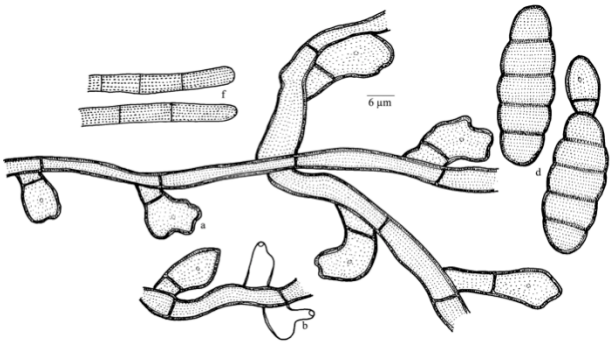


Figure 28. ***Irenopsis molleriana***
a - Appressorium; b - Phialide; f - Apical portion of the perithecial setae; d - Ascospores

Based on the digital formula, the present collection is close to *Irenopsis aciculosa* (Wint.) Stev. known on many members of the family Malvaceae from the tropical countries and *I. sidae* Hughes known on *Sida javensis* and *S. mysorensis* from Philippines. However, the latter species differs from the former in having only straight but not incurved perithecial setae. Hence, the present collection is closer to the latter species (Hansford 1961). The variety differs from the type species in having dense colonies, 5% opposite appressoria and shorter perithecial setae.

Irenopsis trichiliae Hosag. & Riju, J. Threatened Taxa 2(4): 824, 2010; Hosag., J. Threatened Taxa 5(6): 4014, 2013 (Fig. 30).

Material examined: HCIO 48177, TBGT 2913,

10.xi.2007, on leaves of *Trichilia* sp. (Meliaceae), 16th mile, Padinharathara, coll. M.C. Riju.

Colonies epiphyllous, subdense, scattered, up to 2mm in diam., confluent. Hyphae straight to flexuous, branching opposite to alternate at acute to wide angles, loosely to closely reticulate, cells 11–33x6–11 µm. Appressoria alternate, unilateral, antrorse to subantrorse, 13–26 µm long; stalk cells cylindrical to cuneate, 4–11 µm long; head cells globose, angular, sublobate to deeply lobate, 8–18x11–18 µm. Phialides mixed with appressoria, opposite to unilateral, ampulliform, 17–24x6–9 µm. Perithecia scattered, up to 209µm in diameter; perithecial setae 0–5 in number, straight, simple, obtuse at the apex, up to 198µm long; ascospores cylindrical, 4-septate, slightly constricted at the septa, 37–47x15–18 µm.

Irenopsis chukrasiae Hosag., *I. inidica* (Anahosur) Hosag., *I. murrayae* Hosag. & Rajkumar are known on the members of the family Meliaceae (Hosagoudar 1996; Hosagoudar et al. 2001). *Irenopsis trichiliae* differs from *I. chukrasiae* in having only unicellular stalk cells of the appressoria and from *I. indica* in having straight hyphae and 0–5 perithecial setae. It also differs from *I. murrayae* in having angular to lobate head cells of the appressoria.

Irenopsis triumfettae (Stev.) Hansf. & Deight., Mycol. Pap. 23: 14, 1948; Hansf., Reinwardtia 3: 107, 1954; Sydowia Beih. 2: 368, 1961; Hosag. & Goos, Mycotaxon 36: 244, 1989; 42: 128, 1991; Hosag., Meliolales of India, p. 118, 1996.

Meliola triumfettae Stev., Illinois Biol. Monogr. 2: 30, 1916; Deight., Mycol. Pap. 9:17, 1944.

Irenopsis coronata (Speg.) Stev. var. *triumfettae* (Stev.) Stev., Ann. Mycol. 25: 435, 1927: Stev. & Rold., Philippine J. Sci. 56: 51, 1933.

Meliola coronata Speg. var. *triumfettae* (Stev.) Cif., Mycopathologia 8:117, 1954.

Irenopsis molleriana sensu Kapoor, Indian Phytopathol. 20: 151, 1967 (Fig. 31).

Materials examined: HCIO 43691, TBGT 348, 19.xi.1998, on leaves of *Triumfetta rhomboidea* Jacq. (Tiliaceae), Banasuran mala, coll. C.K. Biju.

Colonies amphigenous, mostly epiphyllous, subdense, scattered, up to 3mm in diameter, rarely confluent. Hyphae undulate to tortuous, branching opposite to alternate at wide angles, loosely to closely reticulate, cells 15–20x6–8 µm. Appressoria alternate, mostly straight, antrorse, 18–22 µm long; stalk cells cylindrical to cuneate, 6–8 µm long; head cells globose, entire to sublobate, 12–16x12–14 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 18–20x6–8 µm. Perithecia scattered to aggregated, up to 207µm in diam.; perithecial setae 6–8, straight, spreading, continuous, curved or uncinate at the apex, apex obtuse, 99–144x6–8 µm; ascospores ellipsoidal, 4-septate, constricted at the septa, 36–44x12–16 µm.

Common species on this host genus

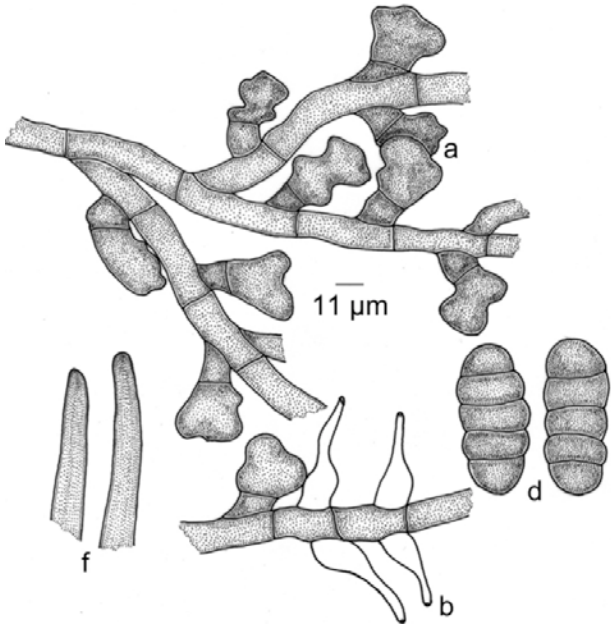


Figure 30. ***Irenopsis trichiliae***
a - Appressorium; b - Phialide; f - Apical portion of the perithecial setae; d – Ascospores

Irenopsis triumfettae (Stev.) Hansf. & Deight. var. ***indica*** Hosag. & Abraham, J. Mycopathol. Res. 36: 98, 1998; Hosag., Meliolales of India 2: 174, 2008 (Fig. 32).

Materials examined: HCIO 50728, TBGT 4645; HCIO 50730, TBGT 4647; HCIO 50732, TBGT 4649, 6.xi.2009, on leaves of *Triumfetta* sp. (Tiliaceae), Puthucherry Kadavu, coll. A. Sabeena & M.C. Riju.

Colonies amphigenous, dense, up to 1mm in diameter, confluent. Hyphae straight to flexuous, branching irregular at acute angles, loosely reticulate, cells 24–29x7–9 µm. Appressoria alternate, antrorse to subantrorse, 17–22 µm long; stalk cells cylindrical to cuneate, 4–8 µm long; head cells globose to slightly ovate, entire, 12–15x12–15 µm. Phialides numerous, mixed with appressoria, alternate to opposite, ampulliform, 14–22x7–9 µm. Perithecia scattered, globose, verrucose, up to 160µm in diameter; perithecial setae 6–8, simple, straight to slightly curved, tortuous to beaded and granulose towards the apex, obtuse at the apex, up to 140µm long; ascospores oblong, 4-septate, slightly constricted at the septa, 36–46x12–17 µm.

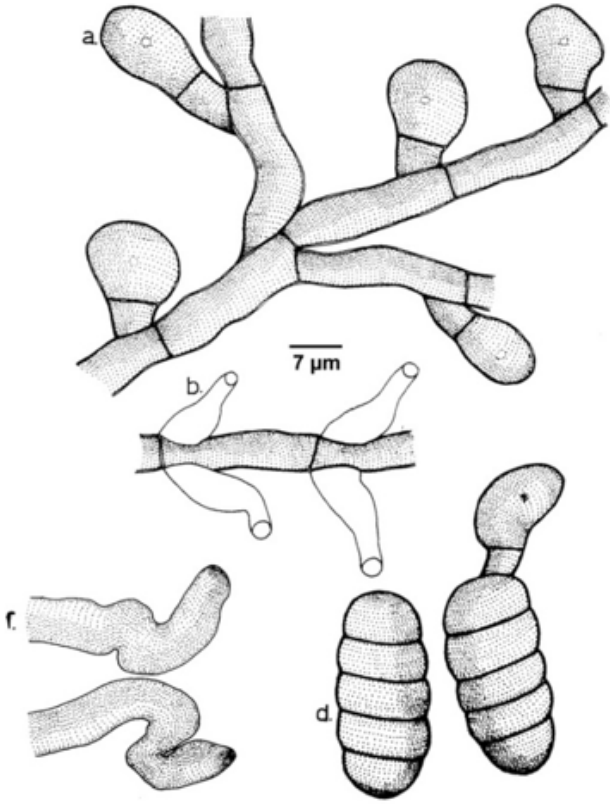


Figure 31. *Irenopsis triumfettae*
a - Appressorium; b - Phialide; f - Apical portion of the mycelial setae; d - Ascospores

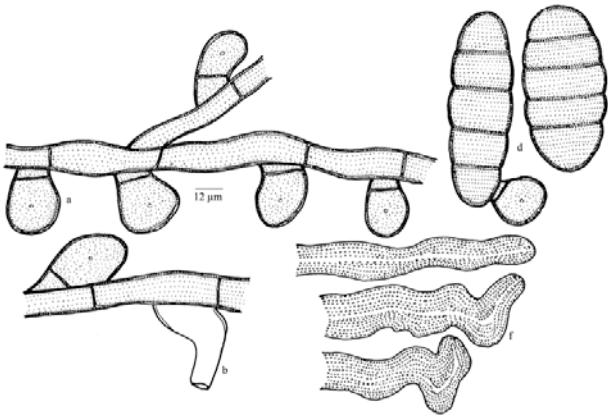


Figure 32. *Irenopsis triumfettae* var. *indica*
a - Appressorium; b - Phialide; f - Apical portion of the perithecial setae; d - Ascospores

This taxon is similar to *Irenopsis triumfettae* (Stev.) Hansf. & Deight. var. *glyphaeicola* (Deight.) Hansf. & Deight. in the morphology of the perithecial setae but differs from it in having entire head cells of the appressoria.

The genus *Meliola*

Meliola Fries *emend*. Bornet, Ann. Sci. Nat. III: 16: 267, 1851.

Meliola Fries, Syst. Orb. Veg. P., 111, 1825.

Amphitrichum Fries, Syst. Mycol. 2: 513, 1829 (*p.p.*)

Myxothecium Kuntze ex Fries, Syst. Mycol. 3: 232, 1829.

Couturea Cast. In Fries, Summ. Veg. Sand. P., 407, 1846.

Asteridieum Sacc., Syll. Fung. 1: 49, 1882.

Mycelium superficial, brown, septate, branched, appressoriate, mycelial setae present. Perithecia globose, descrete, ± ostiolate; asci 2–4 spored, evanescent; ascospores brown, 3–4 septate.

Type: ***M. psidii*** Fries

Meliola psidii Fries is conseved over the earlier synonym *M. trichostroma* (Kuntze) Toro (Crane & Jones, 2001).

Meliola abdulkalamii Hosag. & Riju, Plant Pathology & Quarantine 1(2): 123, 2011; Hosag., J. Threatened Taxa 5(6): 4015, 2013 (Fig. 33).

Material examined: HCIO 51041, TBGT 4958; HCIO 51042, TBGT 4959, 14.vi.2009, on leaves of *Aralia* sp. (Araliaceae), 16th mile, Padinharathara, coll. M.C. Riju.

Colonies epiphyllous, crustose, up to 5mm in diameter, scattered, confluent. Hyphae straight to flexuous, branching opposite at acute to wide angles, loosely to closely reticulate, cells 20–33×5–8 µm. Appressoria alternate, unilateral, antrorse to subantrorse, 17–20 µm long; stalk cells cylindrical to cuneate, 5–8 µm long; head cells globose, subglobose, entire, 7–10×7–13 µm. Phialides mixed with appressoria, mostly opposite, rarely alternate, ampulliform, 12–18×7–8 µm. Mycelial setae simple, straight, obtuse, clavate, inflated, notched to bifid at the apex, ends broadly rounded, up to 320µm long. Perithecia up to 230µm in diameter; ascospores cylindrical to oblong, 4-septate, slightly constricted at the septa, 27–33×10–13 µm.

The present species is distinct from other *Meliola* species known on members of Araliaceae in having broadly obtuse, inflated to bifid tips of the mycelial setae (Hansford 1961, Hosagoudar 1996, 2008, Hu et al., 1996, 1999).

Meliola abri Hosag. & Riju, Plant Pathology & Quarantine 1(2): 124, 2011; Hosag., J. Threatened Taxa 5(6): 4015, 2013 (Fig. 34).

Material examined: HCIO 51190, TBGT 5070,

16.i.2011, on leaves of *Abrus pulchellus* Wallich ex Thwaites (Fabaceae), Padinharathara, coll. M.C. Riju.

Colonies epiphyllous, thin, scattered, up to 3mm in diam. Hyphae flexuous to crooked, branching opposite at wide angles, loosely reticulate, cells 17–30×5–8 µm. Appressoria alternate to unilateral, up to 1% opposite, antrorse, subantrorse to retrorse, 17–20x10–13 µm; stalk cells cylindrical to cuneate, 2–3 µm long; head cells globose, ovate, straight to curved, 12–15x10–13 µm. Phialides mixed with appressoria, opposite to unilateral, ampuliform, 20–25x5–8 µm. Mycelial setae scattered to grouped around perithecia, simple, straight, acute at the tip, up to 360µm long. Perithecia scattered, up to 130µm in diameter; ascospores cylindrical, 4-septate, constricted at the septa, 30–33x10–13 µm.

Meliola bicornis Wint. is known on *Abrus canescens* from Sierra Leone (Hansford, 1961), but this is a complex species and Hansford (1961) has segregated more than hundred species. Based on the simple setae and smaller ascospores, we prefer to accommodate our collection in a new species.

Meliola actephilae Hosag., C.K. Biju & Abraham, Nova Hedwigia 80: 482, 2005; Hosag., Meliolales of India 2: 187, 2008 (Fig. 35).

Materials examined: HCIO 43614, TBGT 321, 15.iv. 1999, on leaves of *Actephila excelsa* (Dalz.) Muell.-Arg. (Euphorbiaceae), Tirunelly, coll. C.K. Biju.

Colonies amphigenous, caulicolous, mostly hypophyllous, dense, up to 5mm in diameter, rarely confluent. Hyphae straight to substraight, branching mostly opposite at acute to wide angles, closely reticulate and often form solid mycelial mat, cells 22–26x6–10 µm. Appressoria opposite, solitary, about 15% alternate, antrorse to subantrorse, straight to curved, 19–23 µm long; stalk cells cylindrical to cuneate, 4–7 µm long; head cells oblong to cylindrical, angular to slightly sublobate, often entire, 12–16x9–11 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 19–23x8-10 µm. Mycelial setae many, scattered, simple, straight, stlightly curved and often flexuous, acute at the tip, up to 300µm long. Perithecia scattered to grouped, up to 140µm in diameter; ascospores cylindrical, 4-septate, constricted at the septa, 40–44x11–14 µm.

This species differs from *Meliola homalanthi* Boed. and its variety in having predominantly opposite and oblong to cylindrical, angular to sublobate appressoria (Hansford 1961).

Meliola affinis Sydow var. ***indica*** Hosag., Nova Hedwigia 47: 538, 1988; Hosag., Meliolales of India, p. 124, 1996 (Fig. 36).

Materials examined: HCIO 47373, TBGT 2411, 19.ix.1999, on leaves of *Memecylon* sp. (Melastomataceae), Banasuranmala, coll. C.K. Biju.

Colonies hypophyllous, very thin, up to 4mm in diameter, confluent. Hyphae substraight to undulate, branching opposite to irregular at subacute to wide angles, loosely to closely reticulate, cells 16–34x4–8 µm. Appressoria alternate, distantly arranged, straight to curved, mostly antrorse, 14–22 µm long; stalk cells cylindrical to cuneate, 9–14 µm long; head cells ovate,

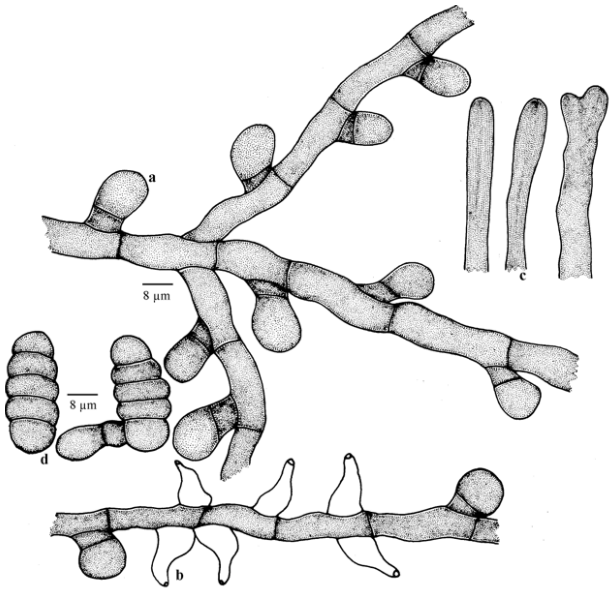


Figure 33. ***Meliola abdulkalamii***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

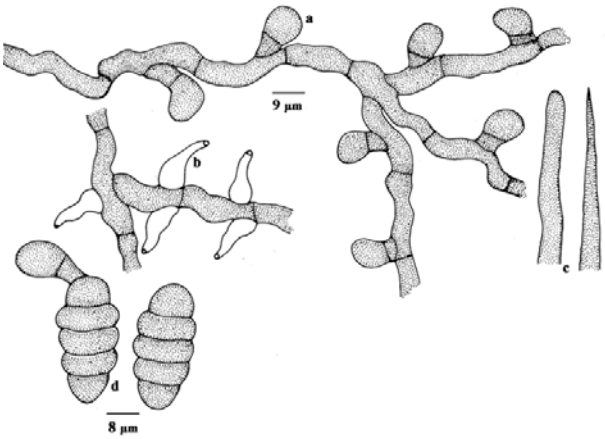


Figure 34. ***Meliola abri***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

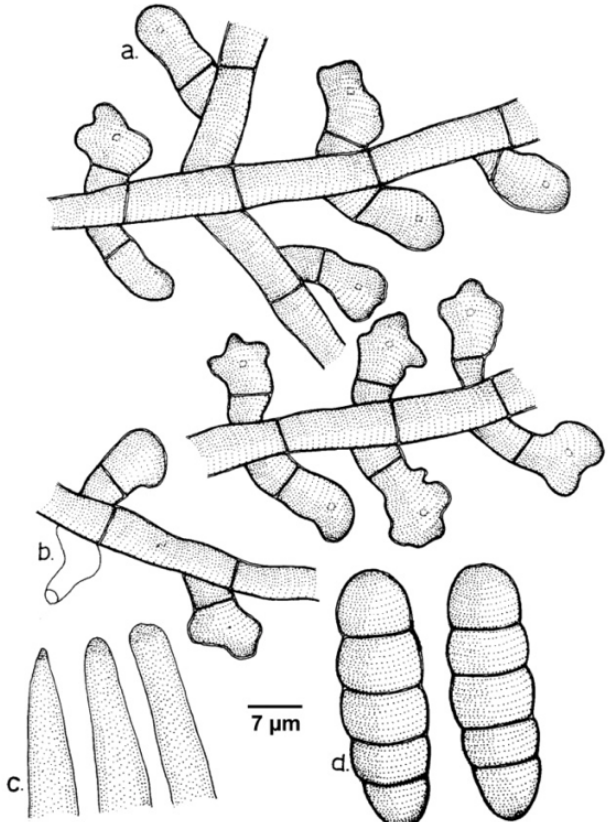


Figure 35. ***Meliola actephilae***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

pointed towards the apex with broadly rounded ends, entire, 9–14x6–10 µm. Phialides mixed with appressoria, opposite to alternate, ampulliform, 19–24x6–10 µm. Mycelial setae grouped around perithecia, straight, simple, acute, up to 670µm long. Perithecia scattered, verrucose, up to 130µm in diameter; ascospores cylindrical to obovoidal, 4-septate, constricted at the septa, 36–41x14–17 µm.

Very thin hypophyllous colonies and distantly placed appressoria are the characteristics of the species *Meliola affinis* Sydow. However, the variety differs from the var. *affinis* in having smaller ascospores (Hansford, 1961; Hosagoudar, 1988).

Meliola ailanthi Sharma, Mohanan & Florence, Kerala Forest Research Institute Report 36: 248, 1985 (*ailanthii*) *emend*. Hosag. in Hosag., Raghu & Pillai, Nova Hedwigia 58: 524, 1994; Hosag., Meliolales of India, p. 126, 1996 (Fig. 37).

Materials examined: HCIO 48171, TBGT 2907; June 30, 2007 HCIO 48173, TBGT 2909, 29.vi.2009, on leaves of *Ailanthus malabarica* DC. (Simaroubiaceae), 16th mile, Padinharathara, coll. M.C. Riju.

Colonies epiphyllous, scattered, dense, velvety, up to 2mm in diameter. Hyphae straight, rarely substraight, branching mostly opposite at acute angles, loosely to closely reticulate, cells 20–28x5–7 µm. Appressoria alternate, straight, antrorse, 12–23 µm long; stalk cells cylindrical to cuneate, 5–7 µm long; head cells ovate to cylindrical, entire, 9–16x8–11 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 16–21x9–13 µm. Mycelial setae numerous, straight to slightly curved but not uncinate, simple, acute to 2–3 times dentate at the tip, up to 265µm long. Perithecia scattered to loosely grouped, verrucose, up to 179µm in diam.; ascospores obovoidal, 4-septate, constricted at the septa, 36–41x12–16 µm.

This taxon was described by Sharma *et al.* (1985) from Kerala but it was inadequate for the identification. Later, Hosagoudar (1994) emended it by providing detailed description along with line drawings.

Meliola ailanthicola Hosag. & Riju, J. Threatened Taxa 2(4): 824, 2010; Hosag., J. Threatened Taxa 5(6):4017, 2013 (Fig. 38).

Material examined: HCIO 48170 (holotype), TBGT 2906 (isotype); HCIO 48173, TBGT 2909, 30.ix.2007, on leaves of *Ailanthus triphysa malabarica* (Dennst.) Alston

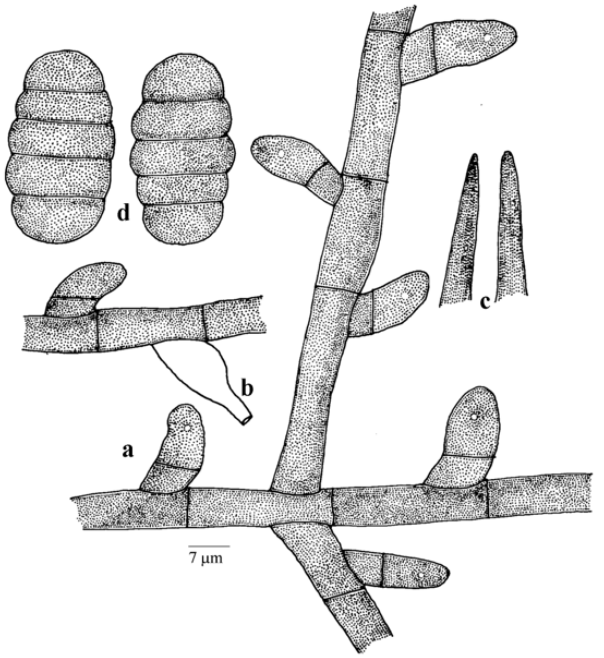


Figure 36. ***Meliola affinis* var. *indica***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

(Simaroubaceae), 16th mile, Padinharathara, coll. M.C. Riju.

Colonies hypophyllous, thin, up to 4mm in diameter, confluent. Hyphae crooked, branching alternate to opposite at acute to wide angles, loosely to closely reticulate, cells 13–33x4–9 µm. Appressoria alternate to unilateral, straight to curved, antrorse, subantrorse to retrorse, 13–27 µm long; stalk cells cylindrical to cuneate, 4–16 µm long; head cells ovate, globose, truncate to slightly lobate, 8–13x6–9 µm. Phialides mixed with appressoria, opposite, alternate to unilateral, ampulliform, 13–22x4–9 µm. Mycelial setae scattered, simple, straight, acute, obtuse to 2–5 dentate at the tip, up to 400µm long. Perithecia scattered, up to 160µm in diameter; ascospores obovoidal, 4-septate, slightly constricted at the septa, 37–44x13–16 µm.

This species differs from *Meliola ailanthi* Sharma et al. *emend.* Hosag. in having strongly appressed colonies on the lower surface of the leaves and having distinctly crooked mycelium (Hosagoudar 1996).

Meliola allophyli-concanici Hosag. in Hosag., Raghu & Pillai, Nova Hedwigia 58: 535, 1994; Hosag., Meliolales of India, p. 126, 1996 (Fig. 39).

Materials examined: HCIO 49436, TBGT 3681, 15.ii.2009, on leaves of *Allophylus* sp. (Sapindaceae), Begoor, coll. Harish et al.

Colonies epiphyllous, scattered, dense, up to 2mm in diameter. Hyphae straight, branching opposite at acute angles, loosely to closely reticulate, cells 14-22x9-12 µm. Appressoria opposite, crowded after an interval, antrorse to subantrorse, recurved, 17–22 µm long;

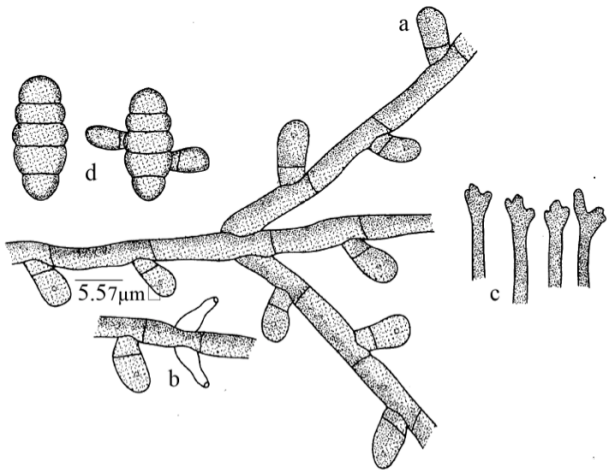


Figure 37. ***Meliola ailanthi***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

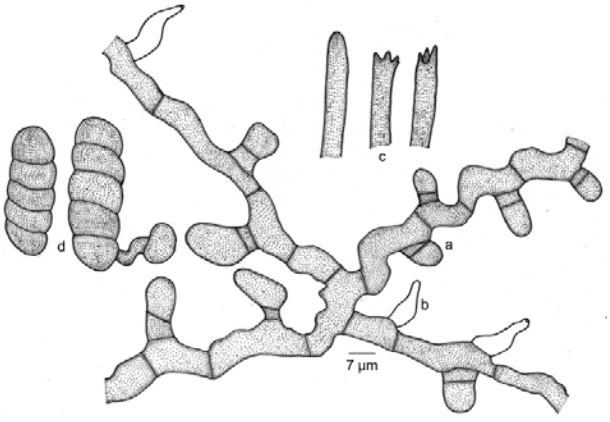


Figure 38. ***Meliola ailanthicola***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

stalk cells cuneate, 6–8 µm long; head cells globose, cylindrical, entire, 12–16x12–14 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 17–22x9–12 µm. Mycelial setae grouped around perithecia, simple, straight, acute, obtuse to dentate at the tip, up to 576µm long. Perithecia, scattered to loosely grouped, verrucose, up to 174µm in diameter; ascospores obovoidal, 4-septate, constricted at the septa, 36–41x14–19 µm.

The present taxon can be compared with *Meliola capensis* (K. & C.) Theiss. var. *lacaniodisci* Hansf. & Deight. and *Meliola capensis* (K. & C.) Theiss. var. *baileyana* Hansf. However, the present taxon differs from them in having appressoria with globose head cells, in contrast to conoid (Hansford 1961).

Meliola allophyli-serrulati Hosag. & Abraham, J. Mycopathol. Res. 36: 99, 1998; Hosag., Meliolales of India, p. 187, 2008 (Fig. 40).

Materials examined: HCIO 45071, TBGT 1126, 21.iv.2003, on leaves of *Allophylus cobbe* (L) Raeusch. (Sapindaceae), Periya, coll. M. Kamarudeen & P.A. Jose.

Colonies hypophyllous, subdense, crustose, up to 2mm in diameter, rarely confluent. Hyphae straight, rarely crooked, branching mostly opposite at acute to wide angles, loosely reticulate, cells 19–21x8–10 µm. Appressoria opposite, about 5% alternate, antrorse to subantrorse, mostly straight, rarely curved, 19–27 µm long; stalk cells cylindrical to cuneate, 4–10 µm long; head cells globose, ovate, rounded to rarely truncate at the apex, entire, 14–17x12–15 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 21–32x9–12 µm. Mycelial setae moderately numerous,

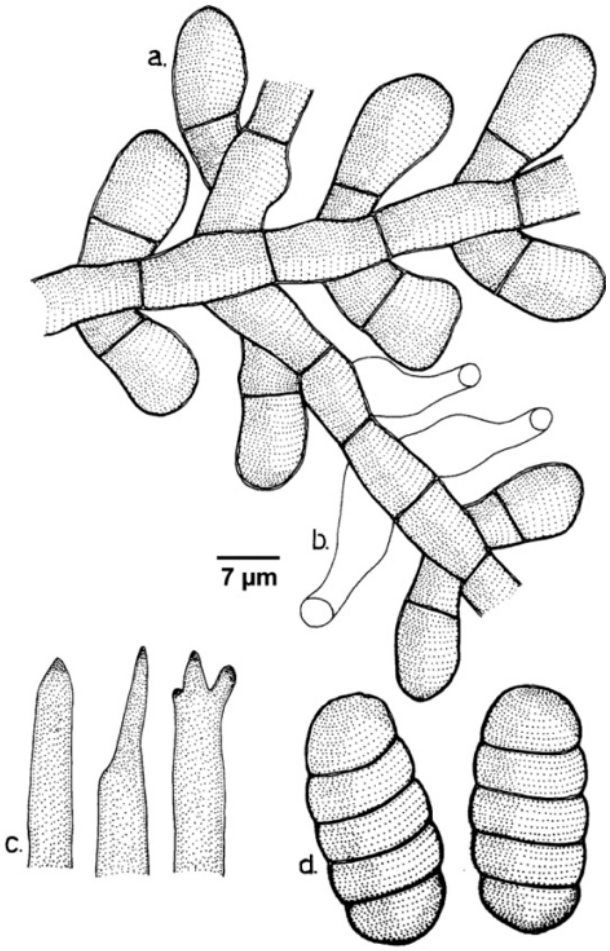


Figure 39. ***Meliola allophyli–concanici***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

scattered to grouped around perithecia, simple, straight to curved, acute to obtuse at the tip, up to 620µm long. Perithecia scattered, up to 170µm in diameter; ascospores oblong to cylindrical, straight to slightly curved, 4-septate, slightly constricted at the septa, 43–46x17–20 µm.

Meliola anceps Sydow & Sydow, Ann. Mycol. 14: 76, 1916; Stev., Ann.Mycol. 28: 205, 1928; Hansf., Sydowia Beih. 2: 586, 1961; Hosag. & Goos, Mycotaxon 37: 218, 1990; Hosag., Meliolales of India, p. 129, 1996.

Meliola makilingiana Sydow & Sydow, Ann. Mycol. 15: 188, 1917.

Meliola mussaendae Sydow & Sydow, Ann. Mycol. 15: 190, 1917(Fig. 41 & Image 5).

Materials examined: HCIO 50916, TBGT 4833, 1.xi.2007, on leaves of *Mussaenda philippica* A.Rich. (Rubiaceae), Banasuranmala, Padinharathara, coll. M.C. Riju.

Colonies epiphyllous, thin, up to 2mm in diameter, rarely confluent. Hyphae substraight to undulate, branching opposite to irregular at acute angles, loosely to closely reticulate, cells 22–54x4–8 µm. Appressoria closely arranged, alternate, unilateral, closely antrorse, 17–24 µm long; stalk cells cylindrical to cuneate, 6–13 µm long; head cells ovate, globose, entire, slightly angular, 10–15x8–10 µm. Phialides mixed with appressoria, opposite, irregular, ampulliform, 12–25x6–10 µm. Mycelial setae scattered to grouped around perithecia, straight to curved, simple, rounded to bifid at the tip, often show knobs in the middle, up to 292µm long. Perithecia scattered, up to 175µm in diameter; ascospores obovoidal, 4-septate, slightly constricted at the septa, 27–33x10–12 µm.

This host plant is extensively cultivated in India and it appears to be a threat to it.

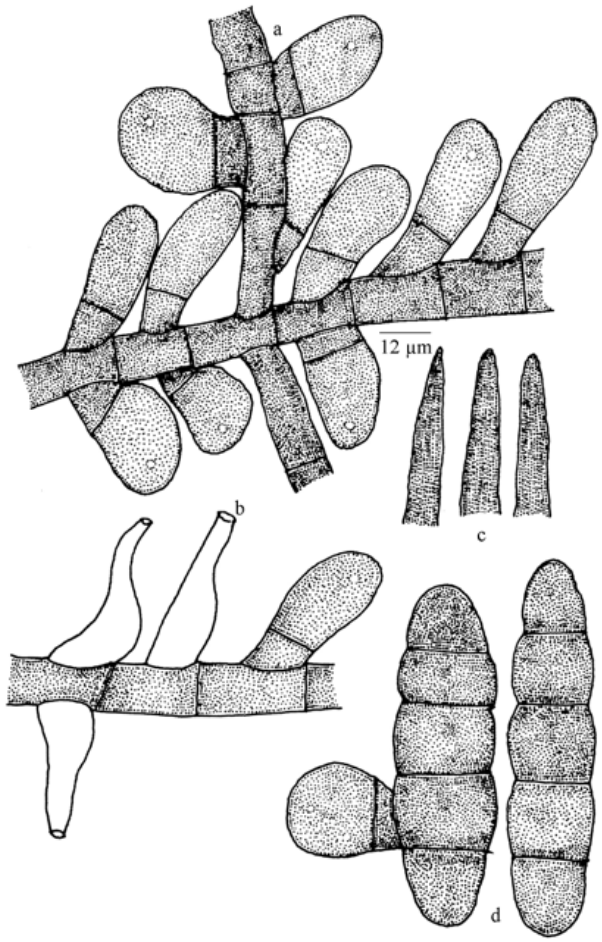


Figure 40. ***Meliola allophyli-serrulati***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Meliola aphanamixidis Hosag. in Hosag. & Goos, Mycotaxon 37: 404, 1990; Hosag., Meliolales of India, p. 133, 1996 (Fig. 42).

Materials examined: TBGT 5943, 10.xi.2007, on leaves of *Aphanamixis polystachya* (Wall.) Parker (*Amoora rohituka* Wight & Arn.) (Meliaceae), 16th Mile, Padinharathara, coll. M.C. Riju.

Colonies epiphyllous, dense, velvety, up to 2mm in diameter, rarely confluent. Hyphae substraight to slightly crooked, branching opposite to irregular at wide angles, loosely to closely reticulate, cells 12–28x9–12.5 µm. Appressoria opposite, crowded after intervals, rarely solitary, antrorse, subantrorse, recurved, 21–31 µm long; stalk cells cylindrical to cuneate, 6–12.5 µm long; head cells ovate, globose, angular, truncate, straight to curved, entire, 15–18.5x9–15.5 µm. Phialides mixed with appressoria, opposite to alternate, ampulliform, 18–25x9–12.5 µm. Mycelial setae mostly grouped around perithecia, simple, straight, acute to obtuse at the tip, up to 572µm long. Perithecia seated on exappressoriate mycelium, scattered, verrucose, up to 232µm; ascospores obovoidal, 4-septate, constricted at the septa, 52–56x18–22 µm.

Meliola aporusae Hosag. & Robin, Bioscience Discovery 2 (2): 264, 2011; Hosag., J. Threatened Taxa 5(6):4017, 2013 (Fig. 43).

Materials examined: HCIO 50925, TBGT 4842, 23.xii.2008, on leaves of *Aporusa* sp. (Euphorbiaceae), Banasuranmala, coll. M.C. Riju.

Colonies amphigenous, mostly hypophyllous, crustose, up to 4mm in diameter, confluent. Hyphae straight to substraight, branching mostly opposite to alternate at acute angles, loosely reticulate, cells 19–24x5–7 µm. Appressoria alternate, about 15% opposite, antrorse to subantrorse, spreading, 24–29 µm long; stalk cells cylindrical to cuneate, 10–12 µm long; head cellsovate, clavate, globose, entire to 2–5 times lobate, often slightly angular 12-19x14–19 µm. Phialides mixed with appressoria, alternate, ampulliform, 17–24x7–10 µm. Mycelial setae few, simple, straight, obtuse at the tip, up to 410µm long. Perithecia scattered, up to 115µm in diam.; ascospores ellipsoidal, 4-septate, constricted at the septa, 41–43x14–17 µm.

Based on the digital formula, the present species is close to *Meliola goleoria* Hansf. and *M. tetrorchidiicola* Hansf. known on *Galearia filiformis* and *Tetrorchidium rubivenium* from Java and Brazil, respectively. However, differs from both in having stellately lobate head cells of the appressoria (Hansford 1961). Based on the lobate head cells, it can be compared with *M. octephilae* Hosag. et al. but differs from it in having only 15% opposite appressoria with stellately lobate head cells (Biju et al. 2005; Hosagoudar 2008; Hosagoudar & Agarwal 2008).

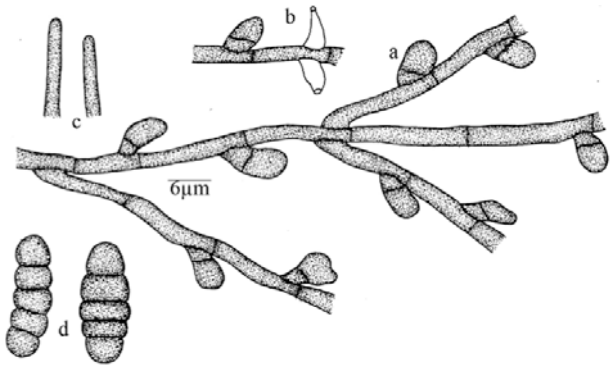


Figure 41. *Meliola anceps*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Image.5 . *Meliola anceps*-Infected leaves

Meliola ardisiicola Hosag., Rajkumar & Jose, Indian Phytopathol. 57: 455, 2004**;** Hosag., Meliolales of India, p. 190, 2008 (Fig. 44).

Materials examined: HCIO 45230, TBGT 1267, 21.iv.2003, on leaves of *Ardisia missionis* Wallich ex DC. (Myrsinaceae), Periya, coll. G. Rajkumar & P.A. Jose; TBGT 5568, 30.ix.2007, *Ardisia* sp., Padinharathara, coll. M.C. Riju.

Colonies epiphyllous, dense, crustose, up to 2mm in diameter, confluent. Hyphae straight to substraight, branching mostly opposite at acute to wide angles, loosely to closely reticulate, cells 11–16x7–9 µm. Appressoria alternate, closely placed, straight to curved, mostly antrorse, rarely retrorse, 24–31 µm long; stalk

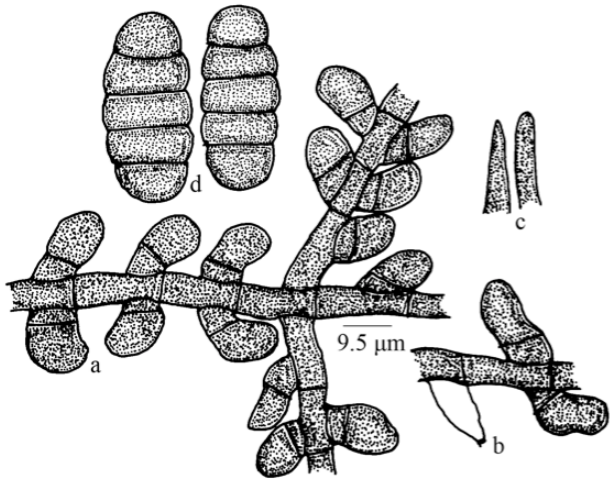


Figure 42. ***Meliola aphanamixidis***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

cells cylindrical to cuneate, 6–10 µm long; head cells oblong, cylindrical, rarely broadly ovate, entire, straight to slightly curved, 17–21x8–10 µm. Phialides mixed with appressoria, alternate, scattered, ampulliform, 19–24x6–8 µm. Mycelial setae scattered, simple, straight, acute at the tip, up to 380 µm long. Perithecia scattered, globose, up to 180µm in diameter; ascospores obovoidal, cylindrical, 4-septate, slightly constricted at the septa, 35–40x12–18 µm.

Meliola ardisiigena Hosag., Sabeena & Robin, Bioscience Discovery 2:120, 2011; Hosag., J. Threatened Taxa 5(6):4018, 2013 (Fig. 45).

Material examined: HCIO 50639 (isotype), TBGT 4556 (holotype), 27.ix.2008, on leaves of *Ardisia* sp. (Myrsinaceae), Pulpally, coll. P.J. Robin et al.

Colonies hypophyllous, subdense to dense, up to 3mm in diameter, confluent. Hyphae substraight, branching opposite to unilateral at acute to wide angles, loosely to closely reticulate, cells 15–30x5–7 µm. Appressoria alternate, up to 30% opposite to unilateral, antrorse to subantrorse, 12–22 µm long; stalk cells cylindrical to cuneate, 2–7 µm long; head cells ovate, globose, entire, 10–17x7–12 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 12–25x5–10 µm. Mycelial setae simple, straight, acute to obtuse at the tip, up to 350µm long. Perithecia scattered, up to 200µm in diam.; ascospores elliptic, 4-septate, constricted at the septa, 42–57x12–15 µm.

Meliola ardisiicola Hosag. *et al.* is known on *Ardisia missionis* from the high ranges of Western Ghats (Hosagoudar 2008). However, the present new species differs from it in having longer and 30% opposite appressoria and longer ascospores.

Meliola aristolochigena Hosag. & Archana, J. Threatened Taxa 1: 348, 2009; Hosag., J. Threatened Taxa 5(6):4019, 2013 (Fig. 46).

Material examined: HCIO 50362, TBGT 4279, 5.xi.2009, on leaves of *Aristolochia grandiflora* Sw. (Aristolochiaceae), Gurukulam Botanic Garden, Periya, coll. A. Sabeena & M.C. Riju.

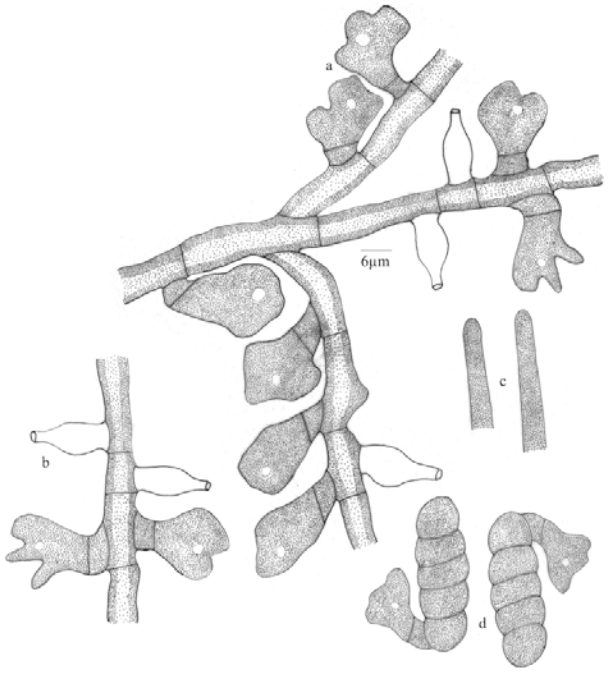


Figure 43. ***Meliola aporusae***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

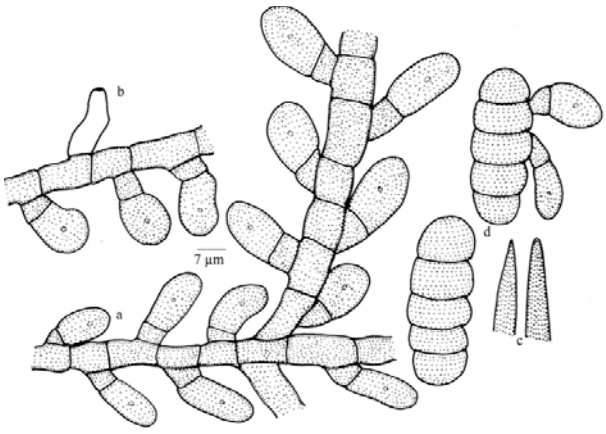


Figure 44. ***Meliola ardisiicola***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Colonies epiphyllous, thin to dense, up to 2mm in diam. Hyphae substraight to flexuous, branching alternate, opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 12–16x8–10 µm. Appressoria alternate to about 3% opposite, antrorse to subantrorse, 14–20 µm long; stalk cells cylindrical to cuneate, 3–7 µm long; head cells ovate to globose, entire, 11–13x9–13 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 16–20x8–10 µm. Mycelial setae scattered, simple, straight, acute to obtuse at the tip, up to 540µm long. Perithecia scattered, up to 120µm in diam.; ascospores oblong to cylindrical, 4-septate, constricted at the septa, 35–40x12–14 µm.

Having opposite appressoria, *Meliola aristolochigena* can be compared with *M. catharinensis* Hansf. reported on *Aristolochia triangularis* from Brazil (Hansford, 1961). However, differs from it in having distinctly longer appressoria (14–20 µm against 11–15 µm) and mycelial setae (540µm against 230µm).

Meliola artocarpi Yates, Philippine J. Sci. 12: 362, 1917; Hansf., Sydowia Beih. 2: 328, 1961; Hosag. & Goos, Mycotaxon 42: 130, 1991; Hosag., Kaveriappa, Raghu & Goos, Mycotaxon 51: 111, 1994; Hosag., Meliolales of India, p. 133, 1996 (Fig. 47 & Image 6).

Materials examined: HCIO 42181, TBGT 53, 28.iii.1996, on leaves of *Artocarpus heterophyllus* Lam. (Moraceae), Karadimala, coll. V.B. Hosagoudar.

Colonies epiphyllous, dense, velvety, up to 2mm in diameter. Hyphae straight to substraight, branching alternate at acute angles, closely reticulate, cells 24–36x7–9.6 µm. Appressoria alternate, antrorse, 26–41 µm long; stalk cells cylindrical to cuneate, margin may wavy or entire, 9–17 µm long; head cells ovate, angular to sublobate, 16–24x17 µm. Phialides borne on separate mycelial branch, 1% mixed with appressoria, alternate to unilateral, ampulliform, 19–26x7–10 µm. Mycelial setae densely scattered, simple, curved, obtuse at the tip, up to 430µm long. Perithecia scattered, verrucose, up to 170 µm in diameter; ascospores obovate, 3–4 septate, constricted at the septa, 50–53x16–19 µm.

Epiphyllous colonies, uncinate and obtuse mycelial setae are the characteristics of this species.

Common throughout Southern Western Ghats.

Meliola atalantiae Hosag. in Hosag. & Goos, Mycotaxon 37: 220, 1990; Hosag., Meliolales of India, p. 135, 1996 (Fig. 48).

Materials examined: HCIO 50365, TBGT 4282; HCIO 49888, TBGT 4040, 18.ix.2008, on leaves of *Atlantia* sp. (Rutaceae), Thirunelly, coll. M. Harish et al.; HCIO 49437, TBGT 3682, 16.ii.2009, Thirunelly, coll. Harish et al.,

Colonies amphigenous, mostly hypophyllous, crustaceous, up to 8mm in diameter, rarely confluent. Hyphae straight, substraight to crooked, branching opposite to irregular at acute angles, loosely reticulate, cells 20–28x6–8 µm. Appressoria alternate, about 20% opposite, straight to curved, subantrorse to spreading, 20–30 µm long; stalk cells cylindrical to cuneate, 4–10

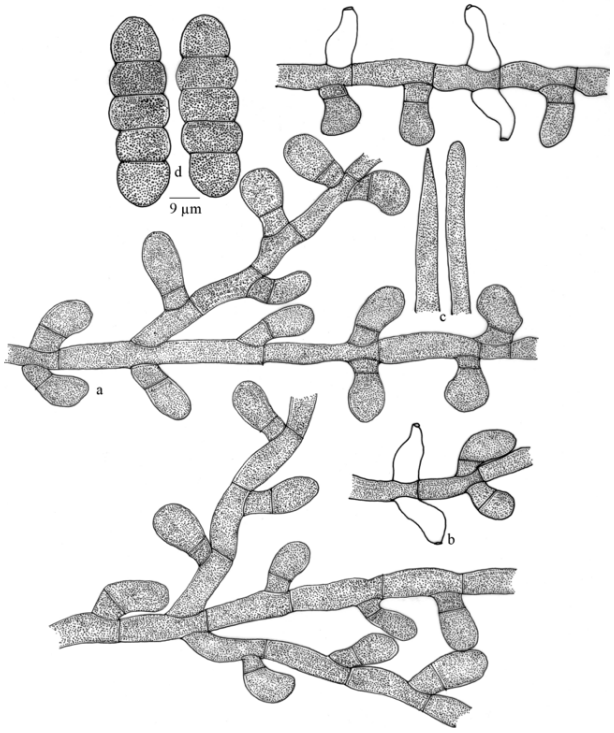


Figure 45. ***Meliola ardisiigena***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

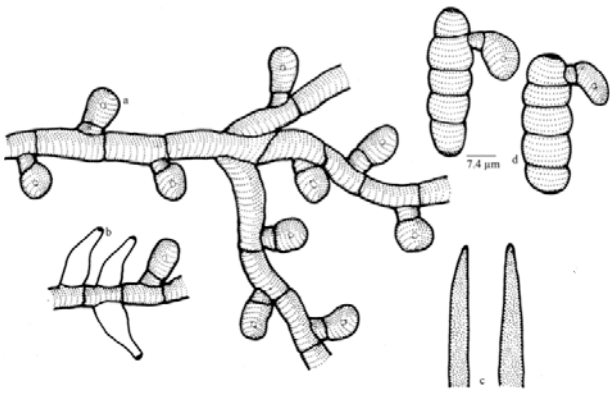


Figure 46. ***Meliola aristolochigena***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

µm long; head cells ovate, conoid, rounded at the apex, entire, 14–20x8–10 µm. Phialides mixed with appressoria, opposite to alternate, ampulliform, 20–26x8–12 µm. Mycelial setae scattered, straight, often curved, simple, acute to 2–3 dentate to cristate at the tip, up to 765µm long. Perithecia scattered, immature; ascospores oblong, 4-septate, constricted at the septa, 40–44x14–16 µm.

Meliola beilschmiediae Yamam. var***. cinnamomicola*** Hosag. in Hosag. & Goos, Mycotaxon 87: 222, 1990; Hosag., Meliolales of India, p. 142, 1996 (Fig. 49).

Materials examined: HCIO 44335, TBGT 718, 10.i.2002, on leaves of *Cinnamomum macrocarpum* (Lauraceae), Periya, coll. M. Kamarudeen.

Colonies hypophyllous, dense, velvety, up to 3mm in diameter, rarely confluent. Hyphae flexuous, branching alternate to irregular at acute angles, closely reticulate, form almost solid mycelial mat, cells 20–30x6–8 µm. Appressoria alternate, straight to variously curved, antrorse to reflexed, 20–24 µm long; stalk cells cylindrical to cuneate, 6–10 µm long; head cells globose, ovate, angular, entire, 14–16x12–14 µm. Phialides few, mixed with appressoria, opposite to alternate, ampulliform, 18–22x8–10 µm. Mycelial setae numerous, evenly scattered, straight, simple, acute to variously dentate at the tip, up to 684µm long. Perithecia closely scattered,

Image 6. *Meliola artocarpi*-Infected leaves

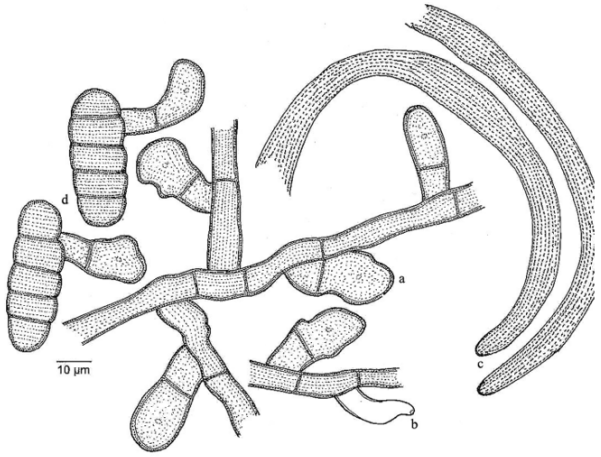


Figure 47. *Meliola artocarpi*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

verrucose, up to 216µm in diameter; ascospores obovoidal, 4-septate, slightly constricted at the septa, 54–60x16–20 µm.

Meliola buteae Hafiz, Azmatulla & Kafi, Biologia 1: 112, 1955; Hansf., Sydowia Beih. 2: 291, 1961; Thite & Patil, Kavaka 10: 29, 1982; Hosag. & Goos, Mycotaxon 37: 223, 1990; Hosag., Meliolales of India, p. 148, 1996 (Fig. 50).

Materials examined: HCIO 49063, TBGT 3318, 19.xi.2008, on leaves of *Butea parviflora* Roxb. (Fabaceae), Pulpally, coll. M. Harish & P.J. Robin; HCIO 49628, TBGT 3870, 19.ix.2008, coll. M. Harish & P.J.

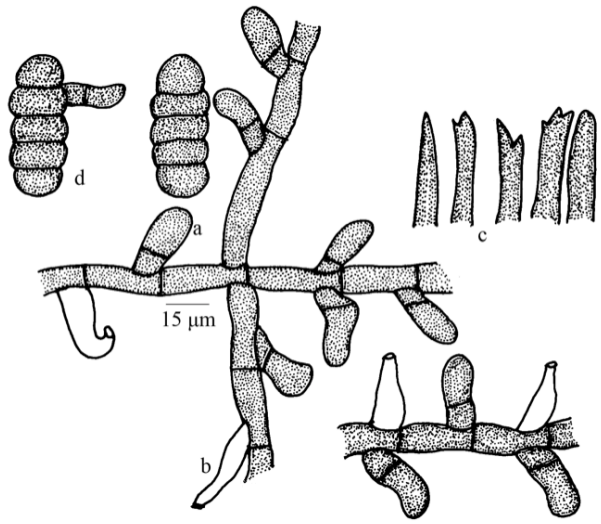


Figure 48. *Meliola atalantiae*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

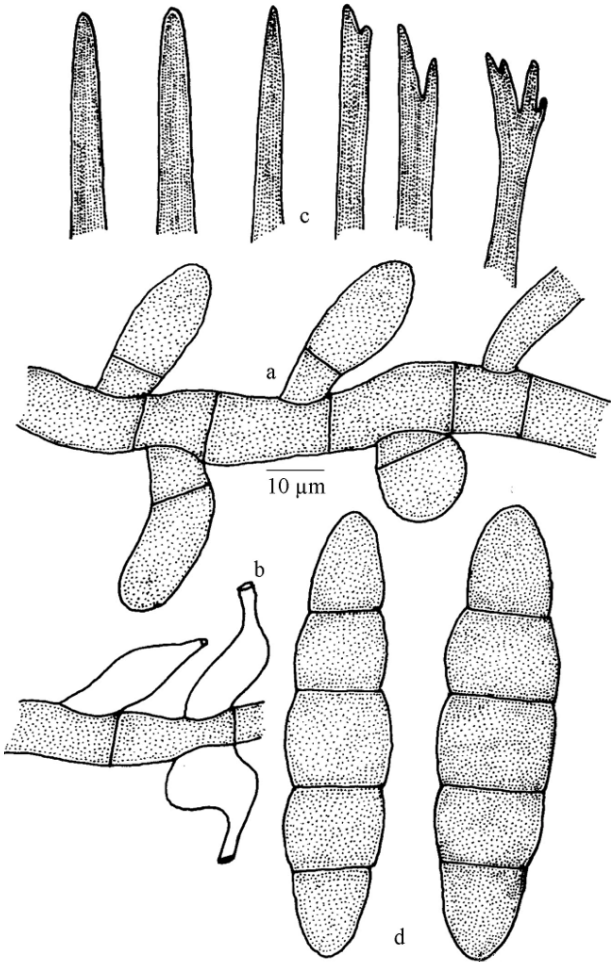


Figure 49. ***Meliola beilschmiediae*** **var.** ***cinnamomicola***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

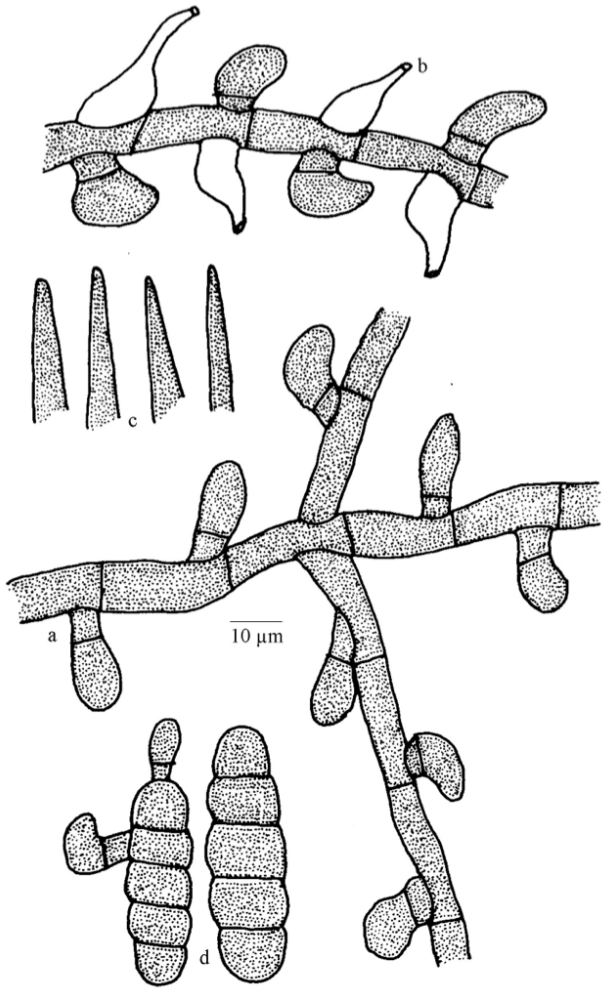


Figure 50. ***Meliola buteae***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Robin; HCIO 50845; TBGT 4762; HCIO 50854, TBGT 4771, 6.xi.2009, *Butea monosperma* (Lam.) Taubert, Padinharathara, coll. M.C. Riju & A. Sabeena.

Colonies epiphyllous, dense, velvety, up to 3mm in diameter, confluent. Hyphae straight to substraight, branching opposite at wide angles, loosely reticulate, cells 21–31x5–7 µm. Appressoria opposite to alternate, about 5% unilateral, subantrorse to spreading, 12–17 µm long; stalk cells cylindrical to cuneate, 2–5 µm long; head cells cylindrical, clavate, subglobose, entire to angulose, 9–12x9–12 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 14–19x7–9 µm. Mycelial setae numerous, scattered, straight, simple, acute at the tip, up to 680µm long. Perithecia scattered, verrucose, globose, up to 170µm in diameter; ascospores cylindrical, 4-septate, constricted at the septa, 36–38x14–17 µm.

This species is very common on this host genus in the Western Ghats

Meliola butleri Sydow, Ann. Mycol. 9: 379, 1911; Hansf., Sydowia Beih. 2: 382, 1961; Srinivasulu, Nova Hedwigia Beih. 47: 423, 1974; Hosag., J. Econ. Tax. Bot. 9: 375, 1987; Hosag., Meliolales of India, p. 148, 1996; J. Econ. Taxon. Bot. 30: 947, 2006.

Amazonia butleri Stev., Ann. Mycol. 25: 415, 1927 (Fig. 51).

Materials examined: HCIO 50843, TBGT 4760, 6.xi.2009, on leaves of *Citrus* sp. (Rutaceae), Padinharathara, coll. M.C. Riju & A. Sabeena.

Colonies amphigenous, mostly epiphyllous, dense, up to 4mm in diameter. Hyphae straight to undulate, branching opposite to irregular at wide angles, closely

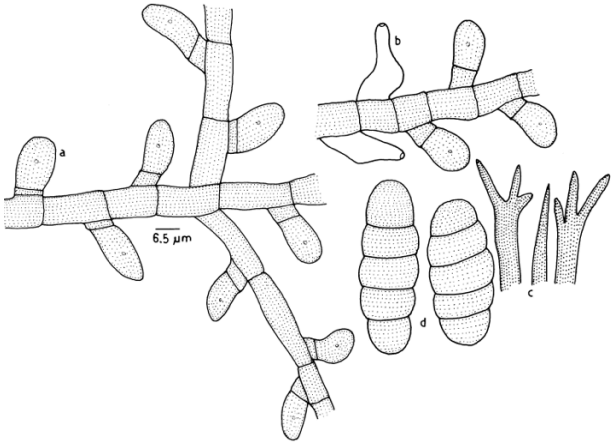


Figure 51. ***Meliola butleri***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

reticulate, cells 11–25x6–8 µm. Appressoria alternate to opposite, antrorse, curved, 15–24 µm long; stalk cells cylindrical to cuneate, 4–6 µm long; head cells ovate, clavate, cylindrical, often curved, entire, 12–17x7–10 µm. Phialides mixed with appressoria, opposite to alternate, ampulliform, 15–21x6–8 µm. Mycelial setae scattered, straight, acute to dentate, up to 685µm long. Perithecia scattered, verrucose, up to 232µm in diam.; ascospores oblong to subellipsoidal, 4-septate, constricted at the septa, 32–45x14–19 µm.

The present taxon can be compared with *Meliola citricola* Sydow. The former has mostly epiphyllous, smaller, crustose colonies with straight hyphae, mostly antrorse appressoria and dentate mycelial setae. However, the latter has mostly hypophyllous, larger, velvety colonies with crooked mycelium, irregularly curved appressoria and both acute and dentate mycelial setae.

Meliola cadigensis Yates var. ***toddaliae*** Hosag., C.K. Biju & Abraham, Nova Hedwigia 80: 484, 2005; Hosag., Meliolales of India, p. 199, 2008 (Fig. 52).

Materials examined: HCIO 43617, TBGT 299, 19.xi.1998, on leaves of *Toddalia* sp. (Rutaceae), Banasuranmala, coll. C.K. Biju.

Colonies amphigenous, dense, up to 2mm diameter, rarely confluent. Hyphae substraight to flexuous, branching alternate to opposite at acute angles, loosely to closely reticulate, cells 12–28x6–8 µm. Appressoria alternate, 5% opposite, antrorse to closely antrorse, 12–18 µm long; stalk cells cylindrical to cuneate, 3–7 µm long; head cells mostly ovate, entire, 9–12x8–10 µm. Phialides mixed with appressoria, alternate to opposite,

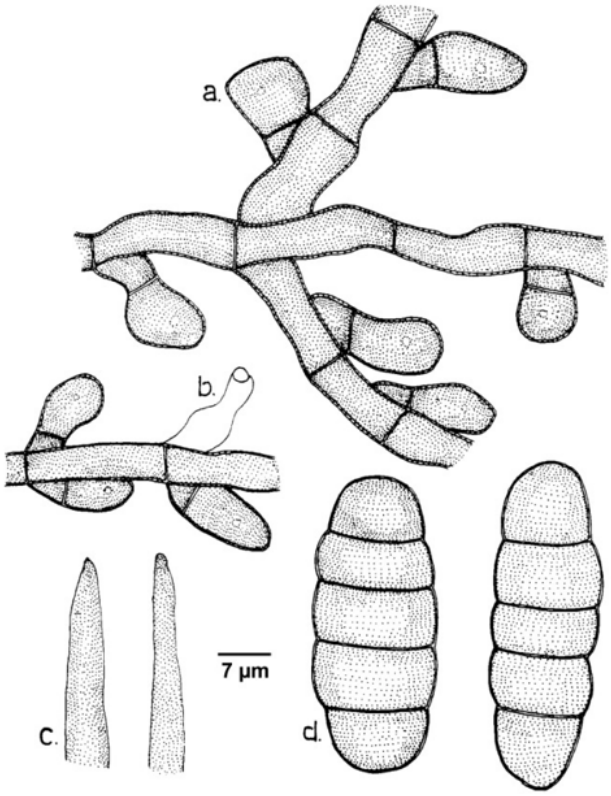


Figure 52. ***Meliola cadigensis*** **var.** ***toddaliae***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d – Ascospores

ampulliform, 16–24x6–8 µm. Mycelial setae scattered to grouped around perithecia, simple, predominantly straight, few curved, acute to obtuse at the tip, up to 540µm long; perithecia scattered to loosely grouped, up to 165µm diam.; ascospores oblong to cylindrical, 4-septate, constricted at the septa, 35–39x14–16 µm.

Meliola cadigensis Yates var. ***glycosmidis*** (Kapoor) Hosag., Crypt. Bot. 213: 186, 1991; Hosag., Meliolales of India, p. 149, 1996.

Meliola glycosmidis Kapoor, Indian Phytopath. 20: 153, 1967; Hosag. & Goos, Mycotaxon 37: 234, 1990 (Fig. 53).

Materials examined: HCIO 49067, TBGT 3322; HCIO 49072, TBGT 3327; HCIO 51151, TBGT 5031; HCIO 51294, TBGT 5174, 18.ix.2008, on leaves of *Glycosmis mauritiana* (Lam.) Tanaka {(*G. pentaphylla* Correa)} (Rutaceae), Thirunelly, coll. M. Harish & P.J. Robin; HCIO 42970, TBGT 246, 11.viii.1998, coll. C.K.Biju; HCIO 44628, TBGT 910, 23.ix.2002, coll. K. Vijayakumar; HCIO 49399, TBGT 3644, 12.ii.2009, coll. P.J. Robin et al.; HCIO 49649, TBGT 3891, 17.xi.2008, Periya, coll. M. Harish & P.J. Robin; HCIO 49438, TBGT 3683, 15.ii.2009, Begoor,

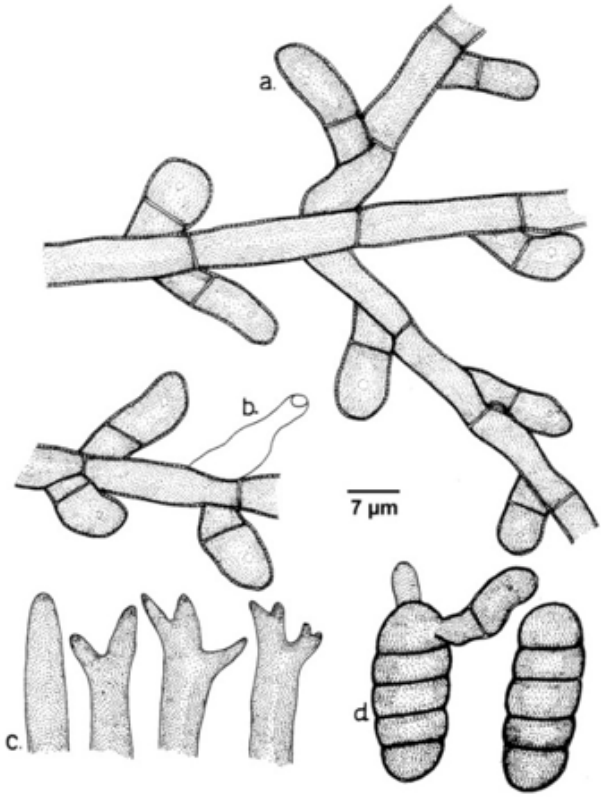


Figure 53. ***Meliola cadigensis*** **var.** ***glycosmidis***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

coll. Harish et al.; HCIO 49966, TBGT 4118, 16.ix.2007, Puthuserrkadavu, coll. M.C. Riju; HCIO 50826, TBGT 4743; HCIO 50828, TBGT 4745, 4.xi.2009, Padinharathara, coll. M.C. Riju & A. Sabeena.

Colonies amphigenous, mostly epiphyllous, dense, velvety, scattered, cover all the upper surface of the leaves, up to 4mm in diameter, confluent. Hyphae straight to substraight, branching opposite at acute to wide angles, closely reticulate to form a mycelial mat, cells 12–22x7–10 µm. Appressoria alternate and opposite, crowded, straight to curved, antrorse to spreading, 14–22 µm long; stalk cells cylindrical to cuneate, 4–10 µm long; head cells ovate, globose to subglobose, entire, rounded at the apex, 9–12x7–12 µm. Phialides mixed with appressoria, opposite to alternate, ampulliform, 14–22x7–10 µm. Mycelial setae numerous, scattered, straight, simple, acute to dentate at the tip, up to 700µm long. Perithecia scattered, verrucose, up to 180µm in diameter; ascospores obovoidal to slightly ellipsoidal, 4-septate, constricted at the septa, 33–38x12–16 µm.

The variety differs from the species in having dentate mycelial setae.

Meliola cannonicola Hosag. & C.K. Biju, Indian Phytopath. 57: 456, 2004; Hosag., Meliolales of India, p. 202, 2008 (Fig. 54).

Materials examined: HCIO 45266, TBGT 1304, 16.iv.1999, on leaves of *Toddalia asiatica* (L.) Lam. (Rutaceae), Banasuran Mala, coll. C.K. Biju.

Colonies epiphyllous, dense, scattered, velvety, up to 3mm in diameter, rarely confluent. Hyphae straight to substraight, branching alternate to opposite at acute angles, loosely to closely reticulate, cells 19–24x6–8 µm. Appressoria alternate, 5% opposite, antrorse to subantrorse, 19–24 µm long; stalk cells cylindrical to cuneate, 4–8 µm long; head cells oblong, clavate, cylindrical, entire to rarely slightly angular, 14–16x9–11 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 19–24x8–10 µm. Mycelial setae scattered, simple, straight, acute at the tip, up to 980µm long. Perithecia scattered to loosely grouped, up to 136µm in diam.; ascospores oblong to cylindrical, 4-septate, constricted at the septa, 38–44x13–15 µm.

There are six taxa of the genus *Meliola* on the host genus *Toddalia* (Hansford 1961; Mibey & Hawksworth 1997). The present taxon is close to *Meliola toddalicola* Hansf. and *M. toddalicola* Hansf. var. *indica* Hansf. & Thirum. in having alternate and opposite appressoria. This taxon differs from the former in having smaller and only 5% appressoria and having shorter mycelial setae. It also differs from the latter taxon in having only 5% opposite appressoria and longer mycelial setae.

Meliola cannonii Hosag., J. Mycopathol. Res. 43: 22, 2005; Hosag., Meliolales of India, p. 201, 2008 (Fig. 55).

Materials examined: HCIO 43818, TBGT 389, 20.ix.2008, on leaves of *Strychnos nux-vomica* L. (Strychnaceae), Pulpally, coll. M. Harish. & P.J Robin.

Colonies amphigenous, mostly hypophyllous, subdense, up to 2mm in diameter, confluent. Hyphae substraight, flexuous to crooked, branching opposite to irregular at acute to wide angles, loosely reticulate, cells 16–20x6–8 µm. Appressoria alternate, less than 1% opposite, antrorse, subantrorse to recurved, 17–26 µm long; stalk cells cylindrical to cuneate, 6–10 µm long; head cells ovate, oblong, entire to angular, attenuated to truncate at the apex, 11–16x8–12 µm. Phialides numerous, mixed with appressoria, alternate to opposite, ampulliform, 12–20x6–8 µm. Mycelial setae scattered to grouped around perithecia, simple, straight, curved to uncinate, acute at the tip, up to 350µm long. Perithecia scattered to loosely grouped, up to 130µm in diameter; ascospores cylindrical, 4-septate, constricted at the septa, 30–32x12–15 µm.

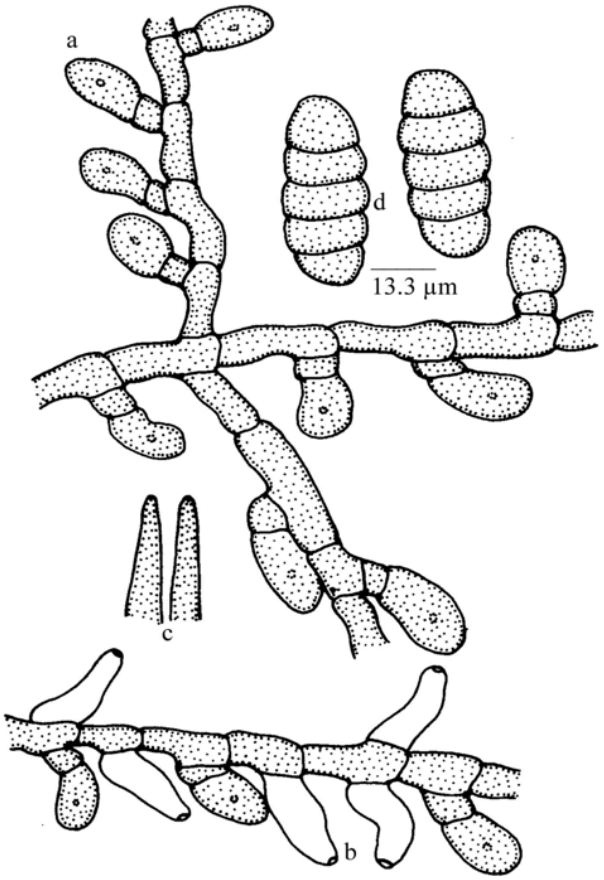


Figure 54. *Meliola cannonicola*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

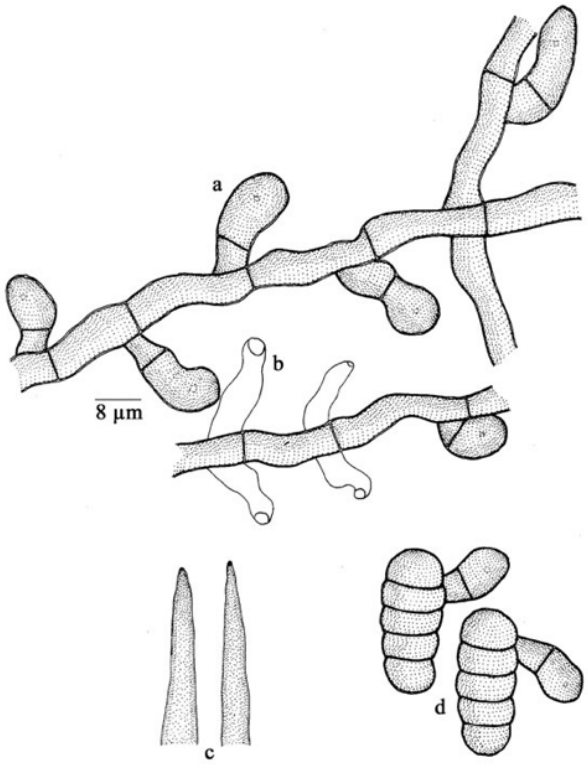


Figure 55. *Meliola cannonii*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

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 comparatively closely arranged appressoria, shorter and straight to uncinate mycelial setae.

Meliola canavaliae Hosag. & Riju, Plant Pathology & Quarantine 1(2): 125, 2011; Hosag., J. Threatened Taxa 5(6):4022, 2013 (Fig. 56).

Material examined: HCIO 51043, TBGT 4960; HCIO 51044, TBGT 4961, 10.i.2011, on leaves of *Canavalia* sp. (Fabaceae), 16th mile, Padinharathara, coll. M.C. Riju.

Colonies foliicolous, epiphyllous, thin, scattered, up to 4mm in diameter. Hyphae flexuous to undulate, branching mostly opposite at acute to wide angles, loosely to closely reticulate, cells 15–38x5–8 µm. Appressoria alternate, unilateral, rarely opposite, straight to slightly curved, antrorse, subantrorse to retrorse, 10–18 µm long; stalk cells cylindrical to cuneate, 2–8 µm long; head cells ovate, globose, 10–15x8–15 µm. Phialides mixed with appressoria, opposite, unilateral, ampulliform, 15–25x7–10 µm. Mycelial setae scattered to grouped around perithecia, simple, straight to slightly curved, acute to obtuse at the tip, up to 340µm long. Perithecia scattered, up to 160µm in diameter; ascospores cylindrical, 4-septate, slightly constricted at the septa, 33–35x10–13 µm.

Hansford (1961) identified *M. teramni* Sydow infecting leaves of *Canavalia ensiformis* collected by F.C. Deighton from Sierra Leone. The present fungus is similar but differs in having shorter (340 µm vs. 1000 µ), acute to obtuse setae (in contrast to 2–4 dentate or furcate) and smaller ascospores (33–35x10–13 µm vs. 35–42x13–16 µm).

Meliola canthiicola Hosag., C.K. Biju & Abraham, J. Econ. Taxon. Bot. 25: 69, 2001; Hosag., Meliolales of India, p. 204, 2008 (Fig. 57).

Materials examined: HCIO 43828, TBGT 360, 18.xi.1999, on leaves of *Canthium rheedii* DC. (Rubiaceae), Chembra hills, coll. C. K. Biju.

Colonies amphigenous, mostly epiphyllous, dense,

velvety, up to 3mm in diameter. Hyphae straight to flexuous, branching alternate to opposite at acute angles, closely reticulate, cells 20–24x8–10 µm. Appressoria alternate, antrorse to closely antrorse, 28–35 µm long; stalk cells cylindrical to cuneate, 8–13 µm long; head cells ovate, oblong, entire, angular to slightly lobate, attenuated and broadly rounded to truncate at the apex, 19–23x12–16 µm. Phialides borne on a separate mycelial branch, alternate to opposite, ampulliform, 15–18x7–9 µm. Mycelial setae scattered, simple, straight to rarely curved, acute at the tip, up to 500µm long. Perithecia scattered, up to 25µm in diameter; ascospores slightly ellipsoidal, 4-septate, constricted at the septa, 44–47x19–22 µm.

Morphologically, *Meliola canthiicola* is similar to *M. canthii* Hansf. but differs from it in having the phialides borne on a separate mycelial branch and smaller ascospores.

Meliola capensis (Kalch. & Cooke) Theiss. var. ***allophylicola*** Hansf. & Deight., Mycol.Pap. 23: 45, 1948; Hansf., Sydowia Beih. 2: 437, 1961; Kar & Bhattacharya, Indian Phytopath. 35: 39, 1982; Hosag., Meliolales of India, p. 154, 1996 (Fig. 58).

Materials examined: HCIO 46690, TBGT 2031, 27.xii.2002, on leaves of *Allophylus* sp. (Sapindaceae), Periya, coll. M. Kamarudeen & P.A. Jose.

Colonies epiphyllous, dense, velvety, up to 4mm in diameter, confluent. Hyphae straight to substraight, branching opposite at acute to wide angles, loosely to closely reticulate, cells 16–26x6–7 µm. Appressoria alternate and opposite, 10% unilateral, antrorse to subantrorse, straight to curved, 16–24 µm long; stalk cells cylindrical to cuneate, 2–7 µm long; head cells ovate, globose to subglobose, entire to subangular, 12–17x9–12 µm. Phialides mixed with appressoria, opposite to alternate, ampulliform, 21–26x7–10 µm. Mycelial setae numerous, scattered to grouped around perithecia, simple, straight, acute, obtuse to dentate at the tip, up to 580µm long. Perithecia scattered, numerous, verrucose, up to 170µm in diameter; ascospores obovoidal to cylindrical, 4-septate, constricted at the septum, 36–43x14–17 µm.

Subglobose to oblong head cells of the appressoria distinguishes this taxon. Common species in the Western Ghats.

Meliola capensis (Kalch. & Cooke) Theiss. var. ***malayensis*** Hansf., Sydowia 10: 67, 1951; Sydowia Beih. 2: 439, 1961; Hosag. & Goos, Mycotaxon 37: 224, 1990; Hosag., Meliolales of India, p. 156, 1996 (Fig. 59).

Materials examined: HCIO 49965, TBGT 4117 14.iii.2007, on leaves of *Nephelium longan* Lour. (Sapindaceae), Batherry, coll. M.C. Riju; HCIO 44495, TBGT 785, 21.v.2002, *Nephelium* sp., Wayanad, coll. M.Kamarudeen.

Colonies epiphyllous, dense, velvety, up to 4mm in diameter, rarely confluent. Hyphae straight, branching

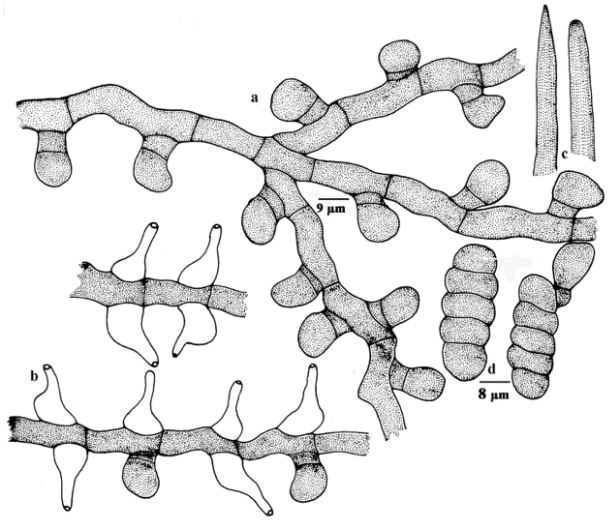


Figure 56. ***Meliola canavaliae***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

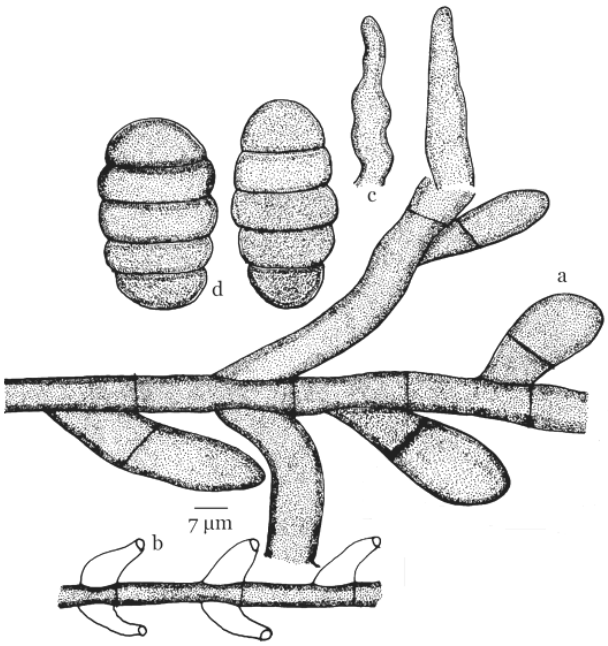


Figure 57. ***Meliola canthiicola***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

opposite at wide angles, loosely to closely reticulate, cells 12–7x6–8 µm. Appressoria opposite to alternate, straight to curved, antrorse to spreading, 11–18 µm long; stalk cells cylindrical to cuneate, 1–3 µm long; head cells ovate to cylindrical, attenuated at the apex, entire, 9–14x6–8 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 12–18x6–8 µm. Mycelial setae grouped around perithecia, straight, simple, acute, obtuse to variously dentate at the tip, up to 660µm long. Perithecia scattered, globose, up to 150µm in diameter; ascospores subellipsoidal to cylindrical, 4-septate, constricted at the septa, 28–36x12–16 µm.

Ovate, conoid and slightly recurved head cells of appressoria are the distinguishing characters of this species.

Common species in the Western Ghats.

Meliola capensis (Kalch. & Cooke) Theiss. var. ***schleicherae*** Hosag. & Pillai in Hosag., Raghu & Pillai, Nova Hedwigia 58: 583, 1994; Hosag., Meliolales of India, p. 157, 1996(Fig. 60).

Materials examined: TBGT 3938, 15.ii.2009, on leaves of *Schleichera oleosa* (Lour.) Oken (Sapindaceae),

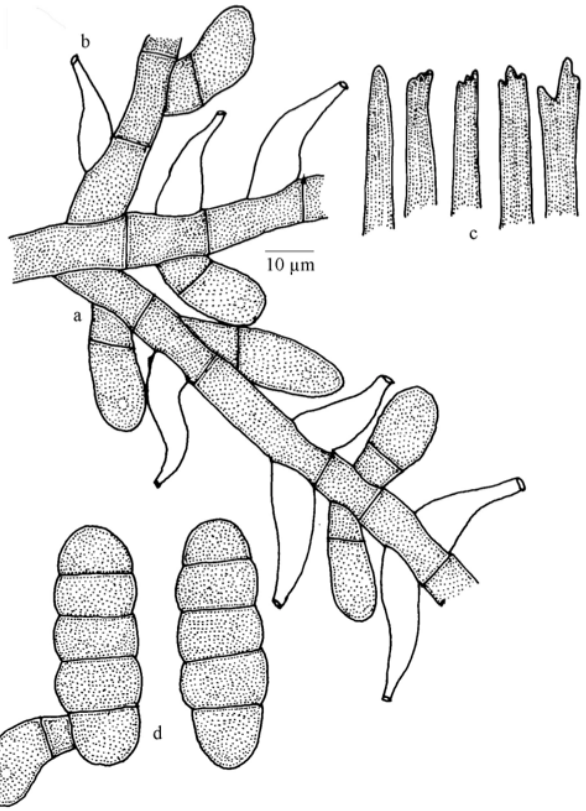


Figure 58. *Meliola capensis* var. *allophylicola*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

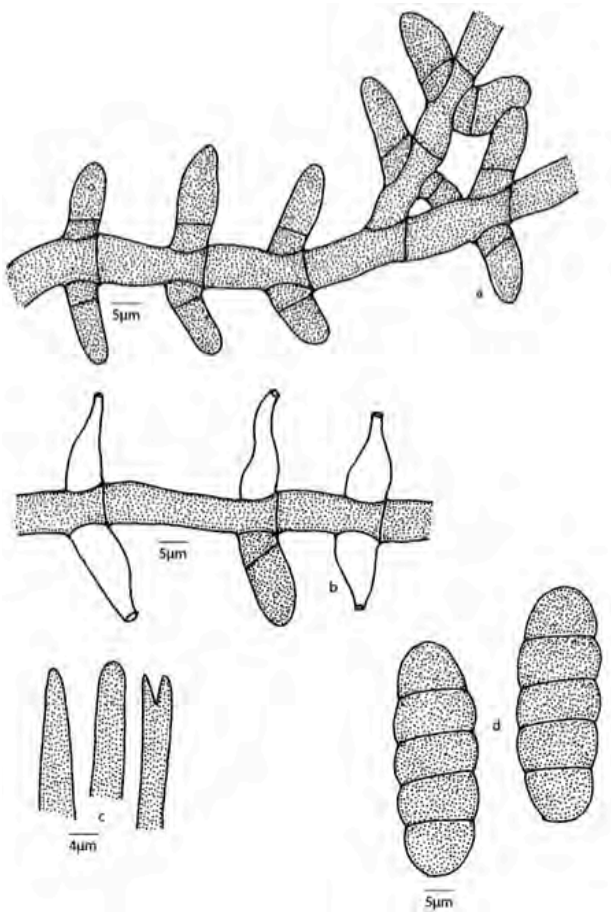


Figure 59. *Meliola capensis* var. *malayensis*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Wayanad, coll. Jacob Thomas et al.

Colonies epiphyllous, dense, velvety, up to 3mm in diameter, confluent. Hyphae straight, branching opposite at acute angles, loosely to closely reticulate, cells 14–26x4–7 µm. Appressoria opposite, crowded, 12–14 µm long; stalk cells cuneate, 2–4 µm long; head cells conoid, entire, 9–12x6–7 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 14–21x4–7 µm. Mycelial setae scattered, straight, simple, acute to dentate at the tip, up to 480µm long. Perithecia scattered, verrucose, up to 140µm in diameter; ascospores obovoidal, 4-septate, constricted at the septa, 31–36x14–17 µm.

Opposite, crowded to sparse appressoria with conoid head cells distinguishes this taxon.

Endemic to southern Western Ghats

Meliola careyae (Stev.) Hosag. var. ***indica*** Hosag., Persoonia 18:2, 2003 (Fig. 61).

Materials examined: HCIO 44368, TBGT 631, 6.ii.2002, on leaves of *Careya arborea* Roxb. (Lecythidaceae), Periya; HCIO 44798, TBGT 1035, 26.xii.2002, Chandanathode, coll. M. Kamarudeen & P.A. Jose; HCIO 44868, TBGT 1096, 09.iii.2001, Periya, coll. G. Rajkumar & P.A. Jose; HCIO 43672, TBGT 336, 19.ix.1998, Banasuranmala, C.K. Biju.

Colonies epiphyllous, dense, up to 5mm in diameter, rarely confluent. Hyphae straight to substraight, branching alternate to opposite at acute to wide angles, closely reticulate and form solid mycelial mat, cells 12–26x4–8 µm. Appressoria opposite, about 3% alternate, antrorse to subantrorse, 14–18 µm long; stalk cells cylindrical to cuneate, 3–5 µm long; head cells ovate, rarely globose, entire, 9–13x9–12 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 16–23x8–10 µm. Mycelial setae scattered to grouped around perithecia, straight, simple, acute at the tip, up to 350µm long. Perithecia scattered, up to 175µm in diameter; ascospores oblong to cylindrical, 4-septate, constricted at the septa, 36–44x14–16 µm.

Meliola celastrigena Hosag., Plant Pathology & Quarantine 3(1): 5, 2013 (Fig. 62).

Materials examined: TBGT 6232, 15.ii.2008, on Celasteraceae member, Periya, coll. M.C Riju.

Colonies hypophyllous, dense, velvety, scattered, up to 6mm in diameter. Hyphae straight to slightly undulate, branching alternate to unilateral at acute to wide angles, loosely to closely reticulate, cells 19–30x6–9 µm. Appressoria alternate, antrorse, subantrorse, spreading, retrorse, 37–42 µm long; stalk cells cylindrical to cuneate, 11–16 µm long; head cells ovate, clavate, lobate to stellately lobate, 24–27x24–26 µm. Phialides mixed with appressoria, alternate, conoid to ampulliform, 16–35x5–9 µm. Mycelial setae numerous, scattered, simple, acute to obtuse at the tip, up to 430µm long. Perithecia scattered, up to 120µm in diameter; ascospores curved, ellipsoidal, 3-septate, deeply constricted at the septa, 57–59x19–21 µm.

Meliola euonymi Stevens ex Hansf. known on *Euonymus* sp. from Philippines (Hansford 1961) but the present species differs from it in having shorter appressoria (36–42 vs. 40–55 µm) and ascospores (19–21 vs. 22–24 µm).

Meliola chandrasekharanii Hosag. in Hosag. & Goos, Mycotaxon 37: 225, 1990; 42: 133, 1991; Hosag.,

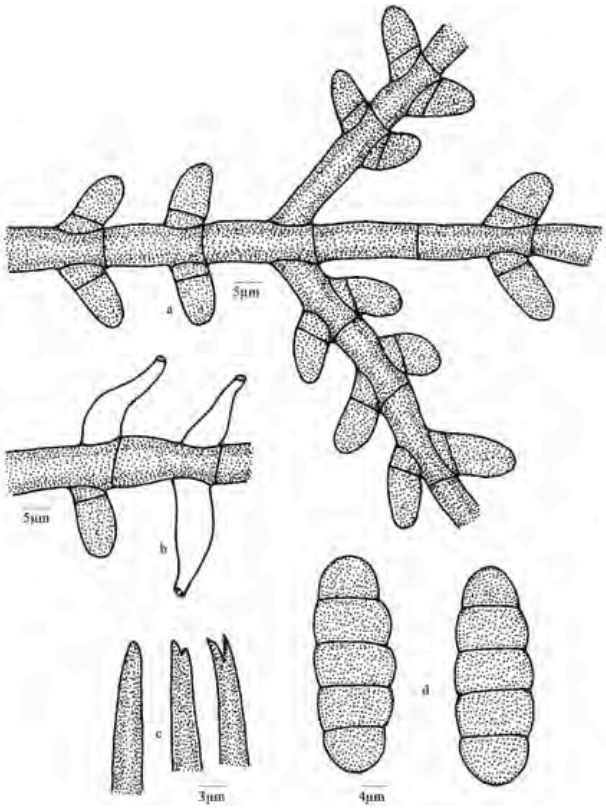


Figure 60. ***Meliola capensis*** **var.** ***schleicherae***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

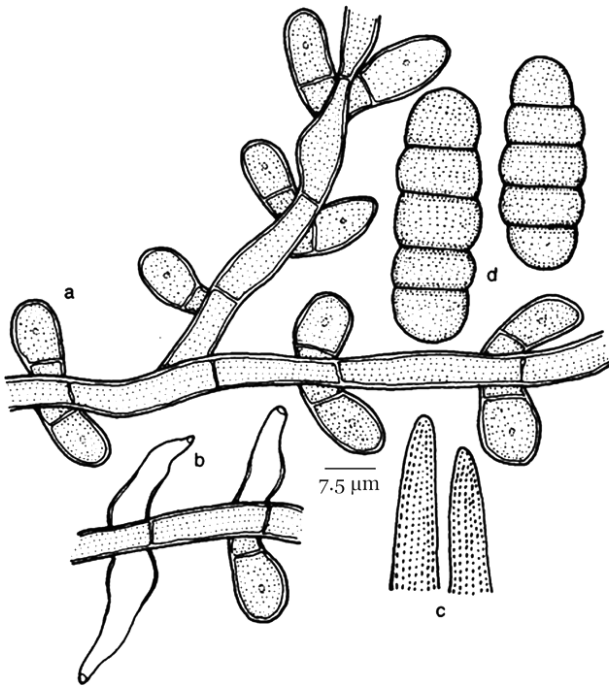


Figure 61. ***Meliola careayae*** **var.** ***indica***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Meliolales of India, p. 164, 1996 (Fig. 63).

Materials examined: HCIO 44350, TBGT 587, 6.ii.2002, on leaves, stems and petioles of *Nothapodytes nimmoniana* (Graham) Mabberly (Icacinaceae), Periya, coll. M.Kamarudeen; HCIO 48005, TBGT 2788, 6.xii.2006, coll. M. Harish et al.; HCIO 49069, TBGT 3324, 18.ix.2008, Thirunelly, coll. M. Harish et al.; HCIO 44793, TBGT 1030; HCIO 48008, TBGT 2791, 27.xii.2002, *Nothopodites* sp., Periya, M. Kamarudeen & P.A. Jose; TBGT 5719, 22.iii.2008, Padinharathara, coll. M.C. Riju; HCIO 50645, TBGT 4562, 26.xii.2007, coll. M.C. Riju; HCIO 51297, TBGT 5177, 27.xii.2007, coll. M.C. Riju; TBGT 3939, 13.ii.2007, Thirunelly, coll. M. Harish et al.; HCIO 51277, TBGT 5157, 22.iii.2008, Wayanad, coll. M.C. Riju et al.; HCIO 51232, TBGT 5112, 23.xii.2008; TBGT 5723, 23.iii.2008.

Colonies amphigenous, caulicolous, mostly epiphyllous, velvety, cover almost all the part of upper surface of the leaf, up to 3mm diameter, confluent. Hyphae substraight to undulate, branching alternate to opposite at acute angles, closely reticulate and form a mycelial mat, cells 15–29x6–9 µm. Appressoria alternate, about 1% opposite, straight to curved, spreading, mostly antrorse, 17–26 µm long; stalk cells cuneate to cylindrical, 4–9 µm long; head cells subglobose, ovate, angular to sublobate, 11–18x13–15 µm. Phialides borne on a separate mycelial branch, alternate to opposite, ampulliform, 15–26x6–9 µm. Mycelial setae numerous, scattered to grouped around perithecia, straight, simple, acute to obtuse at the tip, up to 490µm long. Perithecia scattered, verrucose, up to 160µm in diameter; ascospores obovoidal to cylindrical, 4-septate, 33–40x11–15 µm.

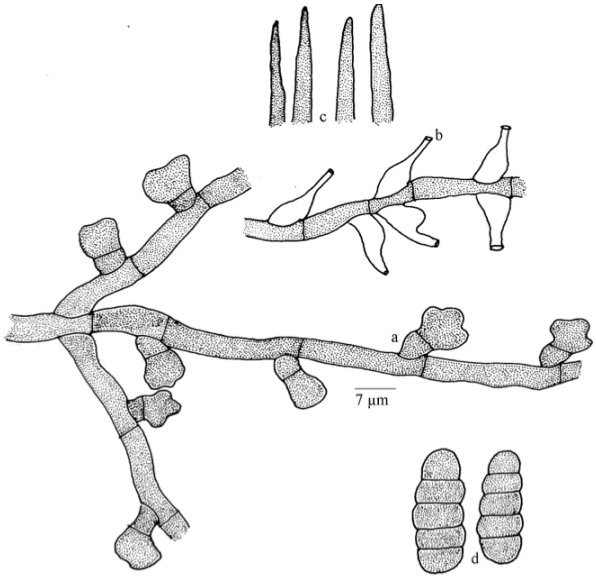


Figure 63 ***Meliola chandrasekharanii***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Because of the lobate head cells of appressoria and separately borne phialides the present collection merits its placement in the above mentioned.

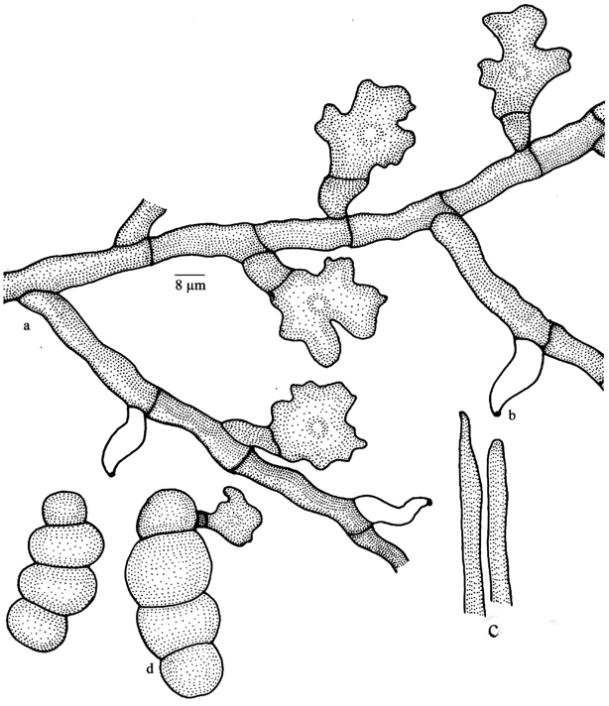


Figure 62. ***Meliola celastrigena***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Meliola citricola Sydow & Sydow, Ann.Mycol. 15: 183, 1917; Hansf., Sydowia Beih. 2: 246, 1961; Kar & Maity, Norw. J. Bot. 19: 246, 1972; Hosag. & Goos, Mycotaxon 37: 326, 1990; 42: 133, 1991; Hosag., Meliolales of India, p. 167, 1996; J. Econ. Taxon. Bot. 30: 949, 2006 (Fig. 64).

Materials examined: HCIO 49963, TBGT 4115, 15.iii.2007, on leaves of *Citrus* sp. (Rutaceae), Puthuserrykadavu, coll. M.C. Riju; HCIO 50843, TBGT 4760, 6.xi.2009, Padinharathara, coll. M.C. Riju & A. Sabeena.

Colonies amphigenous, dense, velvety, up to 6mm in diameter. Hyphae straight to substraight, branching opposite to irregular at acute to wide angles, closely reticulate to form a mycelial mat, cells 9–26x6–7 µm. Appressoria alternate to opposite, about 10% unilateral, antrorse to retrorse, straight to curved, closely packed, 16–24 µm long; stalk cells cylindrical to cuneate, 4–7 µm long; head cells cylindrical, ovate, clavate, entire, curved to recurved, 12–16x7–10 µm. Phialides mixed

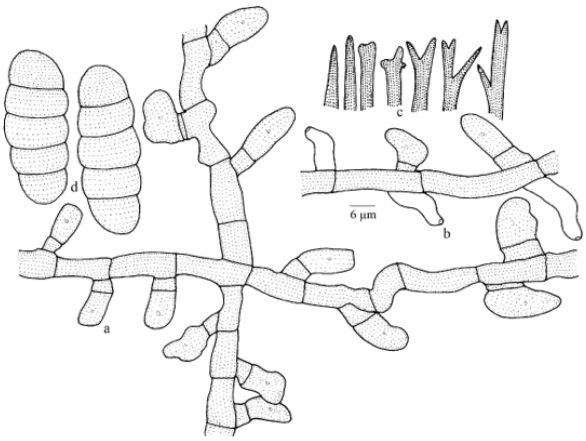


Figure 64. ***Meliola citricola***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d – Ascospores

with appressoria, opposite to alternate, ampulliform, 16–26x6–7 µm. Mycelial setae numerous, scattered, straight, simple, acute to variously dentate at the tip, up to 810µm long. Perithecia scattered, verrucose, up to 190µm in diameter; ascospores cylindrical to subellipsoidal, 4-septate, constricted at the septa, 36–41x14–19 µm.

Two species of the genus *Meliola*, namely *M. butleri* Sydow and *M. citricola* Sydow have been recorded on the host genus *Citrus.* However, the latter differs from the former in having opposite and alternate appressoria and obtuse to dentate mycelial setae.

Meliola clerodendricola Henn., Hedwigia 37: 288, 1895; Hansf., Sydowia Beih. 2: 694, 1961; Hosag. & Goos, Mycotaxon 37: 226, 1990; Hosag., Kaveriappa, Raghu & Goos, Mycotaxon 51: 111, 1994; Hosag., Meliolales of India, p. 169, 1996.

Meliola sakawensis Henn. var. *longispora* Beeli, Bull. Jard. Bot. Etat. 7: 98, 1920.

Meliola sakawensis P. Henn., Hedwigia 43: 141, 1904; Stev., Ann. Mycol. 26: 248, 1928 (Fig. 65).

Materials examined: HCIO 49630, TBGT 3872, 16.ix.2008, on leaves of *Clerodendrum viscosum* Vent. (Verbenaceae), Periya, coll. M. Harish & Robin P.J.; HCIO 49970, TBGT 4122, 14.iii.2007, Puthuserrykadavu, coll. M.C. Riju; HCIO 50819, TBGT 4736, 4.xi.2009, *Clerodendrum* sp., Padiharathara, coll. M.C. Riju & A. Sabeena.

Colonies amphigenous, mostly epiphyllous, dense, scattered, up to 2mm in diameter, confluent. Hyphae undulate to tortuous, branching alternate to opposite at

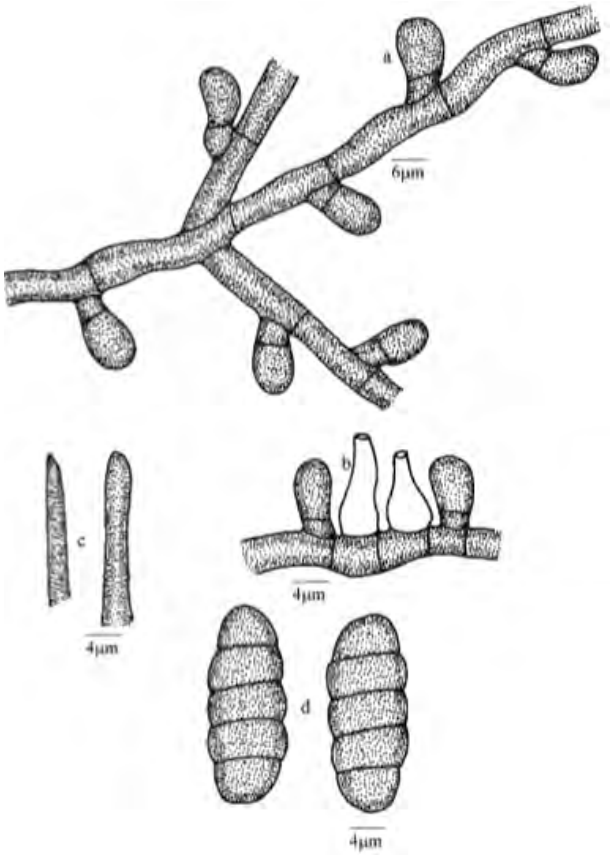


Figure 65. ***Meliola clerodendricola***
a – Appressorium, b – Phialide, c - Apical portion of mycelial setae, d – Ascospores

acute to wide angles, loosely to closely reticulate, cells 16–24x4–6 µm. Appressoria alternate to unilateral, straight to curved, antrorse to reflexed, 12–17 µm long; stalk cells cylindrical to cuneate, 4–7 µm long; head cells ovate, globose, entire, 7–10x6–7 µm. Phialides mixed with appressoria, opposite to alternate, ampulliform, 14–17 µm. Mycelial setae few, grouped around perithecia, simple, acute to obtuse at the tip, up to 220µm long. Perithecia grouped, verrucose, up to 130µm in diameter; ascospores obovoidal to ellipsoidal, 4-septate, constricted at the septa, 28–34x12–14 µm.

This is the only species of the genus *Meliola* on this host in the Western Ghats region.

Common in the Western Ghats of Peninsular India

Meliola crescentiae Stev., Ann. Mycol. 26: 240, 1928; Hansf., Sydowia Beih. 2: 673, 1961; Hosag., Meliolales of India, p. 174, 1996 (Fig. 66 & Image 7).

Materials examined: HCIO 48182, TBGT 2918, 29.vi.2007, on leaves of *Oroxylum* sp. (Bignoniaceae), 16th mile, Padinharathara, coll. M.C. Riju; HCIO 48184,

Image 7. *Oroxylum* sp.-Infected leaves

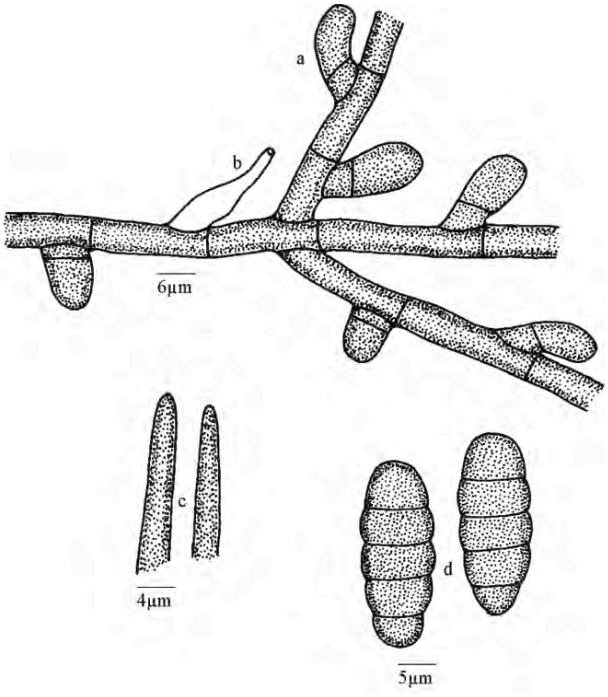


Figure 66. *Meliola crescentiae*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

TBGT 2920, 10.xi.2007 coll. M.C. Riju; HCIO 50754, TBGT 4671; HCIO 50756, TBGT 4673, 6.xi.2009, *Pajenelia* sp., Chennalodu, coll. A. Sabeena & M.C. Riju.

Colonies epiphyllous, thin to subdense, subvelvety, up to 3mm in diameter, confluent. Hyphae straight to substraight, branching opposite at acute to wide angles, loosely to closely reticulate, cells 19–36x4–12 µm. Appressoria alternate, antrorse to subantrorse, straight to curved, 14–24 µm long; stalk cells cylindrical to cuneate, 4–10 µm long; head cells globose to subglobose, subangular, entire, 9–14x9–12 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 12–28x4–7 µm. Mycelial setae numerous, scattered, straight, simple, subacute to obtuse at the tip, up to 220µm long. Perithecia scattered, verrucose, up to 120µm in diameter; ascospores oblong to subellipsoidal, 4-septate, constricted at the septa, 31–34x12–14 µm.

This collection matches well with assigned species.

Meliola cycleae Hosag. in Hosag. & Goos, Mycotaxon 37: 228, 1990; Hosag., Meliolales of India, p. 176, 1996 (Fig. 67).

Materials examined: HCIO 49206, TBGT 3445, 14.ii.2009, on leaves, stems and petioles of *Cyclea peltata* Cooke (Menispermaceae), Thirunelly, coll. Jacob Thomas et al.; HCIO 49976, TBGT 4128; HCIO 50004, TBGT 4156, 14.iii.2007, Puthuserrykadavu, coll. M.C. Riju; HCIO 50334, TBGT 4251, 5.xi.2009, Gurukulam Botanic Garden, Periya, coll. A. Sabeena & M.C. Riju; HCIO 50823, TBGT 4740, 4.xi.2009, Padinharathara, coll. M.C. Riju & A. Sabeena; HCIO 50825, TBGT 4742, 6.xi.2009, Chennalode, coll. M.C. Riju & A. Sabeena; HCIO 49068, TBGT 3323, 17.ix.2008, Periya, coll. M. Harish & P.J. Robin; HCIO 49639, TBGT 3881, HCIO 49206, TBGT 3445, 14.ii.2009, Thirunelli, coll. Jacob Thomas et al.; HCIO 49976, TBGT 4128, 14.iii.2007, Puthuserrykadavu, coll. M.C. Riju.

Colonies amphigenous, mostly epiphyllous, subdense to dense, up to 3mm in diameter, confluent. Hyphae substraight to slightly undulate, branching opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 14–36x6–8 µm. Appressoria alternate to unilateral, straight, antrorse, 16–28 µm long; stalk cells cuneate, 7–12 µm long; head cells ovate, versiform, slightly and bluntly pointed at the apex, entire, 14–17x12-14 µm. Phialides born on a separate mycelial branch, alternate to opposite, conoid to ampulliform, 12–22x6–8 µm. Mycelial setae scattered to grouped around perithecia, simple, acute at the tip, up to 420 µm long. Perithecia scattered, verrucose, up to 160µm in diameter; ascospores oblong, 4-septate, slightly constricted at the septa, 36–40x15–20 µm.

Meliola cymbopogonis Kapoor, Indian Phytopathol. 20: 152, 1967; Hosag. & Goos, Mycotaxon 37: 229, 1990; Hosag., Meliolales of India, p. 177, 1996 (Fig. 68).

Materials examined: HCIO 43632, TBGT 300, 18.xi.1998, on leaves of *Cymbopogon* sp. (Poaceae), Chembra, coll. C.K. Biju.

Colonies epiphyllous, rarely amphigenous, subdense

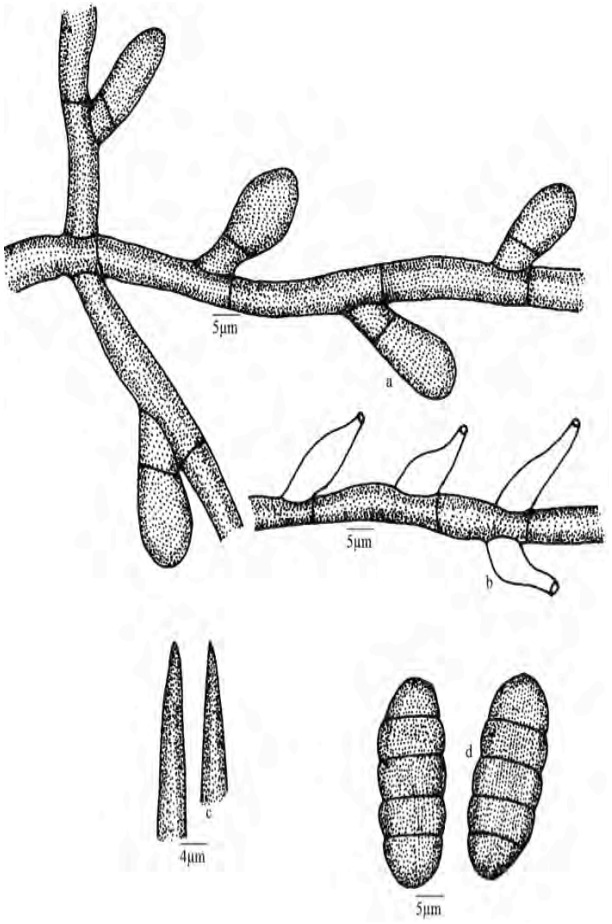


Figure 67. *Meliola cycleae*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

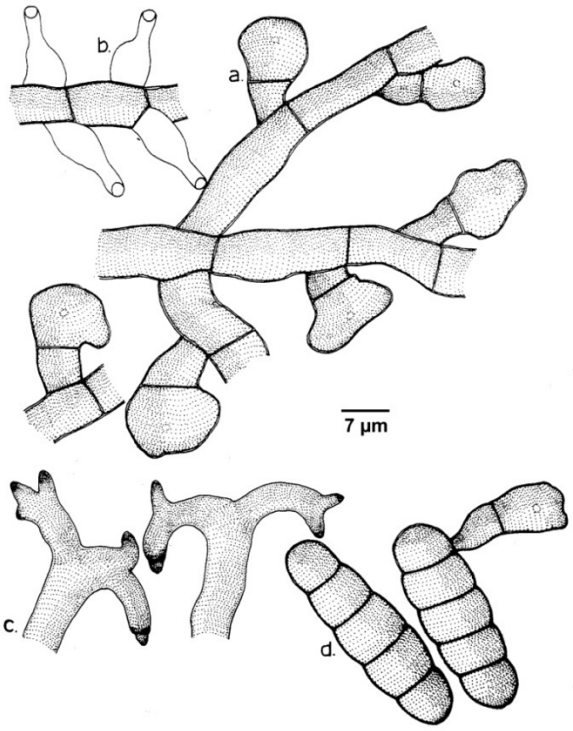


Figure 68. *Meliola cymbopogonis*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

to dense, velvety, up to 3mm in diameter. Hyphae straight to tortuous, straight hyphae run along the veins and tortuous hyphae cross the straight hyphae, branching mostly opposite at wide to acute angles, loosely to closely reticulate, cells 14–22x6–8 µm. Appressoria alternate, unilateral, antrorse, spreading, 10–24 µm long; stalk cells cuneate to cylindrical, 4–12 µm long; head cells ovate, globose, angular to sublobate, 10–14x12–14 µm. Phialides few, mixed with appressoria, alternate to opposite, ampulliform, 12–18x10–12 µm. Mycelial setae straight, dichotomously branched at the tip, up to 176µm long till branching, primary branches up to 20µm long, while, tertiary up to 10µm long, branchlets retrorse, acute to obtuse at the tip. Perithecia scattered, up to 120µm in diameter; ascospores ellipsoidal, 4-septate, constricted at the septa, 38–44x12–14 µm.

Dichotomously branched mycelial setae on this host genus is the distinguishing character of this species.

Meliola densa Cooke, Grevillea 12: 85, 1884; Hansf., Sydowia Beih. 2: 141, 1961; Hosag. & Goos, Mycotaxon 37: 229, 1990; Hosag., Kaveriappa, Raghu & Goos, Mycotaxon 51: 111, 1994; Hosag., Meliolales of India, p. 178, 1996 (Fig. 69).

Materials examined: HCIO 45254, TBGT 1292, 7.iii.2001, on leaves of *Syzygium* sp. (Myrtaceae), Periya, coll. G. Rajkumar & P.A. Jose; HCIO 49971, TBGT 4123, 14.iii.2007, Puthuserrykadavu, coll. M.C. Riju; HCIO 50030, TBGT 4182, 6.xii.2006, Periya, coll. Gireesh et al.

Colonies hypophyllous, dense, velvety, up to 5mm in diameter, confluent. Hyphae substraight to tortuous, branching opposite to irregular at wide angles, closely reticulate, cells 18–40x8–10 µm. Appressoria alternate, straight to variously bent, antrorse, spreading, 18–24 µm long; stalk cells cylindrical to cuneate, 6–14 µm long; head cells curved, ovate, cylindrical, angulose, entire, 12–16x8–12 µm. Phialides mixed with appressoria, opposite to alternate, ampulliform, neck elongated and twisted, 22–30x8–10 µm. Mycelial setae fairly numerous, simple, broadly uncinate to arcuate above, very few are straight, acute to obtuse at the tip, up to 540µm long. Perithecia scattered, verrucose, up to 180µm in diam.; ascospores obovoidal, 4-septate,

constricted at the septa, 46–48x18–20 µm.

Hypophyllous dense colonies with uncinate mycelial setae are the distinguishing characters of this species. This species occurs on many genera of Myrtaceae.

Meliola dimidiatae Hosag. in Hosag. & Goos, Mycotaxon 37: 229, 1990; Hosag., Meliolales of India, p. 181, 1996. (Fig. 70).

Materials examined: HCIO 50643, TBGT 4560, 30.ix.2007, on leaves of *Nothopodytes nimmoniana* (Graham) Mabb. (Icacinaceae), Padinharathara, coll. M.C. Riju.

Colonies epiphyllous, subdense, subvelvety, scattered, up to 3mm in diameter, rarely confluent. Hyphae flexuous, branching opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 16–28x4–7 µm. Appressoria alternate and unilateral, rarely opposite, straight to curved, antrorse to reflexed, spreading, 14–19 µm long; stalk cells cylindrical to cuneate, 4–6 µm long; head cells globose, ovate, curved, entire, 12–14x9–12 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 16–24x7–10 µm. Mycelial setae numerous, scattered, often grouped around perithecia, straight, simple, acute, up to 520µm long. Perithecia scattered, verrucose, up to 130µm in diameter; ascospores cylindrical to subellipsoidal, 4-septate, constricted at the septa, 40–43x16–19 µm.

This species differs from other *Meliola* species reported on the members of the family Icacinaceae in having globose head cells of appressoria, straight mycelial setae and 4-septate ascospores.

Endemic to southern Western Ghats

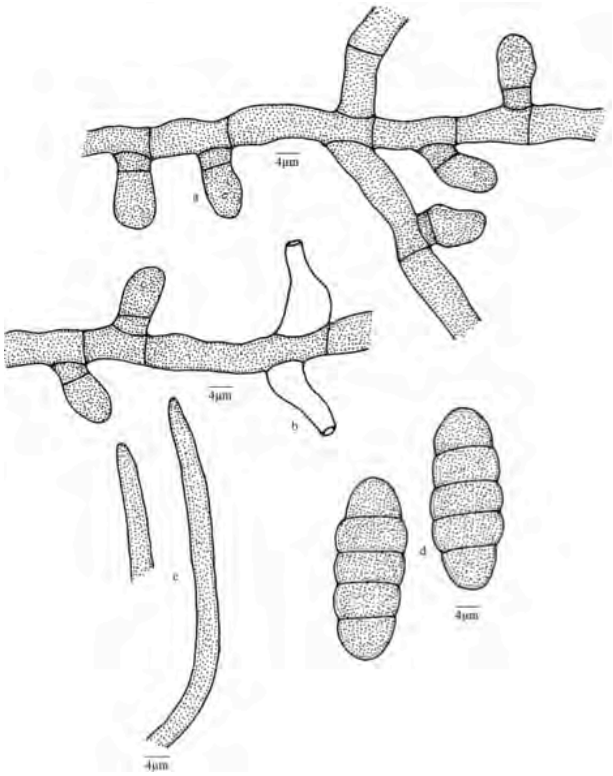


Figure 69. *Meliola densa*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Meliola dysoxyligena Hosag. & Riju, Plant Pathology & Quarantine 1(2): 126, 2011; Hosag., Journal of Threatened Taxa 5(6):4029, 2013 (Fig. 71).

Material examined: HCIO 51045, TBGT 4962; HCIO 51037, TBGT 4954; HCIO 51038, TBGT 4955; HCIO 51052, TBGT 4969, 26.xii.2009, on leaves of *Dysoxylum* sp. (Meliaceae), Chennalode, Padinharathara, coll. M.C. Riju.

Colonies epiphyllous, dense, velvety, up to 5mm in diameter. Hyphae substraight to crooked, branching opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 20–45x7–8 µm. Appressoria alternate, unilateral, opposite, antrorse, subantrorse to retrorse, 15–17x7–10 µm; stalk cells cylindrical to cuneate, 3–5 µm long; head cells globose, subglobose, entire to rarely truncate, 10–13x7–10 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 15–38x7–10 µm. Mycelial setae scattered, simple, straight, acute to 2–3-times dentate at the tip, up to 200 µm long. Perithecia scattered, up to 210µm in diameter; ascospores cylindrical to oblong, 4-septate, slightly constricted at the septa, 35–40x12–15 µm.

Meliola ptaeroxyli Doidge, *M. Carapace* Hansf. & Deight. and *M. toonae* Hosag. & Sabu are the species that have simple and dentate mycelial setae. The present fungus differs from *M. ptaeroxyli* in not producing a pathogenic effect on the host, from *M. carapace* in having shorter appressoria (15–17 µm vs. 24– 40 µm) and smaller ascospores (35–40x12–15 vs. 51–58x19–23 µm). It differs from *M. toonae* in having shorter appressoria (15–17 µm vs. 16–24 µm) and shorter ascospores (35–40 µm vs. 40–44 µm) (Hansford 1961; Hosagoudar 1996, 2008; Hu et al. 1996, 1999). The neck or apical portion of the phialides are unusually elongated, often variously bent and proliferate as hyphae by holding the phialoconidia in their neck.

Meliola erythropali Hosag. in Hosag. & Goos, Mycotaxon 37: 232, 1990 (*erythropalii*); Hosag., Meliolales of India, p. 190, 1996 (Fig. 72).

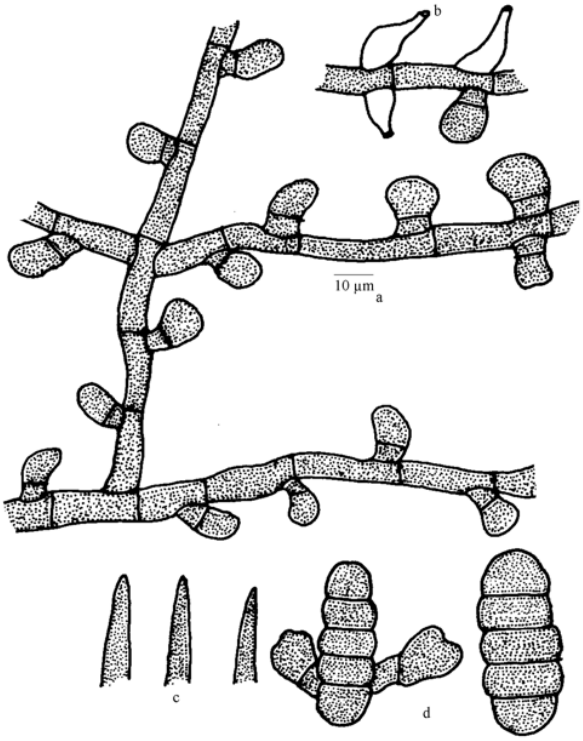


Figure 70. ***Meliola dimidiatae***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

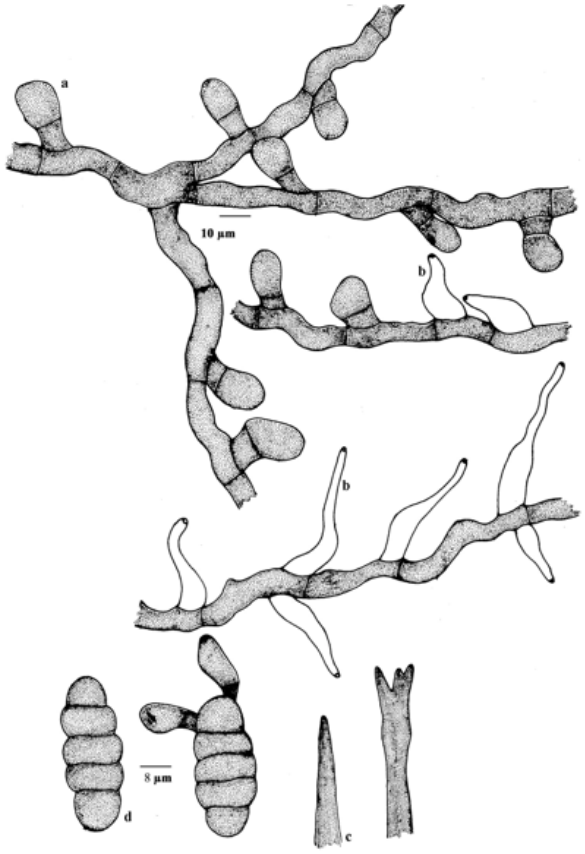


Figure-71. ***Meliola dysoxyligena***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Materials examined: HCIO 43629, TBGT 322, on leaves of *Erythropalum populifolium* (Arn.) Masrt. (Erythropalaceae), Chembra, coll. C.K.Biju; 4.iv.1999; TBGT 3754, 18.ii.2009, Periya, coll. P.J. Robin et al.

Colonies amphigenous, caulicolous, dense, velvety, up to 5mm in diameter, confluent. Hyphae straight to slightly undulate, branching opposite to irregular at acute to wide angles, loosely reticulate, cells 14–41x4–7 µm. Appressoria alternate to unilateral, straight, antrorse, spreading, 12–22 µm long; stalk cells cylindrical to cuneate, 2–5 µm long; head cells ovate, globose, slightly curved, entire, 9–17x7–9 µm. Phialides few, mixed with appressoria, alternate to opposite, ampulliform, 14–26x6–8 µm. Mycelial setae scattered, grouped around perithecia, numerous, simple, straight, acute at the tip, up to 310µm long. Perithecia scattered, verrucose, up to 170µm in diameter; ascospores cylindrical, 4-septate, slightly constricted at the septa, 33–40x9–14 µm.

This is the only species of the genus *Meliola* on the members of the family Erythropalaceae.

Endemic to Southern Western Ghats

Meliola flemingiicola Hosag., Jose & H. Biju in Hosag., J. Mycopathol. Res. 43: 26, 2005; Hosag., Meliolales of India 2: 243, 2008. (Fig. 73).

Materials examined: HCIO 43616, TBGT 298, 19.xi.1998, on leaves of *Flemingia* sp. (Fabaceae), Banasuranmala, coll. C.K.Biju.

Colonies epiphyllous, dense, crustose to velvety, scattered, up to 2mm in diameter, rarely confluent. Hyphae substraight to flexuous, branching irregular at acute to wide angles, loosely to closely reticulate, cells 17–28x6–8 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, 9–11x10–12 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 14–21x8–10 µm. Mycelial setae scattered to grouped around perithecia, simple, straight, obtuse, dentate to cristate at the apex, up to 441µm long. Perithecia scattered to loosely grouped, globose, up to 140µm in diameter; ascospores oblong to cylindrical, 4 septate, slightly constricted at the septa, 33–36x11–13 µm.

Meliola gamblei Hosag. in Hosag. & Goos, Mycotaxon 42: 134, 1991; Hosag., Meliolales of India, p. 201, 1996. (Fig. 74)

Materials examined: HCIO 49435, TBGT 3680, 16.ii.2009, on leaves of *Smilax* sp. (Smilacaceae), Periya, coll. Harish et al.

Colonies epiphyllous, dense, crustose, up to 2mm in diameter, confluent. Hyphae substraight to crooked, branching opposite at acute angles, loosely to closely reticulate, cells 18–31x6–9 µm. Appressoria alternate, straight to curved, antrorse to spreading, 18–22 µm long; stalk cells cylindrical to cuneate, 4–5 µm long; head cells ovoid to globose, straight to curved, often bluntly pointed at the apex, entire, 12–15.5x12–14 µm. Phialides mixed with appressoria, opposite to alternate, ampulliform, 15–25x6–9.5 µm. Mycelial setae few, straight, simple, acute to obtuse at the tip, up to 650µm long. Perithecia scattered, verrucose, up to 280µm in diameter; ascospores obovoidal, 4-septate, slightly constricted at the septa, 37–43.5x15–18.5 µm.

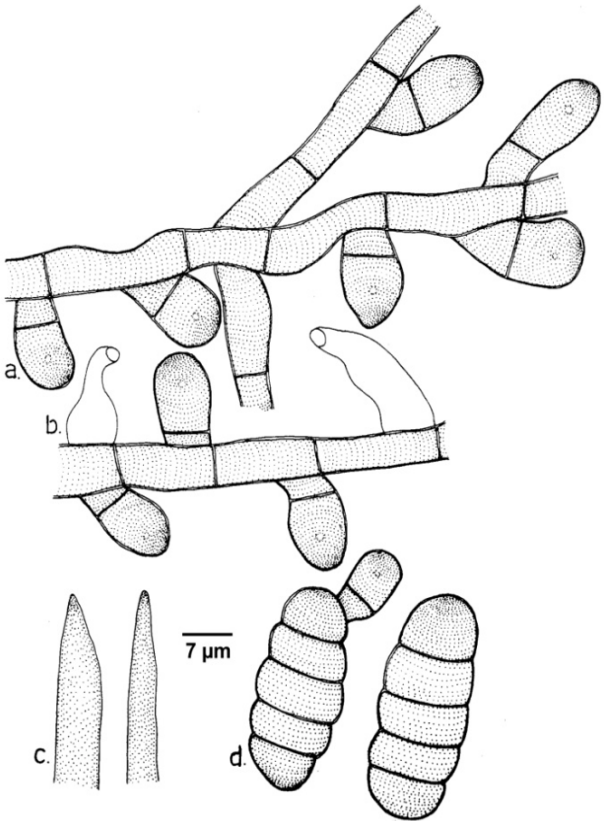


Figure 72. ***Meliola erythropali***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

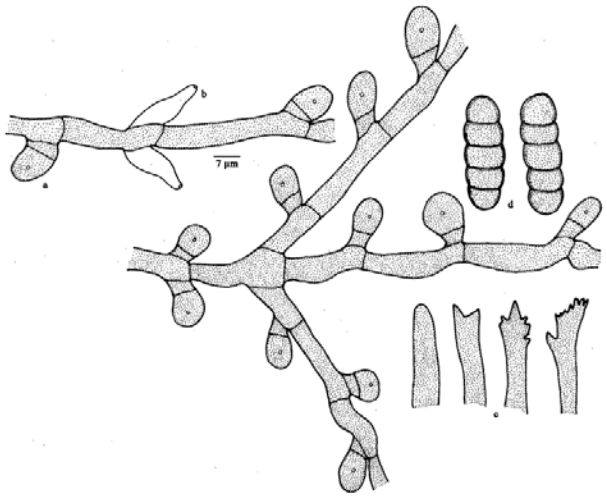


Figure 73. ***Meliola flemingiicola***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Meliola gemellipoda Doidge, Bothalia 1: 80, 1920; Stev., Ann. Mycol. 26: 229, 1928; Hansf., Sydowia Beih. 2: 530, 1961; Hosag. & Goos, Mycotaxon 37: 232, 1990; Hosag., Meliolales of India, p. 204, 1996.

Meliola busogensis Hansf., J. Linn. Soc. Bot. 51: 538, 1938. (Fig. 75)

Materials examined: HCIO 49462, TBGT 3704; HCIO 49771, 9.ix.2008, on leaves of *Jasminum* sp. (Oleaceae), Pulpally, coll. P.J. Robin et al., TBGT 3923, 14.ii.2009, Thirunelly, coll. Jacob Thomas et al.; HCIO 49967, TBGT 4119, 13.iii.2007, Puthuserrykadavu, coll. M.C. Riju; HCIO 50841, TBGT 4758, 5.xi.2009, *Jasminum malabaricum* Wight, Gurukulam Botanical Garden, coll. M.C. Riju & A. Sabeena; HCIO 49627, TBGT 3869, 20.ix.2008, *Jasminum* sp., Pulpally, coll. M. Harish & P.J. Robin.

Colonies amphigenous, mostly epiphyllous, dense, up to 3mm in diameter, confluent. Hyphae straight to slightly undulate, branching opposite at acute to subacute angles, loosely to closely reticulate, cells 12–19x4–7 µm. Appressoria opposite (very few unilateral), straight to slightly curved, closely antrorse, 14–19 µm long; stalk cells cuneate, 4–7 µm long; head cells subglobose to ovate, entire, 9–14x7–10 µm. Phialides few, mixed with appressoria, alternate to opposite, ampulliform, 16–26x7–10 µm. Mycelial setae fairly numerous, scattered to mostly grouped around perithecia, straight, simple, acute to obtuse at the tip, up to 570µm long. Perithecia scattered, verrucose, up to 120µm in diameter; ascospores obovoidal, 4-septate, slightly constricted at the septa, 43–50x14–20 µm.

This is distinct from other species having opposite

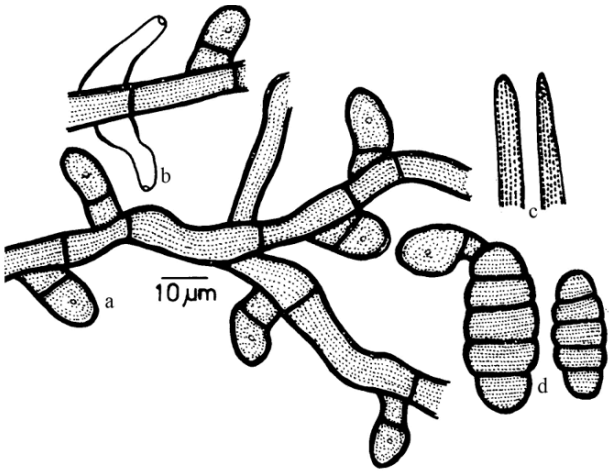


Figure 74. ***Meliola gamblei***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

appressoria.

Not very common in the Western Ghats

Meliola glanduliferae Hosag., C.K. Biju & Abraham, Nova Hedwigia 80: 485, 2005; Hosag., Meliolales of India 2: 250, 2008 (Fig. 76).

Materials examined: HCIO 43630, TBGT 328, 16.iv.1999, on leaves of *Olea glandulifera* Wallich ex G. Don (Oleaceae), Banasuran mala, coll. C.K.Biju.

Colonies amphigenous, subdense to dense, up to 2mm diameter, confluent. Hyphae substraight to flexuous, branching mostly opposite, loosely to rather closely reticulate, cells 12–18x5–7 µm. Appressoria alternate, straight to curved, antrorse to subantrorse, 19–22 µm long; stalk cells cylindrical to cuneate, 7–9 µm long; head cells oblong to cylindrical, broadly rounded to rarely truncate at the apex, entire, 11–16x6–8 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 19–24x4–7 µm. Mycelial setae scattered, simple, straight, acute to slightly obtuse at the tip, up to 200µm long. Perithecia scattered, up to 160µm diam.; ascospores obovoidal to cylindrical, 4-septate, constricted at the septa, 35–40x14–16 µm.

Meliola gliricidiicola Hosag. & Agarwal, Indian Phytopath. 56: 103, 2003; Hosag., Meliolales of India 2: 251, 2008; Hosag. & Agarwal, Taxonomic studies of Meliolales. Identification Manual, p. 178, 2008. (Fig. 77)

Materials examined: HCIO 49964, TBGT 4116, 16.iii.2007, on leaves of *Gliricidia* sp. (Fabaceae), Batherry, coll. M.C. Riju.

Colonies amphigenous, mostly epiphyllous, subdense to dense, up to 2mm in diameter, often confluent.

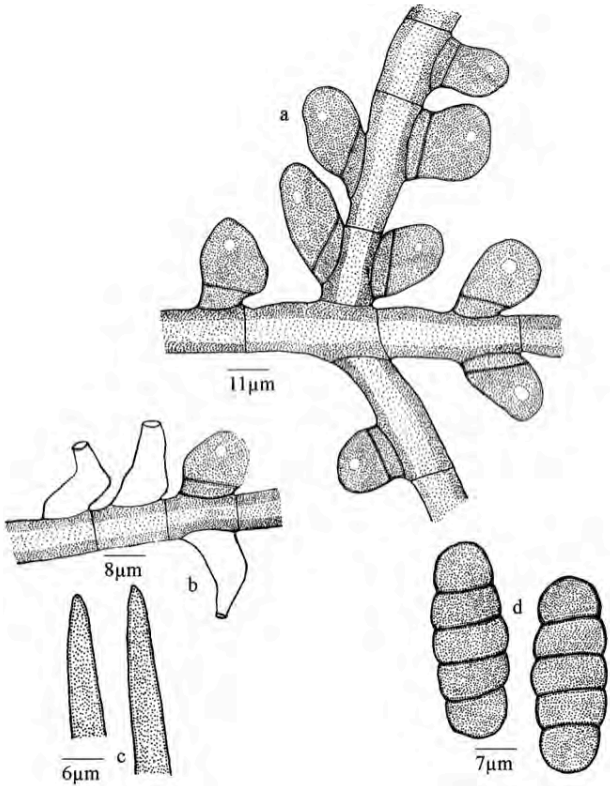


Figure 75. ***Meliola gemellipoda***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Hyphae straight to flexuous, branching mostly opposite at acute to wide angles, loosely to closely reticulate, cells 14–21x4–8 µm. Appressoria alternate, opposite, subantrorse to spreading, 11–16 µm long; stalk cells cylindrical to cuneate, 3–5 µm long; head cells globose, rarely ovate, straight to slightly curved, entire, 9–10x7–11 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 8–16x6–8 µm. Mycelial setae scattered to grouped around perithecia, simple, straight, acute at the tip, up to 368µm long. Perithecia scattered, up to 164µm in diameter; ascospores mostly cylindrical, 4-septate, constricted at the septa, 32–37x9–13 µm.

Meliola gliricidicola can be compared with *Meliola nyanzae* Hansf. having the same Beeli formula 3113. 3222. However, it differs from it in not causing any pathogenic effect on the host. It differs from *Meliola bicornis* Wint. in having only acute setae and smaller ascospores. It also differs from *Meliola cranatissima* Sydow in having phialides mixed with appressoria, mycelial setae acute and having smaller ascospores (Hansford, 1961).

Meliola groteana Sydow var. ***maesae*** Hosag., C.K.

Biju & Abraham, Nova Hedwigia 80: 486, 2005; Hosag., Meliolales of India 2: 257, 2008. (Fig. 78).

Materials examined: HCIO 43673, TBGT335, 18.xi.1998, on leaves of *Maesa indica* (Roxb.) DC. (Myrsinaceae), Chembra hills, coll. C.K. Biju; HCIO 50329, TBGT 4246, 31.x.2007, 10th Mile, Banasura sagar, coll. V.B. Hosagoudar et al.; HCIO 49059, TBGT 3314, 16.ix.2008, Periya, coll. M. Harish & P.J. Robin; HCIO 49210, TBGT 3449, 14.ii.2009, Thirunelly, coll. Jacob Thomas et al.; HCIO 47399, TBGT 2437, 21.iv.2003, *Maesa perrottetiana* A.DC., Periya, coll. G. Rajkumar & P.A. Jose.

Colonies mostly hypophyllous, dense, velvety, up to 5mm diameter, confluent. Hyphae straight to flexuous, branching mostly opposite at acute angles, loosely to closely reticulate, cells 12–16x5–7 µm. Appressoria alternate, about 30% opposite, antrorse to subantrorse, 12–16 µm long; stalk cells cylindrical to cuneate, 3–5 µm long; head cells predominantly globose, rarely ovate, entire, 9–11x8–11 µm. Phialides few, mixed with appressoria, alternate to opposite, ampulliform, 16–20x8–11 µm. Mycelial setae densely scattered, simple, straight, flexuous to arcuate, obtuse to acute at the tip, up to 300µm long. Perithecia scattered, up to 175µm diameter; ascospores obovoidal to cylindrical, 4-septate, slightly constricted at the septa, 33–40x–12–15 µm.

The present collection can readily be assigned to the type species. However, the new variety differs from var. *groteana* in having straight to arcuate mycelial setae and smaller ascospores.

Meliola gymnemae Jana, Ghosh & Das, Indian Phytopath. 58: 444, 2005; Hosag., Meliolales of India 2: 259, 2008. (Fig. 79).

Materials examined: HCIO 49377, TBGT 3622, 16.ii.2009, on the leaves of *Gymnema sylvestre* (Retz.) R. Br. ex Schultes (Asclepiadaceae), Periya, coll. P.J. Robin et al.; HCIO 50002, TBGT 4154 13.iii.2007, Puthuserrykadavu, coll. M.C. Riju; HCIO 49422, TBGT 3667, 14.ii.2009, *Gymnema* sp., Thirunelly, Harish et al.; HCIO 49803, TBGT 3955, 8.iii.2008, Periya, coll. P.J. Robin et al.

Colonies amphigenous, mostly epiphyllous, dense, velvety, scattered, up to 3mm in diameter. Hyphae substraight to undulate, branching opposite at acute angles, closely reticulate, cells 12–26x4–7 µm. Appressoria alternate to unilateral, antrorse, straight to

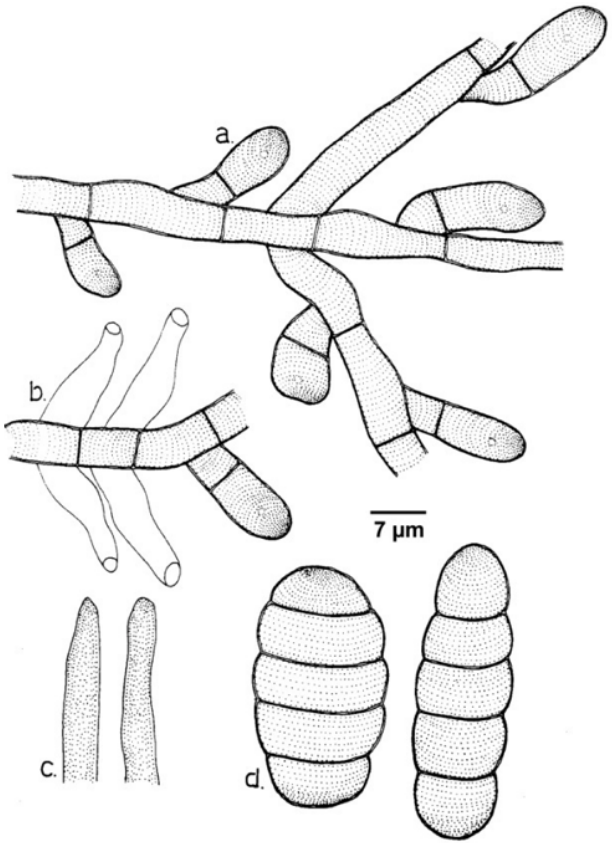


Figure 76. ***Meliola glanduliferae***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

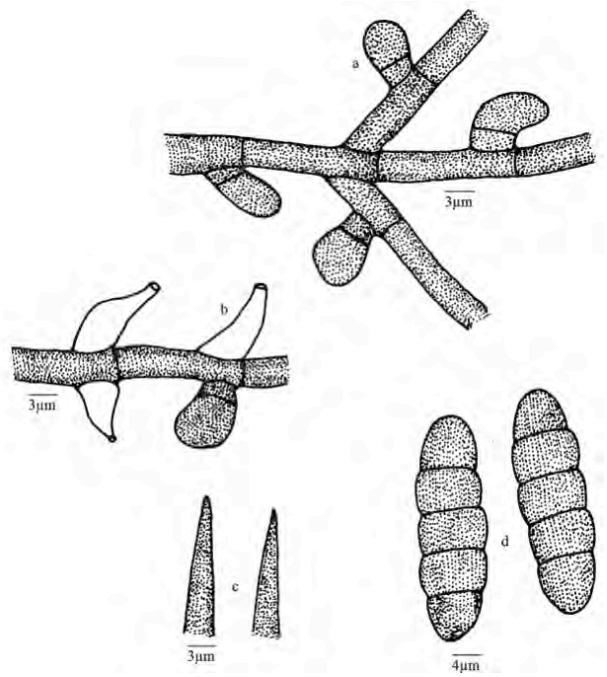


Figure 77. ***Meliola gliricidiicola***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

curved, 14–22 µm long; stalk cells cylindrical to cuneate, 2–7 µm long; head cells ovate, globose to subangular, cylindrical, entire, 12–17x9–12 µm. Phialides borne on a separate mycelial branch, alternate to opposite, ampulliform, 14–22x6–7 µm. Mycelial setae numerous, scattered, straight, simple, acute at the tip, up to 390µm long. Perithecia scattered to grouped, verrucose, up to 170µm in diameter; ascospores cylindrical to subellipsoidal, 4-septate, slightly constricted at the septa, 31–36x12–14 µm.

This fungus causes severe damage on this medicinally important plant.

Meliola hemidesmicola Hosag., Meliolales of India, p. 212, 1996. (Fig. 80)

Materials examined: HCIO 49064, TBGT 3319, 20ix.2008, on leaves of *Hemidesmus indicus* (L.) R. Br. (Periplocaceae), Pulpally, coll. M. Harish & P.J. Robin; HCIO 44796, TBGT 1033, 26.xii.2002, Chandanathode, coll. M. Kamarudeen & P.A. Jose.

Colonies epiphyllous, dense, confluent and cover an entire upper surface of the leaves. Hyphae straight to slightly undulate, branching mostly opposite at wide angles, loosely to closely reticulate, cells 21–29x4–7 µm. Appressoria alternate, antrorse to subantrorse, 16–24 µm long; stalk cells cylindrical to cuneate, 4–7 µm long; head cells ovate, globose, entire, 12–14x9–12 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 19–24x4–7 µm. Mycelial setae fairly numerous, scattered, simple, straight, acute at the tip, up to 680µm long. Perithecia scattered, verrucose, up to 120µm in diameter; ascospores oblong to subellipsoidal, 4-septate, constricted at the septa, 31–36x12–14 µm.

This species differs from *Meliola hemidesmi* Kamal & Gupta in having longer mycelial setae, smaller perithecia and ascospores (Hosagoudar, 1996).

Endemic to Southern Western Ghats

Meliola holigarnae Stev., Mem. Dept. Agric. India, Bot. Ser. 15: 108, 1928; Hansf., Sydowia Beih. 2: 468, 1961; Thite & Kulkarni, J. Shivaji Univ. (Sci.) 6: 162, 1973; Hosag., J. Econ. Tax. Bot. 7: 45, 1985; Hosag. & Goos, Mycotaxon 37: 234, 1990; 42: 135, 1991; Hosag., Dayal & Goos, Mycotaxon 46: 204, 1993; Hosag., Raghu & Pillai, Nova Hedwigia 58: 529, 1994; Hosag., Meliolales of India, p. 217, 1996. (Fig. 81 & Image 8).

Materials examined: HCIO 45105, TBGT 1160, 26.xii.2002, on leaves of *Holigarna arnottiana* Hook.f. (Anacardiaceae), Periya, coll. M. Kamarudeen & P.A. Jose; HCIO 45159, TBGT 1214, 27.xii.2002, Chandanathode, coll. M. Kamarudeen & P.A. Jose; HCIO 49382, TBGT 3627; HCIO 49384, TBGT 3629, 16.ii.2009, *Holigarna* sp., Periya, Wayanadu, coll. Gireesh Kumar et al.

Colonies hypophyllous, dense, velvety, up to 8mm in diameter, confluent. Hyphae strongly appressed to the host surface, crooked, branching alternate to irregular at acute to wide angles, closely reticulate, cells 37–54x6–8 µm. Appressoria scattered, alternate to unilateral, antrorse to reflexed, variously curved, 25–50 µm long; stalk cells cylindrical, flexuous, usually elongated, 8–20

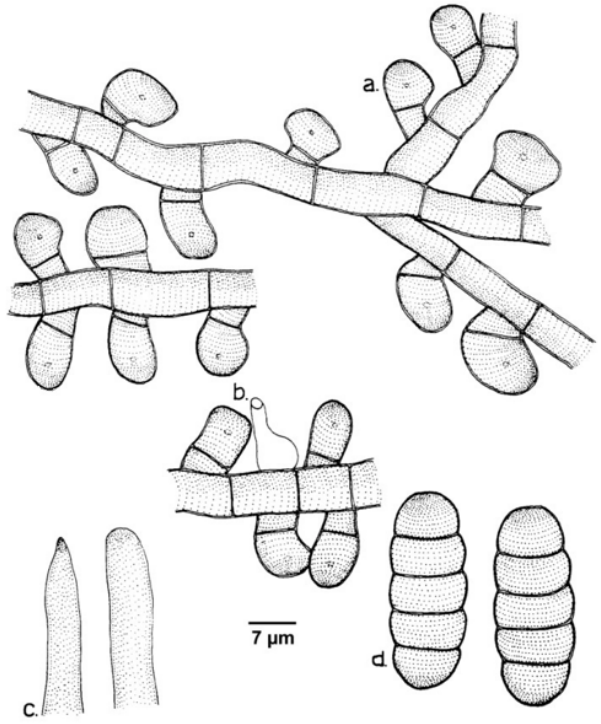


Figure-78. *Meliola groteana* var. *maesae*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

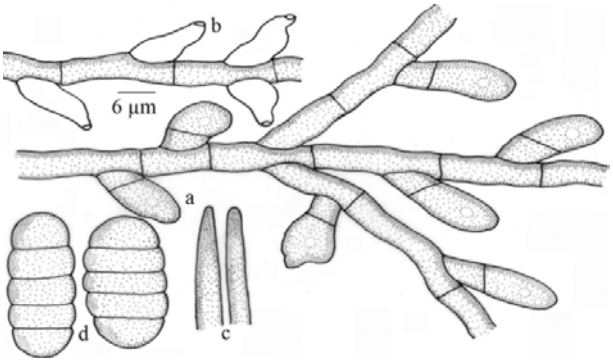


Figure-79. *Meliola gymnemae*
a – Appressorium, b – Phialide, c - Apical portion of mycelial setae, d – Ascospores

µm long; head cells ovate, versiform, angulose, entire to lobate, straight to curved, 17–22x14–18 µm. Phialides few, mixed with appressoria, conoid to ampulliform, 11–26x4–8 µm. Mycelial setae numerous, straight, flexuous, simple, acute to obtuse at the tip, up to 826µm long. Perithecia scattered, verrucose, up to 286µm in diam.; ascospores ellipsoidal, 4-septate, constricted at the septa, middle cell largest, 62–74x23–30 µm.

The present taxon can be easily distinguished by its flexuous mycelial setae and fusiform, large ascospores with the larger central cell.

Meliola ichnocarpi-volubili Hansf., Sydowia 16: 320, 1963; Hosag., Abraham & Pushpangadan, The Meliolineae - A Supplement, 1987; Hosag., Zoos' Print J. 18: 1002, 2002; Hosag., Meliolales of India 2: 268, 2008. *Meliola ichnocarpi* Stev. & Rold., Philippine J. Sci. 56: 66,

Image. 8. *Meliola holigarnae*-Infected leaf

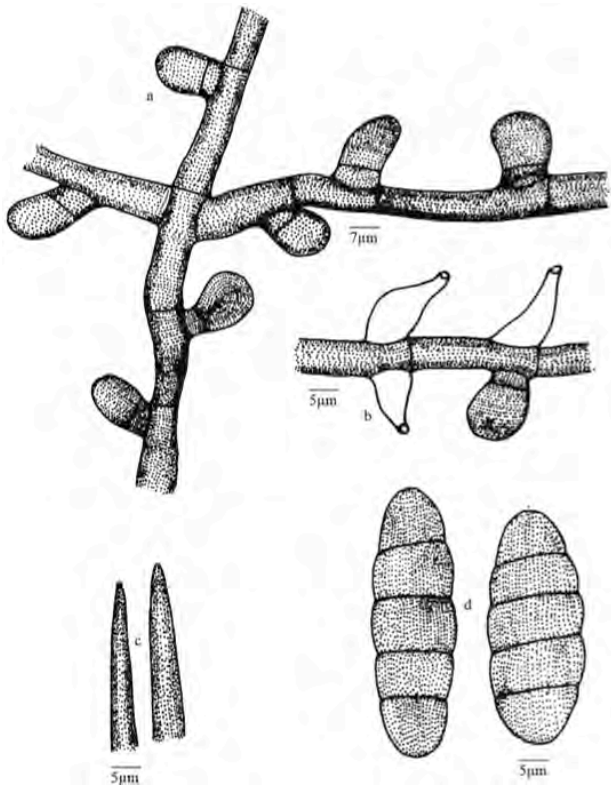


Figure-80. *Meliola hemidesmicola*
a – Appressorium, b – Phialide, c - Apical portion of mycelial setae, d – Ascospores

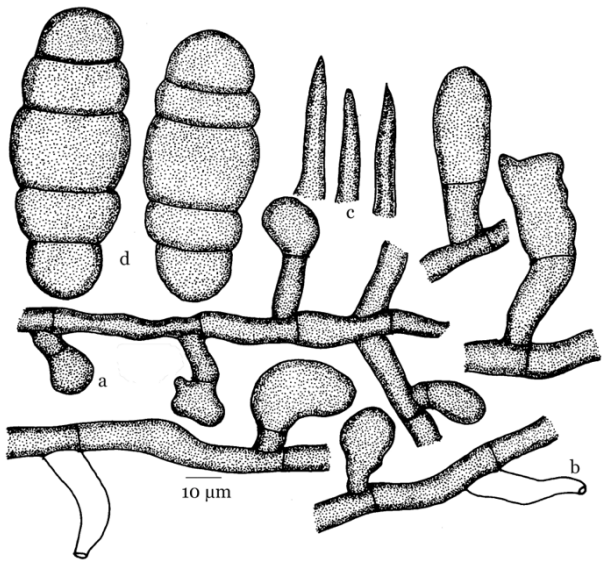


Fig.-81. *Meliola holigarnae*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

1935 (*non* Hansf. & Thirum., 1948); Hansf., Sydowia Beih. 2: 561, 1961. (Fig. 82).

Materials examined: TBGT 5575, 10.xi.2007, on leaves of *Quirivelia frutescens* (L.) M.R. Almeida & S.M. Almieda {(*Ichnocarpus frutescens* (L.) R. Br.)} (Apocynaceae), Padinharathara, coll. M.C. Riju.

Colonies amphigenous, mostly epiphyllous, dense, velvety, up to 3mm in diameter, confluent and covering almost upper surface of the leaves. Hyphae straight to substraight, branching opposite at acute to wide angles, closely reticulate, cells 16–29x4–7 µm. Appressoria alternate, about 5% unilateral, straight to curved, antrorse to spreading, 9–14 µm long; stalk cells cylindrical to cuneate, upto 2µm long; head cells globose to subglobose, ovate, entire, 7–12x7–10 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 14–19x4–10 µm. Mycelial setae numerous, scattered, straight, simple, acute to obtuse at the tip, up to 420µm long. Perithecia scattered, verrucose, up to 130µm in diameter; ascospores cylindrical to obovoidal, 4-septate, constricted at the septa, 26–38x12–14 µm.

Meliola ichnocarpi Hansf. & Thirum. and *Meliola ichnocarpi-volubili* Hansf. are known on this host genus. The former species differs from the latter in having longer appressoria (15–30 µm) and larger ascospores (40–48x20–28 µm). Hence, the present species is accommodated in the latter species.

Meliola jasmini Hansf. & Stev., J. Linn. Soc. London 5: 273, 1937; Hansf., Sydowia Beih. 2: 235, 1961; Hosag., Indian J. Bot. 11: 185, 1988; Hosag. & Raghu, New Botanist 20: 70, 1993; Hosag., Meliolales of India, p. 226, 1996. (Fig. 83).

Materials examined: HCIO 49887, TBGT 4039, 17.ix.2008, on leaves of *Jasminum rottlerianum* Wallich ex A. DC. (Oleaceae), Periya, coll. Harish et al.; HCIO 50401, TBGT 4318, 6.xi.2009, Thariyode, coll. A. Sabeena & M. C. Riju; HCIO 44600, TBGT 887, 19.iii.1997, *Jasminum* sp., Tirunelly, coll. S. Shiburaj; HCIO 48055, TBGT 2838, 6.xii.2006, Kunkichira, Periya, coll. M. Harish, V. Gireesh Kumar & K. Anilkumar; TBGT 3701, 10.ix.2008, Thirunelly, coll. Robin et al.; TBGT 4061, 11.xi.2007, *Jasminum* sp., coll. A. Chandraprabha; Puthuserrykadavu, coll. M.C Riju; HCIO 49969, TBGT 4121, 13.iii.2007; HCIO 50846, TBGT 4763, 6.xi.2009, on *Jasminum cordifolium* Wallich ex G.Don, Padinharathara, coll. M.C. Riju & A. Sabeena; HCIO 50848, TBGT 4765, 6.xi.2009, Chennalode, coll. A. Sabeena & M.C. Riju; HCIO 48055, TBGT 2838, 6.xii.2006, on *Jasminum* sp., Kunkichira, Periya, coll. M. Harish, V. Gireesh Kumar & K. Anilkumar; HCIO 49066, TBGT 3321, 18.ix.2008, Thirunelly, coll. M. Harish et al.; HCIO 49442, TBGT 3687, 20.ix,2008, Mananthavady, coll. P.J.Robin et al.; HCIO 43626, TBGT 304, 18.xi.1998, Chembra, coll. C.K. Biju.

Colonies hypophyllous, thin, velvety, up to 3mm in

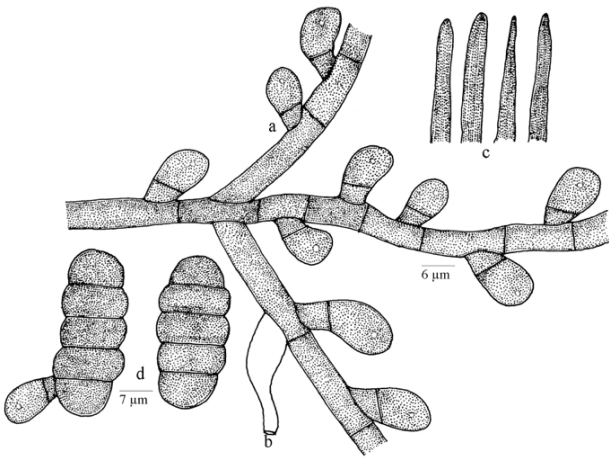


Figure-82. ***Meliola ichnocarpi-volubili***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

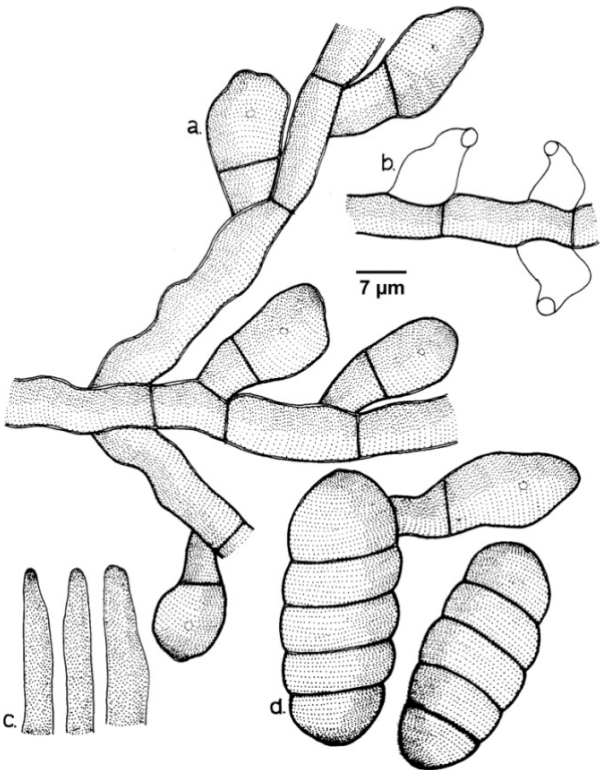


Figure 83. ***Meliola jasmini***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

diameter, confluent. Hyphae straight to substraight, branching opposite at acute to wide angles, loosely reticulate, cells 21–36x4–7 µm. Appressoria alternate, straight to curved, subantrorse to spreading, 24–26 µm long; stalk cells cylindrical to cuneate, 7–12 µm long; head cells globose, ovate, slightly angular, entire, 14–19x12–14 µm. Phialides borne on a separate mycelial branch, opposite to alternate, ampulliform, 14–24x7–10 µm. Mycelial setae numerous, scattered, straight, simple, acute to obtuse at the tip, up to 380µm long. Perithecia scattered, verrucose, up to 130µm in diameter; ascospores obovoidal, 4-septate, constricted at the septa, 33–38x14–17 µm.

This species is distinct from other *Meliola* species known on *Jasminum* species in having phialides borne on separate mycelial branches.

This host appears to be the source of inoculation for the cultivated *Jasminum* species.

Meliola jasmini Hansf. & Stev. var. ***microspora*** Hosag., C.K. Biju & Abraham, Nova Hedwigia 80: 488, 2005; Hosag., Meliolales of India, 2: 273, 2008. (Fig. 84)

Materials examined: HCIO 43626; TBGT 304, 19.xi.1998, on leaves of *Jasminum* sp. (Oleaceae), Banasuran mala, coll. C.K. Biju.

Colonies amphigenous, thin, confluent, up to 2mm diameter. Hyphae straight to substraight, branching opposite to rarely unilateral at wide angles, loosely reticulate, cells 20–29x4–6 µm. Appressoria alternate, antrorse, rarely 3-celled, straight, 14–25 (-33) µm long; stalk cells cylindrical, 4–13 µm long; head cells ovate to clavate, entire to sublobate, 6–14x6–10 µm. Phialides borne on a separate mycelial branch, alternate to opposite, ampulliform, 14–19x4–7 µm. Mycelial setae few, grown from the subiculum of perithecia, acute to obtuse at the apex, simple, straight, up to 177µm long. Perithecia scattered, up to 110µm in diam; ascospores oblong, 4-septate, constricted at the septa, 25–30x11–13 µm.

The present collection is close to *Meliola jasmini* Hansf. & Stev. but the new variety differs from the var. *jasmini* in having smaller ascospores and shorter and less mycelial setae.

Meliola jasminigena Hosag., Plant Pathology & Quarantine 3(1): 7, 2013. (Fig. 85).

Materials examined: TBGT 6231 (holotype), 2.i.2010, on leaves of *Jasminum bignoniaceum* Wallich ex DC. (Oleaceae), Periya, coll. M.C. Riju.

Colonies epiphyllous, thin, scattered, up to 1mm in diameter. Hyphae crooked, branching alternate to

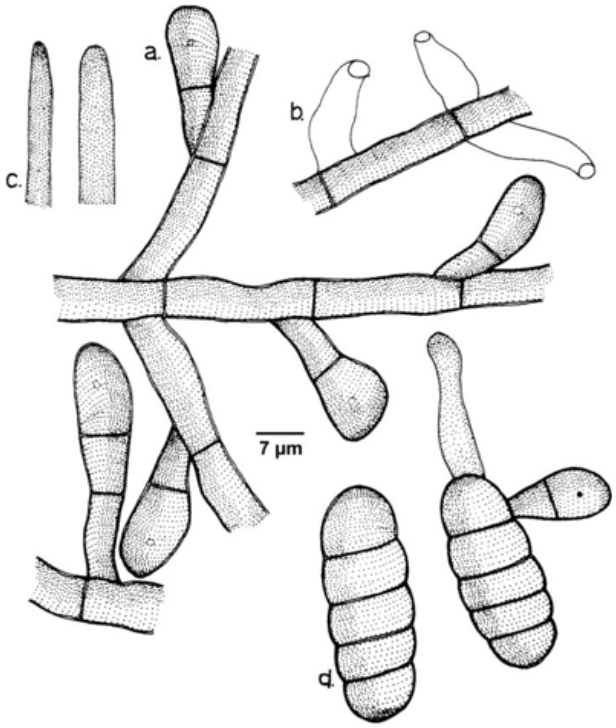


Figure 84. ***Meliola jasmini*** **var.** ***microspora***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

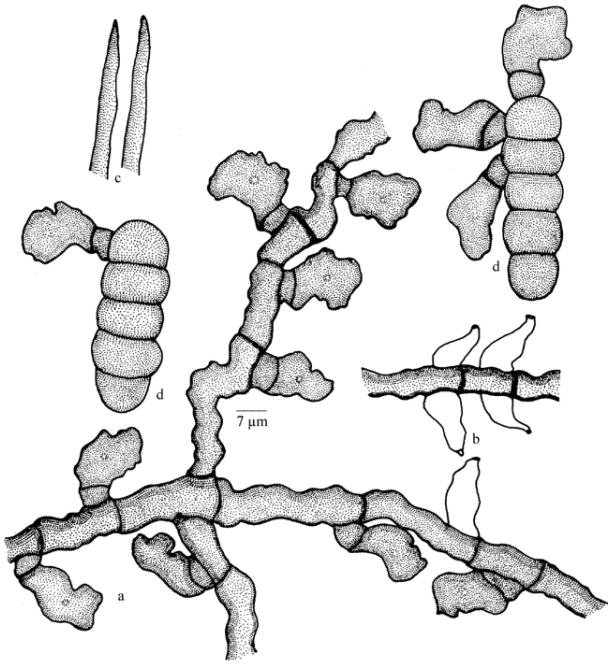


Figure 85. ***Meliola jasminigena***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

opposite at acute to wide angles, loosely to very closely reticulate, cells 16–22x6–10 µm. Appressoria alternate to unilateral, antrorse, subantrorse to retrorse, straight to curved, 19–29 µm long; stalk cells cylindrical to cuneate, 4–10 µm long; head cells ovate, clavate, oblong to cylindrical, entire, angular and crenately lobate to sublobate, 16–22x12–16 µm. Phialides mixed with appressoria, alternate, ampulliform, 17–24x6–10 µm. Mycelial setae numerous, simple, straight, acute at the tip, up to 410µm long. Perithecia scattered, up to 110µm in diameter; ascospores cylindrical, 4-septate, slightly constricted at septa, 48–50x15–18 µm.

This species is similar to *Meliola jasminicola* var. *africana* Hansf. in having crooked mycelium and in the morphology of appressoria. However, it differs in having phialides mixed with appressoria, longer ascospores (48–50 vs. 31–39 µm).

Meliola kamettiae Hosag. & Riju, J. Threatened Taxa 2(4): 824, 2010; Hosag., J. Threatened Taxa 5(6): 4038, 2013. (Fig. 86)

Material examined: HCIO 48175, TBGT 2911; HCIO 48183, TBGT 2919, 30.ix.2007, on leaves of *Kamettia caryophyllata* Roxb. (Apocynaceae), Puthusserikadavu, Padinharathara, coll. M.C. Riju; HCIO 50751, TBGT 4668; HCIO 50753, TBGT 4670, 6.xi.2009, *Kamettia* sp., Padinharathara, coll. A. Sabeena & M.C. Riju.

Colonies hypophyllous, scattered, dense, velvety, up to 4mm in diameter, rarely confluent. Hyphae straight to substraight, branching mostly opposite at acute to wide angles, loosely to closely reticulate, cells 13–35x4–7 µm. Appressoria alternate, unilateral, straight, antrorse, 11–20 µm long; stalk cells cylindrical to cuneate, 2–9 µm long; head cells ovate, globose, 7–13x6–11 µm. Phialides mixed with appressoria, opposite, alternate, unilateral, ampulliform, 11–22x4–7 µm. Mycelial setae numerous, up to 260µm long, simple, straight, few slightly curved to uncinate, obtuse, bifid, trifid, often subdentate to furcated to branched at the tip, branches up to 30µm long. Perithecia scattered, up to 150µm in diameter; ascospores cylindrical, 4-septate, slightly constricted at the septa, 26–33x8–11 µm.

Straight, slightly curved to uncinate, obtuse, bifid, trifid, often subdentate to furcated mycelial setae distinguishes this taxon from rest of the *Meliola* species reported on the members of the family Apocynaceae (Hansford 1961; Hosagoudar 1996, 2008; Hosagoudar et al. 1997).

Meliola lepianthedis Hosag. & Kamar. in Hosag., C.K. Biju & Abraham, J. Econ. Taxon. Bot. 25: 72, 2001; Hosag., Meliolales of India, 2: 278, 2008. (Fig. 87)

Materials examined: HCIO 43714, TBGT 364, 8.xii.2000, on leaves of *Lepianthes umbellata* (L.) Rafin (Piperaceae), Wayanad, coll. M. Kamarudeen.

Colonies amphigenous, predominantly epiphyllous, dense, up to 2mm in diameter, confluent. Hyphae straight to flexuous, branching opposite to alternate at acute to wide angles, loosely reticulate, cells 14–18x6–8

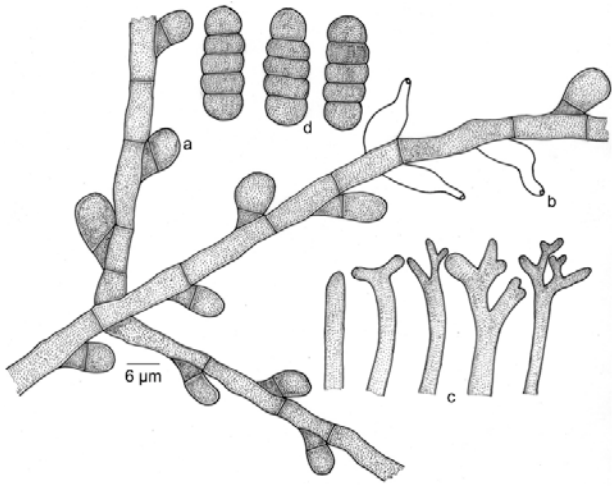


Figure 86. *Meliola kamettiae*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

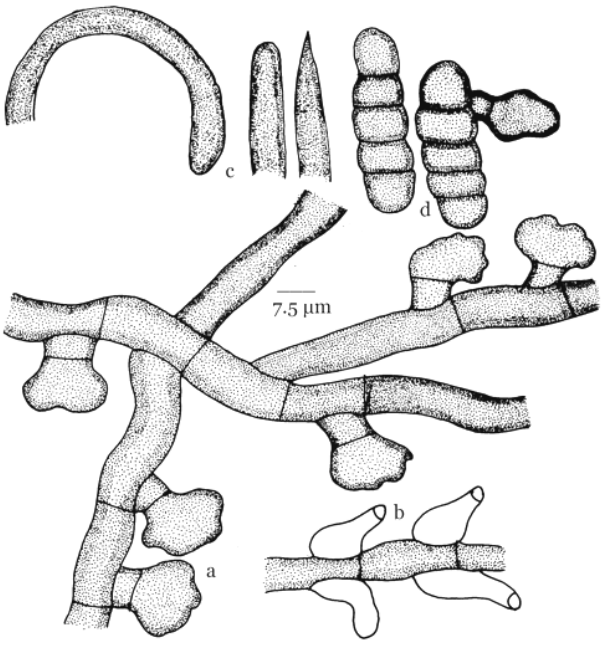


Figure 87. *Meliola lepianthedis*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d – Ascospores

µm. Appressoria alternate, antrorse to subantrorse, 16–23 µm long; stalk cells cylindrical to cuneate, 4–8 µm long; head cells globose, minutely and irregularly lobate, 11–16x12–18 µm. Phialides borne on a separate mycelial branch, alternate to opposite, ampulliform, 14–21x8–10 µm. Mycelial setae scattered to grouped around perithecia, simple, straight to uncinate, acute to broadly rounded at the apex, up to 300µm long. Perithecia scattered, up to 120µm in diameter; ascospores cylindrical, straight to curved, 4- septate, not constricted at the septa, 40–42x9–12 µm.

Sublobate head cells of the appressoria, broadly obtuse tip and uncinate mycelial setae distinguishes this species.

Meliola ligustri Hosag. in Hosag. & Goos, Mycotaxon 37: 236, 1990; Hosag., Meliolales of India, p. 236, 1996, Meliolales of India 2: 293, 2008. (Fig. 88).

Materials examined: HCIO 44867, TBGT 1095, 7.iii.2001, on leaves of *Ligustrum walk*eri Roxb. ssp. *walkeri* (Decne) Green (*L. walkeri* Decne) (Oleaceae), Periya, coll. G. Rajkumar & P.A. Jose; HCIO 45197, TBGT 1233, 11.viii.1998, Thirunelli, coll. C.K.Biju; HCIO 50005, TBGT 4157, 14.iii.2007, on *Ligustrum* sp. Puthuserrykadavu, coll. M.C. Riju; HCIO 49058, TBGT 3313, 19.ix.2008, Kattikulam, coll. M. Harish et al.; HCIO 49061, TBGT 3316, 19.ix.2008, Pulpally, coll. M. Harish & P.J. Robin; HCIO 49071, TBGT 3326, 18.xi.2008, Thirunelly, coll. M. Harish & P.J. Robin; HCIO 49647, TBGT 3889, 16.xi.2008, Periya coll. M. Harish & P.J. Robin; HCIO 49209, TBGT 3448; HCIO 49252, TBGT 3491, 14.ii.2009, Thirunelly, coll. Jacob Thomas et al.

Colonies amphigenous, subdense, up to 4mm in diameter, confluent. Hyphae flexuous, branching opposite to irregular at wide angles, loosely reticulate, cells 20–30x6–8 µm. Appressoria alternate, spreading, antrorse, straight to curved, 20–24 µm long; stalk cells cylindrical to cuneate, 6–8 µm long; head cells globose, cylindrical, versiform, angulose, entire, 12–18x8–10 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, tip twisted and elongated, 16–20x6–8 µm. Mycelial setae fairly numerous, scattered, simple, acute to obtuse at the tip, up to 270µm long. Perithecia scattered, up to 160µm in diameter; ascospores obovoidal, 4-septate, constricted at the septa, 36–40x14–16 µm.

Alternate and antrorse appressoria and simple mycelial setae are the characters of this species.

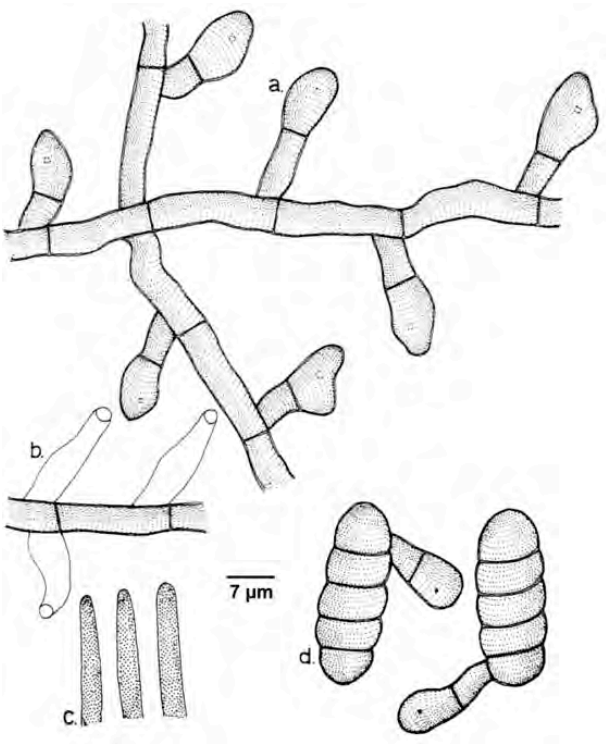


Figure 88. ***Meliola ligustri***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

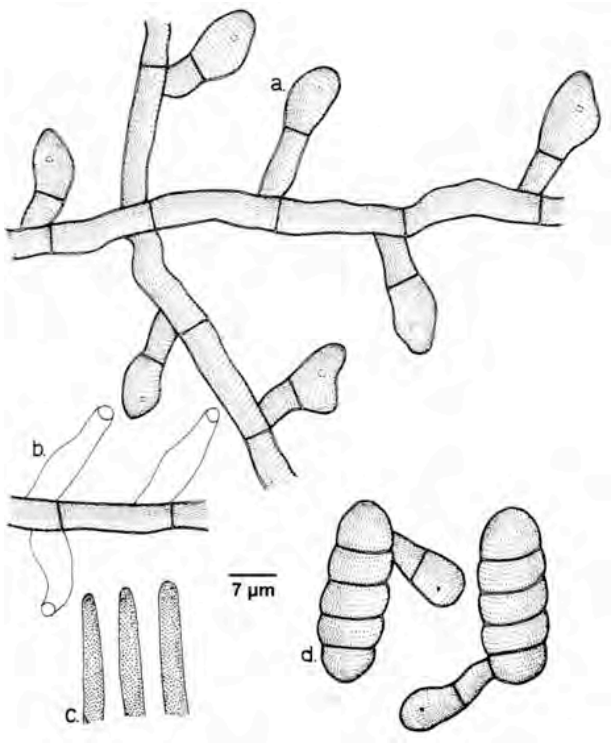


Figure 89. ***Meliola ligustricola***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Meliola ligustricola Hosag., C.K. Biju & Abraham, Nova Hedwigia 80: 489, 2005; Hosag., Meliolales of India 2: 280, 2008. (Fig. 89)

Materials examined: HCIO 43625, TBGT 305; HCIO 43624, TBGT 306, 19.xi.1998, on leaves of *Ligustrum perrottettii* DC. (Oleaceae), Banasuran mala, coll. C.K. Biju.

Colonies amphigenous, moistly epiphyllous, thin, up to 4mm diameter. Hyphae substraight to undulate, branching opposite to irregular at acute angles, loosely reticulate, cells 17–23x4–6 µm. Appressoria alternate, straight to slightly curved, antrorse to spreading, 16–27 µm long; stalk cells cylindrical to cuneate, 5–15 µm long; head cells ovate to obovate, attenuated and broadly rounded towards apex, entire, 9–16x7–8 µm. Phialides borne on a separate mycelial branches, alternate, opposite, ampulliform, 14–23x4–6 µm. Mycelial setae few, grouped around perithecia, simple, straight, flexuous to curved, acute at the tip, up to 185µm long. Perithecia scattered, globose, verrucose, up to 115µm diameter; ascospores obovoidal, 4-septate, constricted at the septa, 26–29x11–12 µm.

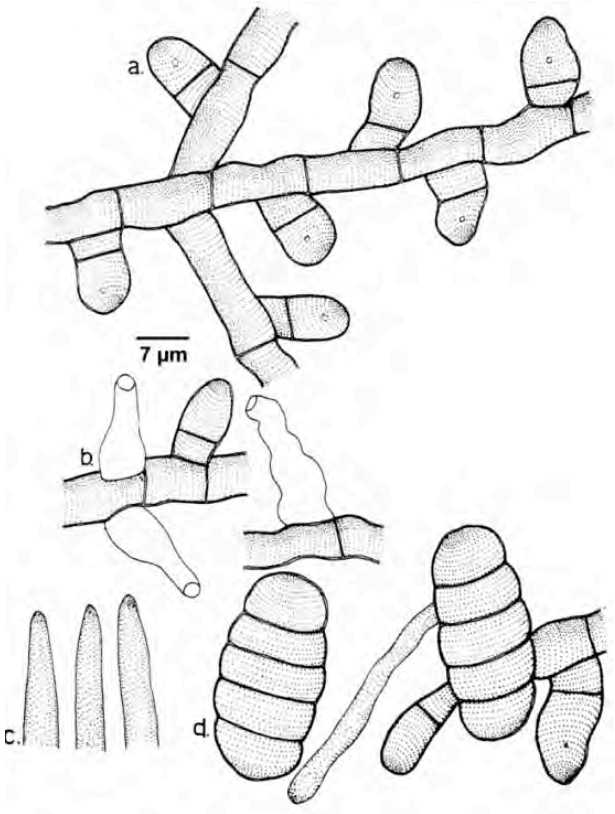


Figure 90. *Meliola litsea* var. *keralensis*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Meliola litseae Sydow var. ***keralensis*** Hosag. in Hosag. & Goos, Mycotaxon 37: 238, 1990 (*keralense*); Hosag., Meliolales of India, p. 240, 1996. (Fig. 90).

Materials examined: HCIO 43622, TBGT 323, 16.iv.1999, on leaves of *Litsea* sp. (Lauraceae), Banasuranmala, coll. C.K.Biju.

Colonies epiphyllous, subdense, up to 3mm in diameter, rarely confluent. Hyphae substraight, branching opposite at wide angles, loosely reticulate, cells 14–20x8–10 µm. Appressoria alternate, antrorse, 26–28 µm long; stalk cells cuneate, 6–8 µm long; head cells ovate, versiform, entire, 18–20x12–14 µm. Phialides mixed with appressoria, alternate to opposite, 18–26x8–10 µm. Mycelial setae few, mostly grouped around perithecia, simple, acute, up to 578µm long. Perithecia mostly scattered, seated on exappressoriate hyphae, up to 186µm in diameter; ascospores obovoidal, 4-septate, slightly constricted at the septa, 36–38x18–20 µm.

This variety differs from the type variety in having the perithecia seated on exappressoriate mycelium.

Meliola litseae Sydow & Sydow var. ***rotundipoda*** Hansf., Reinwardtia 3: 88, 1954; Sydowia Bieh. 2: 57, 1961; Hosag. & Goos, Mycotaxon 37: 239, 1990; Hosag., Meliolales of India, p. 241, 1996.

Meliola litseae Graff, Mem. Torry Bot. Club 17: 61, 1918 (*non* Sydow & Sydow, 1917). (Fig. 91).

Materials examined: HCIO 43621, TBGT 287, 16.iv.1999, on leaves of *Actinodaphne* sp. (Lauraceae), Banasuran hills, coll. C.K.Biju.

Colonies epiphyllous, dense, velvety, up to 4mm diameter, confluent. Hyphae straight to undulate, branching opposite at wide angles, loosely reticulate, cells 14–20x6–8 µm. Appressoria alternate, straight to curved, antrorse, rarely spreading, 24–26 µm long; stalk cells cylindrical to cuneate, 4–8 µm long; head cells versiform, obovate, rarely truncate, entire, 16–20x8–10 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 20–24x10–12 µm. Mycelial setae few, straight, simple, acute at the tip, up to 612µm long. Perithecia scattered, up to 200µm in diameter; ascospores obovate, 4-septate, slightly constricted at the septa, 44–48x18–20 µm.

The present collection has slightly longer appressoria.

Meliola machili Yamam., Trans. Nat. Hist. Soc. Taiwan 31: 23, 1941; Hansf., Sydowia Beih. 2: 54, 1961; Hosag. & Goos, Mycotaxon 37: 239, 1990; Hosag., Dayal & Goos, Mycotaxon 46: 206, 1993; Hosag., Meliolales of India, p.

244, 1996. (Fig. 92).

Materials examined: HCIO 50702, TBGT 4619; HCIO 50704, TBGT 4621; HCIO 51065, TBGT 4982, 5.xi.2009, on leaves of *Persea macrantha* (Nees) Kosterm. (Lauraceae), Gurukulam Botanic Garden, coll. A. Sabeena & M.C. Riju.

Colonies hypophyllous, dense, velvety, up to 4mm in diameter, confluent. Hyphae crooked, branching opposite to irregular at acute to wide angles, loosely to closely reticulate, rarely form solid mycelial mat, cells 14–29x7–10 µm. Appressoria alternate to unilateral, straight to curved, antrorse, spreading, 16–22 µm long; stalk cells cylindrical to cuneate, 4–10 µm long; head cells ovate, globose, slightly angular, truncate, entire, 12–14x9–14 µm. Phialides mixed with appressoria, alternate to unilateral, 9–14x7–10 µm. Mycelial setae numerous, scattered to grouped around perithecia, straight, simple, acute at the tip, up to 470µm long. Perithecia scattered, verrucose, up to 250µm in diameter; ascospores obovoidal to cylindrical, 4-septate, constricted at the septa, 53–55x19–22 µm.

Crooked mycelia, spreading appressoria and mostly angular head cells of the appressoria are the distinct characters of this species.

Common on this host in the Southern Western Ghats

Meliola malabarensis Hansf., Proc. Linn. Soc. London 157: 182, 1946; Sydowia Beih. 2: 531, 1961; Thite & Kulkarni, J. Shivaji Univ. 5: 161, 1973; Hosag. & Goos, Mycotaxon 37: 240, 1990; 42: 135, 1991; Hosag., Dayal & Goos, Mycotaxon 46: 206, 1993; Hosag., Meliolales of India, p. 246, 1996. (Fig. 93)

Materials examined: HCIO 50745, TBGT 4662; HCIO 50844, TBGT 4761, 5.xi.2009, on leaves of *Olea dioica* Roxb. (Oleaceae), Gurukulam Botanical Garden, Periya, coll. M.C. Riju & A. Sabeena; HCIO 50915, TBGT 4832, 1.xi.2007, Padinharathara, coll. M.C. Riju; HCIO 43699, TBGT 339, 19.xi.2009, Banasuranmala, coll. C.K.Biju; HCIO 49222, TBGT 3461, 16.ii.2009, Periya, coll. Jacob Thomas et al.

Colonies epiphyllous, dense, up to 5mm in diameter, confluent. Hyphae straight to slightly undulate, branching opposite at wide to acute angles, loosely to closely reticulate, cells 9–16x4–6 µm. Appressoria alternate, straight to curved, antrorse to spreading, 12–17 µm long; stalk cells cylindrical to cuneate, 2–5 µm long; head cells ovate, globose, cylindrical, slightly

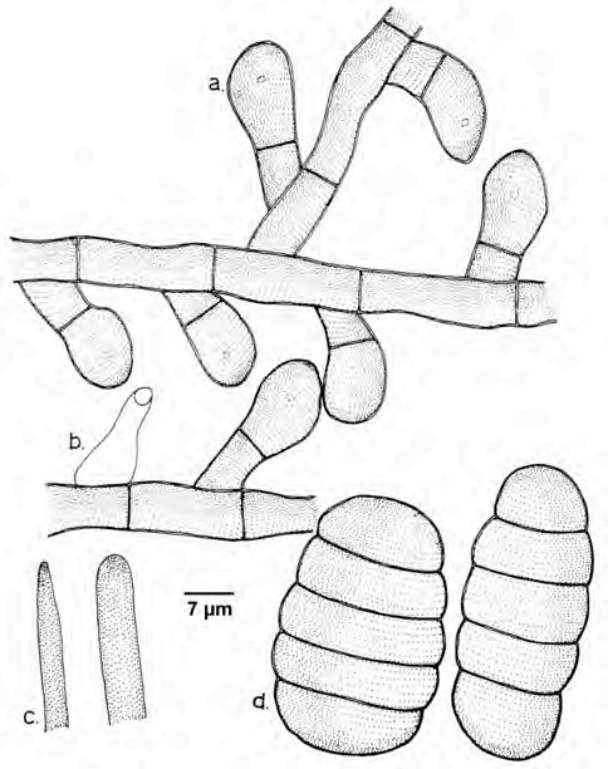


Figure 91. ***Meliola litseae*** **var.** ***rotundipoda***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

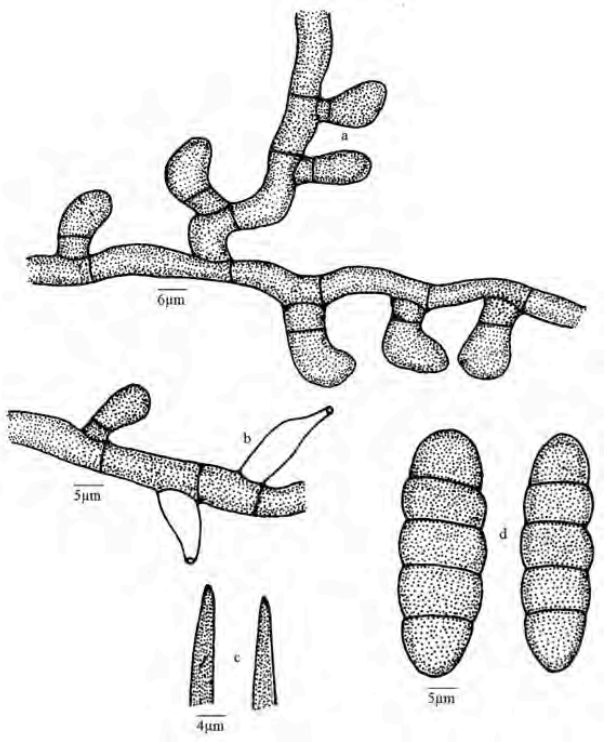


Figure 92. ***Meliola machili***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

curved, entire, 9–14x7–10 µm. Phialides mixed with appressoria, opposite to alternate, ampulliform, 14–26x6–7 µm. Mycelial setae grouped around perithecia, straight, simple, acute at the tip, up to 340µm long. Perithecia scattered, verrucose, up to 150µm in diameter; ascospores obovoidal, 4-septate, constricted at the septa, 33–36x14–17 µm.

Epiphyllous colonies with ovate head cells of the appressoria distinguishes this species.

Endemic to Southern Western Ghats

Meliola malacotricha Speg., Ann. Soc. Cienc. Argentina 22: 59, 1888; Hansf., Sydowia Beih. 2: 647, 1961; Gupta & Gupta, Indian Phytopath. 38: 390, 1985; Hosag., Meliolales of India, p. 247, 1996.

Meliola ipomoeae Earle, Muhlenbergia 1: 10, 1901.

Meliola merremiae Rehm, Philippine J. Sci. 8: 253, 1913.

Meliola hewittiae Rehm, Philippine J. Sci. 8: 253, 1913.

Meliola ipomoeae Rehm, Ann. Mycol. 12: 171, 1914.

Meliola lepistomonis Hansf., J. Linn. Soc. London 51: 277, 1937. (Fig. 94)

Materials examined: HCIO 50744, TBGT 4661; HCIO 51073, TBGT 4990, 6.xi.2009, on leaves of *Argyereia speciosa* (L. f.) Sweet (Convolvulaceae), Dam site, coll. A. Sabeena & M.C. Riju; HCIO 44627, TBGT 909, 25.ix.2002, *Argeyreia* sp., Thirunelly, coll. K. Vijayakumar.

Colonies epiphyllous, dense, velvety, up to 2mm in diameter, rarely confluent. Hyphae undulate to slightly crooked, branching opposite to alternate at acute angles, loosely to closely reticulate, cells 12–29x4–6 µm. Appressoria opposite, 20% alternate, straight to curved, closely antrorse to spreading, 9–14 µm long; stalk cells very small, cylindrical to cuneate, 2–4 µm long; head cells globose to subglobose, ovate, entire, 7–10x7–9 µm. Phialides mixed with appressoria, opposite to alternate, ampulliform, 12–19x4–10 µm. Mycelial setae grouped around perithecia, straight, simple, acute, to obtuse at the tip, up to 550µm long; Perithecia grouped at the centre, verrucose, up to 170µm in diameter; ascospores obovoidal to cylindrical, 4-septate, constricted at the septa, 36–41x14–17 µm.

Common on this host in the this area

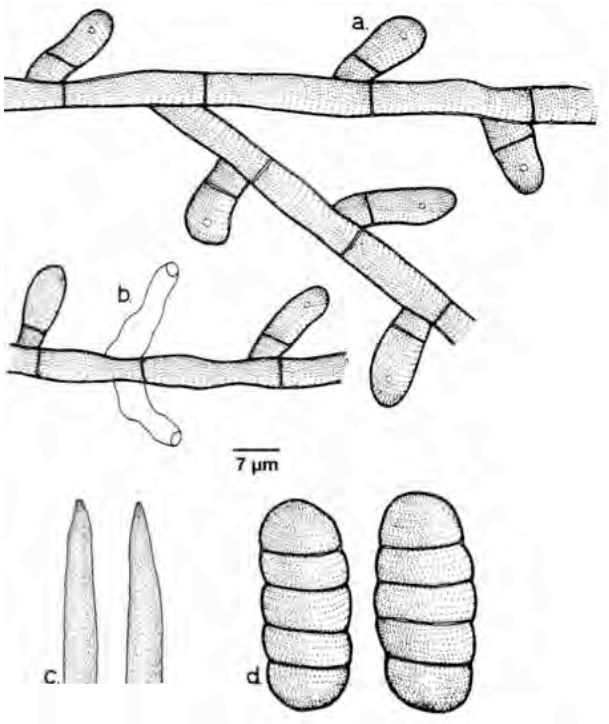


Figure 93. ***Meliola malabarensis***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

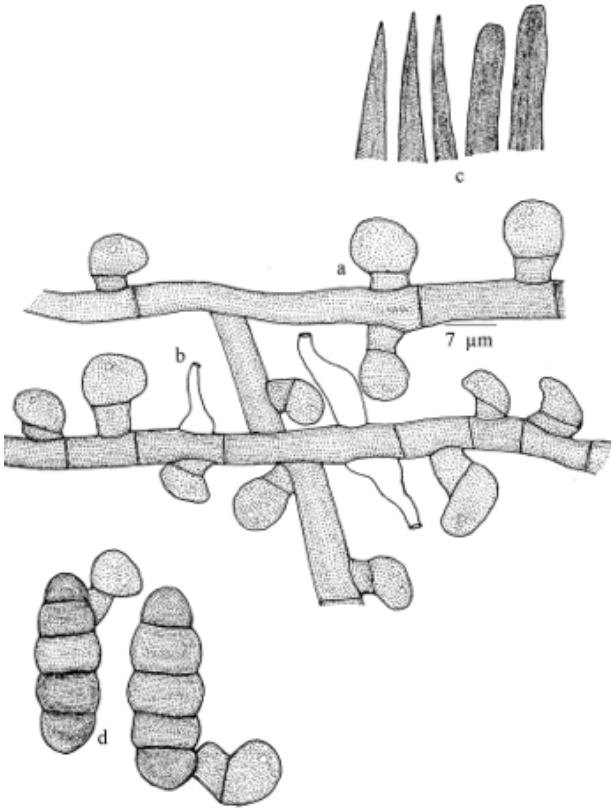


Figure 94. ***Meliola malacotricha***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Meliola malacotricha Speg. var***. major*** Beeli, Bull. Jard. Bot. Etat. 7: 89, 1920; Hansf., Sydowia Beih. 2: 649, 1961; Hosag. & Goos, Mycotaxon 37: 240 1990; 42: 137, 1991; Hosag., Crypt. Bot. 2/3: 186, 1991; Hosag., Raghu & Pillai, Nova Hedwigia 58: 540, 1994; Hosag., Meliolales of India, p. 249, 1996. (Fig. 95)

Materials examined: HCIO 50003, TBGT 4155, 14.iii.2007, on leaves of *Argyereia* sp. (Convolvulaceae), Puthuserrykadavu, coll. M.C. Riju; HCIO 50349, TBGT 4266, 5.xi.2009, *Merremmia umbellata,* Gurukulam Botanic Garden, Periya, coll. A. Sabeena & M.C. Riju.

Colonies amphigenous, mostly epiphyllous, dense, velvety, up to 2mm in diameter, confluent. Hyphae straight to slightly crooked, branching mostly opposite at acute angles, closely reticulate, cells 16–34x7–10 µm. Appressoria mostly opposite, about 5% unilateral, antrorse to spreading, straight to curved, 12-14 µm long; stalk cells cuneate, 2-5 µm long; head cells ovate to subglobose, entire, 7-12 x 7-10 µm. Phialides mixed with appressoria, opposite and alternate, ampulliform, 14-21 x 7-10 µm. Mycelial setae fairly numerous, scattered to grouped around perithecia, simple, straight, acute to obtuse at the tip, up to 580 µm long. Perithecia scattered to grouped, verrucose, up to 180 µm in diameter; ascospores oblong to cylindrical, 4-septate, strongly constricted at the septa, 36-43 x 12-17 µm.

This species is very close to *M. bonamiae* Hansf. & Deight. but differs from it in having shorter appressoria and mycelial setae.

Meliola mangiferae Earle, Bull. New York Bot. Gard. 3: 307, 1905; Hansf., Sydowia Beih. 2: 464, 1961; Hansf. & Thirum., Farlowia 3: 296, 1948; Hansf., Sydowia Beih. 2: 464, 1961; Hosag. & Goos, Mycotaxon 37: 240, 1990; Hosag., Crypt. Bot. 2/3: 186, 1991; Hosag. & Ansari, J. Andaman Sci. Assoc. 7: 89, 1991; Hosag., Meliolales of India, p. 250, 1996. (Fig. 96)

Materials examined: HCIO 50914, TBGT 4831, 1.xi.2007, on leaves of *Mangifera indica* L. (Anacardiaceae), Wayanad, coll. M.C. Riju; TBGT 5588, 29.x.2007, Thirunelly, coll. M.C. Riju**;** HCIO 51298**,** TBGT 5178, 14.ii.2009, Padinharathara, coll. M.C. Riju; HCIO 49217, TBGT 3456, 14.ii.2009, Thirunelly, coll. Jacob Thomas et al.; HCIO 49217, TBGT 3457; HCIO 49806, TBGT 3958, 15.ii.2009, Begoor, coll. Gireesh et al.; HCIO

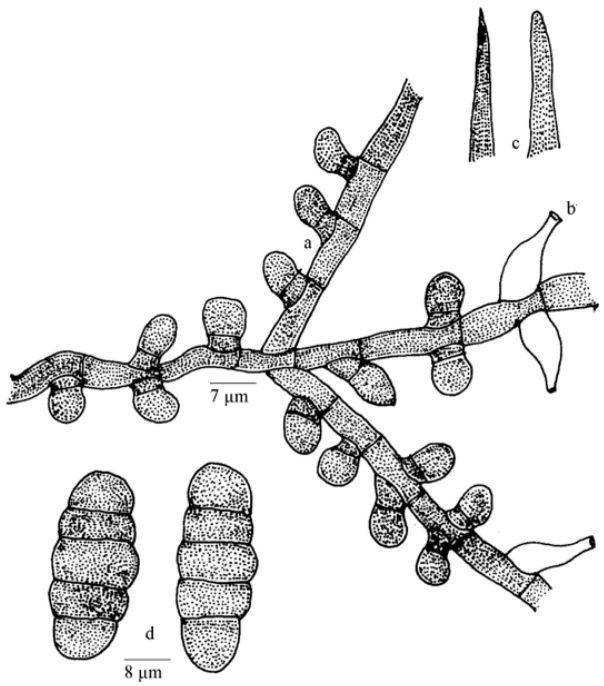


Figure 95. ***Meliola malacotricha*** **var.** ***major***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

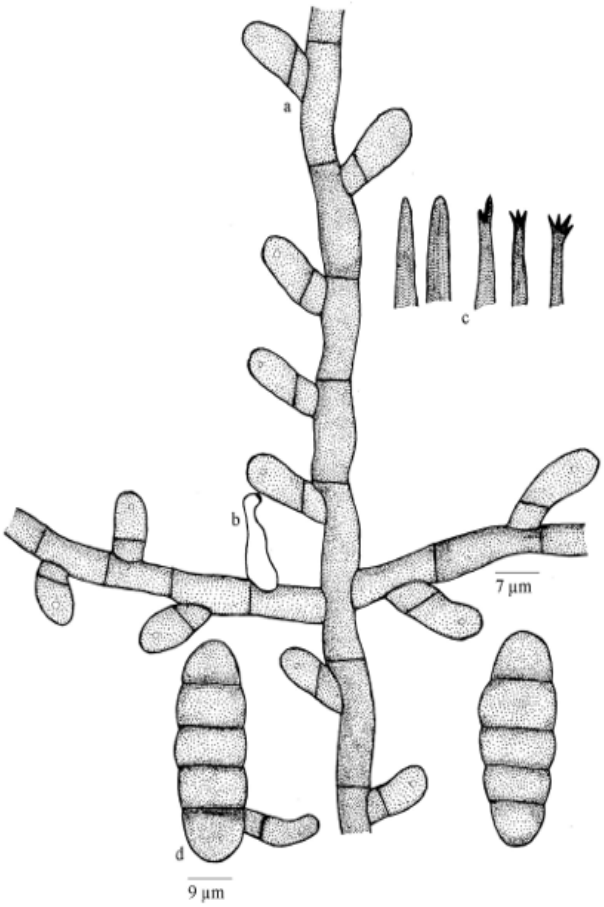


Figure 96. ***Meliola mangiferae***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

50731, TBGT 4648, 6.xi2009, Padinharathara, coll. A. Sabeena & M.C. Riju.

Colonies amphigenous, mostly hypophyllous, dense, velvety, up to 5mm in diameter. Hyphae straight, branching opposite at acute to wide angles, loosely to closely reticulate, cells 19–36x7–10 µm. Appressoria alternate, 2% unilateral, straight to variously curved, 21–29 µm long; stalk cells cylindrical to cuneate, 4–7 µm long; head cells cylindrical, versiform, attenuated and rounded at the apex, entire to subangular, straight to curved, 16–24x9–12 µm. Phialides few, mixed with appressoria, alternate to opposite, ampulliform, 16–24x4–10 µm. Mycelial setae fairly numerous, scattered, simple, straight, acute, obtuse to dentate at the tip, up to 720µm long; perithecia scattered, verrucose, up to 230µm in diameter; ascospores obovoidal to ellipsoidal, middle cell slightly larger, 50–55x24–26 µm.

This species was observed in all the seasons on the cultivated and wild mango trees.

This is the only *Meliola* species known on this host genus. It infects both cultivated and wild Mango trees. Biochemical analysis of the host plant may reveal several interesting facts regarding the harmful or useful nature of the fungus.

Meliola mayapeae Stev., Illinois Biol. Monograph 2: 48, 1916; Hansf., Sydowia Beih. 2: 536, 1961; Hosag., Dayal & Goos, Mycotaxon 46: 206, 1993; Hosag., Meliolales of India, p. 252, 1996. (Fig. 97)

Materials examined: HCIO 49962, TBGT 4114, 30.ix.2007, on leaves of *Ligustrum* sp. (Oleaceae), Puthuserrykadavu, coll. M.C. Riju.

Colonies epiphyllous, dense, up to 2mm in diam., often confluent. Hyphae straight to flexuous, branching opposite at wide angles, closely reticulate, cells 15–34x5–7 µm. Appressoria alternate, antrorse, reflexed to spreading, mostly straight, 15–18.5 µm long; stalk cells cylindrical to cuneate, 3–6.5 µm long. Phialides mixed with appressoria, opposite to alternate, ampulliform, 15–18.5x7–9.5 µm. Mycelial setae grouped around perithecia, straight, simple, acute to obtuse at the tip, up to 235µm long. Perithecia loosely grouped, up to 186µm in diameter; ascospores obovoidal, 4-septate, slightly constricted at the septa, 37–40.5x15–18.5 µm.

Meliola mayapiicola Stev. var. ***indica*** Hosag., Nova Hedwigia 47: 541, 1988; Hosag., Meliolales of India, p. 253, 1996. (Fig. 98)

Materials examined: HCIO 43619, TBGT 308, 11.xi.1998, on leaves of *Chionanthus mala-elengi* (Dennst.) Green (*Linociera malabarica* Wallich ex G. Don) (Oleaceae), Banasuranmala, coll. C.K.Biju; HCIO 49631, TBGT 3873; HCIO 49638, TBGT 3880, 16.ix.2008, *Linociera malabarica* Wallich ex G. Don, Periya, coll. M. Harish & P.J Robin; HCIO 49632, TBGT 3874; HCIO 49640, TBGT 3882, 17.ix.2008, coll. Harish & P.J Robin; HCIO 49770, TBGT 3922, 13.ii.2009, Thirunelly, coll. Jacob Thomas et al.; HCIO 49772, TBGT 3924, 14.ii.2009, coll. Jacob Thomas et al.; HCIO 49643, TBGT 3885, 18.ix.2008, coll. Harish & P.J Robin; HCIO 49812, TBGT 3964, 16.ii.2009, Begoor, coll. Gireesh et al.

Colonies epiphyllous, rarely hypophyllous, dense, crustose to velvety, up to 2mm in diameter. Hyphae substraight, branching mostly opposite at acute to wide angles, closely reticulate, cells 15–34x7–10 µm. Appressoria alternate, antrorse to recurved, 18–25 µm long; stalk cells cylindrical to cuneate, 6–10 µm long; head cells ovate, cylindrical, entire, rarely angular to sublobate, 12–16x9–13 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 12–19x9–13 µm. Mycelial setae grouped around perithecia, straight to curved, simple, acute at the tip, up to 500µm long. Perithecia scattered, up to 125µm in diameter; ascospores obovoidal, 4-septate, constricted at the septa, 40–47x12–18 µm.

This taxon mostly associated with *M. linocierae-malabaricae* and can be easily distinguished by their smaller epiphyllous colonies.

The present collection slightly varies in having smaller ascospores than to the assigned taxon.

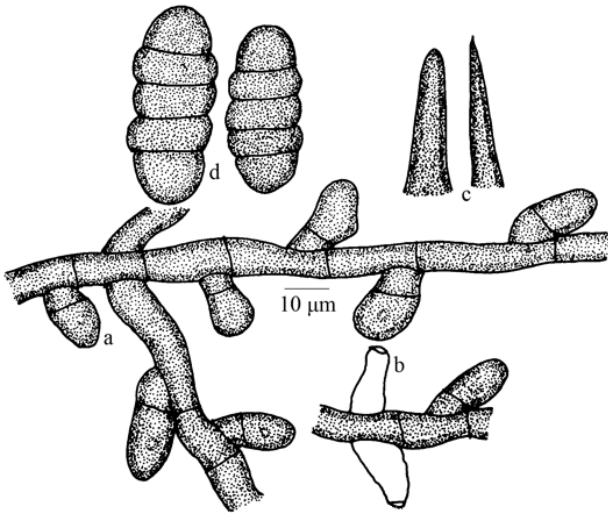


Figure 97. *Meliola mayapeae*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Meliola millettiae-chrysophyllae Deight. var***. indica*** Hosag., Siddappa & Udaiyan, Nova Hedwigia 56: 198, 1993; Hosag., Meliolales of India, p. 257, 1996. (Fig. 99)

Materials examined: HCIO 43645, TBGT 310, 19.xi.1998, on leaves of *Derris benthamii* (Thwaites) Thwaites (Fabaceae), Banasuranmala, coll. C.K.Biju.

Colonies amphigenous, thin to crustose, up to 5mm in diameter, rarely confluent. Hyphae straight to substraight, branching mostly opposite at acute to wide angles, loosely to closely reticulate, cells 19–40x6–8 µm. Appressoria alternate and opposite, straight to curved, antrorse to spreading, 12–18 µm long; stalk cells cylindrical to cuneate, 3–6 µm long; head cells ovate, globose to subglobose, entire, 9–13x6–10 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 12–19x6–10 µm. Mycelial setae fairly numerous, scattered, straight to curved but not uncinate, acute, obtuse to minutely dentate at the tip, up to 560µm long. Perithecia scattered, globose, up to 210µm in diameter; ascospores oblong to subellipsoidal, 4-septate, constricted at the septa, 38–42x12–16 µm.

This taxon was known on *Millettia splendens* from Nilgiris, Tamil Nadu. Here very few setae are minutely dentate at the tip and there are every chances of missing this character. Except slightly long appressoria, the present collection matches well with the assigned taxa.

This taxon was only known from the present locality in Kerala. The collection reveals its distribution towards the Southern tips of Western Ghats.

Meliola nairii Hosag. in Hosag. & Goos, Mycotaxon 37: 409, 1990; Hosag., Meliolales of India, p. 262, 1996. (Fig. 100)

Materials examined: TBGT 5943, 10.xi.2007, on leaves of *Aphanamixis polystachya* (Wall.) Parker (*Amoora rohituka* Wight & Arn.) (Meliaceae), 16th Mile, Padinharathara, coll. M.C. Riju.

Colonies epiphyllous, minute, subdense, up to 2mm in diameter. Hyphae straight, substraight to flexuous, branching opposite to irregular at wide angles, loosely reticulate, cells 18–31x6–9.5 µm. Appressoria alternate, antrorse to subantrorse, 12–15.5 µm long; stalk cells cylindrical to cuneate, 3–6 µm long; head cells ovate, broadly rounded at the apex, straight to curved, entire, 9–12.5x6–9.5 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 18–22x9–12.5 µm. Mycelial setae few, grouped around perithecia, straight,

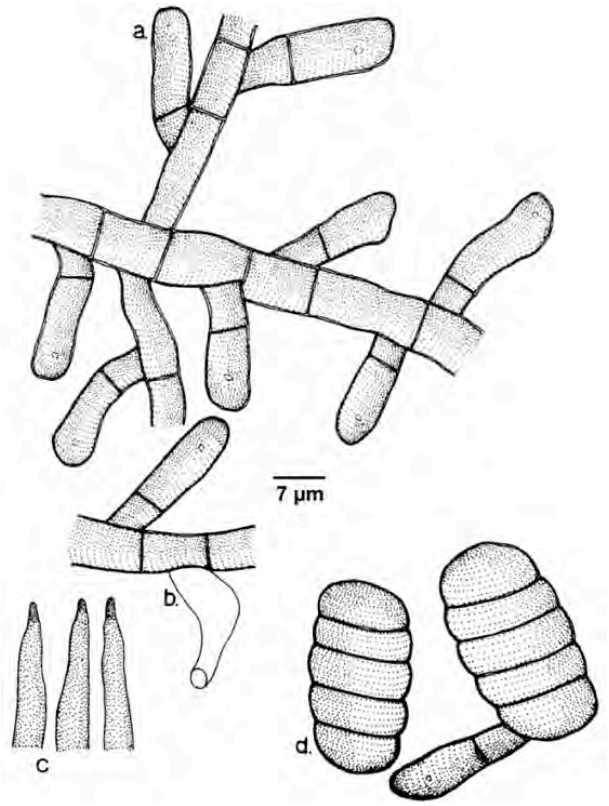


Figure 98. ***Meliola mayapiicola*** **var.** ***indica***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

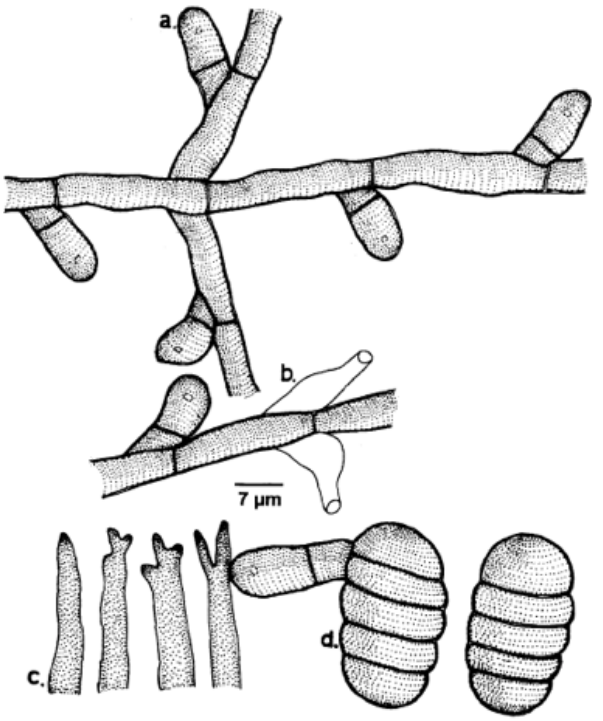


Figure 99. ***Meliola millettiae-chrysophyllae*** **var.** ***indica***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

flexuous, acute to obtuse at the tip, up to 310µm long. Perithecia scattered, verrucose, up to 155µm in diameter; ascospores obovoidal, 4-septate, constricted at the septa, 31–34x15–18.5 µm.

Meliola neolitseae Yamam., Trans. Nat. Hist. Soc. Taiwan 31: 24, 1941; Hansf., Sydowia Beih. 2: 50, 1961; Hosag. & Goos, Mycotaxon 37: 241, 1990; Hosag., Meliolales of India, p. 264, 1996. (Fig. 101)

Materials examined: HCIO 45151, TBGT 1206, 16.iv.1999, on leaves of *Neolitsea* sp. (Lauraceae), Banasuran mala, coll. C.K. Biju; HCIO 43697, TBGT 341, 17.ii.2000, on *Cryptocarya* sp., Chembra hills, coll. C.K.Biju.

Colonies hypophyllous, subdense, subvelvety, up to 8mm in diameter. Hyphae substraight to tortuous, branching opposite to irregular at acute to wide angles, loosely reticulate, cells 18–22x8–10 µm. Appressoria alternate to unilateral, straight to curved, antrorse, spreading, 22–28 µm long; stalk cells cylindrical to cuneate, 6–8 µm long; head cells clavate, versiform, angulose, entire to slightly lobate, 14–22x12–16 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 18–26x8–10 µm. Mycelial setae scattered, straight, simple, acute to 2-3 dentate, up to 900µm long. Perithecia scattered, up to 210µm in diameter; ascospores ellipsoidal, 4-septate, constricted at the septa, 46–52x20–24 µm.

This is the only known species on this host genus in the Western Ghats.

Meliola nothopegiae Hansf., Sydowia 10: 80, 1957; Sydowia Beih. 2: 469, 1961; Thite & Kulkarni, J. Shivaji Univ. 6: 163, 1973; Hosag., Lakshmanan & Viswanathan, Indian J. Bot. 11: 187, 1988; Hosag. & Goos, Mycotaxon 37: 242, 1990; Hosag., Kaveriappa, Raghu & Goos, Mycotaxon 51: 113, 1994; Hosag., Meliolales of India, p. 266, 1996. (Fig. 102)

Materials examined: TBGT 6178, 15.iii.2007, on leaves of *Nothopegia* sp. (Anacardiaceae), Padinharathara, coll. M.C. Riju.

Colonies amphigenous, mostly epiphyllous, subdense, up to 5mm in diameter. Hyphae of the epiphyllous colonies straight, branching regularly opposite at acute angles, loosely reticulate. While the hyphae of the hypophyllous colonies crooked, branching opposite to irregular at wide angles, cells 18–26x6–8 µm. Appressoria alternate, subantrorse to antrorse, 24–36 µm long; stalk cells cuneate, 6–14 µm long; head cells cylindrical, versiform, slightly angulose, entire, 16–22x12–14 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 10–20x8–10 µm. Mycelial setae scattered to grouped around perithecia, straight, simple, acute at the tip, up to 675µm long. Perithecia scattered to aggregated, up to 164µm in

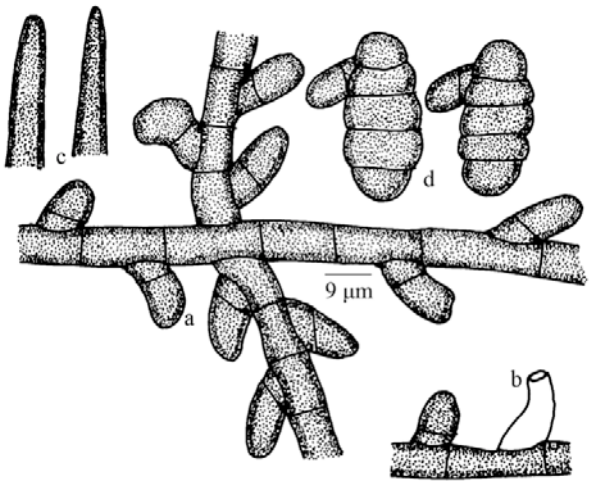


Figure 100. ***Meliola nairii***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

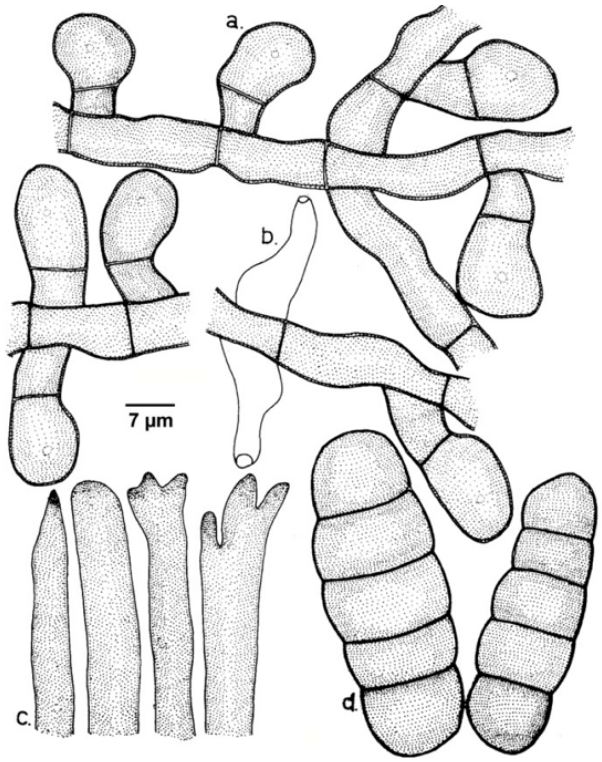


Figure 101. ***Meliola neolitseae***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

diam.; ascospores obovoidal, 4-septate, constricted at the septa, 44–50x18–20 µm.

This is the only species known on this host genus

Meliola oleacearum Hosag., Sydowia 54: 55, 2002; Hosag., Meliolales of India 2: 293, 2008; Hosag. & Agarwal, Taxonomic Studies of Meliolales. Identification Manual, p. 205, 2008. (Fig. 103)

Materials examined: HCIO 48041, TBGT 2824, 6.xii.2006, on leaves of *Olea dioica* Roxb. (Oleaceae), Kunkichira, Periya, coll. M. Harish, V. Gireesh Kumar & K. Anilkumar; TBGT 3933; HCIO 49626, TBGT 3868, 15.ii.2009, coll. Jacob Thomas et al., 19.ix.2008, Pulpally, coll. M.Harish & P.J. Robin; HCIO 49060, TBGT 3315, 17.ix.2008, Perya coll. M.Harish & P.J. Robin.

Colonies hypophyllous, dense, up to 5mm in diameter, confluent. Hyphae straight to substraight, branching opposite at acute angles, loosely to closely reticulate, cells 19–29x4–7 µm. Appressoria alternate, straight to curved, antrorse, retrorse to spreading, 16–26 µm long; stalk cells cylindrical to cuneate, 4–10 µm long; head cells ovate, cylindrical, slightly truncate at the apex, entire, 9–17x7–10 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 16–26x6–8 µm. Mycelial setae numerous, scattered, grouped around perithecia, simple, straight, acute at the tip, up to 320µm long. Perithecia scattered, verrucose, up to 160µm in diameter; ascospores obovoidal, 4-septate, constricted at the septa, 33–38x14–19 µm.

The present species is similar to *Meliola petiolaris* Doidge known on *Olea laurifolia* from South Africa (Hansford, 1961) in having curved to uncinate mycelial setae. However, the present taxon differs from it in having shorter appressoria and straight, sigmoid, flexuous and uncinate setae.

Meliola oleicola Doidge, Bothalia 1: 73, 1922. (Fig. 104)

Material examined: HCIO 45294, TBGT 1332, 16.iv.1999, on leaves of *Ligustrum* sp. (Oleaceae), Banasuranmala, coll. C.K. Biju.

Colonies epiphyllous,thin to subdense, up to 2mm in diameter, confluent. Hyphae straight to substraight, branching opposite to unilateral at acute to wide angles, loosely reticulate, cells 20–27x5–7 µm. Appressoria alternate to unilateral, antrorse to subantrorse, 17–35 µm long; stalk cells cylindrical to cuneate, 5–17 µm long; head cells ovate, clavate, entire, 12–17x7–12 µm. Phialides mixed with appressoria, opposite to unilateral, ampulliform, 17–27x5–7 µm long. Mycelial setae scattered, simple, straight, acute to obtuse at the tip, up to 300µm long. Perithecia scattered, up to 100µm in diameter; ascospores oblong to cylindrical, 4-septate, constricted at the septa, 32–35x12–15µm.

Meliola oligomera Sydow, Ann. Mycol. 15: 190, 1917; Hansf., Sydowia Beih. 2: 345, 1961; Hosag., J. Mycopathol. Res. 43: 29, 2005; Hosag., Meliolales of India, 2: 293, 2008.

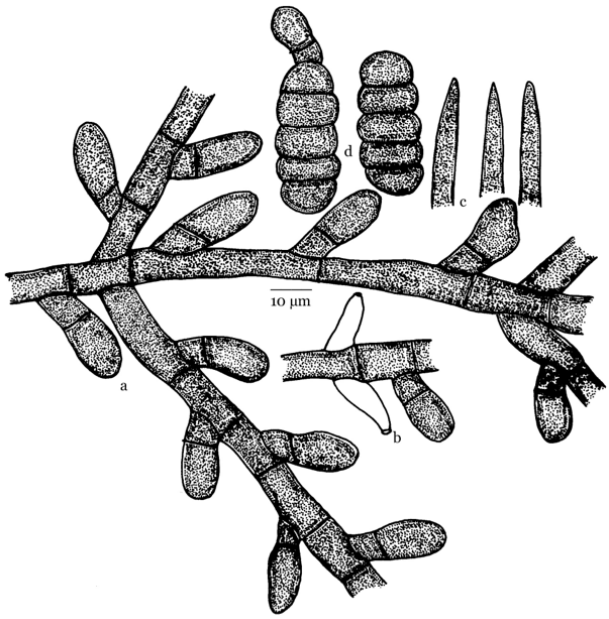


Figure 102. ***Meliola nothopegiae***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

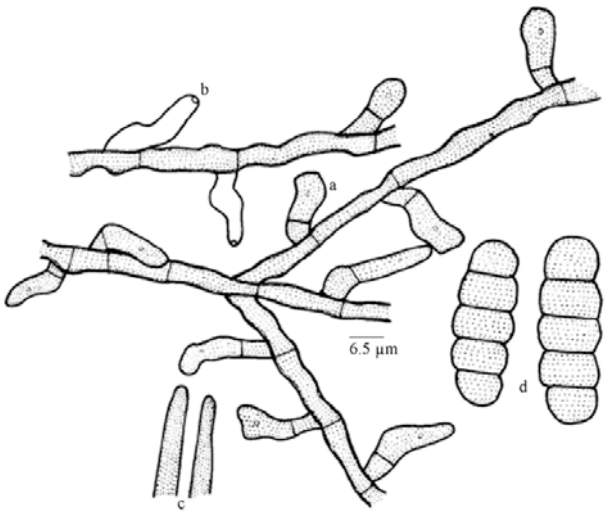


Figure 103. ***Meliola oleacearum***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Meliola reinkingii Sydow, Ann. Mycol. 18: 98, 1920. (Fig. 105)

Materials examined: HCIO 44799, TBGT 1036, 22.xii.2002, on leaves of *Hippocratea* sp. (Hippocrateaceae), periya, coll. M. Kamarudeen.

Colonies amphigenous, mostly epiphyllous, dense, velvety, up to 5mm in diameter, confluent. Hyphae substraight to flexuous, branching alternate to irregular at acute to wide angles, loosely to closely reticulate, cells 12–23x6–7 µm. Appressoria alternate, antrorse to subantrorse, straight to rarely curved, 20–31 µm long; stalk cells cylindrical to cuneate, 6–13 µm long; head cells ovate, globose, angular, sublobate to irregularly lobate, 14–18x12–18 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 17–21x6–8 µm. Mycelial setae numerous, simple, mostly straight, often curved, acute at the tip, up to 300µm long. Perithecia scattered to loosely grouped, up to 200µm in diameter; ascospores 3-septate, straight but slightly curved during germination, constricted at the septa, 44–47x14–16 µm.

This species differs from *Meliola hippocrateicola* Hansf. & Dieght. in having all alternate appressoria.

Meliola panici Earle, Muchlenbergia 1: 12, 1901; Hansf., Sydowia Beih. 2: 745, 1961; Gupta & Gupta, Indian Phytopath. 58: 390, 1985; Hosag. & Goos, Mycotaxon 42: 136, 1991; Hosag., Meliolales of India, p. 276, 1996. (Fig. 106)

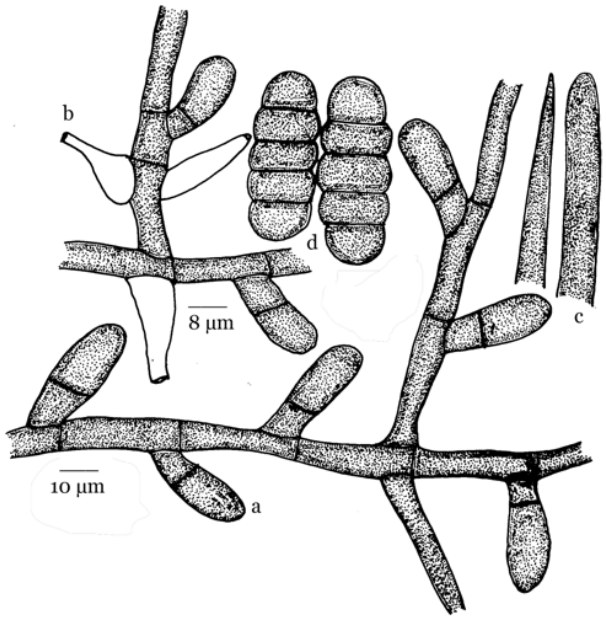


Figure 104. ***Meliola oleicola***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Materials examined: TBGT 3932, 18.ii.2009, on leaves of Poaceae (Grass), Muthanga, coll. Jacob Thomas et al.

Colonies epiphyllous, dense, up to 2mm in diameter. Mycelium straight to substraight, branching opposite to irregular at acute to wide angles, closely reticulate, cells 14–21x6–8 µm. Appressoria alternate, straight to curved antrorse to recurved, 14–22 µm long; stalk cells cylindrical to cuneate, 3–7 µm long; head cells ovate, globose, entire, angular to sublobate, 11–16x12–15 µm. Phialides borne on a separate mycelial branch, alternate to opposite, ampulliform, 12–16x6–9 µm. Mycelial setae few, straight, simple, acute to obtuse at the tip, upto 335µm long. Perithecia mostly grouped, verrucose, up to 156µm in diameter; ascospores obovoidal, 4-septate, slightly constricted at the septa, 33–37x11–14 µm.

This is the most common species on the members of the family Poaceae. Common in Southern Western Ghats.

Meliola phyllanthigena Hosag., Plant Pathology & Quarantine 3(1): 7, 2013. (Fig. 107)

Materials examined: TBGT 6233 (holotype), 2.ii.2008, on leaves of *Phyllanthus* sp. (Euphorbiaceae), Periya, coll. M.C. Riju et al.

Colonies epiphyllous, subdense, up to 2mm in diameter. Hyphae straight to substraight, branching alternate to opposite at acute to wide angles, closely and densely reticulate, cells 16–27x6–10 µm. Appressoria densely arranged, alternate, antrorse, subantrorse to closely antrorse, 25–34 µm long; stalk cells cylindrical to cuneate, 6–13 µm long; head cells ovate, globose, entire, 17–22x11–15 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 22–29x6–10 µm. Mycelial setae numerous, closely scattered, simple,

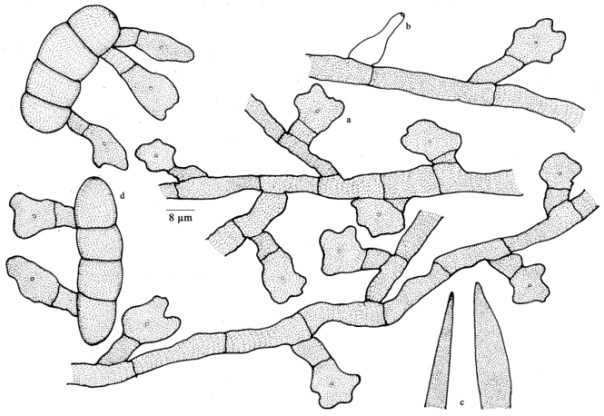


Figure 105. ***Meliola oligomera***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d – Ascospores

straight, about 10% uncinate, acute at the tip, up to 300µm long. Perithecia scattered, up to 130µm in diameter; ascospores oblong to cylindrical, 4-septate, slightly constricted at septa, 48–51x18–20 µm.

This is a unique species of the genus known on the members of Euphorbiaceae in having uncinate mycelial setae (Hansford 1961).

Meliola plectroniae Hansf., Sydowia 9: 72, 1955; Beih. 2: 702, 1961; Hosag., Meliolales of India, p. 284, 1996; Hosag. & Goos, Mycotaxon 37: 228, 1990 (Fig. 108).

Meliola coilicosa Nair & Kaul, Sydowia 36: 204, 1983.

Materials examined: TBGT 4073, 30.x.2007, on leaves of *Canthium dicoccum* (Gaertn.) Teys & Benn. (*Plectronia umbellata* Benth. & Hook.) (Rubiaceae), Wayanad, coll. A. Chandraprabha.

Colonies hypophyllous, thin, up to 5mm in diameter, confluent. Hyphae substraight to flexuous, branching mostly alternate, branches of the main hyphae tortuous, loosely reticulate, cells 18–30x6–8 µm. Appressoria alternate, straight to variously curved, 24–34 µm long; stalk cells aseptate to many septate, tortuous, aseptate stalk cells 8–16 µm long, while, septate stalk cells up to 80µm long; head cells semilunar, versiform, ovate, angular, straight to mostly curved, 16–22x10–14 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 20–24x8–10 µm. Mycelial setae thinly scattered, simple, straight, acute, up to 360µm long. Perithecia scattered, up to 110µm in diameter; ascospores cylindrical, ellipsoidal, 4-septate, constricted at the septa, 52–56x16–18 µm.

Dense colonies and variously curved multiseptate appressoria distinguish this species.

Meliola premnigena Hosag. & Riju, Plant Pathology & Quarantine 1(2), 121, 2011; Hosag., J. Threatened Taxa 5(6): 4046, 2013. (Fig. 109).

Material examined: HCIO 51189**,** TBGT 5069, 10.i.2011, on leaves of *Premna glaberrima* Wight (Verbenaceae), Banasuran mala, coll. M.C. Riju.

Colonies epiphyllous, velvety, up to 5 mm in diam. Hyphae flexuous to crooked, branching opposite at acute to wide angles, cells 15–25x5–8 µm. Appressoria alternate, unilateral, antrorse to subantrorse, 15–23 µm long; stalk cells cylindrical to cuneate, 5–8 µm long; head cells globose, subglobose, entire to sublobate, 10–18x7–13 µm. Phialides mixed with appressoria, opposite,

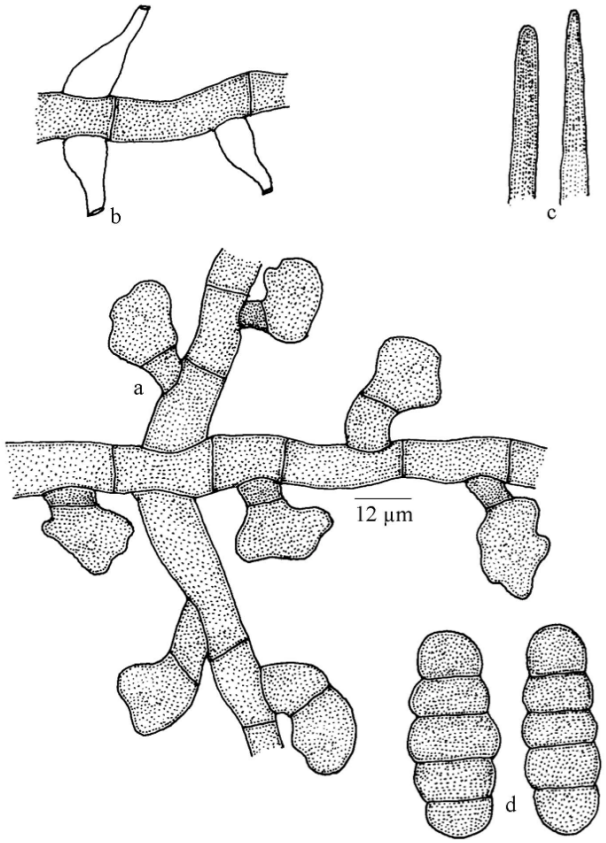


Figure 106. ***Meliola panici***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

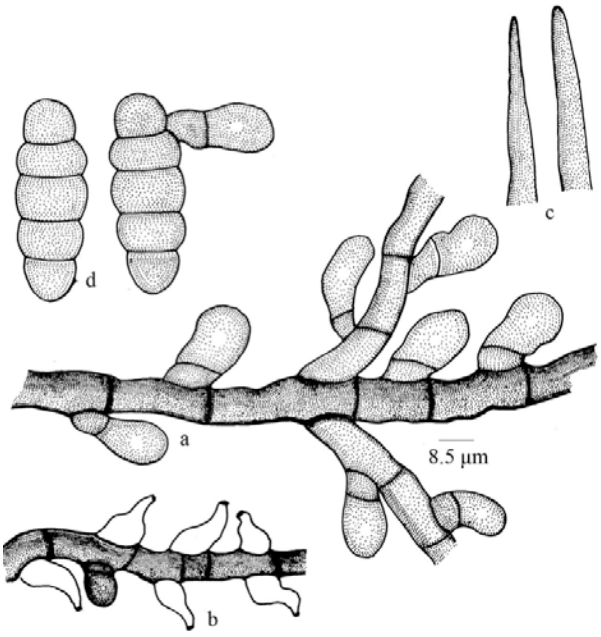


Figure 107. ***Meliola phyllanthigena***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

alternate to unilateral, ampulliform, 14–23x4–6 µm. Mycelial setae scattered, simple, straight, slightly curved to uncinate, up to 300 µm long. Perithecia scattered, up to 150µm in diameter; ascospores cylindrical to oblong, 4-septate, slightly constricted at the septa, 32–38x12–15 µm.

Based on the alternate appressoria and simple setae, this species comes close to *M. cookeana* Speg. and *M. premnae* Hansf. However, it differs from the former in not having inflated, dentate or furcate apex of mycelial setae. It differs from the latter in having straight hyphae and mycelial setae in contrast to flexuous, crooked, uncinate and twisted mycelial setae (Hansford 1961). It also differs from *M. premnicola* in having only obtuse mycelial setae in contrast to variously dentate ones (Hosagoudar 1996).

Meliola psophocarpi Hosag. & Riju, J. Threatened Taxa 2(4): 824, 2010**;** Hosag., J. Threatened Taxa 5(6): 4046, 2013. (Fig. 110; Image 9).

Material examined: 30.xi.2007, HCIO 48174 (holotype), TBGT 2910 (isotype), on leaves of *Psophocarpus tetragonolobus* L. (Fabaceae), 16th mile, Padinharathara, coll. M.C. Riju; HCIO 50351, TBGT 4268, 6.xi.2009, coll. A. Sabeena & M.C. Riju.

Colonies foliicolous, fructicolous, epiphyllous, thin, scattered, up to 3mm in diameter, often confluent. Hyphae undulate, branching mostly opposite at wide angles, loosely to closely reticulate, cells 11–33x4–7 µm. Appressoria alternate, unilateral, up to 3% opposite,

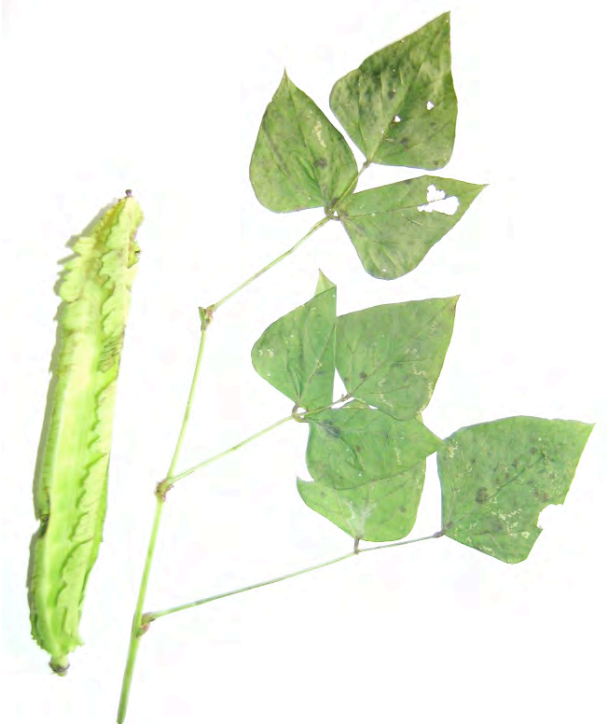


Image.9. *Meliola psophocarpi*-Infected leaves and pod

straight to slightly curved, subantrorse to retrorse, 11-20µm long; stalk cells cylindrical to cuneate, 2–11 µm long; head cells ovate, globose, 8–11 µm in diam. Phialides mixed with appressoria, alternate, opposite, unilateral, ampulliform, 13–20x6–9 µm. Mycelial setae scattered, simple, straight to slightly curved, acute to

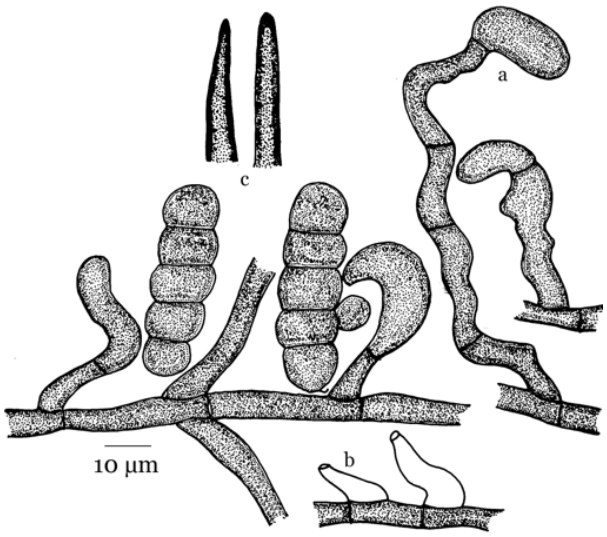


Figure 108. *Meliola plectroniae*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

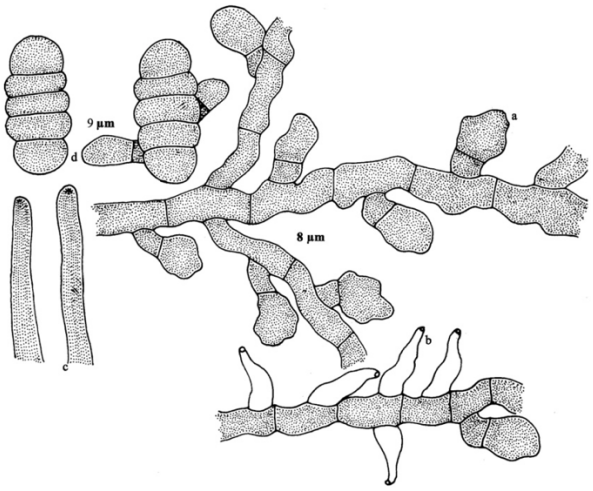


Figure 109. *Meliola premnigena*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

obtuse at the tip, up to 360µm long. Perithecia scattered, up to 130µm in diam.; ascospores cylindrical, 4- septate, slightly constricted at the septa, 33–38x8–11 µm.

Psophocarpus tetragonolobus is a climbing shrub, native of South East Asia, has been extensively cultivated in the backyards for its quadrangular pods used in the culinary purposes. The leaves of this plant is being infected with the black mildew fungus and is similar to *M. nyanzae* in having the same digital formula but differs from it in not being a strong parasite in producing pathogenic symptoms (Hansford 1961; Hosagoudar 1996; Hu et al. 1996, 1999).

Meliola pushpangadanii Hosag. & Abraham in Hosag., Abraham & Goos, Mycotaxon 66: 106, 1998; Hosag., Meliolales of India 2: 311, 2008; Hosag. & Agarwal, Taxonomic Studies of Meliolales. Identification Manual, p. 217, 2008. (Fig. 111)

Materials examined: TBGT 4043, 16.ix.2008, on leaves of *Persea* sp. (Lauraceae), Periya, coll. Harish et al.

Colonies hypophyllous, thin, subvelvety, scattered, spreading, up to 4mm in diameter. Hyphae crooked, branching irregular at acute to wide angles, loosely to closely reticulate, cells 31–50x4–7 µm. Appressoria scattered, alternate, antrorse, ubantrorse to retrorse, straight to curved, 16–22 µm long; stalk cells cylindrical to cuneate, 4–9 µm long; head cells globose, entire, 14–17x16–19 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 16–22x9–12 µm. Mycelial setae fairly numerous, mostly grouped around perithecia, simple, straight to flexuous, acute at the tip, up to 1580µm long. Perithecia scattered, up to 220µm in diameter; ascospores slightly fusiform, 4-septate, constricted at the septa, 40–43x16–19 µm.

This species differs from *Meliola cryptocariicola* Hosag. & Raghu and *M. patileana* Hosag. in having only alternate appressoria, straight to flexuous and acute mycelial setae (Hosagoudar, 1996).

Endemic to Southern Western Ghats

Meliola quadrispina Racib., Parasit. Algen and Pilze Java's 3: 33, 1900; Hansf., Sydowia Beih. 2: 646, 1961; Thite & Patil, Kavaka 10: 30, 1982; Hosag. & Goos, Mycotaxon 37: 244, 1990; Hosag., Meliolales of India, p. 293, 1996.

Meliola quadrifurcata Rehm, Philippine J. Sci. 8: 181, 1913; Leafl. Philippine Bot. 6: 2194, 1914. (Fig. 112)

Materials examined: HCIO 50349, TBGT 4266, 5.xi.2009, on leaves of *Merremia unbellata* (L.) Hallier

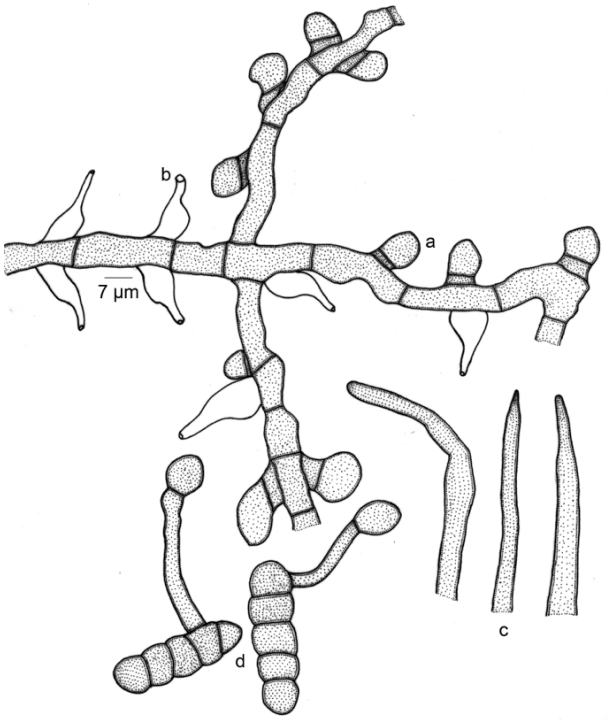


Figure 110. ***Meliola psophocarpi***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

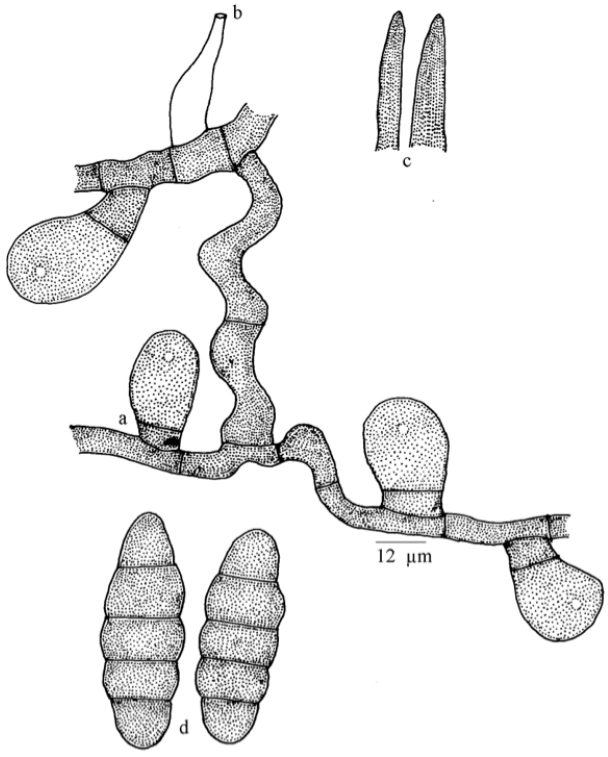


Figure 111. ***Meliola pushpangadanii***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

f. (Convolvulaceae), Gurukulam Botanic Garden, Periya, coll. A. Sabeena & M.C. Riju.

Colonies amphigenous, caulicolous, mostly epiphyllous, dense, up to 4mm in diameter, confluent. Hyphae undulate to tortuous, branching irregular, loosely to closely reticulate, cells 20–40x6–8 µm. Appressoria alternate to unilateral, antrorse, spreading, straight to curved, 16–24 µm long; stalk cells cylindrical to cuneate, 6–14 µm long; head cells ovate, versiform, angulose, rarely irregularly sublobate, 10–16x12–16 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 20–24x6–10 µm. Mycelial setae numerous, uniformly scattered, dichotomously branched, length till the first branching is up to 162µm, from first to second branching up to 24µm long and the final branchlets up to 136µm long, obtuse to acute at the tip. Perithecia mostly grouped, up to 261µm in diameter; ascospores broadly obovoidal, 4-septate, constricted at the septa, 40–50x14–22 µm.

Branched mycelial setae are the characters of this species.

Meliola scleropyri Hosag. in Hosag. & Goos, Mycotaxon 37: 247, 1990; Hosag., Meliolales of India, p. 307, 1996. (Fig. 113).

Materials examined: HCIO 49220, TBGT 3459, 15.ii.2009, on leaves of *Scleropyrum pentandrum* (Dennst.) Mabberley (Santalaceae), Begur, coll. Jacob Thomas et al.,

Colonies amphigenous, dense, velvety, up to 5mm in diameter, confluent. Hyphae substraight to undulate, branching opposite to irregular at acute angles, loosely to closely reticulate, cells 19–26x6–7 µm. Appressoria alternate, subantrorse to antrorse, 16–24 µm long; stalk cells cylindrical to cuneate, 2–10 µm long; head cells ovate to subglobose, rarely subangular, entire, 12–17x9–12 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 16–24x7–10 µm. Mycelial setae numerous, scattered, straight to slightly curved, flexuous, simple, acute to obtuse at the tip, up to 360µm long. Perithecia scattered, verrucose, up to 110µm in diameter; ascospores obovoidal, 4-septate, constricted at the septa, 33–41x12–17 µm.

This species differs from *Meliola hainanensis* Hu reported on *Scleropyrum wallichianum* from China. However, differs from it in having only alternate and longer appressoria, simple and not dentate mycelial setae and also ascospores are smaller (Hosagoudar *et al.* 1997; Hu *et al.* 1997, 1999).

Endemic to Southern Western Ghats.

Meliola stenospora Wint., Hedwigia 25: 97, 1886; Hansf., Sydowia Beih. 2: 75, 1961; Hosag. & Raghu, New Botanist 20: 72, 1993; Hosag., Meliolales of India, p. 314, 1996. (Fig. 114).

Materials examined: HCIO 49255, TBGT 3582, 17.ix.2008, on leaves of *Piper* sp. (Piperaceae), Periya,

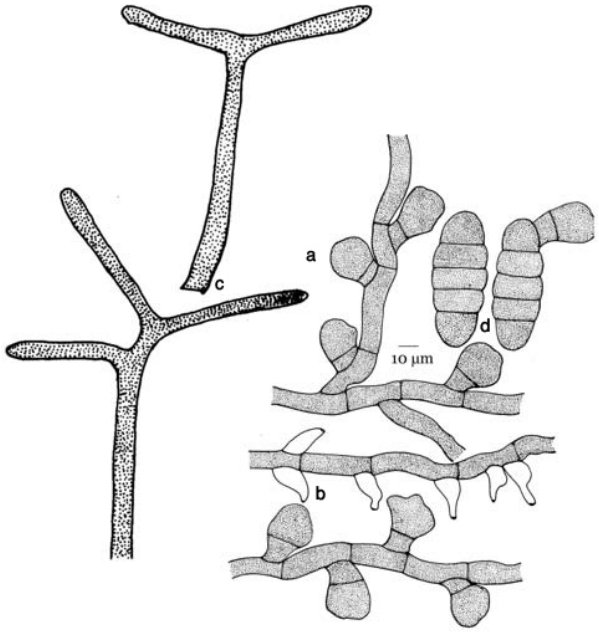


Figure 112. ***Meliola quadrispina***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

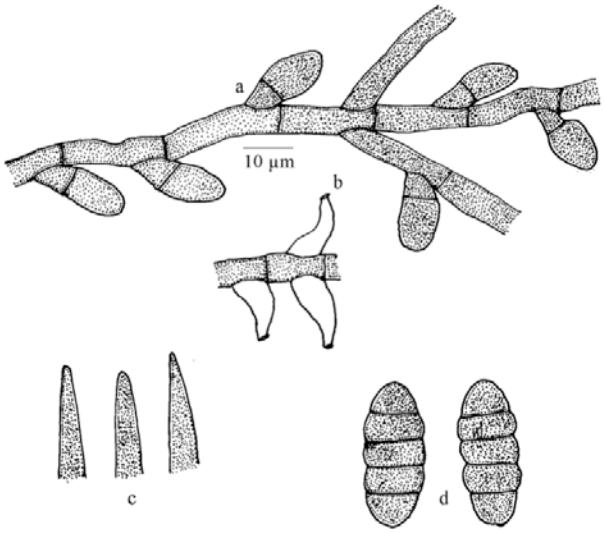


Figure 113. ***Meliola scleropyri***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

coll. Gireesh Kumar et al.; HCIO 44385, TBGT 610, 5.ii.2002, Wayanad, coll. M. Kamarudeen.

Colonies hypophyllous, thin, spreading, up to 5mm in diameter, rarely confluent. Hyphae substraight to slightly crooked, branching opposite at acute to wide angles, loosely to closely reticulate, cells 19–27x8–10µm. Appressoria alternate to unilateral, straight to curved, antrorse to spreading, 19–24 µm long; stalk cells cylindrical to cuneate, 4–8 µm long; head cells truncate, angular to slightly lobate, 12–16x14–19 µm. Phialides borne on a separate mycelial branch, alternate to opposite, ampulliform, 16–24x8–11 µm. Mycelial setae simple, straight, acute at the tip, up to 450µm long. Perithecia scattered, up to 180µm in diameter; ascospores cylindrical to slightly crescent shaped, 4-septate, constricted at the septa, 35–43x12–16 µm.

Infects the plants growing in shade and moisture

Meliola stenospora Wint. var***. major*** Hansf., Sydowia 16: 303, 1963; Patil & Pawar, Indian Phytopathol. 39: 306, 1986; Hosag., Meliolales of India, p. 316, 1996.

Meliola stenospora Wint. var. *major* Hansf., Sydowia Beih. 2: 75, 1961. (Fig. 115).

Materials examined: HCIO 49255, TBGT 3494, 17.ix.2008, on leaves of *Piper sp.* (Piperaceae), Periya, coll. Gireesh Kumar et al.

Colonies mostly epiphyllous, subdense, thinly velvety, up to 3mm in diameter, confluent. Hyphae substraight to slightly undulate, branching opposite to irregular at wide angles, closely reticulate, cells 20–25x8–10 µm. Appressoria alternate, about 1% opposite, spreading to antrorse, straight to curved, 17–23 µm long; stalk cells cuneate to cylindrical, 3–9 µm long; head cells subglobose with crenate to lobulate margin, 11–15x12–20 µm. Phialides borne on a separate mycelial branch, opposite to alternate, ampulliform, 17–20x7–9 µm. Mycelial setae mostly grouped around perithecia, straight, simple, acute, up to 1000µm long. Perithecia loosely grouped, verrucose, up to 170µm in diam.; ascospores oblong, 4-septate, slightly constricted at the septa, 37–43x11–15 µm.

Meliola sterculiacearum Hosag. & Kamar. in Hosag., J. Mycopathol. Res. 43: 31, 2005; Hosag., Meliolales of India 2: 325, 2008. (Fig. 116).

Materials examined: HCIO 44786, TBGT 1023, 22.xii.2002, on leaves of *Sterculia* sp. (Sterculiaceae), Periya, coll. M. Kamarudeen.

Colonies amphigenous, dense, spreading, up to 2mm in diameter, confluent. Hyphae straight to substraight, branching mostly opposite at acute angles, loosely to very closely reticulate and form a solid mycelial mat, cells 14–16x6–8 µm. Appressoria alternate, antrorse to closely antrorse, 12–16 µm long; stalk cells cylindrical to cuneate, 3–5 µm long; head cells ovate, globose, entire, 8–12x9–11 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 14–16x6–8 µm.

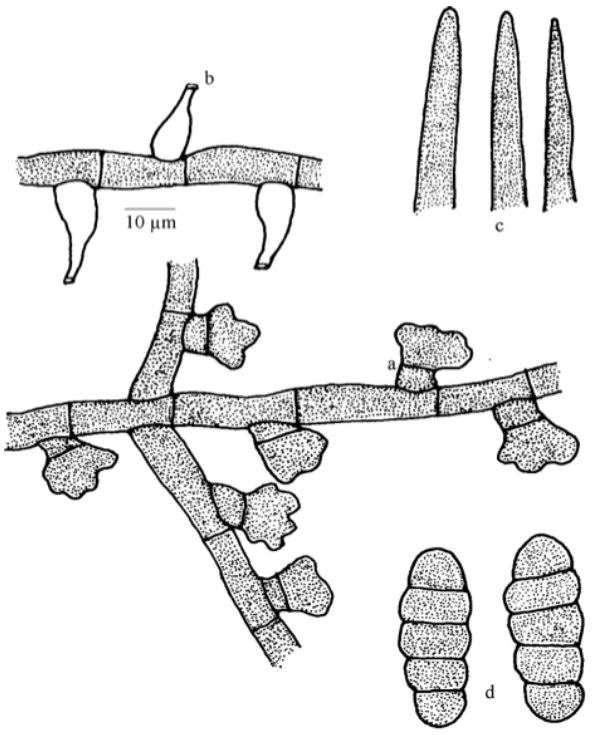


Figure 114. ***Meliola stenospora***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

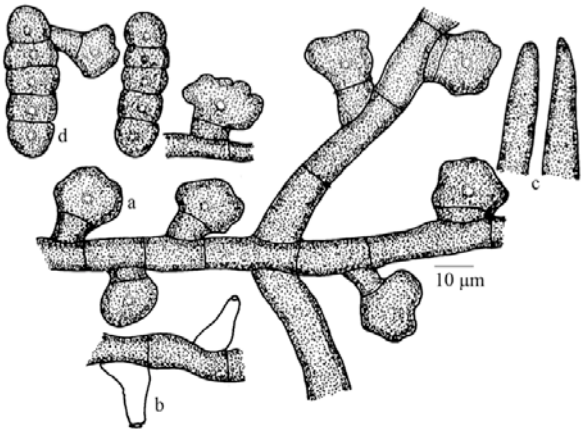


Figure 115. ***Meliola stenospora*** **var.** ***major***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Mycelial setae thinly scattered, simple, straight, acute at the tip, up to 450µm long. Perithecia scattered, globose, up to 160µm in diameter; ascospores oblong, ellipsoidal, 4-septate, constricted at the septa, 36–39x16–18 µm.

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. & 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).

Meliola subramanyaensis Hosag., J. Mycopathol. Res. 43: 207, 2005; Hosag., Meliolales of India 2: 331, 2008; Hosag. & Agarwal, Taxonomic studies of Meliolales. Identification Manual, p. 232, 2008. (Fig. 117)

Materials examined: HCIO 49809, TBGT 3961, 15.ix.2008, on leaves of *Cyclea peltata* Cooke (Menispermaceae), Nagarhole, coll. Robin et al.

Colonies epiphyllous, dense, velvety, up to 2mm in diameter, confluent. Hyphae substraight, flexuous to crooked, branching alternate to irregular at acute to wide angles, loosely to closely reticulate, cells 16–22x4–7 µm. Appressoria alternate, antrorse, 16–26 µm long; stalk cells cylindrical to cuneate, 4–10 µm long; head cells ovate, oblong, clavate, often attenuated at the apex, entire, 11–17x9–11 µm. Phialides borne on a separate mycelial branch, alternate to opposite, ampulliform, 13–24x6–9 µm. Mycelial setae mostly grouped around perithecia, simple, straight, flexuous to curved, up to 2% uncinate, obtuse at the tip, up to 312µm long. Perithecia scattered, globose, up to 171µm in diameter; ascospores oblong, cylindrical, 4-septate, constricted at the septa, 31–36x11–15 µm.

The present species has flexuous to uncinate mycelial setae which distinguishes it from *Meliola cissampelicola* Hansf. & Thirum. and *M. cycleae* Hosag. known on the members of the family Menispermaceae from the Western Ghats of Peninsular India (Hansford, 1961; Hosagoudar, 1996).

Meliola symplocicola Yamam., Trans., Nat. Hist. Soc. Taiwan 31: 57, 1941; Hansf., Sydowia Beih. 2: 519, 1961; Hosag. & Goos, Mycotaxon 37: 249, 1990; Hosag., Meliolales of India, p. 318, 1996. (Fig. 118).

Materials examined: HCIO 49811,TBGT 3963, 15.ii.2009, on leaves of *Symplocos cochinchinensis* (Lour.) Moore ssp. *laurina* (Retz.) Nooteboom (Symplocaceae), Periya, coll. Gireesh et al.; HCIO 48088, TBGT 2871, 6.xii.2006, *Symplocos* sp., Kunkichira, Periya, coll. M. Harish, V. Gireesh Kumar & Anilkumar.

Colonies hypophyllous, subdense, velvety, up to

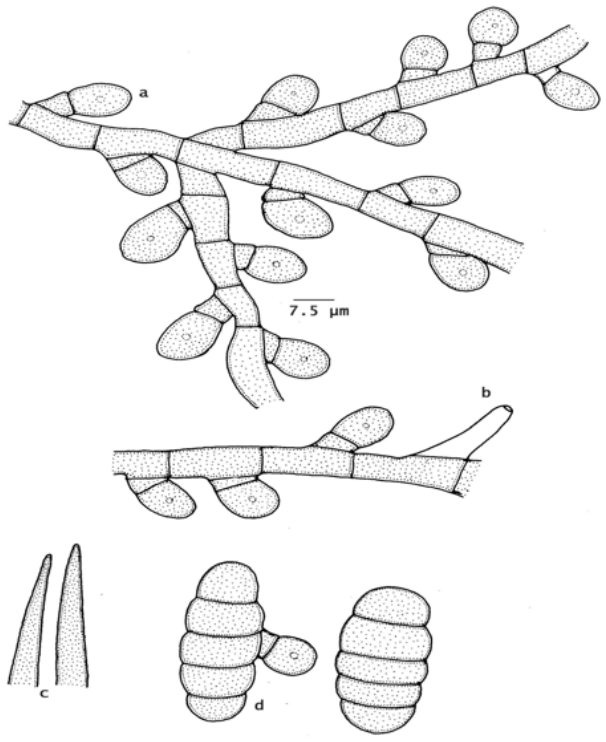


Figure 116. ***Meliola sterculiacearum***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

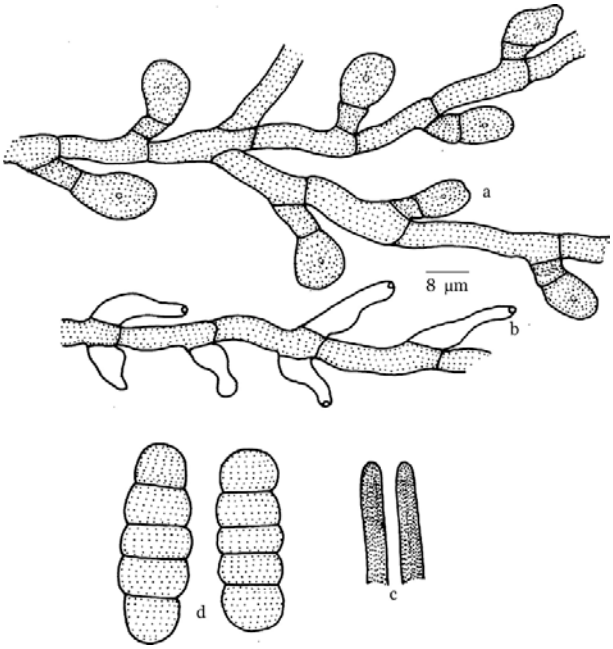


Figure. 117. ***Meliola subramanyaensis***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

8 mm in diameter, confluent. Hyphae substraight to flexuous, branching mostly opposite at wide angles, loosely reticulate, cells 18-34 x 6-8 µm. Appressoria alternate to unilateral, straight to variously curved, antrorse, spreading, 22-26 µm long; stalk cells cylindrical to cuneate, 6-10 µm long; head cells globose, angulose, truncate, variously curved, entire, 12-18 x 8-12 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 20-30 x 8-10 µm. Mycelial setae grouped around perithecia, straight, simple, acute, very few 2-3 dentate, up to 360 µm long. Perithecia scattered, up to 200 µm in diam.; ascospores 4-septate, obovoidal to cylindrical, constricted at the septa, 48-59 x 16-20 µm.

This is the only species known on this host plant from India

Meliola syzygiigena Hosag. & Kamar., Zoos Print J. 18: 1061, 2002; Hosag., Meliolales of India 2: 334, 2008. (Fig. 119)

Materials examined: HCIO 44386, TBGT 594, 6.ii.2002, on leaves of *Syzygium* sp. (Myrtaceae), Wayanad, coll. M. Kamarudeen.

Colonies hypophyllous, dense, velvety, up to 5mm in diameter, confluent. Hyphae straight to substraight, branching alternate, opposite to irregular at acute angles, loosely to closely reticulate, cells 25–28x6–7 µm. Appressoria alternate, less than 1% opposite, antrorse, subantrorse, retrorse, straight, curved to uncinate, 16–23 µm long; stalk cells cylindrical to cuneate, 3–8 µm long; head cells ovate, oblong, cylindrical, straight to curved, entire, broadly rounded to truncate at the apex, 12–16x6–8 µm. Phialides few, mixed with appressoria, alternate to opposite, ampulliform, 19–24x6–8 µm. Mycelial setae numerous, scattered, simple, straight, acute at the tip, up to 294µm long. Perithecia loosely grouped, verrucose, up to 144µm in diameter, wall cells projected; ascospores oblong to subellipsoidal, 4-septate, constricted at the septa, 43–48x15–18 µm.

Based on the Beeli formula and the morphology of the head cells of the appressoria, the present species, *Meliola syzygigena* is similar to an endemic species, *Meliola ranganathi* Hansf. but differs from it in having hypophyllous velvet colonies, distantly placed and variously curved appressoria (Hansford, 1961; Hosagoudar, 1996).

Meliola tamarindi Sydow & Sydow, Ann. Mycol. 10: 79, 1912; Hansf., Sydowia Beih. 2: 250, 1961; Hosag & Goos, Mycotaxon 37: 249, 1990; Hosag., Dayal & Goos, Mycotaxon 46: 208, 1988; Hosag., Kaveriappa, Raghu & Goos, Mycotaxon 51: 116, 1994; Hosag., Meliolales of India, p. 321, 1996. (Fig. 120).

Materials examined: M.C HCIO 51032, TBGT 4949, 11.x.2008, on leaves of *Tamarindus indica* L. (Caesalpiniaceae), 16th mile, Padinharathara, coll. M.C. Riju.

Colonies amphigenous, mostly epiphyllous, dense, velvety, up to 2mm in diameter, confluent. Hyphae undulate to tortuous, branching opposite at wide angles, loosely reticulate, cells 16–28x6–10 µm. Appressoria alternate to 5% opposite, antrorse, spreading, straight to curved, 19–29 µm long; stalk cells cylindrical to cuneate, 4–12 µm long; head cells ovate, angular, entire to sublobate, straight to curved, 13–20x10–16 µm. Phialides mixed with appressoria, alternate to opposite, scattered, 15–28x6–10 µm. Mycelial setae scattered to grouped around perithecia, simple, obtuse at the tip, up

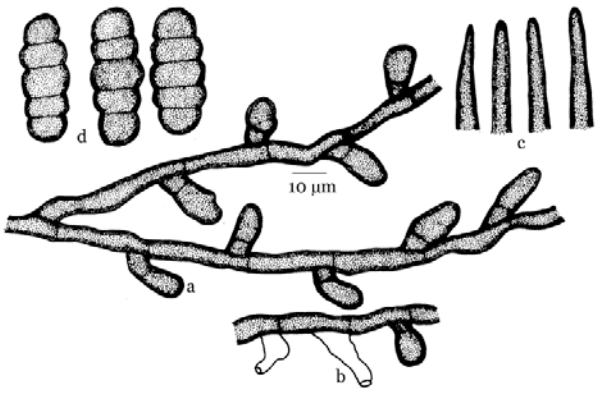


Figure 118. ***Meliola symplocicola***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

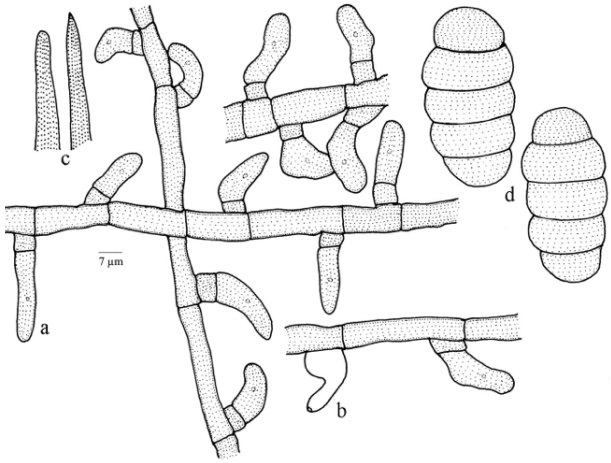


Figure 119. ***Meliola syzygiigena***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

to 463µm long. Perithecia scattered, verrucose, up to 155µm in diameter; ascospores obovoidal, 4-septate, constricted at the septa, 45–50x17–20 µm.

This is the only species known on this host plant.

Meliola tecleae Hansf. var. ***toddaliae-asiaticae*** Hansf., Proc. Linn. Soc. London 153: 11, 1941; Hansf., Sydowia Beih. 2: 392, 1962; Hosag., Meliolales of India, p. 323, 1996. (Fig. 121)

Materials examined: HCIO 42963, TBGT 249, 11.viii.1998, on leaves of *Toddalia asiatica* (L.) Lam. (Rutaceae), Tirunelly, coll. C.K. Biju; HCIO 50016, TBGT 4168, 14.ii.2009, coll. Girish Kumar et al. TBGT 5715, 30.ix.2007, Padinharathara, coll. M.C. Riju.

Colonies epiphyllous, dense, scattered, up to 3mm in diameter, rarely confluent. Hyphae straight, branching mostly opposite at wide angles, loosely to closely reticulate, cells 28–32x6–8 µm. Appressoria alternate, straight to curved, antrorse to subantrorse, 19–29 µm long; stalk cells cylindrical to cuneate, 3–9 µm long; head cells oblong to cylindrical, often clavate, entire, 16–19x8–11 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 16–21x6–8 µm. Mycelial setae scattered to grouped around perithecia, simple, straight, acute at the tip, up to 588µm long. Perithecia scattered to loosely grouped, up to 250µm in diameter; ascospores oblong to cylindrical, 4-septate, strongly constricted at the septa, 48–50x18–20 µm.

This species is recorded from different parts of southern Western Ghats

Meliola tenella Pat., Mycol. 10: 140, 1888; Hansf., Sydowia Beih. 2: 381, 1961; Hosag., Meliolales of India, p. 324, 1996. (Fig. 122 & Image 10).

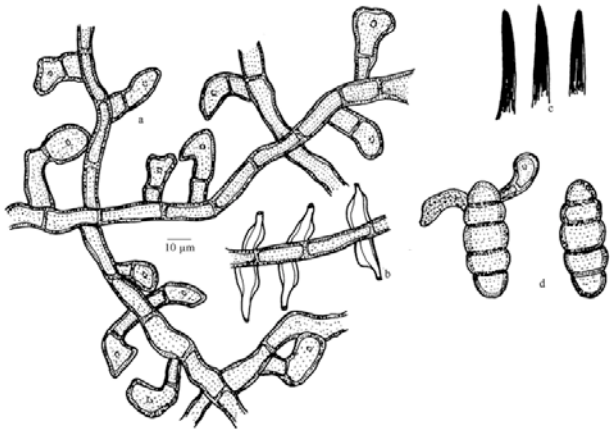


Figure 120. ***Meliola tamarindi***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Materials examined: TBGT 3930, 18.ii.2009, on leaves of *Murraya paniculata* (L.) Jack. (*M. exotica* L.) (Rutaceae), Muthanga, coll. Jacob Thomas et al.; HCIO 49393, TBGT 3638, 14.ii.2009, *Atlantia* sp., Tirunely, coll. P.J. Robin et al.; HCIO 49972, TBGT 4124, 14.iii.2007, *Murraya* sp., Puthuserrykadavu, coll. M.C. Riju.

Colonies amphigenous, dense, velvety, up to 4mm in diameter, confluent. Hyphae straight to substraight, branching opposite at wide angles, loosely to closely reticulate to form mycelial mat, cells 14–34x7–10 µm. Appressoria alternate, antrorse to spreading, straight to curved, 16–26 µm long; stalk cells cylindrical to cuneate, 4–7 µm long; head cells cylindrical, elongated, straight to curved, entire, 12–14x8–12 µm. Phialides mixed with appressoria, opposite to alternate, 16–24x7–10 µm. Mycelial setae numerous, scattered, straight, dichotomously branched, 240µm long up to first branching, first ray up to 60µm long, second ray up to 40µm long and third ray up to 10µm long, acute to obtuse at the tip, branches reflexed. Perithecia scattered, verrucose, up to 220µm in diameter; ascospores

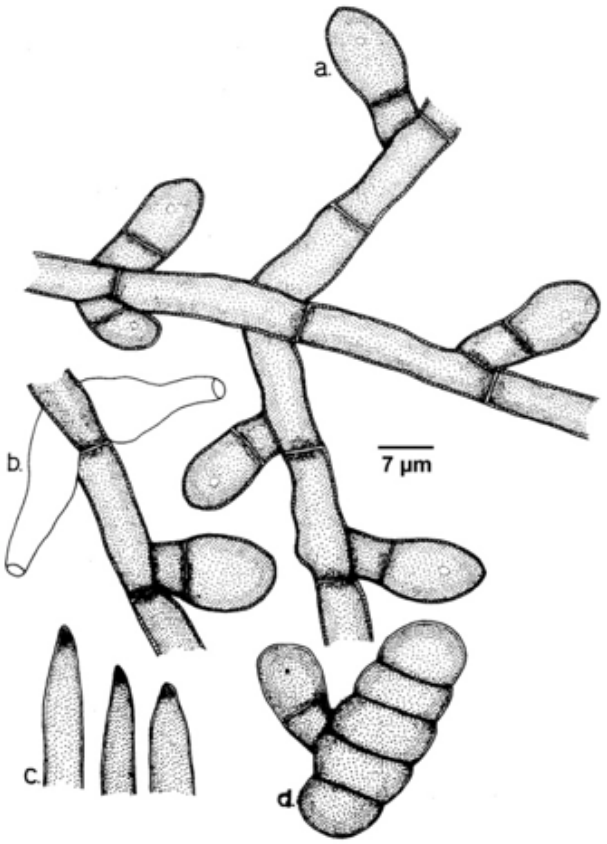


Figure 121. ***Meliola tecleae*** **var.** ***toddaliae-asiaticae***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Image.21. *Meliola tenella* - Infected leaves, petiole and soft stem

subellipsoidal to cylindrical, 4-septate, constricted at the septa, 40–50x16–24 µm.

Common in Western Ghats region of Kerala.

Meliola themedicola Hosag., C.K. Biju & Abraham, Nova Hedwigia 80: 498, 2005; Hosag., Meliolales of India 2: 341, 2008. (Fig. 123)

Materials examined: HCIO 43640, TBGT 315, 17.ii.2000, on leaves of *Themeda triandra* Forssk. (Poaceae), Chembra hills, coll. C.K. Biju.

Colonies mostly epiphyllous, dense, crustose, up to 2mm diameter, rarely confluent. Hyphae substraight to crooked, branching irregular at acute angles, loosely to very closely reticulate and form solid mycelial mat, cells 20–26x6–8 µm. Appressoria alternate, more scattered, antrorse to recurved, 19–56 µm long; stalk cells cylindrical, often flexuous, wall rugose, mostly unicellular, often 1–2-septate, 8–39 µm long; head cells ovate to globose, entire, angular, sublobate to irregularly and deeply lobate, 11–20x11–16 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 14–19x8–10 µm. Mycelial setae numerous, scattered to grouped around perithecia, simple, straight, acute to broadly obtuse at the tip, up to 350µm long. Perithecia loosely grouped, verrucose, up to 175µm diameter; ascospores oblong to mostly cylindrical, 4-septate, constricted at the septa, 48–52x14–20 µm.

Meliola themedae Stev. & Rold. ex Hansf. and *M. themedae* Stev. & Rold. ex Hansf. var. *indica* Hosag. are known on this host genus. *M. themedicola* differs from both in having aseptate to septate and long stalk cells of the appressoria. It also differs from *M. panici* Earle var. *major* Hansf. (having the same Beeli formula 3111. 5222) in having septate basal cell, entire to deeply lobate head cells of appressoria and phialides mixed with appressoria.

Meliola unonicola Hosag. & Abraham, Kavaka 24: 16, 1996; Hosag., Meliolales of India, 2: 348, 2008; Hosag. & Agarwal, Taxonomic studies of Meliolales. Identification Manual, p. 301, 2008. (Fig. 124).

Materials examined: HCIO 43638, TBGT 317; HCIO 47450, TBGT 2488, 16.iv.1999, on leaves of *Meiogyne pannosa* (Dalz.) Sinclair (*Unona pannosa* Dalz.) (Annonaceae), Banasuranmala, coll. C.K. Biju.

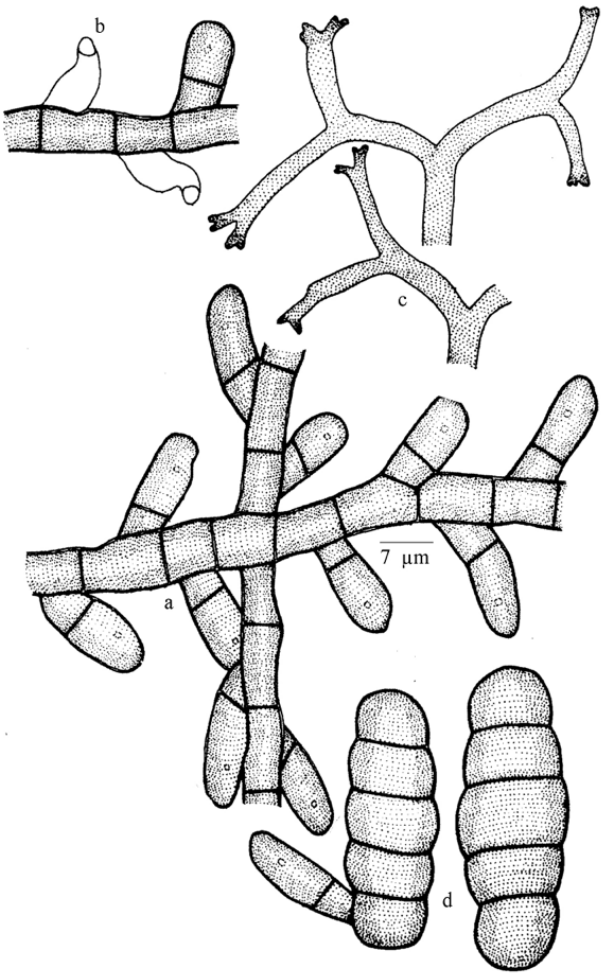


Figure 122. *Meliola tenella*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Colonies amphigenous, dense, velvety, up to 3mm in diameter, confluent. Hyphae straight, branching mostly opposite at acute angles, very closely reticulate and form solid mycelial mat, cells 15–19x7–10 µm. Appressoria opposite, rarely alternate and unilateral, closely antrorse to antrorse, 20–25 µm long; stalk cells cylindrical to cuneate, 4–6 µm long; head cells ovate, cylindrical, broadly rounded to attenuated at the apex, entire 11–16x8–11 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 13–24x6–9 µm. Mycelial setae numerous, densely scattered, simple, uncinate, sickle-shaped, septate, obtuse at the tip, up to 384 µm long. Perithecia scattered, up to 242µm in diameter; ascospores cylindrical, 4-septate, constricted at the septa, 43–47x16–19 µm.

This present taxon can be compared with *Meliola uvariicola* Hansf. but differs from it in having amphigenous, dense and velvety colonies, closely antrorse appressoria and uncinate mycelial setae (Hansford 1961).

Meliola vatsavayae Hosag . & M.C. Riju, Indian J. Sci. and Technol. 2: 6, 2009. (Fig. 125)

Materials examined: HCIO 48299, TBGT 3018, 22.iii.2008, on leaves of *Zanthoxylum rhetsa* (Roxb) DC. (Rutaceae), 16th mile, Padinharathara, coll. M.C. Riju.

Colonies amphigenous, dense, velvety, scattered to confluent, up to 4mm in diameter. Hyphae straight, branching opposite at acute to wide angles, closely reticulate, cells 13–18x6–11 µm. Appressoria alternate, rarely unilateral, often crowded, antrorse, straight, 24–40 µm long; stalk cells cylindrical to cuneate, 8–13 µm long; head cells ovate, angular, sinuately lobate to deeply lobate, 15–27x9–18 µm. Phialides mixed with appressoria, mostly opposite, rarely alternate to unilateral, ampulliform, 22–31x4–9 µm. Mycelial setae straight to slightly curved, scattered to grouped around perithecia, obtuse at the tip, up to 270µm long. Perithecia scattered, up to 110µm in diameter; ascospores cylindrical to slightly ellipsoidal, 4- septate, constricted at the septa, 37–44x15–20 µm.

Based on the digital formula 3113.4221, this species can be compared with *M. toddaliicola* Hansf. and *M. toddaliicola* Hanf. *indica* Hansf. & Thirum. known on the host genus *Toddalia* from Uganda and India, respectively. However, the present new species differs from both in

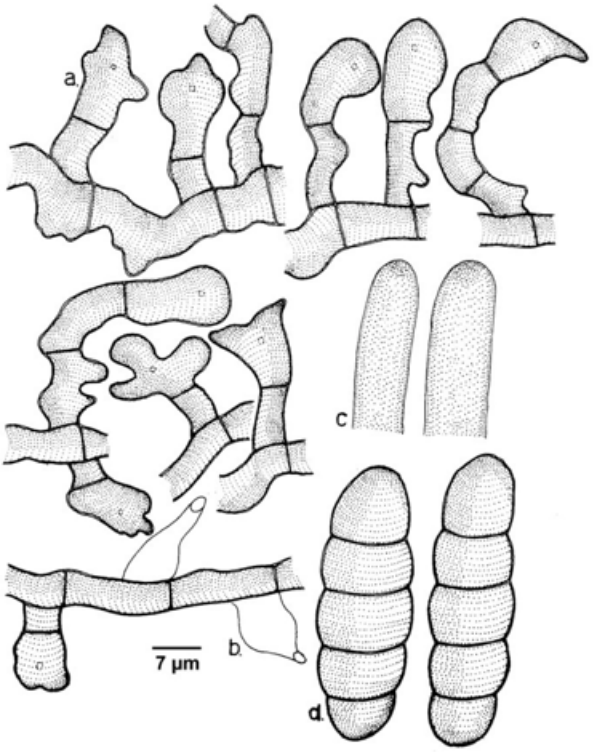


Figure 123. ***Meliola themedicola***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

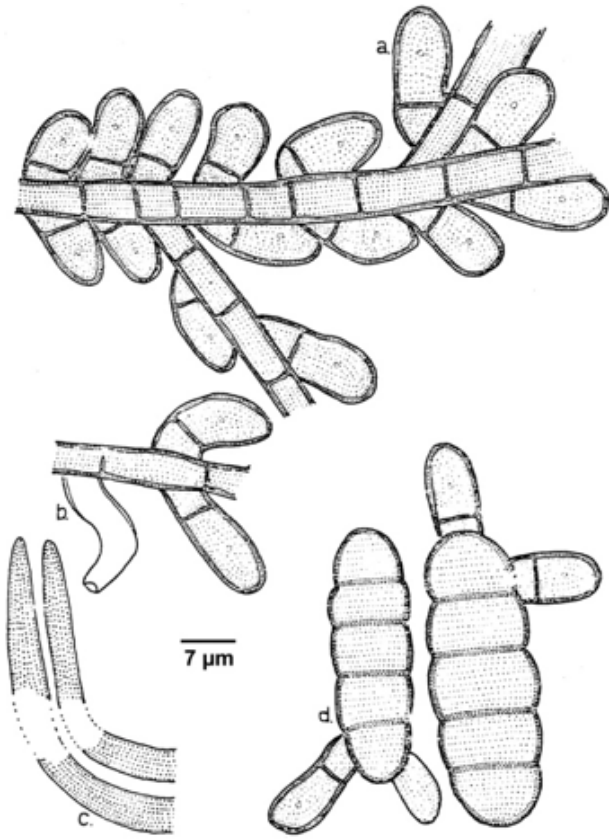


Figure 124. ***Meliola unonicola***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

having angular, sinuately to deeply lobate head cells of the appressoria (Hansford 1961; Hosagoudar 1996, 2008; Hosagoudar et al. 1997).

Meliola wendlandiae Hosag. in Hosag. & Goos, Mycotaxon 37: 251, 1990; Hosag., Meliolales of India, p. 340, 1996 (Fig. 126).

Materials examined: HCIO 43693, TBGT 346; 319, HCIO 43635, TBGT 319, 18.xi.1998, on leaves of *Wendlandia thyrsoidea* (Roemer & Schults) Steudel (Rubiaceae), Chembra hills, coll. C.K. Biju; HCIO 44390, TBGT 714, 6.xi.2001, Brahmagiri, coll. S. Shiburaj; HCIO 49905, TBGT 4057, 11.xi.2007, *Wenlandia* sp., Banasuramalai, coll. A. Chandraprabha; HCIO 50917, TBGT 4834, 23.xii.2008, coll. M.C. Riju.

Colonies amphigenous, mostly hypophyllous, subdense, subvelvety, up to 4mm in diameter, confluent. Hyphae sinuous to crooked, branching opposite to irregular at acute angles, loosely to closely reticulate, cells 18–32x6–10 µm. Appressoria alternate, spreading, antrorse, 20–30 µm long; stalk cells cuneate to cylindrical, 6–12 µm long; head cells ovate, narrow towards apex, slightly angular, entire, 15–18x12–14 µm. Phialides borne on a separate mycelial branch, alternate to opposite, ampulliform, 14–20x8–10 µm. Mycelial setae few, grouped around perithecia, simple, straight, acute to subacute at apex, up to 344µm long. Perithecia scattered, up to 168µm in diameter; ascospores obovoidal, 4-septate, constricted at the septa, 36–46x12–18 µm.

This is the only species known on this host genus from India.

Meliola zanthoxyli Hansf., Proc. Linn. Soc. London 158: 37, 1946; Hansf., Sydowia Beih. 2: 386, 1961; Hosag., Meliolales of India, p. 341, 1996. (Fig. 127)

Materials examined: HCIO 43634, TBGT 326, 2.vi.2000, on leaves of *Zanthoxylum tetraspermum* Wight & Arn. (Rutaceae), Mannavan shola, coll. C.K. Biju; TBGT 6215, 6.ix.2009, *Zanthoxylum* sp., Wayanad, coll. M.C. Riju & A. Sabeena.

Colonies epiphyllous, dense, up to 2mm in diameter, rarely confluent. Hyphae straight to slightly flexuous, branching opposite to alternate at acute angles, closely reticulate and form solid mycelial mat, cells 19–27x8–10 µm. Appressoria alternate, antrorse, 30–37 µm long; stalk cells cylindrical to cuneate, 11–18 µm long; head cells globose, ovate, stellately sublobate to lobate, 19–21x19–26 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 17–27x8–11 µm. Mycelial setae densely scattered all over the colonies, simple, sickle-shaped, curved to very closely arcuate, acute to obtuse at the tip, up to 335µm long. Perithecia

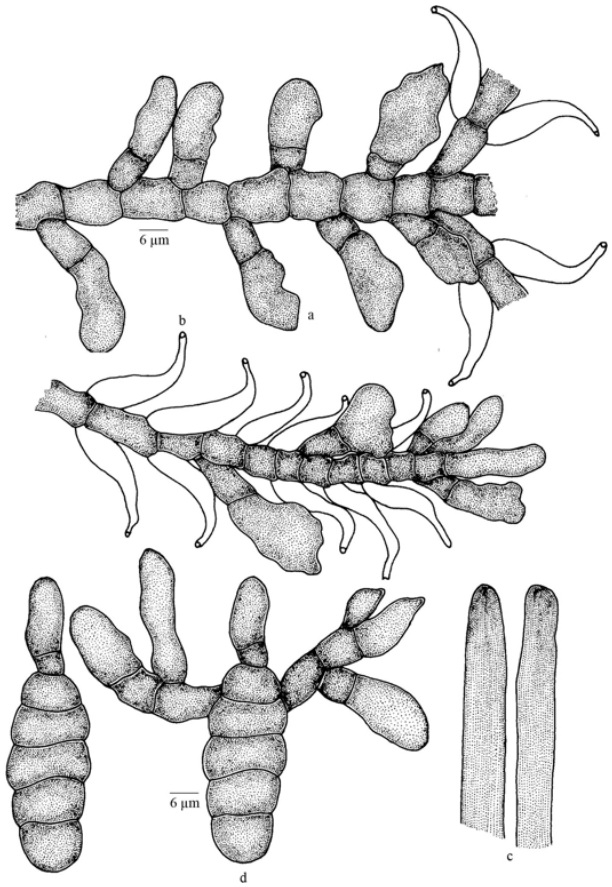


Figure 125. ***Meliola vatsavayae***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

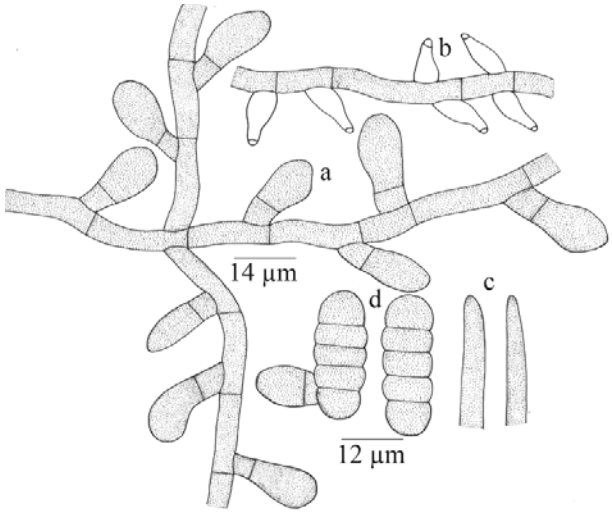


Figure 126. ***Meliola wendlandiae***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

loosely to closely scattered, up to 250µm in diameter; ascospores oblong, 4-septate, constricted at the septa, 50–53x17–23 µm.

This species occurs throughout the Western Ghats of Peninsular India and was also associated with *Asterina zanthoxyli* Yamam.

Meliola ziziphi Hansf. & Thirum., Farlowia 3: 299, 1948; Hansf., Sydowia Beih. 2: 368, 1961; Thite & Kulkarni, J. Shivaji Univ. 6: 163, 1972; Hosag. & Goos, Mycotaxon 37: 251, 1990; Hosag., Crypt. Bot. 2/3: 187, 1991; Meliolales of India, p. 342, 1996. (Fig. 128).

Materials examined: HCIO 50715, TBGT 4632, 6.xi.2009, on leaves of *Ziziphus* sp. (Rhamnaceae), Chennalode, coll. A. Sabeena & M.C. Riju; TBGT 6196, 26.iii.2009, Kandeykayal, coll. M.C. Riju.

Colonies amphigenous, mostly epiphyllous, thin, up to 5mm in diameter, confluent. Hyphae straight to substraight, branching alternate to opposite at acute angles, loosely reticulate, cells 20–38x6–8 µm. Appressoria alternate to opposite, straight, spreading, antrorse, 10–14 µm long; stalk cells cylindrical to cuneate, 2–6 µm long; head cells globose, entire, 8–10 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 16–18x6–8 µm. Mycelial setae scattered and grouped around perithecia, straight, simple, acute to variously dentate at the tip, up to 342µm long. Perithecia scattered, up to 116µm in diameter; ascospores ellipsoidal, 4-septate, constricted at the septa, 30–32x10–12 µm.

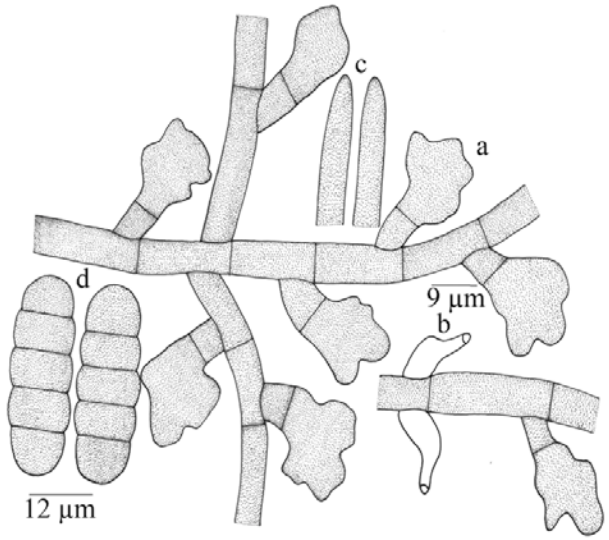


Figure 127. ***Meliola zanthoxyli***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

This is the only species known on this host genus

Materials to be identified

***Meliola* sp.**

Materials examined: HCIO 45097, TBGT 1152, 21.iv.2003, on *Litsea deccanensis,* Periya, Wyanad, coll. G. Rajkumar & P.A. Jose; HCIO 45270, TBGT 1308, 18.iv.1999, on *Allophyllus concanicus,* Chembra, coll. C.K. Biju; HCIO 48179, TBGT 2915, 10.xi.2007, *Allophyllus* sp., 16th mile, Padinharathara.

MELIOLINACEAE

This family constitutes a single genus, *Meliolina,* comprising 36 species (Hughes, 1993). However, the present study represents a single species.

Meliolina pulcherrima (H. Sydow & P. Sydow) H. Sydow & P. Sydow, Ann.Mycol. 12: 553, 1914 (Image 11).

Material examined: HCIO 44895, TBGT 1124, 21.iv.2003, on leaves of *Syzygium cumini* L. (Myrtaceae), Periya, coll. G. Rajkumar & P.A. Jose; HCIO 49996, TBGT 4148, 17.ix.2008, *Syzigium* sp., Periya, coll. P.J. Robin.

Colonies hypophyllous, black, thick, wooly, velvety,

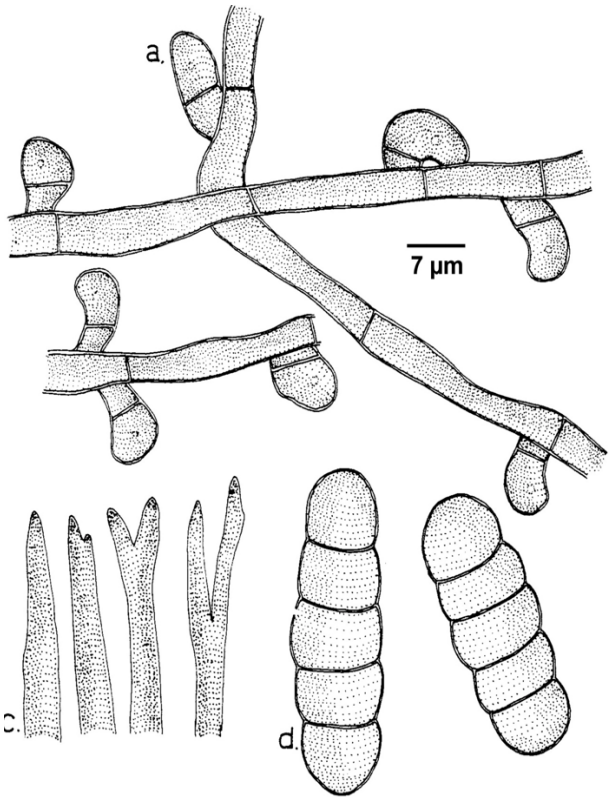


Figure 128. ***Meliola ziziphi***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

3–5 mm in diameter, a pinkish or discoloration occurs on the opposite surface of the leaves, and some times it is also evident on the upper surface. Superficial hyphae form a cushion of closly interwoven, irregularly branched, brown to dark brown hyphae, septate, cells 32–43 µm long and 7–10 µm wide. Phialophores arising as branches of the compact superficial hyphae, densely crowded, up to 128µm long, flexuous, simple, or 1 or 2 dichotomously or irregularly branched and clearly differeniated into stalk and branches, 5–7 µm wide, brown towards the base, narrowing slightly to 3µm wide and brown to pale brown towards the ends of the branches which bear a single phialide. Philides straight to curved, funnel shaped, 30–37x3–6 µm. Phialoconidia scanty and minute. Perthecia black. Perthecial phialophores absent. Paraphysis persistant, more or less cylindrical, septate, often in pairs on a short basal cell, 3–5 µm wide towards the base, tapering to 2–3 µm at the rounded apex. Asci obovoid, and eight spored, upto 45µm long; ascospores ellipsoidal, brown, 3-septate, scarsely constricted at the septa, 20–36x7–11 µm. Polar caps hyaline.

Image 11. *Meliolina pulcherrima*-Infected leaves

Order Asterinales

Leaf parasites. Mycelium ectophytic, with or without appressoria, nutrient mycelium and leaf permeating stroma present. Ascomata ectophytic, dimidiate, orbicular, elliptic, elongated, X or Y shaped, with radiating cells, astomatous, orbicular thyriothecia dehisce stellately at the center, elliptic, elongated, X or Y-shaped thyriothecia dehisce vertically with a central suture; asci globose, spherical, oval or rarely cylindrical, octosporous, bitunicate; ascospores two to many septate, conglobate, hyaline, brown at maturity.

Type Family: Asterinaceae.

Key to the families of the order Asterinales

1. Thyriothecia orbicular, dehisce stellately at the center .....Asterinaceae

1. Thyriothecia oval to elongated, X or Y shaped, dehisce longitudinally at the center..... .....Lembosiaceae

The family Asterinaceae

Asterinaceae Hansf., Mycol. Pap. 15: 189, 1946; Arx & Muller, Stud. Mycol. 9: 40, 1975; Hosag., Abraham & C.K. Biju, J. Mycopathol. Res. 39: 62, 2001; Hosag., Mycosphere 2(5): 625, 2012.

Leaf parasites. Mycelium ectophytic, with or without appressoria, nutrient mycelium and leaf permeating stroma present. Ascomata ectophytic, dimidiate, orbicular with radiating cells, astomatous, dehisce stellately at the center; asci globose, spherical, octosporous, bitunicate; ascospores two to many septate, conglobate, hyaline to brown.

Type Genus: *Asterina* Lev.

KEY TO THE GENERA

1. Appressoria present.....2
1. Appressoria absent.....*Prillieuxina*
2. Appressoria in clusters.....*Ishwaramyces*
2. Appressoria not so.....4
3. Ascospores two septate and one cell taper..... .....*Meliolaster*
3. Ascospores not so.....
4. Appressoria intercalary.....*Asterolibertia*
4. Appressoria lateral.....*Asterina*

The genus *Asterina*

Asterina Lev., Ann. Sci. Nat. Bot. Ser., 3(3):57, 1845; Hansf., Mycol. Pap. 15: 189, 1946b; Arx & Muller, Stud.

Mycol. 9: 42, 1975; Hosag., Abraham & C.K. Biju, J. Mycopathol. Res. 39: 62, 2001; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala, p. 32, 2011; Hosag., Mycosphere 2(5): 632, 2012.

Dimerosporium Fuckel, Symb. Mycol. p. 86, 1870.

Asterella (Sacc.) Speg. ex Sacc., Syll. Fung. 9: 393, 1891 *non* P. de Beauvois 1805.

Myxasterina Hohnel, Sber. Akad. Wiss. Wien 118: 870, 1909.

Englerulaster Hohnel, Sber. Akad. Wiss. Wien 119: 454, 1910.

Parasterina Theiss., Sydow & Sydow, Ann. Mycol. 15: 246, 1917.

Calothyriolum Speg., Boln Acad. nac. Cien. Cordoba 23: 498, 1919.

Opeasterina Speg., Boln Acad. nac. Cien. Cordoba 23: 498, 1919.

Englera F. Stev. in Stev. & Ryan, Illinois. Biol. Monogr. 17: 45, 1939.

Leaf parasites. Mycelium ectophytic, appressoria lateral, setae absent. Thyriothecia orbicular with radiating cells, astomatous, dehisce stellately at the center; asci globose, octosporous, bitunicate; ascospores conglobate, uniseptate, brown.

Type sp.: *A. melastomatis* Lév.

Anamorphs: *Asterostomella* Speg., *Clasterosporium* Schwein, *Mahanteshamyces* Hosag.

KEY TO THE SPECIES

(Based on host families)

Acanthaceae

Asterina

1. Appressoria entire.....*Asterina betonicae*
1. Appressoria lobed.....*Asterina tertia*

Alangiaceae

Asterina

Single species.....*Asterina perpusilla*

Aristolochiaceae

Asterina

Single species.....*Asterina thotteae*

Asclepiacaceae

Asterina

1. On *Wattakakka*.....*Asterina travancorensis*
1. On *Gymnema*.....*Asterina gymnemae*

Caprifoliaceae

Asterina

Single species.....*Asterina viburnicola*

Celastraceae

Asterina

Single species.....*Asterina microtropidicola*

Chloranthaceae

Asterina

Single species.....*Asterina sarcandrae*

Dipterocarpaceae

Asterolibertia

On *Vateria*.....*Asterolibertia vateriae*

Elaeocarpaceae

Asterina

1. Appressoria ovate, oblong, ascospores less than 30µm long.....*Asterina elaeocarpi* var. *ovalis*
1. Appressoria ovate, conoid, rounded at the apex, ascospores more than 30 µm long.....*Asterina gamsii*

Erythropalaceae

Asterina

Single species.....*Asterina erythropalicola*

Euphorbiaceae

Asterina

On *Aporusa*.....*Asterina aporusae*

On *Glochidion*.....*Asterina lobulifera* Sydow var. *indica*

Meliolaster

Single species.....*Meliolaster aporusae*

Flacourtiaceae

Single species.....*Asterina arkemibeyi*

Ishwaramyces

Single species.....*Ishwaramyces flacourtiae*

Gentianaceae

Asterina

Single species.....*Asterina enicostematis*

Lauraceae

Asterina

1. On *Cryptocarya*.....*Asterina cryptocariicola*
1. On *Litsea*.....*Asterina litseae-ligustrinae*

Loranthaceae

Asterina

Single species.....*Asterina deightonii*

Prillieuxina

Single species.....*Prillieuxina anamirtae*

Magnoliaceae

Asterina

1. Ascospores 22–25x10–13 µm .....*Asterina micheliifolia*
1. Ascospores 25–33x15–18 µm.....

.....*Asterina micheliigena*

Malvaceae

Asterina

Single species.....*Asterina hibisci*

Melastomataceae

Asterina

Single species.....*Asterina memecylonis*

Meliaceae

Asterina

1. On *cipadessa*.....*Asterina cipadessae*
1. On *Trichilia*.....*Asterina trichiliae*

Myrtaceae

Asterina

1. Appressoria unicellular.....*Asterina claviflori*
1. Appressoria bicellular.....*Asterina jambolana*

Oleaceae

Asterina

1. On *Ligustrum*.....*Asterina ligustricola*
1. On *Jasminum* sp. 2
2. Appressoria opposite and alternate..... .....*Asterina erysiphoides*
2. Appressoria alternate..... .....*Asterina pongalaparensis*

Passifloraceae

Asterina

Single species.....*Asterina adeniicola*

Piperaceae

Asterina

1. On *Lepianthes*.....*Asterina lepianthis*
1. On *Piper*.....*Asterina piperina*

Ranunculaceae

Asterina

Single species.....*Asterina naraveliae*

Rubiaceae

Prillieuxina

Single species.....*Prillieuxina ixorigena*

Rutaceae

Asterina

1. On *Acronychia*.....*Asterina acronychiae*
1. On other hosts.....2.
2. Appressoria alternate and about 10–12% opposite, on *clausena*.....*Asterina clausenicola*
2. Appressoria not so.....3
3. Appressoria alternate to unilateral..... .....*Asterina toddaliae*
3. Appressoria not so.....4
4. Ascospores conglobate, 25-28x14-18 µm..... .....*Asterina glycosmidis*
4. Ascospores oblong, conglobate 14–19x7–10 µm .....*Asterina glycosmidigena*

Sabiaceae

Asterina

Single species.....*Asterina sabiacearum*

Santalaceae

Asterina

Single species.....*Asterina congesta*

Symplocaceae

Asterina

Single species.....*Asterina indica*

Tiliaceae

Asterina

Single species.....*Asterina triumfetticola*

Ulmaceae

Asterina

Single species.....*Asterina dallasica*

Verbenaceae

Asterina

Single species.....*Asterina pusilla*

Description to species

Asterina acronychiae Hosag. & Goos, Mycotaxon 59: 150, 1996; Hosag., H. Biju & Appaiah, J. Mycopathol. Res. 44: 5, 2006; Hosag., Chandra. & Agarwal, Asterinales of Kerala, p. 32, 2011; Hosag., Mycosphere 2(5): 632, 2012. (Fig. 129).

Materials examined: HCIO 45148, TBGT 1203, 19.xi.1999, on leaves of *Acronychia pedunculata* (L.) Miq. (Rutaceae), Banasuranmala, coll. C.K. Biju; HCIO 48324, TBGT 2972, 10.xi.2007, *Acronychia* sp. Padinharathara, coll. M.C. Riju; HCIO 45202, TBGT 1238, 16.iv.1999, *Acronychia laurifolia* Blume, Banasuran mala, coll. C.K. Biju.

Colonies epiphyllous, dense, crustose, up to 3 mm in diameter, confluent. Hyphae straight to substraight, branching opposite at acute angles, loosely reticulate, cells 13–21×3–7 µm. Appressoria mostly opposite, rarely solitary, unicellular, ovate, oblong, entire, angular to slightly lobate, 6–9x5–8 µm. Thyriothecia scattered, orbicular, up to 132µm in diameter; margin fringed, stellately dehisced at the centre; asci numerous, globose, octosporous, 35–42 µm in diameter; ascospores brown, conglobate, uniseptate, deeply constricted at the septum, 20–24x9–12 µm, wall minutely echinulate.

Asterina adeniicola Hosag. & Kamar., Zoos print J. 21: 2303, 2006; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala, p.35, 2011; Hosag., Mycosphere 2(5): 633, 2012 (Fig. 130)

Materials examined: HCIO 44792 (holotype),

TBGT 1029 (isotype), 17.xii.2002, on leaves of *Adenia hondala* (Gaertn.) Wilde (Passifloraceae), Periya, coll. M. Kamarudeen.

Colonies epiphyllous, dense, crustose, up to 1mm in diameter, confluent. Hyphae strongly flexuous to rarely crooked, branching alternate to irregular at acute to wide angles,loosely to closely reticulate, cells 11–15x4–7 µm. Appressoria alternate, about 3% opposite, unicellular, globose, ovate, sessile to slightly stipitate, mostly 2–3-lobate, often angular to rarely entire, 6–9x6–8 µm. Thyriothecia loosely scattered to connate at the centre of the colony, orbicular, stellately dehisced at the centre, up to 75µm in diameter, margin crenate; asci few, globose, octosporous, up to 30µm in diameter; ascospores oblong, conglobate, uniseptate, slightly constricted at the septum, lower cell slightly larger, 14–16x6–8 µm, wall smooth.

The released ascospores readily germinated and formed colonies. *Asterina adeniae* Hansf. is known on *Adenia lobata* from Uganda (Hansford, 1945). However, *Asterina adeniicola* differs from it in having dense and crustose colonies, 3% opposite and smaller appressoria, smaller thyriothecia and shorter ascospores.

Asterina aporusae Hansf., Reinwardtia 3: 129, 1954; Hosag. & Agarwal, Indian Phytopath. 56: 98, 2003; Hosag. & Appaiah, J. Mycopathol. Res. 43:168, 2005; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala, p. 37, 2011; Hosag., Mycosphere 2(5): 636, 2012 (Fig. 131).

Materials examined: HCIO 49219, TBGT 3458, 15.ii.2009, on leaves of *Aporusa lindleyana* (Wight) Baill. (Euphorbiaceae), Begur, coll. Jacob Thomas et al.; HCIO 49633, TBGT 3875, 17.ix.2008, Periya, coll. M.Harish & P.J. Robin; HCIO 50377, TBGT 4294, 4.xi.2009, Padinharathara, coll. A. Sabeena & M. C. Riju.

Colonies amphigenous, minute, thin, up to 2mm in diameter, confluent. Hyphae straight, flexuous to crooked, branching alternate, opposite to irregular at acute angles, loosely to closely reticulate, cells 10–12x3–5 µm. Appressoria opposite, subopposite, unilateral to rarely alternate, cylindrical, ovate, oblong, entire, rounded at the apex, 8–10x3–5 µm. Thyriothecia scattered to grouped, orbicular, up to 160µm in diameter, crenate to slightly fimbriate at the margin, fringed hyphae flexuous and devoid of appressoria, thyriothecia initially longitudinally dehisced but later and frequently stellately dehisced at the centre; asci globose to ovate, octosporous, up to 30µm in diameter; ascospores brown, oblong, conglobate, 1-septate, constricted at the

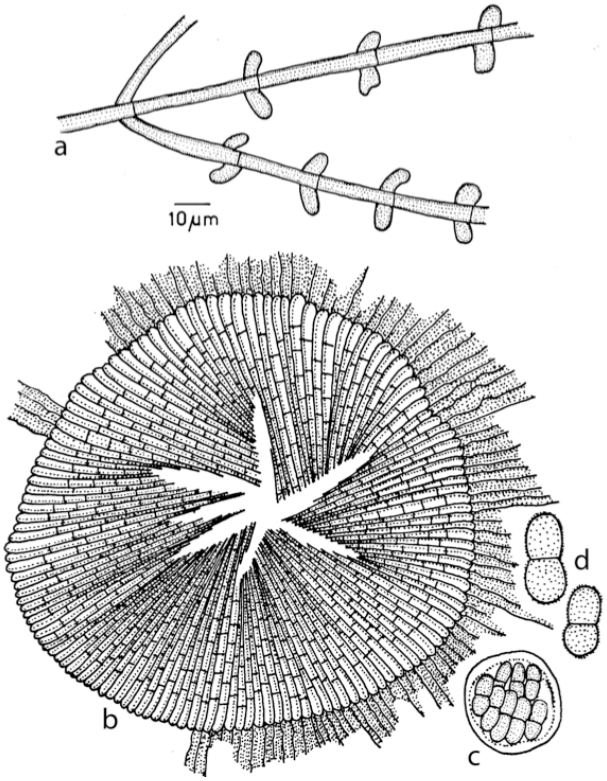


Figure 129. ***Asterina acronychiae***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

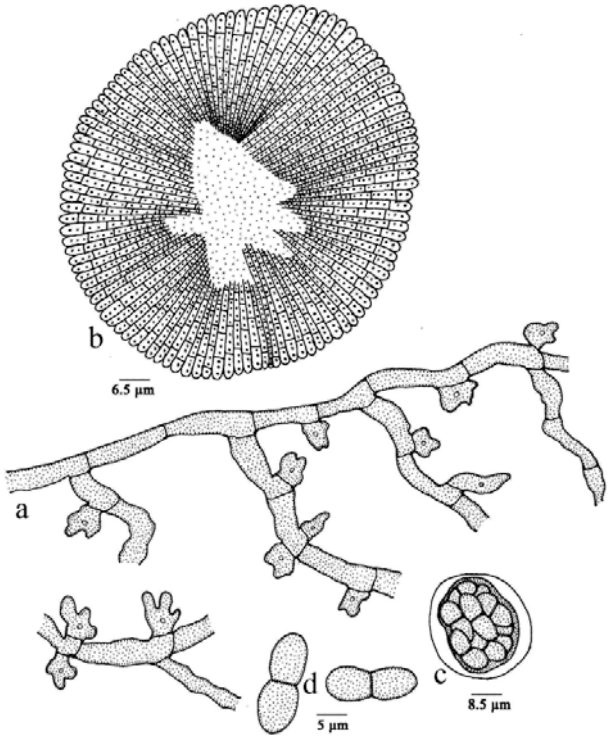


Figure 130. ***Asterina adeniicola***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

septum, 11–13x4–5 µm, wall smooth.

This species is often associated with *Meliolaster aporusae* Hosag. *et al*. but can be distinguished based on the morphology of appressoria and ascospores.

Asterina arkemibeyi Hosag., Sabeena & S.P. Mathew, Journal of Threatened Taxa 5(2): 3670, 2013 (Fig. 132).

Materials examined: TBGT 6648,6.iii.2008, on leaves of *Flacourtia montana* Graham (Flacourtiaceae), Palcherry, coll. P.J. Robin et al.

Colonies hypophyllous, thin to subdense, up to 2mm in diameter, confluent. Hyphae flexuous, branching opposite to alternate at acute to wide angles, loosely reticulate, cells 16–27x3–4 µm. Appressoria unicellular, mostly alternate, often sub-opposite to opposite, narrowly ovate, elongated, tubular, entire to sublobate, straight to variously curved, 6–13x3–5 µm. Thyriothecia scattered to connate, orbicular, up to 130µm in diameter, margin crenate to fimbriate, stellately dehisced at the centre; asci, octosporous, globose, up to 30µm in diameter; ascospores, conglobate, 1-septate, constricted at the septum, 17–20x7–10 µm, wall smooth.

Hofmann & Piepenbring (2008) showed the connection between *Mahanteshamyces* (Hosag.) and *Asterina* Lév. The former genus is an anamorph of the latter. The present collection reveals both anamorph and teleomorph in the same colonies**,** which supports and confirms the observations of Hofmann & Piepenbring (2008). The teleomorph belongs to the genus *Asterina* and differs from the all known *Asterina* species on the members of the family Flacourtiaceae in having ovate, elongated, tubular, entire to sublobate and straight to variously curved appressoria (Hosagoudar & Abraham 2000; Hosagoudar 2012).

Asterina betonicae Hosag. & Goos, Mycotaxon 59: 153, 1996; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala, p.46, 2011; Hosag., Mycosphere 2(5): 644, 2012 (Fig. 133).

Materials examined: HCIO 48237, TBGT 2975, 1.xi.2007, on leaves of *Justicia betonica* L. (Acanthaceae), Pakshipathalam, coll. A. Chandraprabha.

Colonies epiphyllous, thin to subdense, up to 2mm in diameter, rarely confluent. Hyphae straight to substraight, branching opposite to irregular at acute to wide angles, loosely reticulate, cells 12–25x5–7 µm. Appressoria alternate, about 30% opposite, unicellular, ovate, mammiform, seated on broad base, sessile, entire, 6–10x4–6 µm. Thyriothecia loosely scattered, orbicular, up to 220µm in diameter, margin crenate to

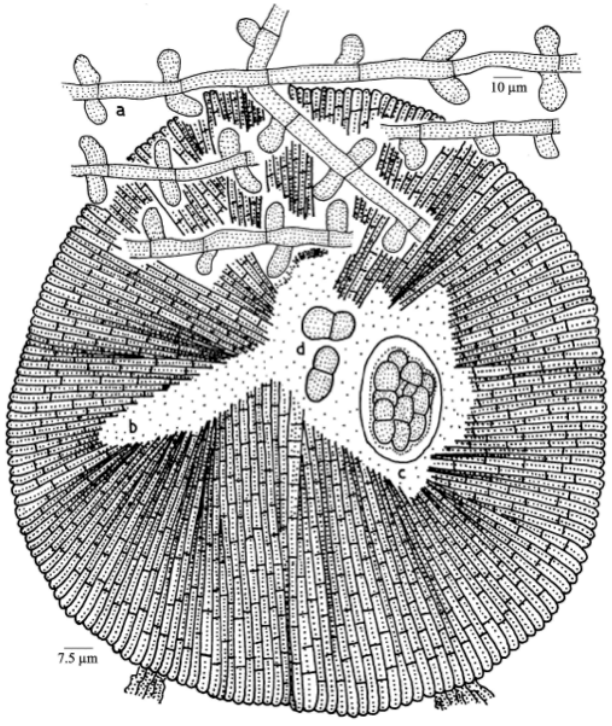


Figure 131. ***Asterina aporusae***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

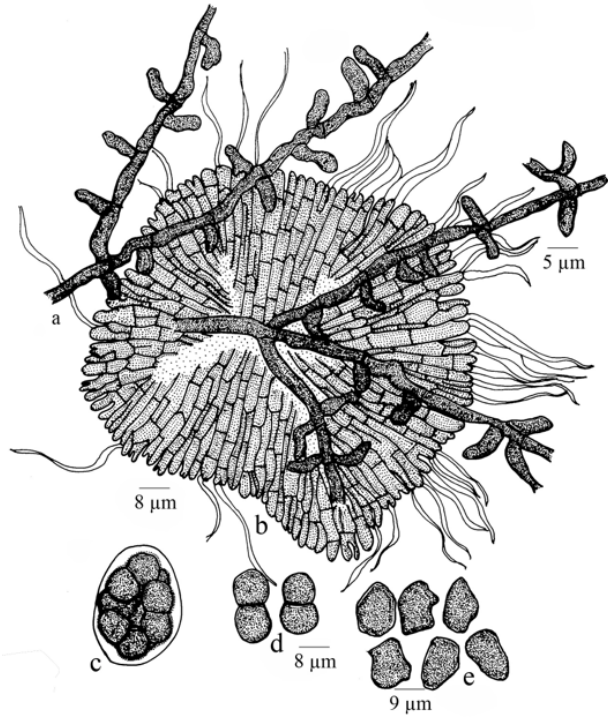


Figure-132. ***Asterina arkemibeyi***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores; e - Pycnothyriospores

fimbriate, fringed hyphae flexuous, dehisced stellately at the centre; asci many, octosporous, globose, 31–35 µm in diameter; ascospores brown, conglobate, 1-septate, 15–19x9–10 µm, wall smooth.

Alternate, opposite and entire head cells of the appressoria distinguishes this species from the other *Asterina* species reported on the members of the family Acanthaceae.

Asterina cipadessae Yates, Philippine J. Sci. 12: 371, 1917; Hosag., Balakr. & Goos, Mycotaxon 60: 172, 1996; Hosag. & Abraham, J. Econ. Taxon. Bot. 4: 574, 2000; Hosag., Zoos' Print J. 18: 1283, 2003; 21: 2326, 2006; Hosag., H. Biju & Appaiah, J. Mycopathol. Res. 44: 6, 2006; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala, p.51, 2011; Hosag., Mycosphere 2(5): 654, 2012.

Parasterina cipadessae (Yates) Mendoza, Philippine J. Sci. 49: 446, 1932 (Fig. 134).

Materials examined: HCIO 49207, TBGT 3446; HCIO 49208, TBGT 3447, 15.ii.2009, on leaves of *Cipadessa baccifera* (Roth.) Miq. (Meliaceae), Begur, coll. Jacob Thomas et al.; HCIO 49221, TBGT 3460, 14.ii.2009, Thirunelly, coll. Jacob Thomas et al HCIO 50356, TBGT 4273, 6.xi.2009, Padinharathara, coll. A. Sabeena & M.C. Riju; TBGT 5724, 23.iii.2008, Padinharathara, coll. M.C. Riju.

Colonies epiphyllous, dense, up to 2mm in diameter, confluent. Hyphae straight, flexuous to crooked, branching mostly opposite at acute angles loosely to closely reticulate, cells 12–34x4–6 µm. Appressoria alternate and opposite, sessile, entire to mostly lobate, 9–13×7–10 µm. Thyriothecia scattered to grouped, often connate, orbicular, up to 202µm in diameter, dehisce stellately at the center, margin crenate, rarely slightly fimbriate; asci many, ovate to globose, eight spored, 30–44x30–35 µm; ascospores conglobate, deep brown, 1-septate, slightly constricted at the septum, 24–28x12–15 µm, upper cell ovate and lower cell globose, wall smooth. Pycnothyria many, similar to the thyriothecia, smaller; pycnothyriospores brown, ovoid to pyriform, 12–16x4–7 µm.

This is the only species known on this host and is common in the Southern Western Ghats.

Asterina clausenicola Doidge, Trans. Royal Soc. South Africa 8: 263, 1920; Hosag., Indian J. Forestry 18: 274, 1995; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala, p. 52, 2011; Hosag., Mycosphere 2(5): 656, 2012 (Fig. 135).

Materials examined: HCIO 44550, TBGT 836, 8.i.2001, on leaves of *Melicope lunu-ankenda* (Gaertn.) T. Hartley (*Euodia lunu-ankenda* (Gaertn.) Merr. (Rutaceae), Periya, coll. M. Kamarudeen.

Colonies epiphyllous, dense to subdense, crustose, up to 3mm in diameter, rarely confluent. Hyphae substraight to flexuous, branching mostly opposite at acute angles, loosely reticulate, cells 18–31x3–5 µm. Appressoria alternate and about 12% opposite, straight to curved, oblong to globose, unicellular, entire and bluntly conoid towards the apex, uni-to multilobate, 6–13x4–8 µm. Thyriothecia scattered, rarely 2–3 connate, roughly circular in outline, up to 125µm in diameter, margin crenate to fimbriate, fringed hyphae flexuous, stellately dehisced at the center; asci globose, rarely ovate or oblong, hexasporous, 30–38 µm in diameter; ascospores brown, conglobate, oblong, 1-septate, strongly constricted at the septum, rounded at both ends, 18–22x10–12.5 µm, wall smooth.

This species was recorded on *Clausena anisata* from South Africa (Doidge, 1942).

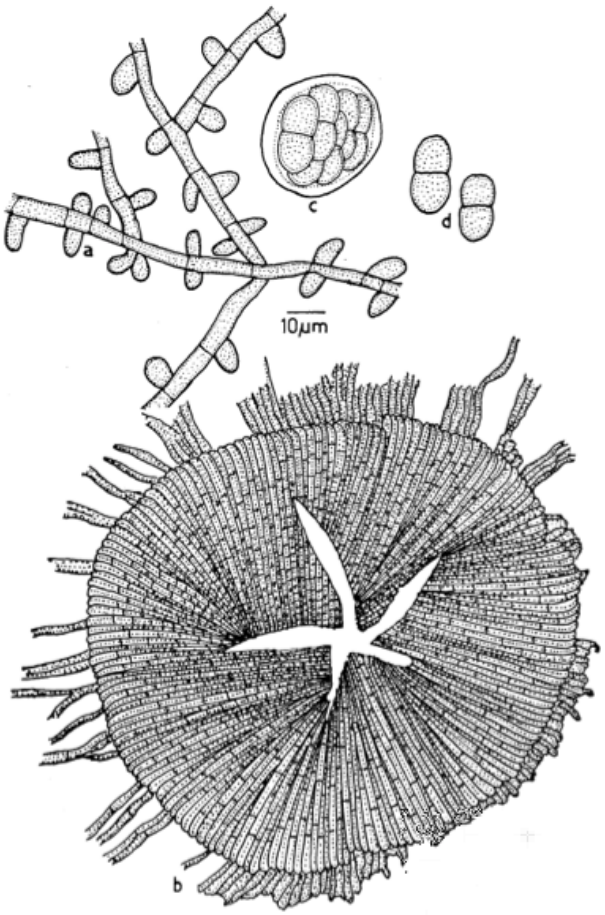


Figure 133. *Asterina betonicae*
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

Asterina claviflori Kar & Maity, Trans. Brit. Mycol. Soc. 54: 441, 1970; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p.54, 2011; Hosag., Mycosphere 2(5): 657, 2012 (Fig. 136).

Materials examined: HCIO 50725, TBGT 4642, 8.xii.2009, on leaves of *Syzygium cumini* (L.) Skeels (Myrtaceae), Chunkathara, coll. Sam P. Mathew; HCIO 50747, TBGT 4664, 5.xi.2009; HCIO 51066, TBGT 4983, 6.xii.2006, HCIO 49759, TBGT 3911, *Syzygium* sp., Gurukulam Botanical Garden, Periya, coll. M.C. Riju & A. Sabeena et al.; TBGT 3934, 13.ii.2009, Thirunelly, coll. Jacob Thomas et al.; HCIO 49808, TBGT 3960, 15.ix.2008, Periya, coll. Robin et al.; HCIO 49971, TBGT 4123, 14.iii.2007, Puthuserrykadavu, coll. M.C. Riju; HCIO 50030, TBGT 4182, 6.ix.2006, Periya, coll. Gireesh et al.

Colonies epiphyllous, dense, up to 2mm in diameter, confluent. Hyphae flexuous, branching alternate to irregular at acute to wide angles, loosely reticulate, cells 25–32x4–8 µm. Appressoria alternate to unilateral, unicellular, ovate, oblong, cylindrical, antrorse to retrorse, straight to curved, entire, 9–18x6–8 µm. Thyriothecia scattered, rarely connate, orbicular, up to 250µm in diameter, margin fimbriate, fringed hyphae flexuous, stellately dehisced at the centre; asci few to many, ovate to globose, octosporous, 30–45 µm in diameter; ascospores oblong, brown, conglobate, uniseptate, constricted at the septum, 14–18x11–13 µm, wall smooth to slightly verrucose.

About 30 species of the genus *Asterina* are known on the members of the family Myrtaceae. The unicellular appressoria matches with the assigned species. However, revision of this on Myrtaceae is needed.

Asterina congesta Cooke, Grevillea 8: 95, 1879; Hansf. & Thirum., Farlowia 3: 305, 1948; Hosag., Balakr. & Goos, Mycotaxon 59: 172, 1996; Hosag. Krishnan & Abraham, New Botanist 24: 28, 1997; Hosag.,

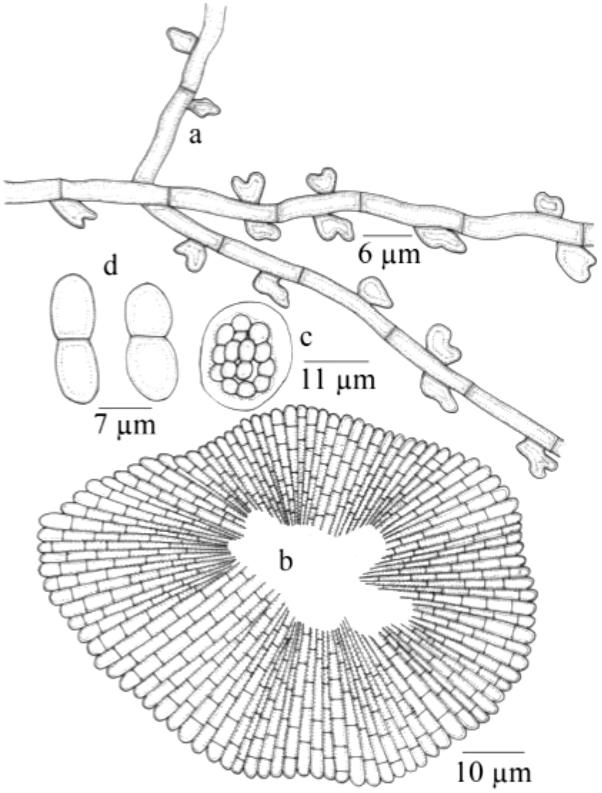


Figure 134. ***Asterina cipadessae***
a- Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

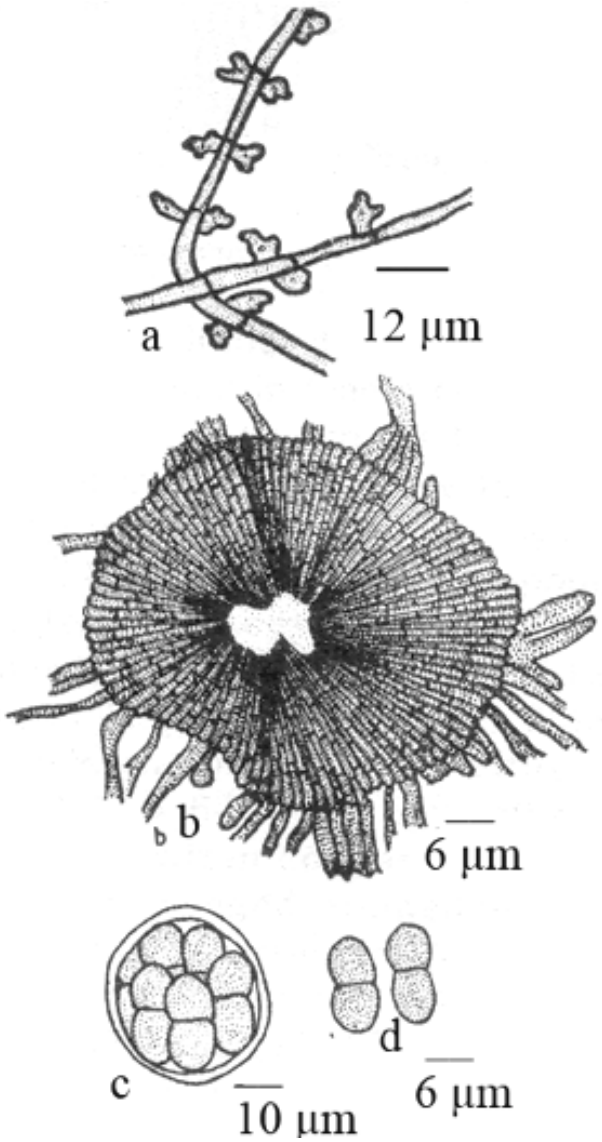


Figure 135. ***Asterina clausenicola***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

Chandraprabha & Agarwal, Asterinales of Kerala**,** p.57, 2011; Hosag., Mycosphere 2(5): 661, 2012 (Fig. 137).

Materials examined: HCIO 49805, TBGT 3957, 15.ix.2008. on leaves of *Santalum* sp. (Santalaceae), Thirunelly, coll. Robin et al.; HCIO 50013, TBGT 4165, 20.ix.2008, Pulpally, coll. Gireesh et al.; HCIO 48302, TBGT 3023, 30.x.2007, Thirunelly, coll. A. Chandraprabha.

Colonies initially epiphyllous, later on both surfaces of the leaves, caulicolous, often on tender stems, form a coating of black mat and are confluent. Hyphae straight to crooked, cells 10–15x4–6 µm. Appressoria alternate to unilateral, unicellular, ovate to cylindrical, straight to curved, entire to sinuately lobate, 5–10x4–5 µm. Thyriothecia scattered, loosely aggregated, often coalesced, up to 130µm in diameter; asci many, aparaphysate, globose, octosporous, bitunicate, 35–45x28–40 µm; ascospores oblong, conglobate, uniseptate, slightly constricted at the septum, 13–26x9–11 µm, wall smooth. Pycnothyria scattered to connate, orbicular, up to 100µm in diameter, crenate to fimbriate at the margin, stellately dehisced at the centre; Pycnothyriospores pyriform to obpyriform, cinnamon brown, 17–20x8–10 µm, wall smooth, often with a single hyaline band at the middle.

This fungus is very common throughout the Western Ghats of Peninsular India. Hansford & Thirumalachar (1948) reported this species from Karnataka. Further, this is the first species of the genus *Asterina* known from India (Cooke, 1884).

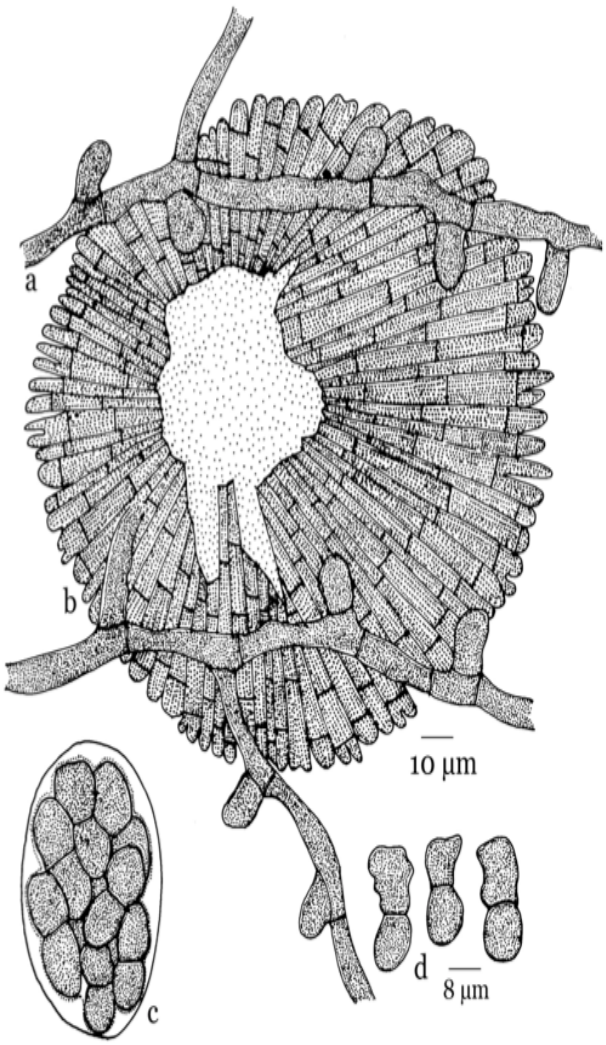


Figure 136. ***Asterina claviflori***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

Asterina cryptocariicola Hosag., C.K. Biju & Abraham, Indian Phytopath. 54: 137, 2001; J. Mycopathol. Res. 40:195, 2002; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p.59, 2011; Hosag., Mycosphere 2(5): 663, 2012(Fig. 138).

Materials examined: HCIO 49224, TBGT 3463, 16.ii.2009, on leaves of *Litsea floribunda* (Blume) Gamble (Lauraceae), Periya, coll. Jacob Thomas et al.

Colonies amphigenous, dense, up to 4mm in diameter. Hyphae substraight to flexuous, branching mostly opposite at wide angles, loosely reticulate, cells 19–26x3–4 µm. Appressoria scattered, alternate, unicellular, globose to ovoid, entire, 4–7x4–6 µm. Thyriothecia scattered, orbicular, up to 100µm in diameter, stellately dehisced at the center, margin crenate; asci not seen; ascospores oblong, conglobate, brown, uniseptate, constricted at the septum, 12–16x6–8 µm. Wall smooth.

Asterina cryptocaryae Cooke is known on this host genus. After examining the holotype, Stevens & Ryan (1939) transferred it to the genus *Prillieuxina* because of the lack of appressoria. *Asterina woodiana* Doidge is known on this host genus from South Africa. The present species differs from it in having only unicellular appressoria, smaller thyriothecia and ascospores.

Asterina dallasica Petrak, Sydowia 8:14, 1954; Hosag., Riju & Uma Maheswari, Indian J. Sci. & Techn. 1:1, 2008; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 60, 2011; Hosag., Mycosphere 2(5): 665, 2012 (Image 12).

Material examined: HCIO 48324, TBGT 3045, 9.xi.2007, on leaves of *Trema orientalis* (L.) Blume (Ulmaceae), Mananthavady, M.C. Riju.

Colonies epiphyllous, scattered, up to 3mm in diameter. Hyphae straight, flexuous to crooked, branching irregular at acute to wide angles, loosely

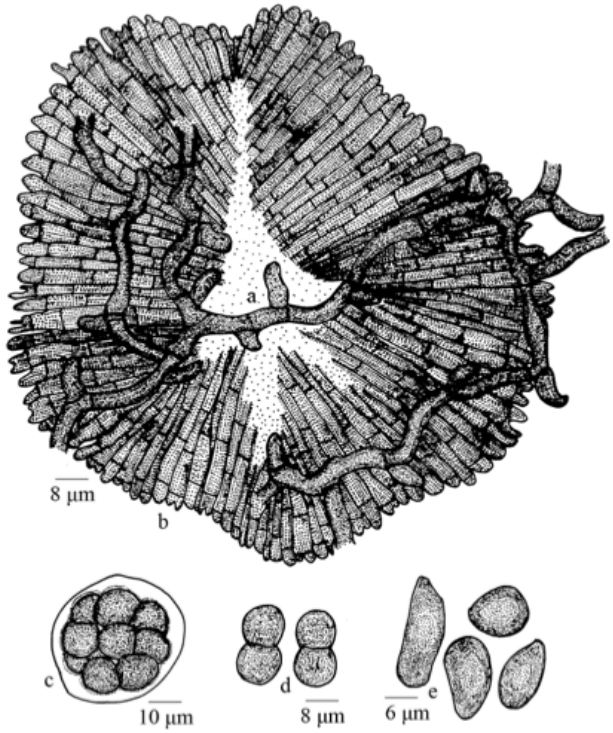


Figure 137. ***Asterina congesta***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores; e. Pycnothyriospores

reticulate, cells 11–26x6–11µm. Appressoria scattered, unicellular, alternate, unilateral, about 2% opposite, antrorse to subantrorse, globose, mammiform, mostly entire, rarely angular to crenately lobate, 6–11x6–11 µm. Thyriothecia closely scattered, orbicular, up to 115µm in diameter, stellately dehisced at the centre, margin fimbriate; asci globose, octosporous, up to 26µm in diameter; ascospores brown, conglobate, uniseptate, constricted at the septum, 17–22x6–11 µm, wall smooth.

Asterina celtidicola Henn., *A. dallasica* Petrak and *A. sponiae* Racib. are known on *Celtis*, *Trema* and *Sponia* species, respectively. *A. dallasica* matches well with that of assigned species. This species was known on *Trema* species from Borneo Islands (Petrak 1954; Hosagoudar & Abraham 2000) and it reveals an affinity between the fungal flora of Wyanad and Borneo Islands.

Asterina deightonii Sydow, Ann. Mycol. 36: 172, 1938; Hosag., C.K. Biju, Abraham & Agarwal, Indian Phytopath. 55: 497, 2002; Hosag., Zoos' Print J. 21: 2326, 2006; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 62, 2011; Hosag., Mycosphere 2(5): 665, 2012 (Fig. 139).

Materials examined: HCIO 49244, TBGT 3483, 12.ii.2009, on leaves of *Loranthus* sp. (Loranthaceae), Thirunelly, coll. Gireesh Kumar et al.

Colonies amphigenous, mostly epiphyllous, thin to subdense, up to 2mm in diameter, rarely confluent. Hyphae substraight to flexuous, branching irregular at acute angles, loosely reticulate, cells 17–21x4–5 µm. Appressoria unicellular, many, alternate, about 1% opposite, globose to ovate, entire, rarely slightly angular, 6–10x5–7 µm. Thyriothecia scattered, often loosely grouped, orbicular, up to 145µm in diameter, margin crenate to fimbriate, fringed hyphae flexuous, stellately dehisced at the centre; asci few to many, globose, octosporous, up to 40µm in diameter; ascospores brown, oblong, conglobate, uniseptate, constricted at the septum, 21–23x11–13 µm; wall glabrous to minutely echinulate. Pycnothyria similar to thyriothecia, smaller; pycnothyriospores few, globose to pyriform, brown, 16–18x12–18 µm, wall smooth.

This species was known on *Loranthus leonensis* from Sierra Leone, collected by F. C. Deighton no. 1378 (Sydow 1938). Hughes (1952) proposed *Asterina aburiensis* and stated that the same fungus is also represented in two of Mr. F. C. Deighton's collections from Sierra Leone.

Asterina elaeocarpi Sydow var. ***ovalis*** Kar & Maity, Indian Phytopath. 39: 218, 1986; Hosag., Balakr. & Goos, Mycotaxon 60: 175, 1996; Hosag., J. Appl. & Nat. Sci. 1(1): 29, 2009; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 68, 2011; Hosag., Mycosphere 2(5): 674, 2012 (Fig. 140).

Materials examined: HCIO 44297, TBGT 622,

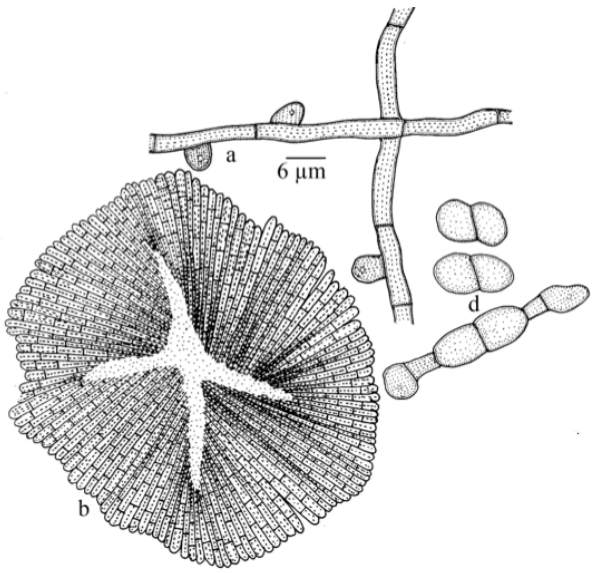


Figure 138. ***Asterina cryptocariicola***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

6.ii.2002, on leaves of *Elaeocarpus tuberculatus* Roxb. (Elaeocarpaceae), Periya, coll. M. Kamarudeen; HCIO 44638, TBGT 920, 20.v.2002, Thirunelly, coll. S. Shiburaj; HCIO 44787, TBGT 1024, 27.xii.2002, Periya, coll. M. Kamarudeen & P.A. Jose; HCIO 48035, TBGT 2818, 6.xii.2006, Mylattumala, coll. M. Harish et al.; HCIO 49245, TBGT 3484, 16.ix.2008, Periya, coll. Harish et al.; HCIO 49815, TBGT 3967, 16.ii.2009, Periya, coll. Gireesh et al.

Colonies epiphyllous, thin to subdense, up to 2mm in diameter, confluent and cover the entire upper surface of the leaves. Hyphae straight to substraight, branching alternate to opposite at acute to wide angles, loosely reticulate, cells 8–13x3–4 µm. Appressoria alternate, opposite to subopposite, ovate to oblong, elongated, unicellular, entire, 4–24x4–5 µm. Thyriothecia scattered to connate, orbicular, up to 160µm in diameter, stellately dehisced at the centre, crenate to fimbriate at the margin, fringed hyphae flexuous; asci few to many, globose to ovate, octosporous, 35–45 µm in diameter; ascospores oblong, conglobate, deep brown, uniseptate, constricted at the septum, 22–24x9–13 µm, wall coarsely echinulate.

This species is very specific and infects this host plant throughout Western Ghats region.

Asterina enicostematis Hosag. & Chandraprabha., Indian J. Sci. & Techn. 2(6):15, 2009 (*enicostematis*); Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 70, 2011; Hosag., Mycosphere 2(5): 677, 2012 (Image.13).

Materials examined: HCIO 48242 (holotype), TBGT 2980 (isotype), 30.x.2007, on the leaves of *Enicostema axillare* (Lam.) A. Raynal. (Gentianaceae), upper peak of Pakshipathalam, coll. A. Chandraprabha.

Colonies amphigenous, dense, up to 3mm in diameter. Hyphae crooked, branching opposite at acute to wide angles, loosely to closely reticulate, cells 18–33x4–7 µm. Appressoria unicellular, alternate, ovate, mammiform, sessile, 7–13x4–9 µm. Thyriothecia scattered, orbicular, up to 132µm in diameter, dehisce stellately at the center, margin crenate to fimbriate; asci globose, octosporous, up to 40µm in diameter; ascospores conglobate, uniseptate, constricted at the septum, 11–20×7–9 µm, wall smooth. Pycnothyria similar to thyriothecia, orbicular, up to 110µm in diameter, margin crenate to fimbriate; pycnothyriospores ovate, pyriform, brown, 9–18x4–13 µm, wall smooth.

Lembosia microtheca Theiss. is known on *Goeppertia* sp. of the family Gentianaceae (Stevens & Ryan 1939) and is the first report of genus *Asterina* on the members of the family Gentianaceae (Hosagoudar & Abraham 2000).

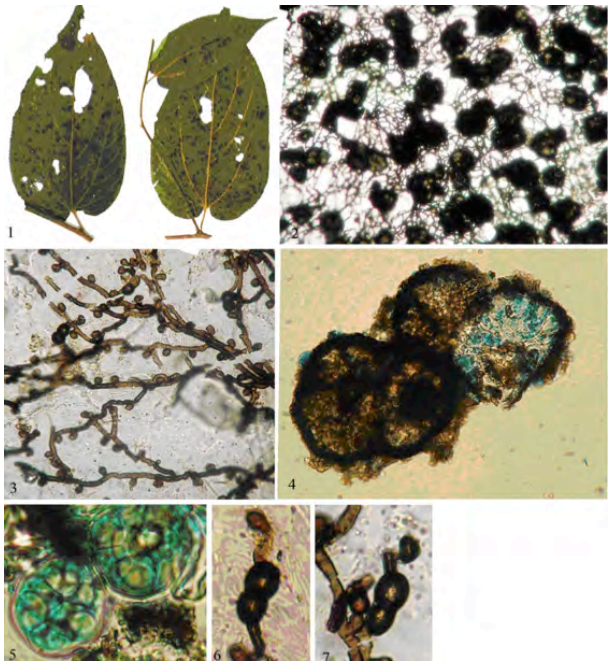


Image 12. *Asterina dallasica*
1 - Infected leaves; 2 - Mycelial colony with thyriothecia; 3 - Appressoriate mycelium; 4 - Asci in exposed thyriothecia; 5 - Globose asci; 6-7 - Germinating ascospores

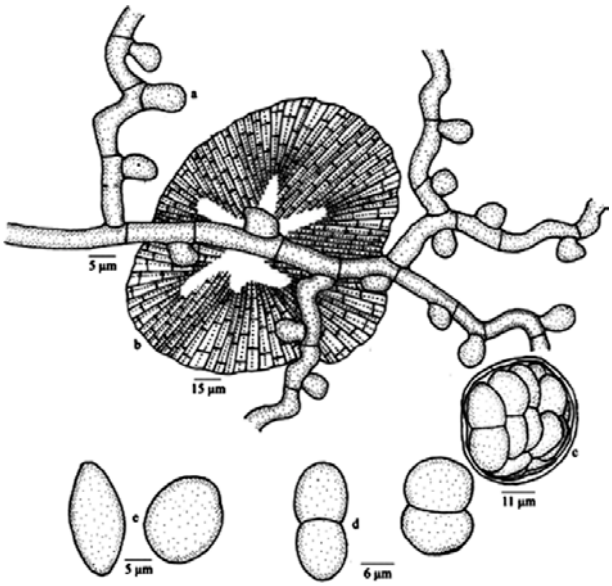


Figure 139. *Asterina deightonii*
a - Appressorium; b - Thyriothecium; c - Ascus; d. Ascospores, e - Pycnothyriospores

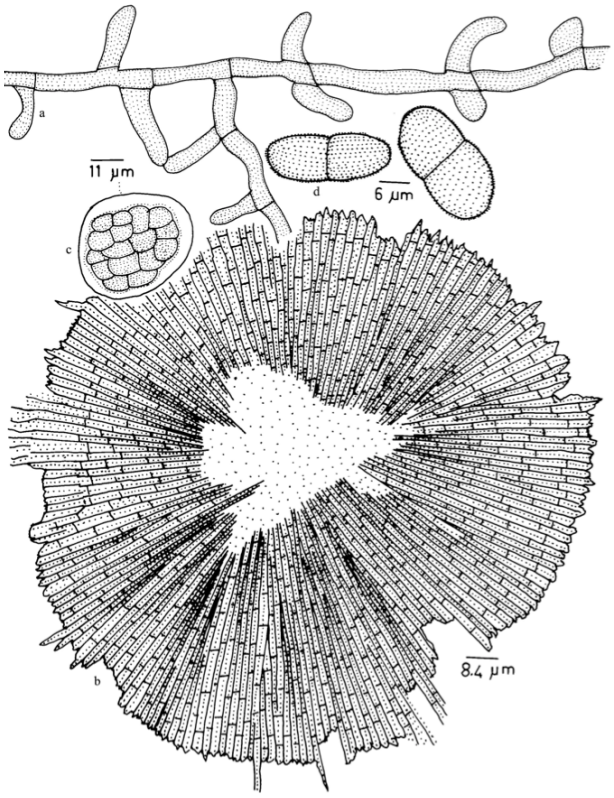


Figure 140. ***Asterina elaeocarpi*** **var.** ***ovalis***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

Asterina erysiphoides Kalch. & Cooke, Grevillea 9: 32, 1880 *emend*. Doidge, Trans. Roy. Soc. South Africa 8: 256, 1920; Hansf. & Thirum., Farlowia 3: 306, 1948; Hosag., Balakr. & Goos, Mycotaxon 59: 175, 1996; Hosag., H. Biju & Appaiah, J. Mycopathol. Res. 44: 7, 2006; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 72, 2011; Hosag., Mycosphere 2(5): 677, 2012 (Fig. 141).

Materials examined: HCIO 45111, TBGT 1166, 16.iv.1999, on leaves of *Jasminum cordifolium* Wallich ex G. Don (Oleaceae*)*, Banasuranmala, coll. C.K. Biju; HCIO, 45082, TBGT 1137, 15.v.1999, *Jasminum* sp., Thirunelli, coll. C.K. Biju; HCIO 48055, TBGT 2838, 6.xii.2006, Periya, Kunkichira, coll. M. Harish et al.; HCIO 49439, TBGT 3684, 15.ii.2009, *Jasminum* sp., Begoor, Harish et al.; TBGT 3701, 10.ix.2008, Thirunelly, coll. P.J. Robin et al.; HCIO 49462, TBGT 3704, 20.ix.2008, Pulpally, coll. P.J. Robin et al.; HCIO 49771, TBGT 3923, 14.ii.2009, Thirunelly, coll. Jacob Thomas et al.; HCIO 49773, TBGT 3925, 12.ii.2009, coll. Jacob Thomas et al.; HCIO 49775, TBGT 3927, TBGT 3936, 15.ii.2009, Jacob Thomas et al.; HCIO 49969, TBGT 4121, 13.iii.2007, Puthuserrykadavu, coll. M.C. Riju; HCIO 50392, TBGT 4309, 8.xii.2009, on *Jasminum malabaricum* Wight, MS Swaminathan Foundation, coll. Sam P. Mathew; HCIO 50711, TBGT 4628, 6.xi.2009, *Jasminum sambac* (L) Aiton, Padinharathara, coll. A. Sabeena & M.C. Riju; HCIO 50841, TBGT 4758, 5.xi.2009, *Jasminum malabaricum* Wight, Gurukulam Botanical Garden, coll. M.C. Riju & A. Sabeena; HCIO 50846, TBGT 4763, 6.ix.2009, *Jasminum cordifolium* Wallich ex G.Don*,* Padinharathara, M.C. Riju & A. Sabeena; HCIO 50848, TBGT 4765, 6.xi.2009, Chennalode, coll. A. Sabeena & M.C. Riju; HCIO 48055, TBGT 2838, 6.xii.2006, *Jasminum* sp.*,* Kunkichira, Periya, coll. M. Harish et al.; HCIO 49442, TBGT 3687, 20.ix.2008, Mananthavady, coll. P.J. Robin et al.; HCIO 49627, TBGT 3869, Pulpally, coll. M. Harish & P.J. Robin; HCIO 49637, TBGT 3879, 17.ix.2008, Periya, coll. M.Harish & P.J. Robin; HCIO 43831, TBGT 373, 19.xi.2000, Banasuranmala, coll. C.K. Biju.

Colonies epiphyllous, dense, up to 2mm in diameter, rarely confluent. Hyphae flexuous to crooked, branching mostly opposite at acute angles, loosely to closely reticulate, cells 18–25x2–5 µm. Appressoria opposite and alternate, antrorse to reflexed, straight to variously curved, 15–20 µm long; stalk cells cylindrical to cuneate, 4–13 µm long; head cells straight to curved, entire to lobate, 6–11x7–10 µm. Thyriothecia numerous, scattered, often confluent, initially closed, stellately dehisced at center at maturity, margin crenate to

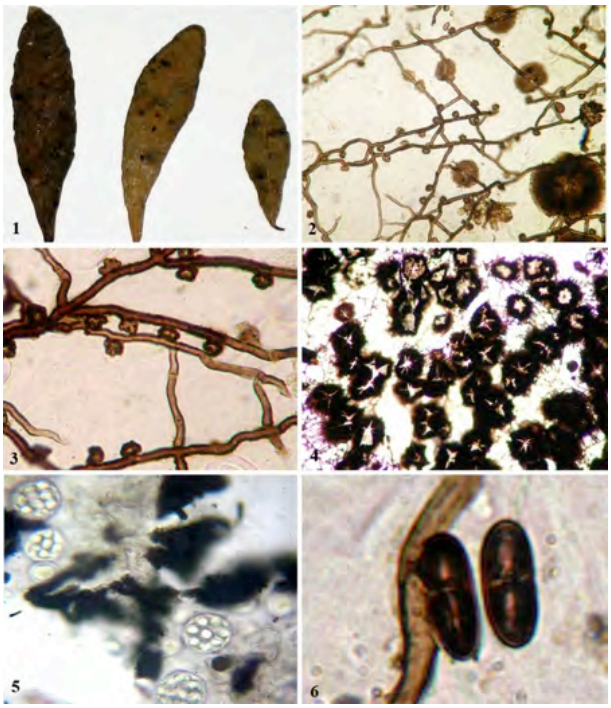


Image 13. ***Asterina enicostematis***
1 - Infected leaves; 2 - Colony with thyriothecia; 3 - Appressoriate mycelium; 4 - Stellately dehisced thyriothecia; 5 - Asci; 6 - Ascospores

fimbriate; asci numerous, ovoid to globose, octosporous, 30–33x27–30 µm; ascospores initially hyaline, brown at maturity, conglobate, oblong, rounded at both ends, 1-septate, constricted at septum, 18–22x9–13µm.

In most of the collections, the colonies were associated with the colonies of *Meliola gemellipoda* Doidge and *Meliola jasminii* Hansf. & Stev.

This species is common in the southern Western Ghats.

Asterina erythropalicola Hosag. & Goos, Mycotaxon 59: 156, 1996; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 73, 2011; Hosag., Mycosphere 2(5): 679, 2012 (Fig. 142).

Materials examined: HCIO 48037, TBGT 2820, 6.xii.2006, on leaves of *Erythropalum populifolium* (Arn.) Masters (Erythropalaceae) Periya, Kunkichira, coll. M. Harish et al.

Colonies epiphyllous, dense, crustose, up to 2mm in diameter, confluent. Hyphae straight to substraight, branching mostly opposite at acute to wide angles, loosely reticulate, cells 21–28x6–8 µm. Appressoria alternate, unilateral, about 30% opposite, subantrorse to perpendicular to the hyphae, mostly straight, 2-celled, 12–22 µm long; stalk cells cylindrical, 3–10 µm long; head cells ovate, globose, entire, rarely truncate, 9–13x6–8 µm. Thyriothecia closely scattered, orbicular, up to 217µm in diameter, margin fringed, rarely crenate, fringed hyphae flexuous, with appressoria, thyriothecia dehisce stellately at the center and widely opened at maturity; asci many, globose, octosporous, 40–46 µm in diameter; ascospores conglobate, 1-septate, constricted at the septum, both cells unequal, 24–28x12–16 µm, wall smooth. Pycnothyria attached or mixed with thyriothecia, slightly smaller; pycnothyriospores oval to pyriform, 18–20x12–14 µm.

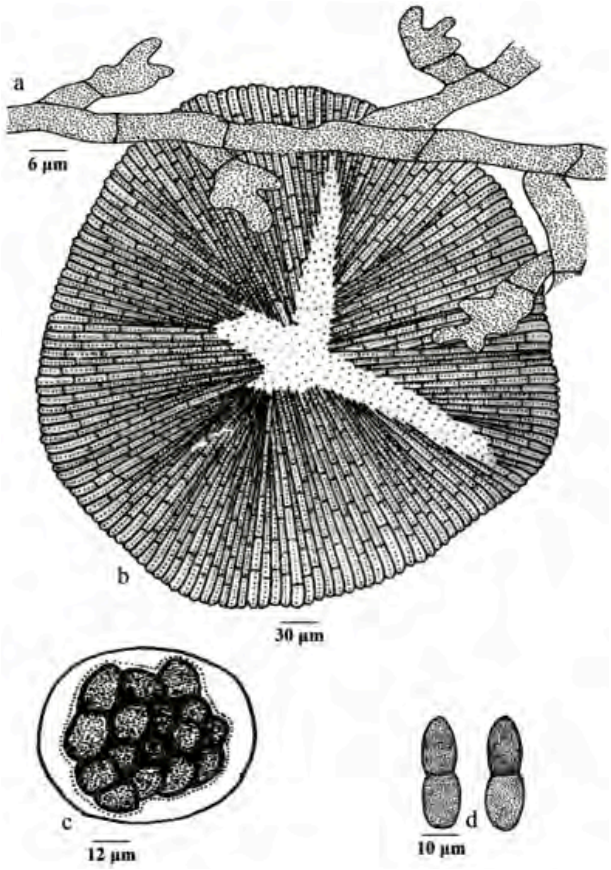


Figure 141. ***Asterina erysiphoides***
a- Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

This species differs from *Asterina erythropali* Hansf. in having epiphyllous colonies and appressoria with entire head cells (Hansford 1954).

Asterina gamsii Hosag. & C.K. Biju in Hosag., Indian Phytopath. 58: 195, 2005; Hosag., J. Appl. & Nat. Sci. 1(1): 27, 2009; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 77, 2011; Hosag., Mycosphere 2(5): 683, 2012 (Fig. 143).

Materials examined: HCIO 45166, TBGT 1221, 19.xi.2000, on leaves of *Elaeocarpus variabilis* Zmarzty (*Elaeocarpus tectorius* (Lour.) Poir.) (Elaeocarpaceae), Banasuran mala, coll. C.K. Biju.

Colonies epiphyllous, dense, velvety, up to 3mm in diameter and cover an entire upper portion of the leaves. Hyphae straight to substraight, branching irregular at acute angles, loosely to closely reticulate, cells 16–23x4–7 µm. Appressoria alternate, unilateral and about 20% opposite to subopposite, mostly straight, subantrorse to rarely retrorse, ovate to cylindrical, entire, rounded at the apex, 8–13x6–8 µm. Thyriothecia closely scattered, orbicular, up to 300µm in diameter, stellately dehisced at the centre, crenate to fimbriate at the margin, fringed hyphae flexuous; asci few to many, globose, octosporous, up to 38µm in diameter; ascospores oblong, brown, uniseptate, constricted at the septum, 32–36x11–18 µm, wall smooth. Pycnothyria similar to thyriothecia, smaller; pycnothyriospores pyriform, apiculate, brown, 22–26x16–18 µm.

There are five species, namely *Asterina borneensis* Hansf., *A. elaeocarpi* Sydow, *A. elaeocarpi* Sydow var. *ovalis* Kar & Ghosh, *A. elaeocarpicola* Hansf. and *A. elaeocarpi kobenmochi* Yamam., known on the members of the family Elaeocarpaceae (Hosagoudar & Abraham 2000). *Asterina gamsii* differs from *A. elaeocarpicola* and *A. borneensis* in having octosporous asci and straight appressoria (Hansford 1954). It differs

from *A. elaeocarpi* in having opposite appressoria and larger ascospores. It also differs from *A. elaeocarpi* var. *ovalis* in having ovate appressoria in contrast to longer and cylindrical ones (Kar & Ghosh, 1986; Hosagoudar, 2009). In *A. elaeocarpi-kobanmochi* appressoria are predominantly opposite and oblong and ascospores are smaller (Yamamoto 1957).

Asterina glycosmidigena Hosag. & JacobThomas, J. Appl. Nat. Sci. 2: 102, 2010; Hosag., Mycosphere 2(5): 686, 2012 (Fig. 144).

Colonies epiphyllous, thin, up to 2mm in diameter, confluent. Hyphae pale brown, straight to slightly crooked, branching irregular at acute to wide angles, loosely reticulate and form a loose mycelial net, cells 12–19x2–5 µm Appressoria sessile, mostly alternate, about 2% opposite, unicellular, ovate, subglobose, irregularly sublobate, entire, 4–10x4–7 µm. Thyriothecia scattered, orbicular, often connate, up to 110µm in diameter, stellately dehisced at the centre, margin crenate; asci globose, octosporous, 50–60 µm in diameter; ascospores oblong, conglobate, brown, uniseptate, strongly constricted at the septum, 14–19x7–10 µm, wall smooth.

Materials examined: TBGT 3669, HCIO 49424, 14.ii.2009, on leaves of *Glycosmis pentaphylla* (Retz.) DC. (Rutaceae), coll. Jacob Thomas et al.

The present species differs from *Asterina glycosimidis* Hosag. & Rajkumar and *A.banguiensis* Yates known on the host genus in having hemispherical, broad based, irregularly sublobate to lobate appressoria (Yates 1918a,b; Hosagoudar 2005).

These colonies were mixed with the colonies of *Meliola* sp.

Asterina glycosmidis Hosag. & Rajkumar in Hosag., Indian Phytopath. 58: 194, 2005; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 80, 2011; Hosag., Mycosphere 2(5): 687, 2012 (Fig. 145).

Materials examined: HCIO 45174 (holotype), TBGT

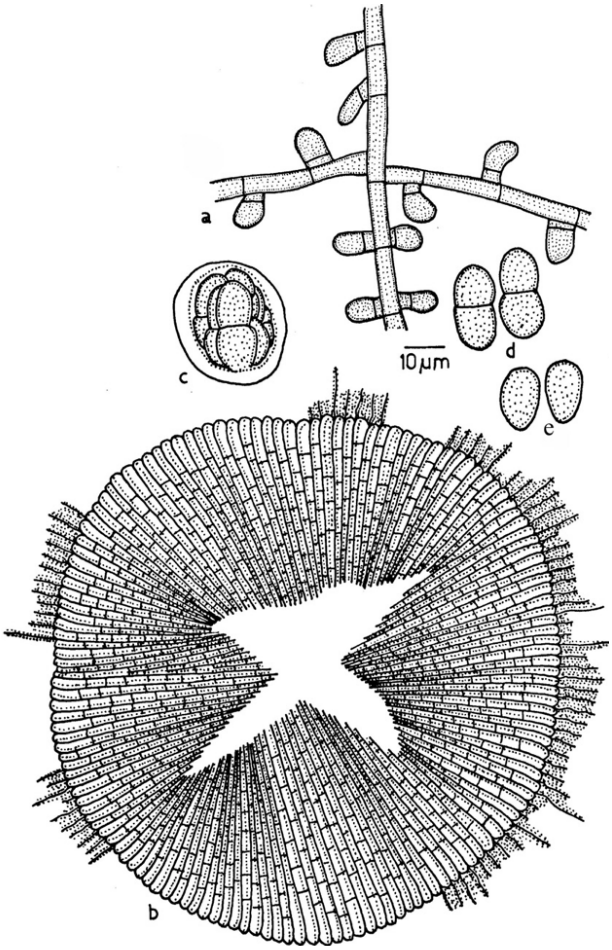


Figure 142. ***Asterina erythropalicola***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

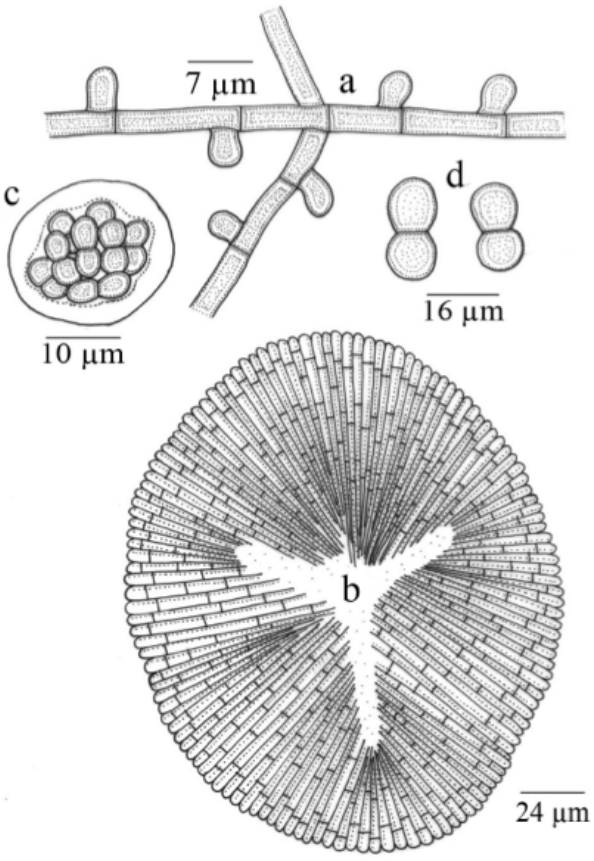


Figure 143. ***Asterina gamsii***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

1335 (isotype), 6.iii.2001, on leaves of *Glycosmis* sp. (Rutaceae), Wayanad, coll. G. Rajkumar.

Colonies mostly epiphyllous, subdense to dense, thinly velvety, up to 2mm in diameter, confluent. Hyphae straight, substraight to flexuous, branching opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 20–26x4–6 µm. Appressoria unicellular, alternate, unilateral, about 40% opposite, ovate, conoid, oblong, often cylindrical, entire to rarely angular to sublobate, 6–13x4–6 µm. Thyriothecia scattered to closely grouped, orbicular, up to 150µm in diameter,margin crenate to fimbriate, fringed hyphae small, stellately dehisced at the centre; asci few, globose, octosporous, up to 30µm in diameter; ascospores conglobate, brown, uniseptate, deeply constricted at the septum, 25–28x14–18 µm, wall smooth.

Asterina banguiensis Yates is known on this host genus from Philippines (Yates, 1918a,b; Hosagoudar & Abraham, 2000). *Asterina glycosmidis* differs from it in having opposite, alternate and unilateral appressoria, differ in the shape of the appressoria, and possessing larger ascospores.

Asterina gymnemae Hosag. & Jacob-Thomas, J. Appl. Nat. Sci. 2: 102, 2010; Hosag., Mycosphere 2(5): 690, 2012 (Fig. 146).

Materials examined: TBGT 3667a (holotype), HCIO 49422a (isotype), 14.ii.2009, on leaves of *Gymnema sylvestre* R.Br. (Asclepiadaceae), Thirunelly, February 14, 2009, coll. Jacob Thomas et al.; HCIO 49803, TBGT 3955, 8.iii.2008, on leaves of Asclepiadaceae member, Periya, coll. P.J. Robin et al.

Colonies epiphyllous, subdense, up to 1mm in diameter, confluent. Hyphae substraight to undulate, branching opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 19–34x2–5 µm. Appressoria alternate, two celled, straight to curved, antrorse, 12–14 µm long; stalk cells cylindrical to cuneate, straight to crooked, 2–5 µm long; head cells ovate, globose, oblong, angular, sublobate to variously lobate, 4–7x4–10 µm. Thyriothecia scattered,

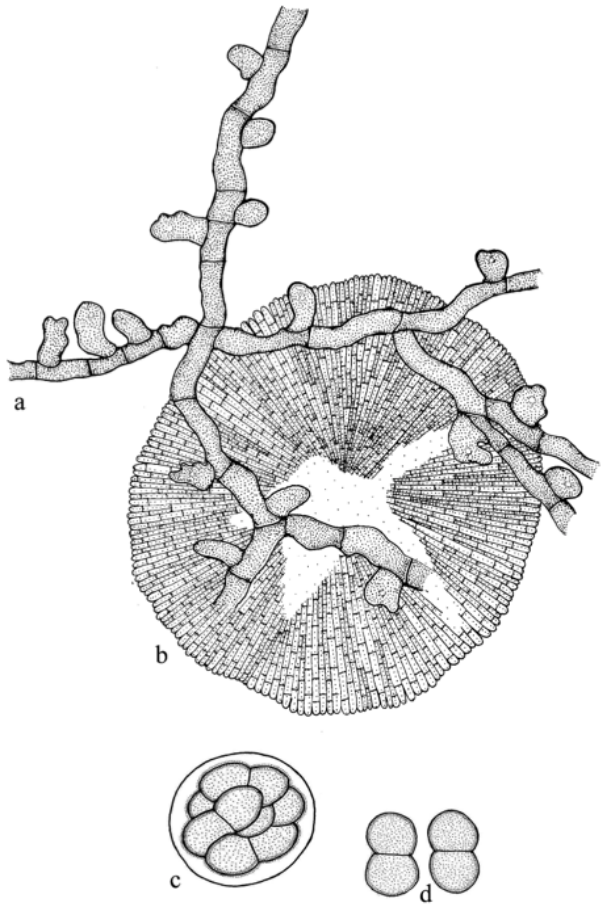


Figure 144. ***Asterina glycosmidigena***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

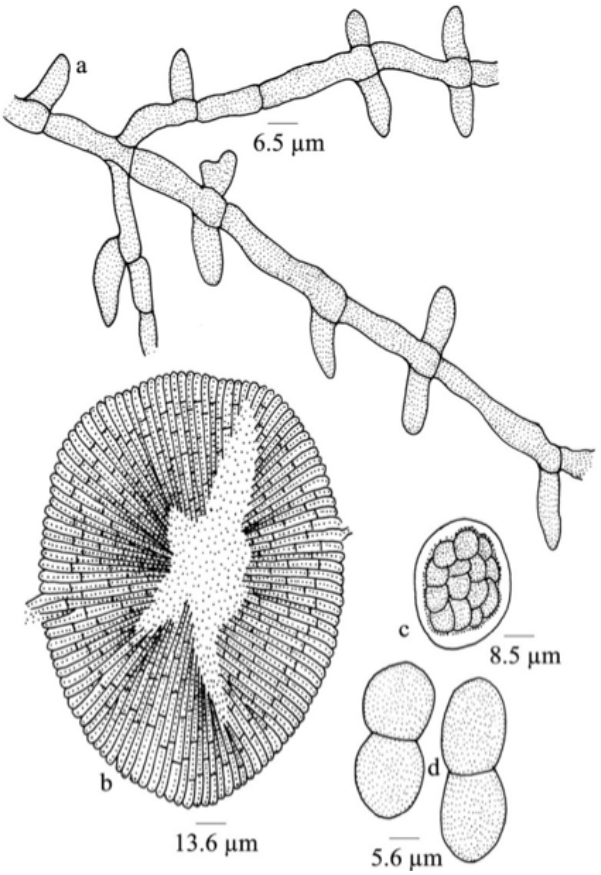


Figure 145. ***Asterina glycosmidis***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

orbicular, up to 150µm in diameter, stellately dehisced at the centre, margin crenate; asci few to many, globose, octosporous, 40–60 µm in diameter; ascospores conglobate, uniseptate, hyaline, constricted at the septum, 16–19x7–10 µm, wall smooth.

There are six species of the genus *Asterina* known on the members of the family Asclepiadaceae, namely, *Asterina asclepiadis* Hosag. & Goos (1996), *A.coccina* Sydow (1930), *A. cynanchi* Hosag. & Shiburaj (Hosagoudar 2002), *A. leonensis* Sydow (1938) and *A. paraffinis* Speg. (Theissen 1913). Based on the character of angular to sublobate head cells and evenly placed appressoria, the present species is closer to *A. cynanchi, A. leonensis* and *A. paraffinis*. However, the present species differs from *A. paraffinis* in having narrow ascospores and from *A. cynanchi* in having longer ascospores. It also differs from *A. leonensis* in having only alternate appressoria.

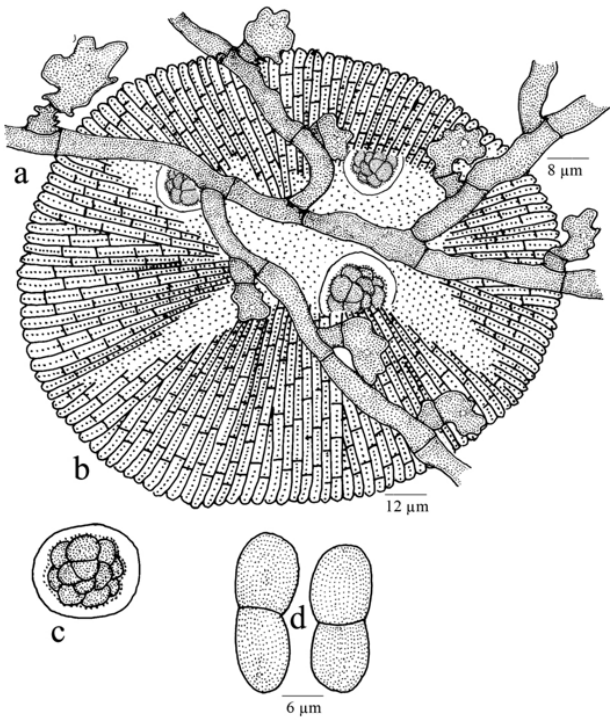


Figure 146. ***Asterina gymnemae***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

Asterina hibisci (Doidge) Hosag. in Hosag., C.K. Biju & Abraham, J. Econ. Taxon. Bot. 28: 175, 2004; Hosag., Zoos' Print J. 21: 2327, 2006; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 88, 201; Hosag., Mycosphere 2(5): 693, 2012.

Asterina diplocarpa Cooke var. *hibisci* Doidge, Botahalia 4: 331, 1942 (Fig. 147).

Material examined: HCIO 45150, TBGT 1205, 2.vi.1999, on leaves of *Symplocos rosea* Bedd. (Symplocaceae), Banasuranmala, coll. C.K. Biju; HCIO 50924, TBGT 4841, 23.xii.2008, *Symplocos* sp.*,* coll. M.C. Riju.

Colonies mostly epiphyllous, thin to subdense, up to 5mm in diameter, confluent and thinly cover an entire upper surface of the leaves. Hyphae substraight to undulate, branching alternate to opposite at acute angles, loosely reticulate, 20–32x2–4 µm. Appressoria unicellular, alternate, scattered, straight to rarely curved, ovate, globose, entire to sublobate, 9–12x4–9 µm. Thyriothecia scattered, orbicular, up to 110µm in diameter, stellately dehisced at the center, margin crenate; asci few to many, mostly globose, octosporous, 25–35 µm in diameter; ascospores brown, conglobate, uniseptate, constricted at the septum, 20–23x9–12 µm., wall verrucose. Pycnothyria few to many, similar but smaller than thyriothecia; pycnothyriospores unicellular, globose to pyriform, brown, 16–18x13–15, wall smooth.

Materials examined: TBGT 4496, 4498, 25.xi.2008, on leaves of *Hibiscus rosa-sinensis* L. (Malvaceae), 16th mile, Padinharathara, coll. M.C. Riju; TBGT 4644, 4.xi.2009, Padinharathara, coll. A. Sabeena & M.C. Riju.

Doidge (1942) distinguished and placed this fungus by giving the status of variety. However, loosely reticulate mycelia, morphologically different and less number of appressoria and distinctly larger ascospores justifies its species status.

Asterina indica Sydow in Sydow, Sydow & Butler, Ann. Mycol. 9: 390, 1911; Patil & Thite, J. Shivaji Univ. 17: 152, 1977; Hosag., Zoos' Print J. 18: 1285, 2003; 21: 2327, 2006; Hosag., H. Biju & Appaiah, J. Mycopathol. Res. 44: 8, 2006; Hosag., Jacob Thomas & Robin, Indian J. Sci. Techn. 2: 2, 2009; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 94, 2011; Hosag., Mycosphere 2(5): 693, 2012 (Fig. 148).

Colonies epiphyllous, thin, up to 2mm in diameter. Hyphae straight to substraight, branching opposite to alternate at acute to wide angles, loosely reticulate, cells 31–38x8–12 µm. Appressoria 95% alternate and 5% opposite, unicellular, slightly antrorse, 14-22x7-10 µm. Thyriothecia scattered, orbicular, up to 72 µm in diameter, stellately dehisced at the centre; ascospores dark brown, 1-septate, constricted at the septum, 38-43x14-19 µm.

Asterina grammocarpa Sydow is known on the host genus *Symplocos. Asterina indica* differs from it in having unicellular appressoria.

Asterina jambolana Kar & Maity, Trans. Brit. Mycol. Soc. 54: 438, 1970; Hosag., Balakr. & Goos, Mycotaxon 59: 180, 1996; Hosag. & Abraham, J. Econ. Taxon. Bot. 4: 576, 2000; Hosag., C.K. Biju & Abraham, J. Econ. Taxon. Bot. 25: 306, 2001; J. Mycopathol. Res. 40:195, 2002; Hosag., Zoos' Print J. 18:1283, 2003; 21: 2327, 2006; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala, p. 96, 2011; Hosag., Mycosphere 2(5): 701, 2012 (Image 14, Fig. 149).

Materials examined: HCIO 42958, TBGT 239, 13.vii.1998, on leaves of *Syzygium* sp. (Myrtaceae), Tirunelly, coll. C.K.Biju.

Colonies amphigenous, mostly epiphyllous, dense, crustose to velvety, up to 2mm in diameter, confluent. Hyphae substraight to flexuous, branching irregular at acute angles, loosely to closely reticulate, cells 25–32x4–7 µm. Appressoria scattered, alternate, unilateral, mostly closely antrorse and appressed to the hyphae, often, curved, subantrorse to spreading, 16–20 µm long; stalk cells cylindrical to cuneate, 6–7 µm long; head cells ovate to globose, straight to slightly curved, entire, 9–13x8–10 µm. Thyriothecia scattered to connate and often fused, orbicular, up to 300µm indiameter, stellately dehisced at the centre, margin crenate to fimbriate, fringed hyphae short; asci globose, octosporous, up to 50µm in diameter; ascospores oblong, conglobate, brown, uniseptate, slightly constricted at the septum, 32–34x13–16 µm.

Kar & Maity (1970) described this species from West Bengal. This is one of the most common species throughout the SouthernWestern Ghats.

Asterina lepianthis (Hosag., Balakr. & Goos) Hosag. in Hosag.,C.K. Biju, Abraham & Agarwal, Indian Phytopath. 55: 498, 2002 (*lepianthedis*); Hosag., Chandraprabha & Agarwal, Asterinales of Kerala, p. 103, 2011; Hosag., Mycosphere 2(5): 708, 2012.

Anamorph: *Asterostomella lepianthedis* Hosag., Balakr. & Goos, Mycotaxon 58: 492, 1996 (Fig. 150).

Materials examined: HCIO 43714, TBGT 364, 8.xii.2000, on leaves of *Lepianthes umbellata* (L.) Rafin. [*Hackeria subpeltata* (Willd.) Kunth] (Piperaceae), coll. M. Kamarudeen.

Colonies amphigenous, mostly epiphyllous, thin to dense, up to 1mm in diameter, confluent. Hyphae straight, flexuous to crooked, branching irregular at acute angles, loosely reticulate, cells 12–33x3–5 µm. Appressoria scattered, alternate to unilateral, straight

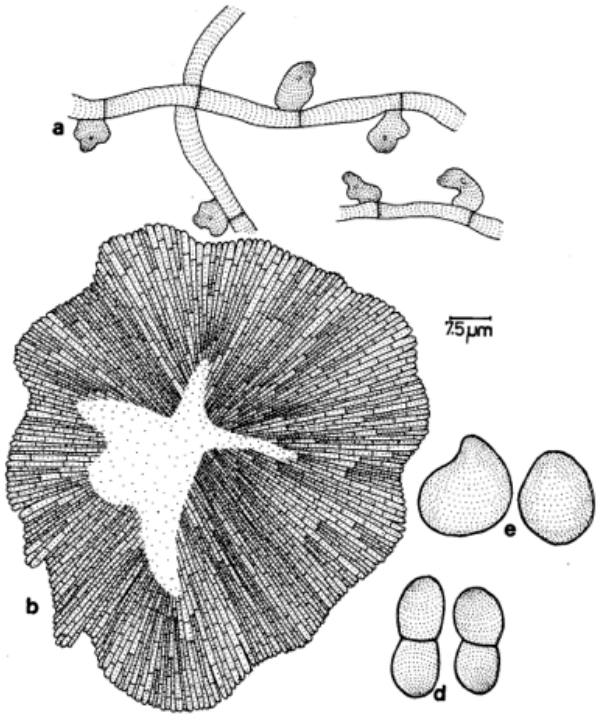


Figure 147. ***Asterina hibisci***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

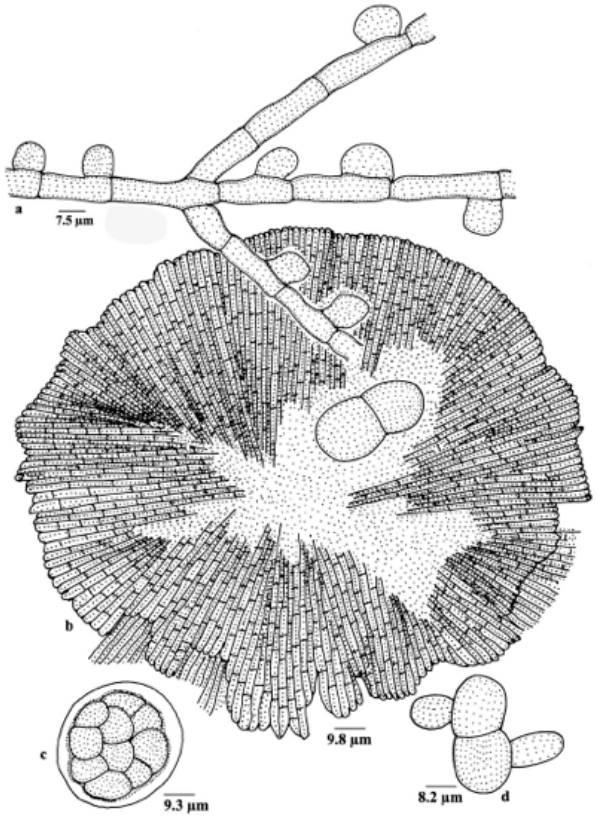


Figure 148. ***Asterina indica***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

to curved, two celled, 9–13 µm long; basal cells cuneate to cylindrical, 3–7 µm long, head cells ovate to globose, straight to slightly curved, entire, 9-13 x 8-10 µm. Thyriothecia scattered to connate and often fused, orbicular, up to 300µm in diameter, stellately dehisced at the centre, margin crenate to fimbriate, fringed hyphae short; asci globose, octosporous, up to 50µm in diameter; ascospores oblong, conglobate, brown, uniseptate, slightly constricted at the septum, 32–34 x13–16 µm. Pycnothyria scattered, orbicular, up to 60µm in diam., stellately dehisced at the centre, center, margin crenate; pycnothyriospores unicellular, globose to ellipsoidal, brown, 9–15x6–10 µm.

Asterina ligustricola Hosag. & Kamar. in Hosag., J. Econ. Taxon. Bot. 28: 187, 2004; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 106, 2011; Hosag., Mycosphere 2(5): 709, 2012.

Asterostomella ligustri Hosag., Balakr. & Goos, Mycotaxon 58: 493, 1996 (Fig. 151).

Materials examined: HCIO 44129, TBGT 528, 24.v.2001, on leaves of *Ligustrum travencoricum* Gamble (Oleaceae), M. Kamarudeen; HCIO 44867, TBGT 1095, 7.iii.2001, on leaves of *Ligustrum walkeri auct*. *non* Decne, Periya, coll. G. Rajkumar & P.A. Jose.

Colonies amphigenous, mostly epiphyllous, subdense to dense, up to 3mm in diameter, confluent. Hyphae substraight to flexuous, branching irregular at acute angles, loosely reticulate, cells 11–15x3–4 µm. Appressoria alternate to unilateral, scattered, unicellular, sessile to stipitate, irregularly and stellately sublobate to lobate, globose, 4–8x6–10 µm. Pycnothyria numerous, scattered, orbicular, up to 50µm in diameter, margin fimbriate to crenate, stellately dehisced at the center; pycnothyriospores ellipsoidal, taper towards both ends, brown, 19–21x9–10 µm. Thyriothecia scattered, orbicular, up to 130µm in diameter, margin crenate to fimbriate, fringed hyphae tortuous, thyriothecia stellately dehisced at the center; asci globose, octosporous, 30–35 µm in diameter; ascospores conglobate, brown, uniseptate, constricted at the septum, 16–19x9–10 µm, wall minutely echinulate.

This species differs from *Asterina ligustri* P. Henn in having unicellular appressoria and is the teleomorph of *Asterostomella ligustri* Hosag. et al. (Katumoto 1975; Hosagoudar et al. 1996).

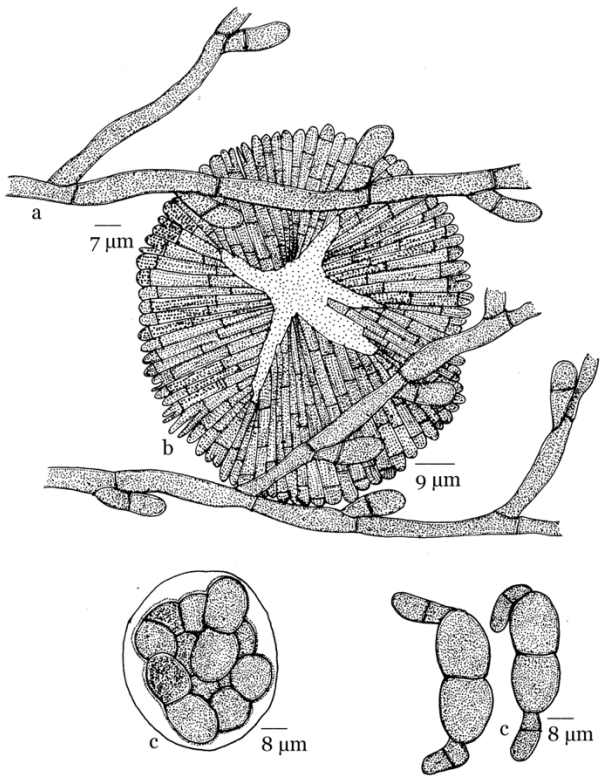


Figure 149. ***Asterina jambolana***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

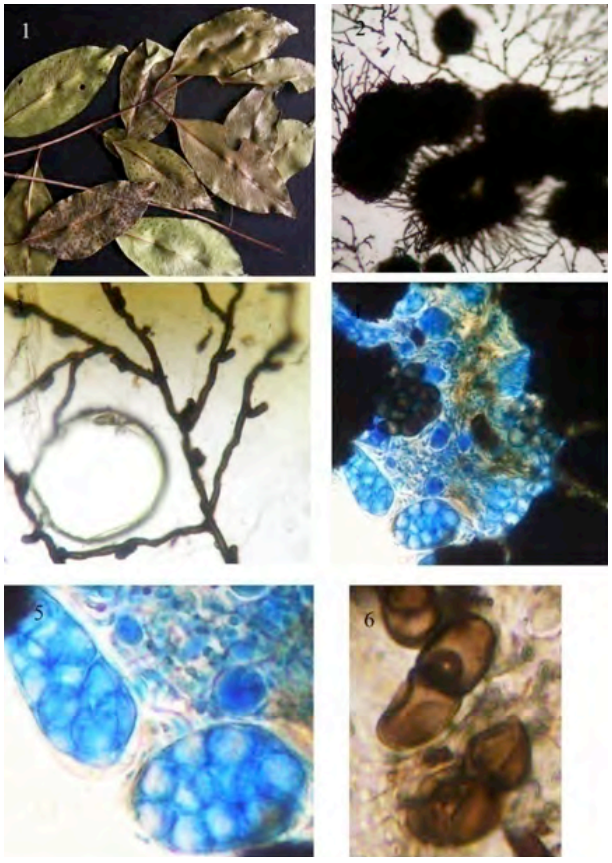


Image 14. ***Asterina jambolana***
1 - Infected leaves; 2 - Thyriothecia; 3 - Appressoriate mycelium; 4 - Asci in the Ascomata; 5 - Asci; 6 - Ascospores

It was parasitised by *Zygosporium* sp.

Asterina litseae-ligustrinae Hosag., Balakr. & Goos, Mycotaxon 59: 180, 1996; Hosag., Mycosphere 2(5): 711, 2012 (Fig. 152).

Materials examined: HCIO 49871, TBGT 4023, 18.ix.2008, on leaves of *Litsea* sp. (Lauraceae), Thirunelly, coll. Harish et al.

Colonies hypophyllous, dense, crustose, up to 5mm in diameter, rarely confluent. Hyphae straight to substraight and in few places crooked, branching opposite to irregular at acute to wide angles, loosely reticulate, cells 15–22x3–5 µm. Appressoria alternate, about 15% opposite, straight to curved, unicellular, conoid, entire to variously sublobate, 9–13x6–10 µm. Thyriothecia scattered to loosely grouped, round to ovate, up to 110µm in diameter, stellately fissured at the center, inner content deep yellow, margin crenate to fimbriate, fringed hyphae long and tortuous; asci many, globose, eight spored, 24–26 µm in diameter; ascospores conglobate, 1-septate, constricted at the septum, 18–19x6–10 µm, upper cell slightly ovate, lower cell globose, wall echinulate.

This species is similar to *Asterina litseae* Yates in having yellow contents in the thyriothecia (Hansford, 1949) but differs from it in having hypophyllous colonies, substraight to crooked hyphae, 15% opposite, and entire to variously sublobate appressoria and echinulate ascospores.

Asterina lobulifera Sydow var. ***indica*** Hosag. & Chandraprabha, Indian J. Sci. Techn. 2: 15, 2009; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 109, 2011; Hosag., Mycosphere 2(5): 711, 2013 (Fig. 153).

Materials examined: HCIO 48236, TBGT 2974, 29.x.2007, on leaves of *Glochidion* sp. (Euphorbiaceae), Periya, coll. A. Chandraprabha.

Colonies amphigenous, dense, up to 2mm in diameter. Hyphae flexuous to crooked, branching opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 15–26x4–7 µm. Appressoria 2-celled,

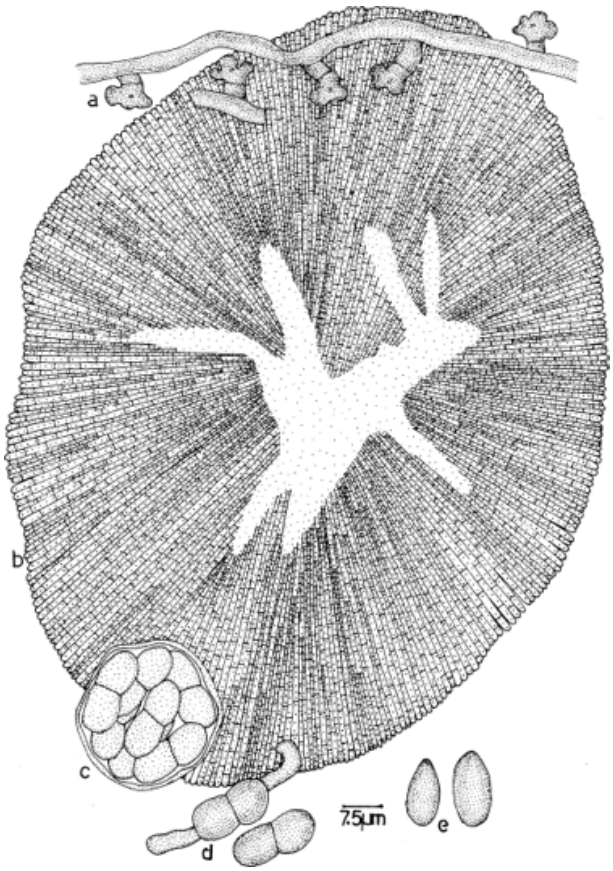


Figure 150. ***Asterina lepianthis***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

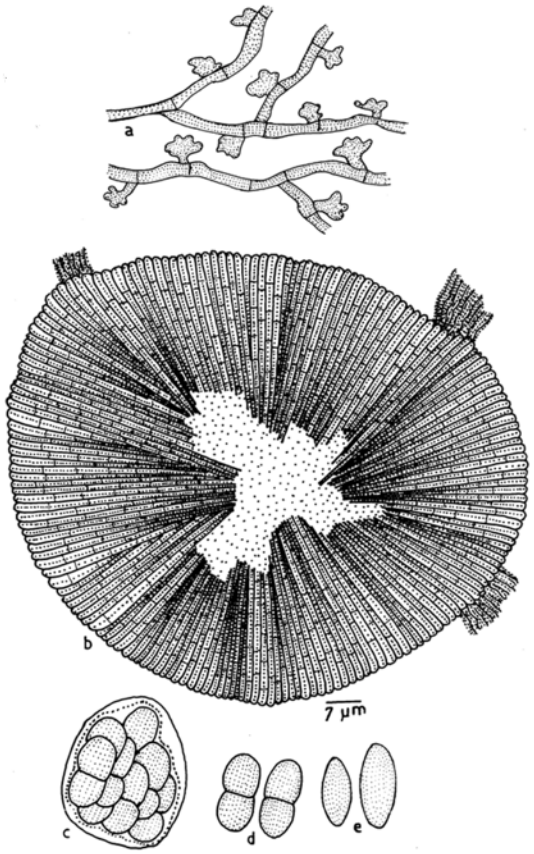


Figure 151. ***Asterina ligustricola***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores; e - Pycnothyriospores

alternate to opposite (5–10%), subantrorse, straight to curved, 11–15 µm long; stalk cells cylindrical to cuneate, 4–7 µm long; head cells ovate, globose, sublobate to lobate, 7–11x4–7 µm. Thyriothecia scattered to grouped at the centre of the colonies, orbicular, up to 121µm in diameter, margin crenate to fimbriate, stellately dehisced at the center; ascospores oblong, conglobate, uniseptate, constricted at the septum, 13–22x7–9 µm, wall smooth. Pycnothyria smaller, similar to thyriothecia; pycnothyriospores ovate, pyriform, brown, 11–22x7–11 µm, wall smooth.

This species was known from Philippines, Taiwan and Japan (Sydow & Sydow 1914; Yamamoto 1956; Katumoto 1991).

Asterina melicopecola Hosag. & Abraham, Indian Phytopath. 50: 216, 1997; Hosag., C.K. Biju & Abraham, J. Econ. Taxon. Bot. 25: 305, 2001; Hosag., Zoos' Print J. 18: 1284, 2003; 21: 2328, 2006; Hosag., H. Biju & Appaiah, J. Mycopathol. Res. 44: 9, 2006; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala, p. 115, 2011; Hosag., Mycosphere 2(5): 718, 2012 (Fig. 154).

Materials examined: HCIO 44301, TBGT 588, 10.i.2002, on leaves of *Euodia luna-ankenda* (Gaertner) Merr. (Rutaceae), Periya, coll. M. Kamarudeen; 16.iv.1999, HCIO 45147, TBGT 1202, Banasuran mala, coll. C.K. Biju; HCIO 45149, TBGT 1204, 19.xi.1999, coll. C.K. Biju; HCIO 49223, TBGT 3462, Periya, coll. Jacob Thomas et al.

Colonies amphigenous, mostly epiphyllous, dense, up to 1mm in diameter, confluent. Hyphae straight, branching opposite at acute angles, loosely reticulate, cells 19–24x3.5–5 µm. Appressoria opposite, about 20% alternate, unicellular, ovate, globose, clavate, pyriform, irregularly sublobate to lobate, 9–12.5x6–7.5 µm. Thyriothecia orbicular, loosely grouped in the center of the colony, scattered to connate, up to 150µm in diameter, stellately dehisced at the center, splitting up to margin, crenate to fimbriate at the margin, fringed hyphae small, profusely branched; asci globose, rounded, octosporous, up to 42µm in diameter; ascospores conglobate, brown, 1-septate, deeply constricted at the septum, upper cell globose, lower cell slightly ovate, 31–34x12–13.5 µm.

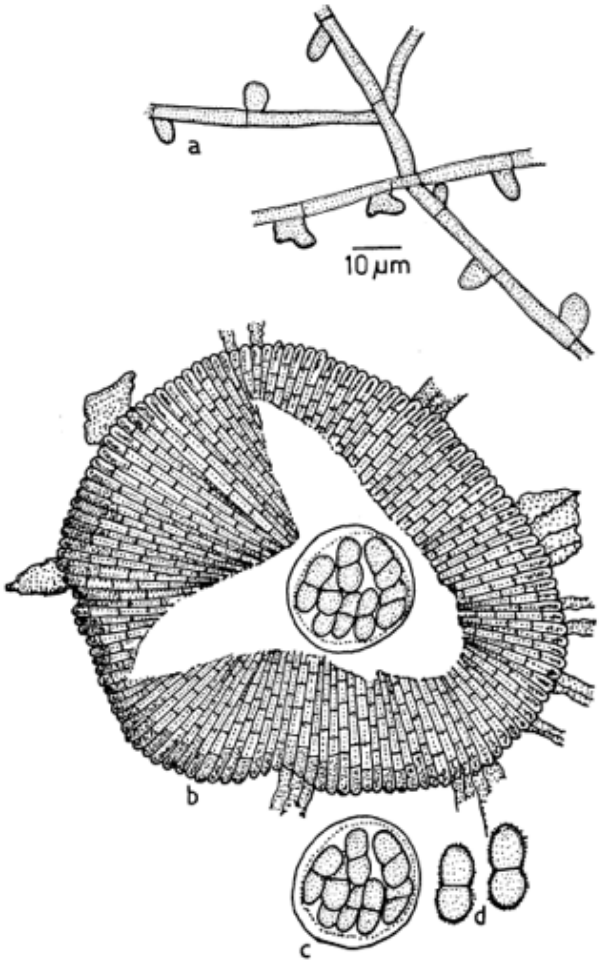


Figure-152. ***Asterina litseae-ligustrinae***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

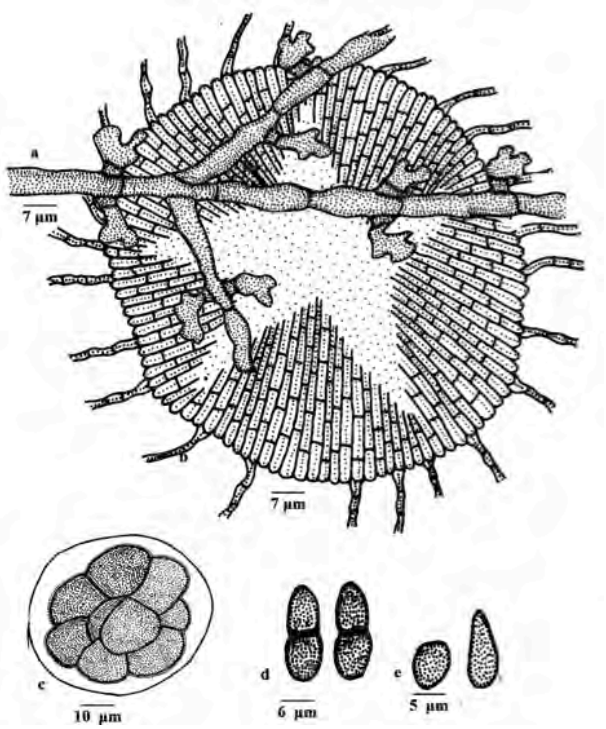


Figure 153. ***Asterina lobulifera* var. *indica***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

Asterina memecylonis Ryan, Mem. Dept. Agric. India 15: 105, 1921; Hosag., Zoos' Print J. 19: 1386, 2004; Hosag., H. Biju & Appaiah, J. Mycopathol. Res. 43:204, 2005; Hosag., Zoos' Print J. 21: 2328, 2006; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 116, 2011; Hosag., Mycosphere 2(5): 720, 2012 (Fig. 155).

Materials examined: HCIO 49629, TBGT 3871, 20.ix.2008, on leaves of *Memecylon* sp. (Melastomataceae), Pulpally, coll. M. Harish & P.J. Robin; HCIO 45684, TBGT 1431,15.xi.2008, *Memecylon* sp., coll. V.B. Hosagoudar; TBGT 5726, 4.viii.2008; HCIO 44585, TBGT 872, 24.iv.2002, *M. sylvaticum* Thwaites, coll. H. Biju.

Colonies amphigenous, subdense to dense, up to 2mm in diameter, confluent. Hyphae straight, branching alternate, opposite to irregular at acute angles, loosely to closely reticulate, cells 28–32x4–7 µm. Appressoria scattered, alternate, unicellular, broad based, mammiform, globose, entire, angular, crenately lobate to slightly lobate, 11–13x11–15 µm. Thyriothecia scattered, orbicular, up to 441µm in diameter; crenate at margin, irregularly dehisce at the centre; asci few, globose to ovate, octosporous, 56–62 µm in diameter; ascospores brown, conglobate, uniseptate, constricted at the septum, taper at both ends, 38–42x14–16 µm.

Asterina micheliifolia Hosag. & Riju, J. Threatened Taxa 3: 1942, 2011; Hosag., Mycosphere 2(5): 721, 2012. (Fig. 156).

Materials examined: HCIO 49111, TBGT 3366; HCIO 49112, TBGT 3367; HCIO 49113, TBGT 3368; HCIO 49114, TBGT 3369; HCIO 49115, TBGT 3370, 20.ix.2008, on leaves of *Michelia chempaka* L. (Magnoliaceae), Chennalode, Padinharathara, coll. M. C. Riju.

Colonies hypophyllous, thin, up to 2mm in diameter, confluent. Hyphae flexuous to crooked, branching irregular at acute to wide angles, forming closely reticulated rings, cells 12–40x3–5 µm. Appressoria scattered, unicellular, opposite, alternate, unilateral, antrorse to retrorse, globose to cylindrical, entire, 5–18x5–8 µm. Pycnothyria scattered, orbicular, up to 58µm in diameter, stellately dehisced and widely opened at the centre; pycnothyriospores globose, clavate, 15–20 µm in diameter, wall smooth. Thyriothecia scattered, orbicular, up to 85µm in diameter, stellately dehisced and widely opened at the centre by exposing asci; asci globose to ovate, 37–45 µm in diameter; ascospores brown, uniseptate, constricted at the septum, 22–25x10–13 µm, wall smooth.

This species differs from *Asterina micheliae* Hansf. in having typically thyriothecium like fruiting bodies and differs from *A. micheligena* in having straight mycelium and larger ascospores.

Asterina micheliigena Hosag. & Riju, J. Threatened Taxa 3: 1944, 2011; Hosag., Mycosphere 2(5): 722, 2012 (Fig. 157).

Materials examined: HCIO 49111, TBGT 3366; HCIO 49112, TBGT 3367; HCIO 49113, TBGT 3368; HCIO 49114, TBGT 3369; HCIO 49115, TBGT 3370, 20.ix.2008, on leaves of *Michelia chempaka* L. (Magnoliaceae), Chennalode, Padinharathara, coll. M. C. Riju.

Colonies epiphyllous, dense, up to 3mm in diameter, confluent and often trait along the major veins of the upper surface of the leaves. Hyphae substraight to flexuous, branching opposite, alternate to irregular at acute to wide angles, loosely to closely reticulate, cells 9–24x4–6 µm. Appressoria scattered, unicellular, opposite, alternate, unilateral, globose, entire, mammiform, 4–7x4–9 µm. Pycnothyria scattered, orbicular, up to 75µm in diameter, stellately dehisced and widely opened at the centre; pycnothyriospores globose to slightly ovate, 17–25 µm in diameter, wall smooth. Thyriothecia scattered, orbicular, up to 188µm in diameter, stellately dehisced and widely opened at

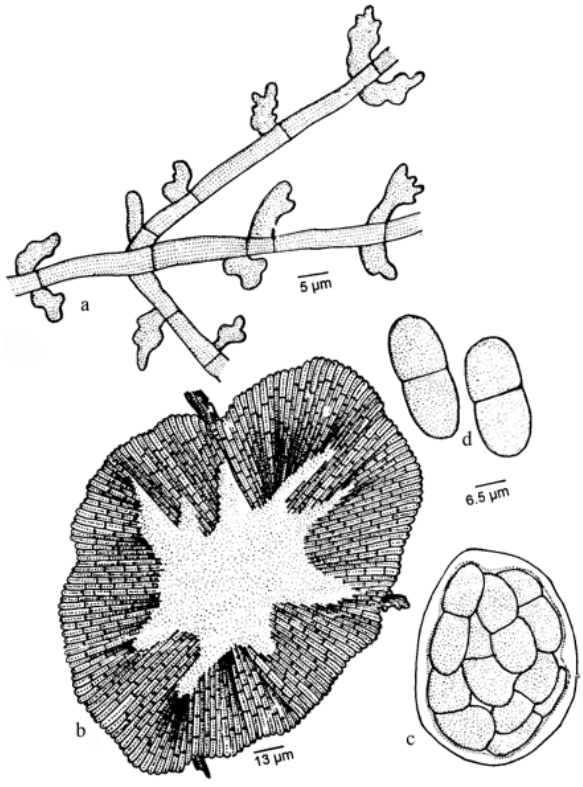


Figure 154. ***Asterina melicopecola***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

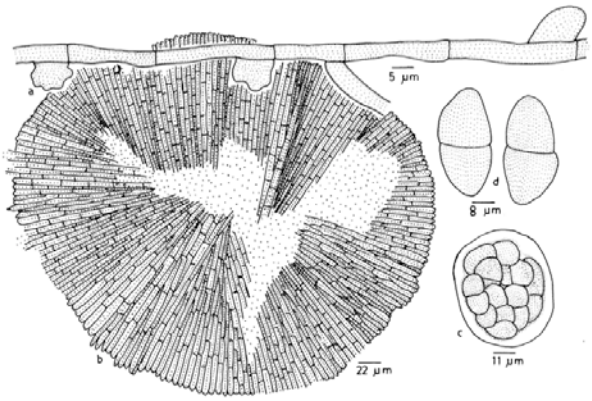


Figure 155. ***Asterina memecylonis***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

the centre by exposing asci; asci globose to ovate, up to 63µm in diameter; ascospores brown, uniseptate, constricted at the septum, 25–33x15–18 µm, wall smooth.

Asterina microtropidicola Hosag. & C.K. Biju in Hosag., C.K. Biju, Abraham & Agarwal, Indian Phytopath. 55: 499, 2002; Hosag., Zoos' Print J. 21: 2328, 2006; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 118, 2011; Hosag., Mycosphere 2(5): 722, 2012 (Fig. 158).

Materials examined: HCIO 43712, TBGT 370, 12.viii.1999, on leaves of *Microtropis latifolia* Wight & Lawson (Celastraceae), Thirunelly shola forest, coll. C.K. Biju.

Colonies amphigenous, dense, velvety, up to 5mm in diameter, rarely confluent. Hyphae straight, rarely substraight to slightly flexuous, branching irregular at acute angles, loosely to closely reticulate, cells 12–20x3–5 µm. Appressoria unicellular, alternate, about 30% opposite, straight to slightly curved, conoid, attenuated and broadly rounded at the apex, entire, 11–20x6-8 µm. Thyriothecia closely scattered, often connate, orbicular, up to 125µm in diameter, mostly crenate at the margin, stellately dehisced and widely opened at the centre; asci many, octosporous, globose, up to 40µm in diameter; ascospores oblong, conglobate, uniseptate, deeply constricted at the septum, 30–34x14–16 µm, wall smooth.

Asterina microtropidis Hosag. *et al.* is known on *Microtropis ovalifolia* from the Western Ghats of peninsular India (Hosagoudar et al. 1996). However, *Asterina microtropidicola* differs from it in having alternate and opposite, conoid and straight appressoria.

Asterina naraveliae Hosag., C.K. Biju & Agarwal, Indian Phytopath. 55: 499, 2002; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 126, 2011; Hosag., Mycosphere 2(5): 730, 2012 (Fig. 159).

Materials examined: HCIO 43711, TBGT 369, 19.xi.2009, on leaves of *Naravelia zeylanica* (L.) DC. (Ranunculaceae), Banasuranmala, coll. C.K. Biju; HCIO 49968, TBGT 4120, 14.iii.2007, Puthuserry Kadavu, coll. M.C. Riju; HCIO 50006, TBGT 4158, 27.xii.2007, coll. M.C. Riju; HCIO 50740, TBGT 4657; HCIO 51128, TBGT 5008, 5.xi.2009, Gurukulam Botanical Garden, Periya, coll. M.C. Riju & A. Sabeena; HCIO 51175, TBGT 5055, 6.xi.2009, Thariode, coll. A. Sabeena & M.C. Riju.

Colonies amphigenous, thin to subdense, up to 2mm in diameter, rarely confluent. Hyphae flexuous to crooked, branching irregular at acute angles, loosely reticulate, cells 16–20x3–4 µm. Appressoria two celled, very much scattered, antrorse, 9–15 µm long; stalk cells cylindrical to cuneate, 1.5–5 µm long; head cells ovate, globose, mostly bilobate, rarely 3–4-times lobate, 8–10x6–10 µm. Thyriothecia scattered, orbicular, up to 65µm in diameter, stellately dehisced at the centre, crenate at the margin; asci few to many, globose, octosporous, up to 28µm in diameter; ascospores oblong, brownish, conglobate, 1-septate, upper cell

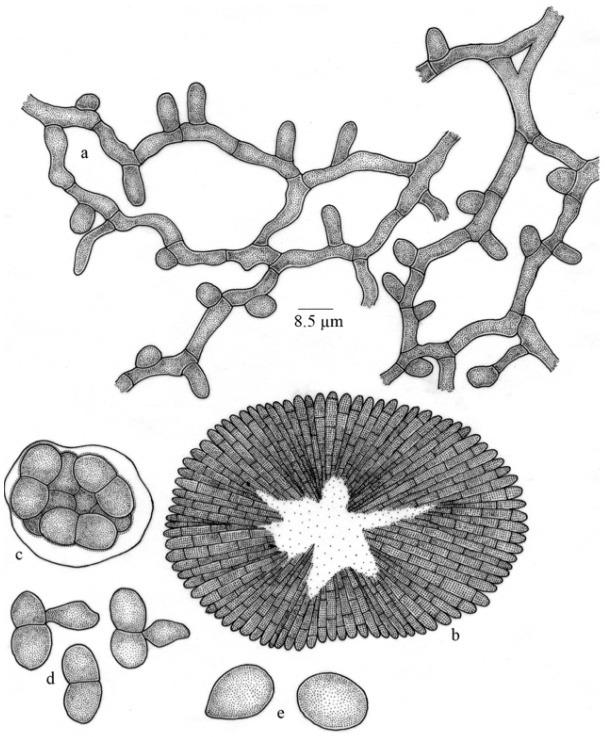


Figure 156. ***Asterina micheliifolia***
a.Appressorium, b. Thyriothecium, c. Ascus, d. Ascospores

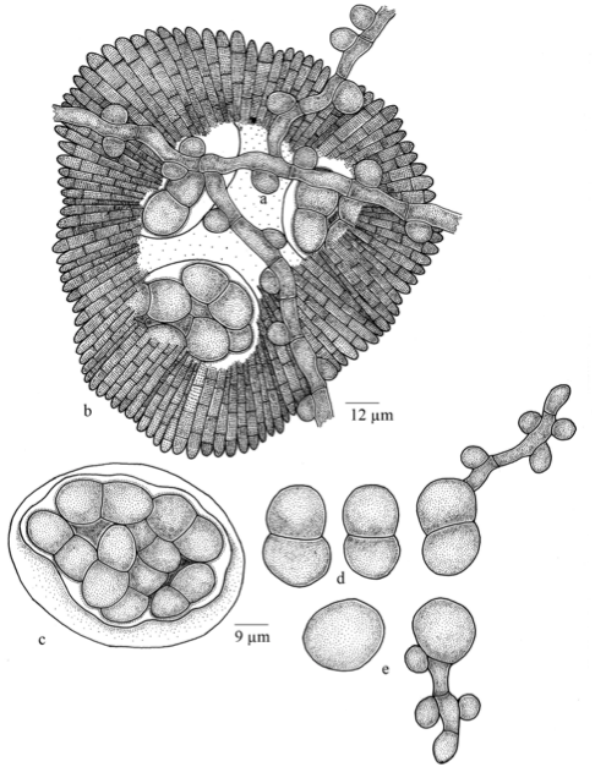


Figure 157. *Asterina micheliigena*
a.Appressorium, b. Thyriothecium, c. Ascus, d. Ascospores, e. Pycnothyriospores

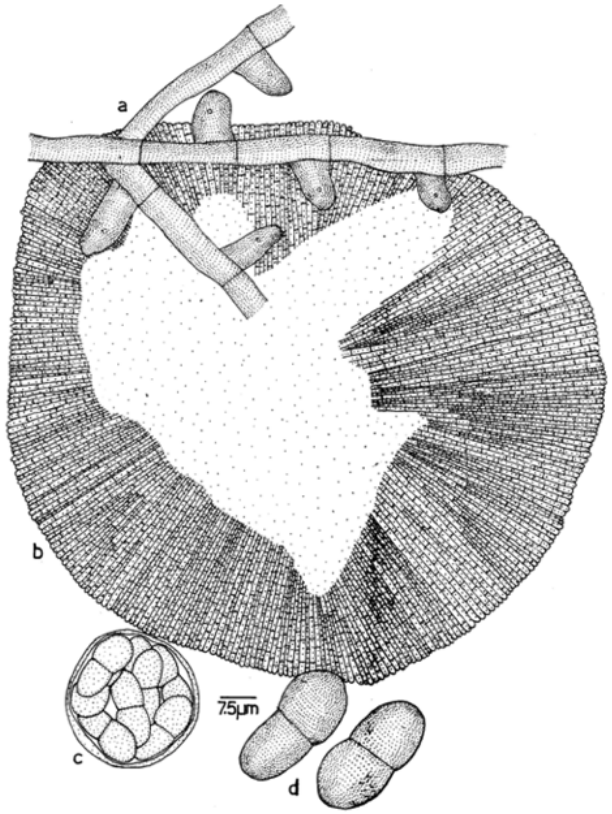


Figure 158. *Asterina microtropidicola*
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

slightly larger, 14–16x6–8 µm, wall smooth. Pycnothyria not seen; pycnothyriospores ovate, pyriform, sometimes pale hyaline band present at the middle, 14–16×7–9 µm.

Asterina clematidis Hansf. is known on *Clematis glycinoides* from Australia (Hansford, 1954). *Asterina naraveliae* differs from it in having sparsely arranged, alternate appressoria having deeply lobate head cells.

Asterina perpusilla Sydow, Ann. Mycol. 14: 366, 1916; Hosag., Mycosphere 2(5): 730, 2012.

Anamorph: *Asterostomella alangii* Hosag. & Mohanan, Indian J. Forestry 19: 371, 1996 (Fig. 160).

Materials examined: HCIO 50382, TBGT 4299, 4.xi.2009, on leaves of *Alangium salvifolium* (L.f.) Wans (Alangiaceae), Padinharathara, *Alangium* sp., A. Sabeena & M.C. Riju; TBGT 5573, 22.v.2008, *Alangium sundanum* (Miq.) Bloemb., Padinharathara, coll. M.C. Riju.

Colonies epiphyllous, thin, up to 2mm in diameter, confluent. Hyphae substraight, branching opposite, alternate to irregular, at acute to wide angles, loosely to closely reticulate, cells 11–24x2–3 µm. Appressoria sessile, unilateral, alternate, angular, broad based, 4–10x4–10 µm. Thyriothecia scattered to grouped, orbicular, stellately dehisced at the centre, up to 160µm in diameter; ascospores conglobate, uniseptate, constricted at the septum, 19–26x9–11 µm. Pycnothyria scattered, rarely connate, orbicular, up to 78µm in diameter, margin crenate, rarely fringed, stellately dehisced at the center; pycnothyriospores numerous, cinnamon brown, pyriform, 21–25x12–16 µm.

Asterina piperina Sydow, Ann. Mycol. 15: 243, 1917; M. S. Patil & Pawar, Indian Phytopath. 42: 251, 1989; Hosag., Mycosphere 2(5): 740, 2012.

Asterina piperis Yates, Philippine J. Sci. 13: 374, 1918 (Fig. 161).

Materials examined: HCIO 49636, TBGT 3878, 17.ix.2008, on leaves of *Piper* sp. (Piperaceae), Periya, coll. M. Harish & P.J. Robin

Colonies amphigenous, thin to dense, up to 1mm in diameter, rarely confluent. Hyphae crooked, branching irregular at acute to wide angles, loosely to closely reticulate, cells 19–24 µm. Appressoria scattered, alternate to unilateral, very closely antrorse, antrorse, subantrorse to retrorse, straight to curved, 12–20 µm long; stalk cells cylindrical to cuneate, 3–7 µm long; head cells ovate, globose, oblong, straight to curved, entire,

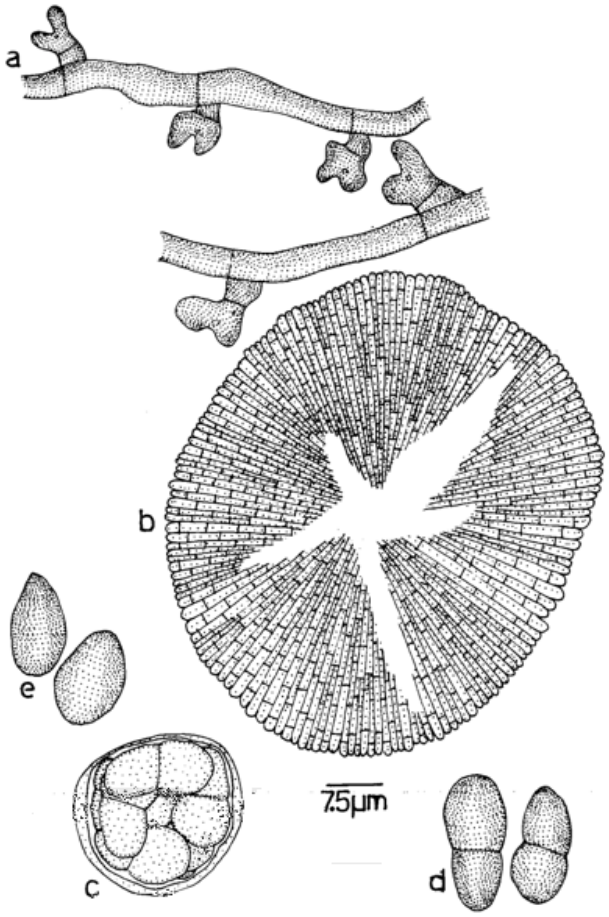


Figure 159. ***Asterina naraveliae***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

µm. Appressoria alternate, unilateral, two celled, straight to variously curved, smooth to variously bulged, entire to lobate, 5–10 µm long; head cells clavate, ovate, cylindrical, hamate, straight to curved, 3–7 times sublobate to lobate, 7–13x11–13 µm. Thyriothecia scattered, orbicular, up to 150µm in diameter, stellately dehisced at the center, margin fringed, fringed hyphae flexuous, exappressoriate; asci globose, octosporous, 22–33 µm in diameter; ascospores oblong, cylindrical, brown, uniseptate, strongly constricted at the septum, 20–25x10–13 µm, wall echinulate.

There are six taxa of the genus *Asterina* known on the members of the family Oleaceae (Yates 1918a; Doidge 1942; Hansford 1945, 1948; Yamamoto 1956; Hosagoudar & Goos 1996). *Asterina spissa* Sydow known on this host genus is a doubutful species since it does not have appressoria (Sydow et al. 1911).

Asterina pusilla Sydow & Sydow, Philippine J. Sci. 8: 488, 1913; Hosag. & Sabeena, Zoos' Print J. 22: 2786, 2007; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 137, 2011; Hosag., Mycosphere 2(5): 746, 2012 (Fig. 163).

Materials examined: TBGT 5718, 30.ix.2007, on leaves of *Premna serratifolia* L. (Verbenaceae), Padinharathara, coll. M.C. Riju.

angular, crenately lobate to deeply lobate, 9–13x9–11 µm. Thyriothecia scattered to rarely connate, orbicular, up to 120µm in diameter, stellately dehisced at the centre, margin crenate to slightly fimbriate, fringed hyphae very small; asci globose, octosporous, up to 28µm in diameter; ascospores conglobate, brown, uniseptate, constricted at the septum, 14–21x6–11 µm, wall smooth.

Asterina pongalaparensis Hosag., C.K. Biju & Abraham, Indian Phytopath. 54: 138, 2001; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 136, 2011; Hosag., Mycosphere 2(5): 744, 2012 (Fig. 162).

Materials examined: TBGT 5549**,** 5.xi.2009, on leaves of *Jasminum sambac* (L.) Aiton*,* (Oleaceae), Wayanad, coll. M.C. Riju.

Colonies amphigenous, subdense to dense, up to 4mm in diameter, rarely confluent. Hyphae undulate to crooked, branching alternate to unilateral at acute angles, loosely to closely reticulate, cells 17–23x4–6

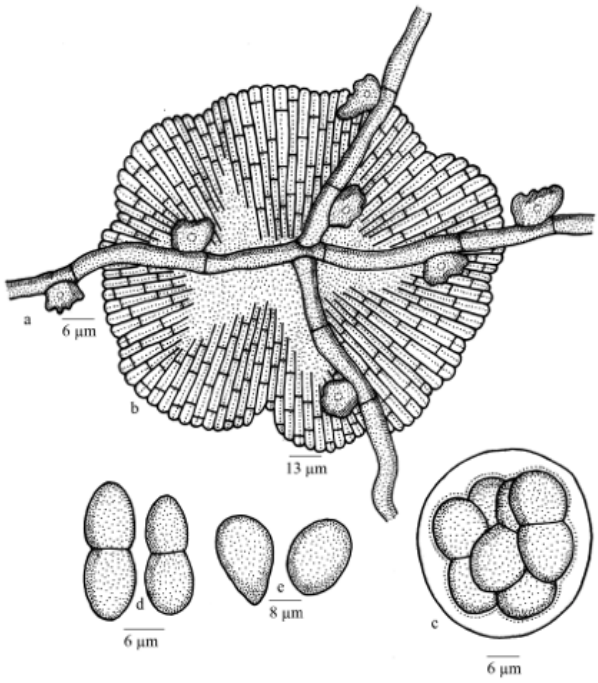


Figure 160. ***Asterina perpusilla***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores; e - Pycnothyriospores

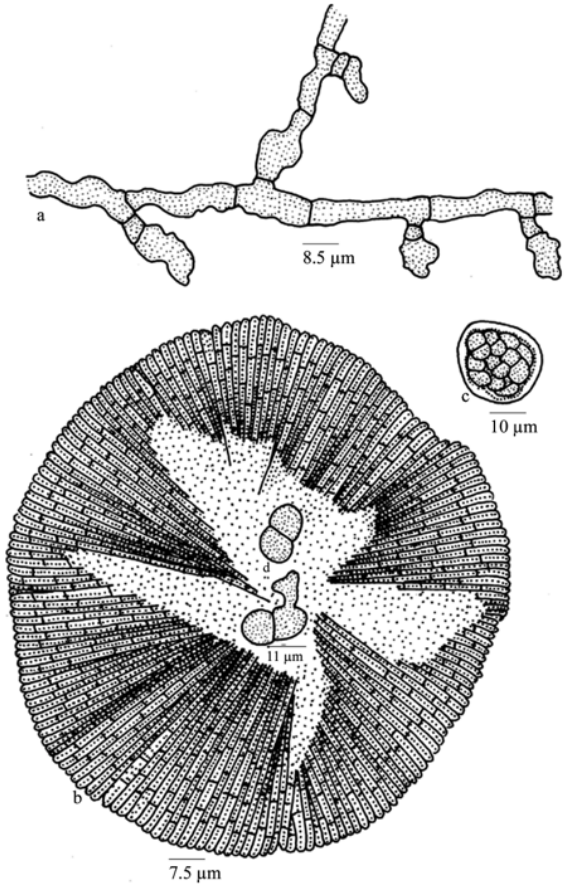


Figure 161. ***Asterina piperina***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

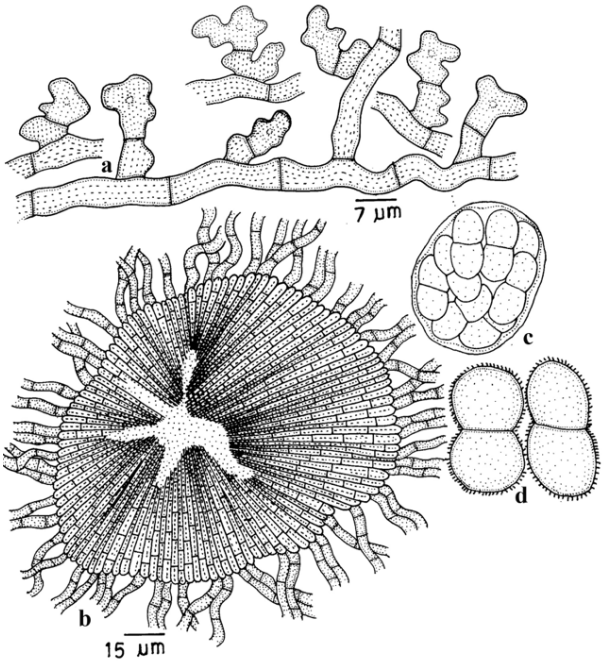


Figure 162. ***Asterina pongalaparensis***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

Colonies epiphyllous, thin, dense, crustose, up to 2mm in diameter, confluent. Hyphae straight to undulate, branching alternate, opposite to irregular at acute to wide angles, loosely reticulate, cells 20–48x3–5 µm. Appressoria alternate, scattered, unicellular, antrorse, subantrorse to retrorse, sublobate to lobate, mostly broad based, 8–11x6–11µm. Thyriothecia closely scattered, orbicular, up to 136µm in diameter, stellately dehisced at the centre, margin fimbriate, fringed hyphae long, crooked; asci globose, up to 34µm in diameter; ascospores brown, conglobate, uniseptate, constricted at the septum, 16–22x6–10 µm, wall smooth. Pycnothyria numerous; pycnothyriospores brown, ovate, globose, pyriform, 10–15x10–14 µm.

This species was known on *Premna nauseosa* from Philippines (Sydow & Sydow 1913; Hosagoudar & Abraham 2000). Perhaps, this is the first collection after its type collection.

Asterina sabiacearum Hosag. & Goos, Mycotaxon 52: 469, 1994; Hosag. & Abraham, J. Econ. Taxon. Bot. 4: 582, 2000; Hosag., Zoos' Print J. 18: 1284, 2003; 21: 2328, 2006; Singh, Duke, Bhandari & Jain, J. Econ. Taxon. Bot. 30: 184, 2008; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 140, 2011; Hosag., Mycosphere 2(5): 748, 2012 (Fig. 164).

Materials examined: HCIO 49070, TBGT 3325, 17.ix.2008, on leaves of *Meliosma simplicifolia* (Roxb.) Walp. ssp. *pungens* (Wall ex Wight & Arn.) Beus (Sabiaceae), Periya, coll. M. Harish & P.J. Robin; HCIO 43804, TBGT 371, 19.xi.1999, Banasuran mala, coll. C.K. Biju; HCIO 44882, TBGT 1110, 26.xii.2002, Periya, coll. M. Kamarudeen & P.A. Jose

Colonies epiphyllous, subdense, minute, up to 1 mm in diameter. Hyphae flexuous to slightly crooked, branching alternate to irregular at acute angles, loosely reticulate, cells 30-37x3-5 µm. Appressoria alternate, scattered, mostly unicellular, rarely two celled, mammiform, entire to sublobate, 13-22x5-7 µm. Thyriothecia grouped at the center of the colony, stellately dehisced and widely opened, margin crenate, up to 60 µm in diameter; ascospores conglobate, brown, 1-septate, deeply constricted at the septum, upper cell larger, lower cell smaller, 18–22x12–14 µm, wall smooth.

This species can be compared with *Asterina meliosmaticola* Petrak & Cif., reported on *Meliosma* sp. from which it differs in having unicellular to bi-cellular appressoria, and smaller thyriothecia, asci and

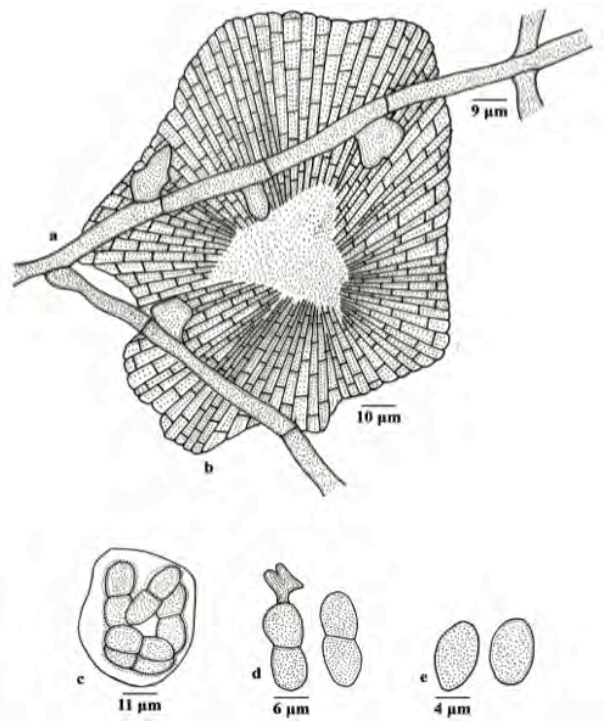


Figure 163. ***Asterina pusilla***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores; e - Pycnothyriospores

ascospores (Petrak & Cifferi 1932).

Asterina sarcandrae Hosag. & Kamar. in Hosag., Zoos' Print J. 21: 2305, 2006; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 143, 2011; Hosag., Mycosphere 2(5): 751, 2012 (Fig. 165).

Materials examined: HCIO 44794, TBGT 1031, 26.xii.2002, on leaves of *Sarcandra chloranthoides* Gard. (Chloranthaceae), Periya, coll. M. Kamarudeen.

Colonies hypophyllous, very thin, up to 5mm in diameter. Hyphae flexuous, branching irregular at acute to wide angles, form a circularly angular and irregular net, cells 16–21x4–7 µm. Appressoria scattered, alternate to irregular, two celled, antrorse, retrorse, spreading, straight to curved, 12–32 µm long; stalk cells cylindrical to cuneate, 3–7 µm long; head cells ovate, oblong, mostly curved, hamate, twisted, rarely straight, entire, angular to rarely sublobate, 10–26x6–10 µm. Thyriothecia scattered, orbicular, stellately dehisced at the centre, up to 104µm in diameter, margin crenate; asci few, globose, octosporous, up to 30µm in diameter; ascospores conglobate, uniseptate, strongly constricted at the septa, 20–22x7–9 µm, wall echinulate.

Asterina chloranthi Sydow is known on *Chloranthus officinalis* from Philippines (Sydow & Petrak 1931; Hosagoudar & Abraham 2000). However, *Asterina sarcandrae* differs from it in having very thin hypophyllous colonies, net forming mycelia and longer appressoria.

Asterina tertia Racib. in Theiss., Die Gattung Asterina 7:103, 1913; Sacc., Sylloge Fungorum 24: 443, 1926; Hosag. & Abraham, J. Econ. Taxon. Bot. 4: 558, 2000; Hosag., H. Biju & Appaiah, J. Mycopathol. Res. 43: 204, 2005; 44:12, 2006; Hosag., Zoos' Print J. 21: 2329, 2006; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 147, 2011 ; Hosag., Mycosphere 2(5): 755, 2012 (Fig. 166).

Materials examined: HCIO 50726, TBGT 4643, 6.xii.2009, on leaves of *Adhatoda vasica* Nees (Acanthaceae), Padinharathara, coll. A. Sabeena & M.C. Riju; TBGT 4296, 6.xi.2009, *Asystasia violacea* Dalz. ex C.B. Clarke (Acanthaceae), Padinharathara, coll. A. Sabeena & M.C. Riju; HCIO 50614, TBGT 4531; HCIO 50616, TBGT 4533; HCIO 50618,TBGT 4535; HCIO 50620, TBGT 4537; HCIO 50622, TBGT 4539, 6.xi.2009, *Lepidagathis* sp. (Acanthaceae), 16th mile, Padinharathara, coll. A. Sabeena & M.C. Riju.

Colonies amphigenous, up to 3mm in diameter, confluent. Hyphal cells up to 4µm broad. Appressoria sparse, continuous, 3–4 lobate, 5–8x8–13 µm. Thyriothecia 120–160 µm in diameter; margin fimbriate,

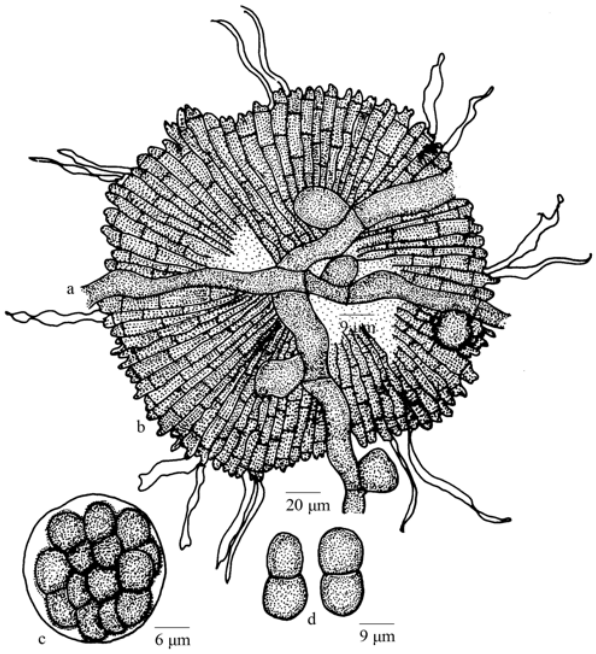


Figure 164. ***Asterina sabiacearum***
a - Appressoriate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores

stellately dehisced in the centre; asci octosporous, 40–48x20–23 µm; ascospores brown, 1-septate, constricted at the septum, 16–20x8–10 µm. Pycnothyria 55–80 µm; pycnothyriospores unicellular, ovate, brown, 17–20x12–15 µm. Thyriothecia 120–160 µm in diam.; margin fimbriate, stellately dehisced in the centre; asci octosporous, 40–48x20–23 µm;ascospores brown, 1-septate, constricted, 16–20x8–10 µm. Pycnothyria 55–80 µm; pycnothyriospores unicellular, ovate, brown, 17–20x12–15 µm.

Asterina thotteae Hosag. & Hanlin, New Botanist 22: 188, 1995; Hosag., H. Biju & Appaiah, J.Mycopathol. Res. 44:12, 2006; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 152, 2011; Hosag., Mycosphere 2(5): 759, 2012 (Fig. 167).

Materials examined: HCIO 48238, TBGT 2976, 29.x.2007, on leaves of *Thottea siliquosa* (Lam.) Ding Hou. (Aristolochiaceae), Periya, coll. A. Chandraprabha; HCIO 43811, TBGT 374, 14.iv.1999, *T. sivarajanii* Santhosh, Shanavas & Binu (Aristolochiaceae), Chembra hills, coll. C.K.Biju; HCIO 44800, TBGT 1037, 27.xii.2002, Periya, coll. M. Kamarudeen & P.A. Jose.

Colonies epiphyllous, thin to subdense, spreading, up to 3mm in diameter, confluent. Hyphae substraight to rarely crooked, branching alternate to opposite at acute to wide angles, loosely reticulate, cells 31–38x3–4 µm. Appressoria alternate and about 3% opposite, straight to curved, antrorse to recurved, two celled, 9–19 µm long; stalk cells cylindrical to cuneate, 3–7 µm long; head cells ovoid, globose, entire to sublobate, angular, straight to curved, 6–13x6–10 µm. Thyriothecia scattered, rarely 1–2 connate, circular, up to 155µm in diameter, margin fimbriate, fringed hyphae flexuous to crooked, pale yellow, center carbonaceous black and stellately dehisced at the center; asci many, initially globose, slightly clavate at maturity, octosporous, 30–38x27–31 µm; ascospores conglobate, oblong, deep brown, rounded at both ends, 1-septate, constricted at the septum, 18–20x9–10 µm, wall verrucose.

This is the only species of the genus *Asterina* on the members of the family Aristolochiaceae (Steven & Ryan 1939; Diodge 1942).

Asterina toddaliae Kar & Ghosh, Indian Phytopath. 39: 210, 1986; Hosag. & Goos, Mycotaxon 52: 470, 1994; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 155, 2011; Hosag., Mycosphere 2(5): 762, 2012 (Fig. 168).

Material examined: TBGT 6647, 19.ix.2008, on leaves of *Toddalia* sp. (Rutaceae), Pulpally, coll. M. Harish et al.

Colonies epiphyllous, thin to subdense, up to 4mm in diameter, rarely confluent. Hyphae straight to flexuous, branching irregular at acute to wide angles, loosely to closely reticulate, cells 19–32x4–6 µm. Appressoria alternate to unilateral, unicellular, antrorse, retrorse,

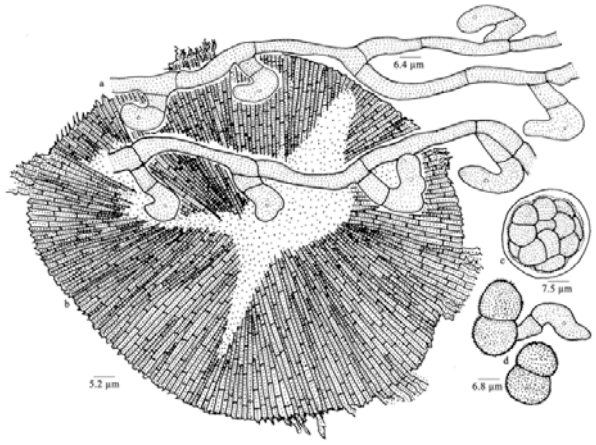


Figure 165. ***Asterina sarcandrae***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

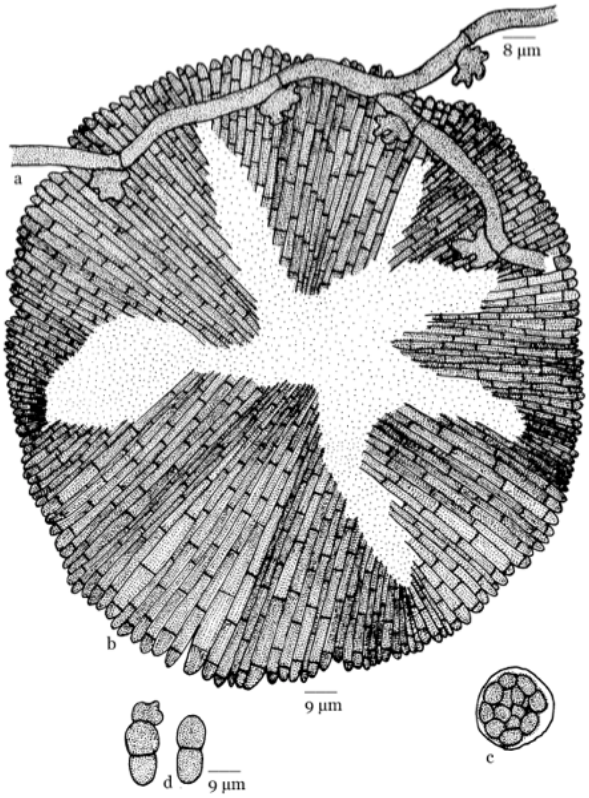


Figure 166. ***Asterina tertia***
a - Appressorium, b - Thyriothecium, c - Ascus, d - Ascospores

straight, flexuous to curved, ovate, oblong, cylindrical, broadly rounded at the tip, 11–18x4–6 µm. Thyriothecia scattered, orbicular, up to 195µm in diameter, stellately dehisced at the centre, margin fimbriate, fringed hyphae small, crooked; asci globose, 8- spored, up to 40µm in diam.; ascospores oblong, brown, uniseptate, constricted at the septum, 27–30x10–12 µm, margin tubercled.

Kar & Ghosh (1986) reported this species from Rangpo forest, Darjeeling, West Bengal

Asterina travancorensis Sydow & Sydow, Ann. Mycol. 13: 38, 1915; Hosag. & Goos, Mycotaxon 69: 160, 1996; Hosag., Mycosphere 2(5): 764, 2012 (Fig. 169).

Materials examined: HCIO 49846,TBGT 3998, 12.ii.2009, on leaves of *Wattakaka volubilis* (L. f.) Stapf. (*Marsdenia volubilis* (L.f.) Cooke) (Asclepiacaceae), Periya, coll. Jacob Thomas et al.

Colonies foliicolous, epiphyllous, often surrounded by yellow haloes, scattered, dense, crustose to velvety, up to 2mm in diameter, rarely confluent. Hyphae straight to flexuous, branching opposite to irregular at acute angles, loosely reticulate, cells 18–25x5–7 µm. Appressoria one to two celled, alternate, about 1% opposite, antrorse to spreading, straight to curved, 12–25 µm long; stalk cells cylindrical to cuneate, 3–19 µm long; head cells ovate, globose, entire to sublobate, 6–10x6–13 µm. Thyriothecia scattered to connate up to 5, round, up to 110µm in diameter, dehisce stellately at the centre, upper cells radiating, margin crenate; asci globose, octosporous, bitunicate, 27–31 µm in diameter; ascospores conglobate, one septate, upper cell slightly larger, 21–25x9–13 µm, wall smooth.

Sydow & Sydow (1915) described this species on *Marsdenia* sp., collected by E.J. Butler from Pulliyanur, Travancore of Kerala State on October 9, 1907.

This species is known only from the Southern Western Ghats.

Asterina trichiliae Doidge, Trans. Royal Soc. South Africa 8: 253, 1920; Hosag. & Goos, Mycotaxon 60: 161,

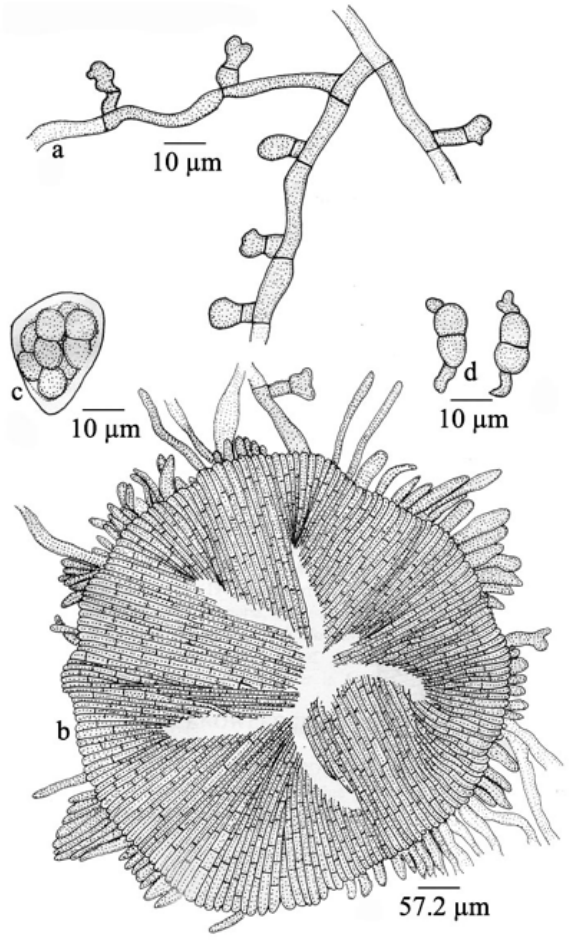


Figure 167. ***Asterina thotteae***
a.Appressorium, b. Thyriothecium, c. Ascus, d. Ascospores

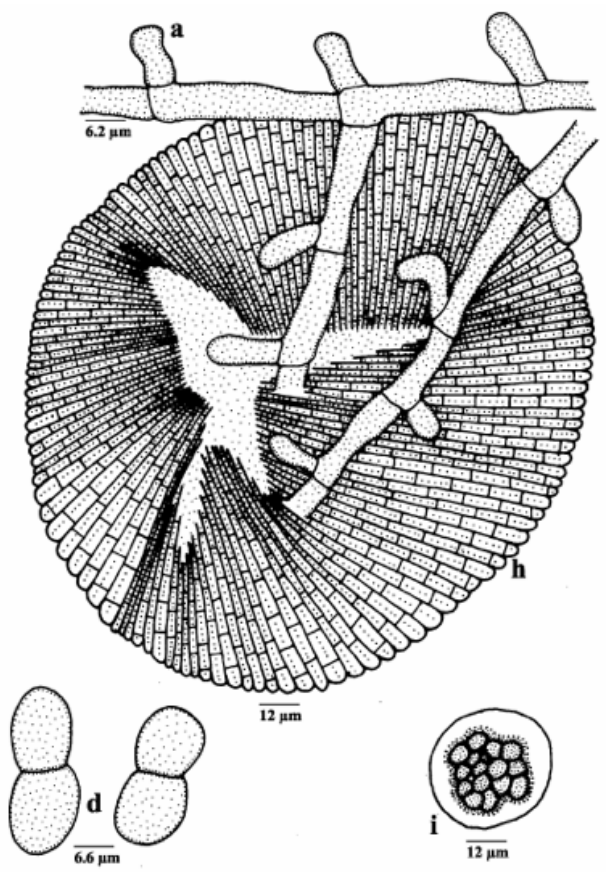


Fig. 168. ***Asterina toddaliae***
a.Appressorium, b. Thyriothecium, c. Ascus, d. Ascospores

1996; Hosag., Mycosphere 2(5): 764, 2012 (Fig. 170).

Materials examined: TBGT 5998, 6.ii.2006, on leaves of *Trichilia connaroides* (Wight & Arn.) Bentv. (Meliaceae), Kunkidhira, coll. Harish et al.; HCIO 49065, TBGT 3320, 18.ix.2008, *Trichilia* sp., Thirunelly, coll. M. Harish et al.; HCIO 49635, TBGT 3877, 17.ix.2008, Periya, coll. M.Harish & P.J. Robin.

Colonies epiphyllous, thin, up to 2mm in diameter, confluent and covering the entire upper surface of the leaves. Hyphae straight, branching opposite to irregular at acute angles, loosely reticulate, cells 15–19x3–7 µm. Appressoria opposite, subopposite, alternate and solitary, conoid, ovate, ampulliform, unicellular, entire, angular to rarely slightly lobate, 6–10x6–8 µm. Thyriothecia loosely grouped, orbicular, up to 140µm in diameter, margin dentate to fringed, fringed hyphae tortuous, elongated and devoid of appressoria, such hyphae also emerge from the mycelia, thyriothecia dehiscing stellately at the center; asci many, globose, eight spored, 40–47 µm in diameter; ascospores conglobate, brown, 1- septate, deeply constricted at septum, both cells unequal, 27–31x15–19 µm, wall smooth.

This species was first reported from South Africa (Doidge 1942).

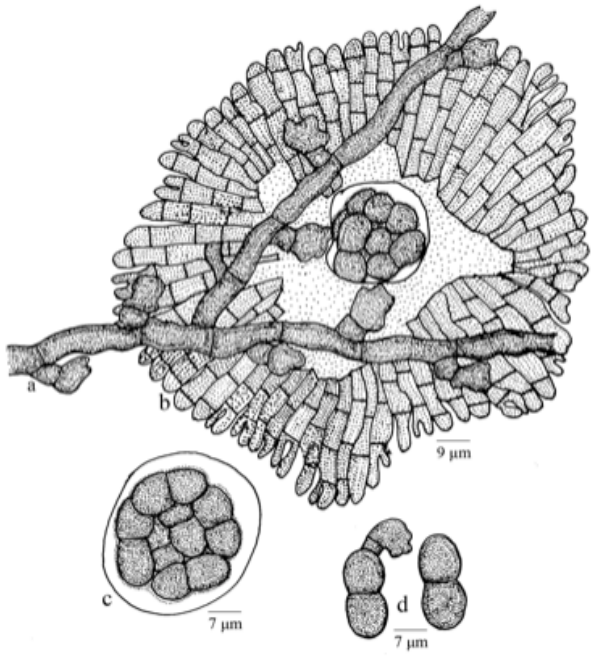


Figure 169. ***Asterina travancorensis***
a.Appressorium, b. Thyriothecium, c. Ascus, d. Ascospores

Asterina triumfetticola Yamam., sci. Rep. Hyogo Univ. Agric., Agric. Biol. Ser. 3:29, 1957; Hosag. & Abraham, J. Econ. Taxon. Bot. 4: 585, 2000; Hosag., Zoos' Print J. 17: 945, 2002; 21: 2329, 2006; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala, p. 158, 2011; Hosag., Mycosphere 2(5): 765, 2012 (Fig. 171).

Materials examined: HCIO 50728, TBGT 4645; HCIO 50730, TBGT 4647, 11.xi.2009, on leaves of *Triumfetta* sp. (Tiliaceae), Puthucherry Kadavu, coll. A. Sabeena & M.C. Riju.

Colonies epiphyllous, subdense to dense, up to 2mm in diameter, confluent. Hyphae strongly appressed to the host surface, substraight to crooked, branching irregular at acute to wide angles, loosely reticulate, cells 16–24x3–4 µm. Appressoria alternate, unilateral, unicellular, stipitate to sessile, globose, clavate, angular to deeply lobate, 4–7 µm long, 7–9 µm broad. Thyriothecia scattered, orbicular, up to 70µm in diameter, stellately dehisced at the centre, margin crenate; asci globose, octosporous, bitunicate, 20–28 µm in diameter; ascospores pale-brown, conglobate, uniseptate, constricted at the septum, 14–16x6–8 µm, wall smooth to slightly punctate. Pycnothyria numerous, orbicular, smaller than thyriothecia; pycnothyriospores pyriform, deep brown, 14–16x11–12 µm.

This species was known on *Triumfetta bartamia* from Taiwan (Yamamoto 1956, 1957). This collection was associated with *Irenopsis* sp.

Asterina viburnicola Hosag., Mycosphere 2(5): 764, 2012.

Asterina viburni Hosag., Dhivaharan & Nithytharani, J. Sci. Environ. & Technov. 4: 47, 2010 (Fig. 172).

Materials examined: TBGT 6148, 6150, 6153, 7.i.2010, on leaves of *Viburnum cylindricum* Buch. Ham. ex D. Don (Caprifoliaceae), Periya, coll. M.C. Riju et al.

Colonies amphigenous, mostly epiphyllous, dense, scattered to confluent, 2–5 mm in diameter. Hyphae flexuous, branching opposite at acute angle, loosely reticulate, cells 15–25x5–7 µm. Appressoria alternate, two celled, antrorse to retrorse, straight to curved, 17–20 µm long; stalk cells cylindrical to cuneate, 7–10 µm long; head cells cylindrical, slightly angular to sublobate, 7–10x5–10 µm. Thyriothecia grouped at the centre of the colony, orbicular, up to 95µm in diameter, dehisce stellately at the center, margin crenate; asci globose, eight spored, 32–35 µm in diameter; ascospores conglobate, 1-septate, slightly constricted at the septum, 17–20x7–10 µm, wall smooth.

This is the only species of the genus *Asterina* known on the members of the family Caprifoliaceae

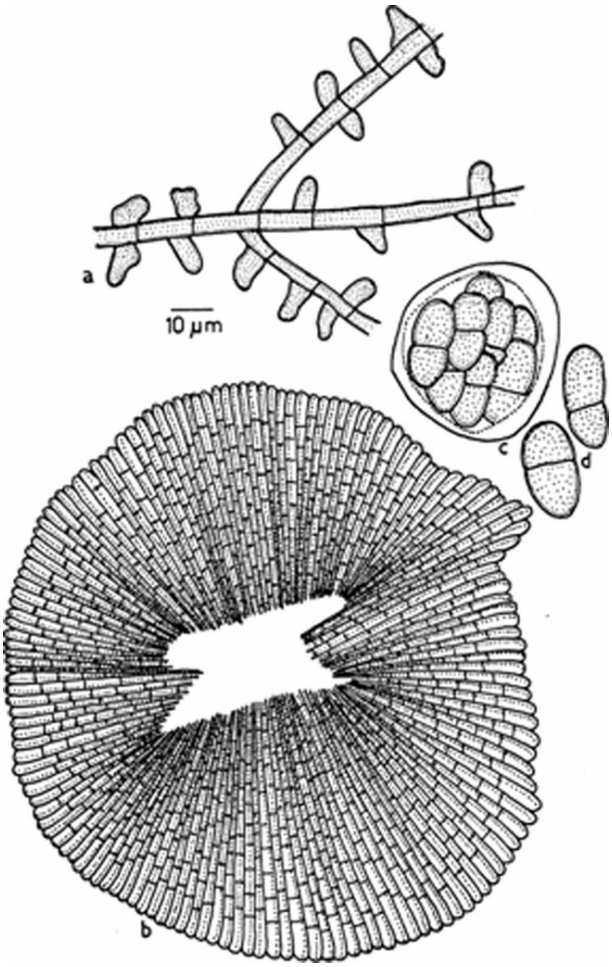


Figure 170. *Asterina trichiliae*
a.Appressorium, b. Thyriothecium, c. Ascus, d. Ascospores

(Hosagoudar & Abraham 2000; Stevens & Ryan 1939; Katumoto 1975; Yamamoto 1957).

Materials to be identified

***Asterina* sp.**

Materials examined: HCIO 44881 TBGT 1109, 22.xii.2002, on leaves of *Syzygium caryophyllatum* (L.) Alston (Myrtaceae), Periya, coll. Kamarudeen & P.A. Jose; HCIO 45117, TBGT 1172, 7.iii.2001, Periya, coll. G. Rajkumar & P.A. Jose; HCIO 45120, TBGT 1175, 8.i.2001, *syzygium* sp. Wayanad, coll. M. Kamarudeen; HCIO 45165, TBGT 1220, 8.i.2002, Chandanathode, coll. M. Kamarudeen & P.A. Jose; HCIO 45285 TBGT1323, 19.xi.1998 Banasuranmala, coll. C.K. Biju; HCIO 45287, TBGT 1325, 14.ix.1999, Chembra, coll. C.K. Biju; HCIO 50049, TBGT 4201, 16.ii.2009, Periya, coll. Robin et al.; HCIO 45258,TBGT 1296, 12.vii.2002, on leaves of *Litsea* sp. (Lauraceae), Wayanad, coll. M. Kamarudeen; HCIO 47469, TBGT 2507, 15.iv.1999, on leaves of *Canthium*

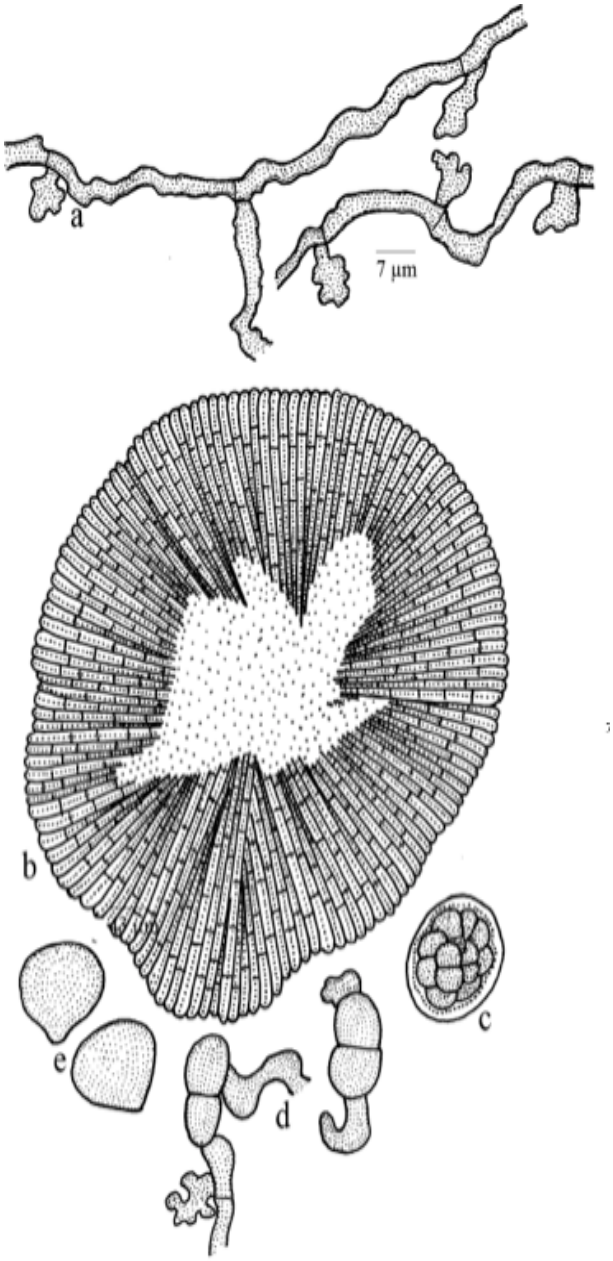


Figure-171. *Asterina triumfetticola*
a -Appressorium, b. Thyriothecium, c. Ascus, d. Ascospores

dicocerum (Rubiaceae), Thirunelly Shola, coll. C.K. Biju.

The genus *Asterolibertia*

Asterolibertia Arn., Les Asterinees, 1: 161, 1918; Hansf., Mycol. Pap. 15: 189, 1946; Muller & Arx, Beitr. Krypt. Schw. 11:97, 1962; Arx & Muller, Stud. Mycol. 9: 43, 1975; Bilgrami, Jamaluddin & Rizwi, Fungi of India p. 54, 1991; Hosag., Abraham & C.K. Biju, J. Mycopathol. Res. 39: 61, 2001; Singh, Duke, Bhandari & Jain, J. Econ.

Taxon. Bot. 30: 185, 2008; Hosag, Mycosphere 2(5): 772, 2012. *Steyaertia* Bat. & Maia, Univ. Recife, Inst. Mycol. Publ. 295:5, 1960.

Wardina Arn., Les Asterinees 1: 165, 1918.

Leaf parasites. Mycelium ectophytic, appressoria intercalary, setae absent. Thyriothecia orbicular with radiating cells, astomatous, dehisce stellately at the center; asci globose, octosporous, bitunicate; ascospores conglobate, uniseptate, brown.

Type sp. *A. couepiae* (Henn.) Arn.

This genus represents here with a single species.

Asterolibertia vateriae Hosag., J. Mycopathol. Res. 44: 13, 2006; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 168, 2011; Hosag, Mycosphere 2(5): 774, 2012 (Fig. 173).

Material examined: HCIO 49774, TBGT 3926, 13.ii.2009, on leaves of *Vateria indica* L. (Dipterocarpaceae), Thirunelly, coll. Jacob Thomas et al.

Colonies amphigenous, mostly epiphyllous, dense, crustose, cause water soaked lesions on the corresponding opposite surface of the leaves, up to 10mm in diameter, confluent. Hyphae substraight to crooked, branching opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 12–21x11–13 µm. Appressoria intercalary, ovate to oblong, located in the cell with a central marking, 10–15x2–14 µm. Thyriothecia scattered, initially orbicular, later ellipsoidal, 300–400x150–250 µm, vertically to irregularly dehisced at the centre, often central portion dissolved, margin crenate to fimbriate, fringed hyphae flexuous, compact; asci globose, ovate, octosporous, up to 35µm in diameter; ascospores conglobate, brown, uniseptate, constricted at the septum, 36–39x21–23 µm, wall smooth.

Asterolibertia anisopterae (Sydow) Hansf. and *A. flabellariae* (Sydow) Hansf. are known on *Anisoptera thursifera* and *Flabelliferia paniculata* from Philippines and Sierra Leone, respectively. *A. vateriae* differs from *A. anisopterae* in not forming polygonal meshes of hyphae, having smaller thyriothecia and in causing pathogenic effect on the host. It differs from *A. fabelliferae* in having distinctly larger ascospores (Hansford 1947, 1949). Ascospores are smaller than *A. hydnocarpi* Hosag. & Abraham (Hosagoudar & Abraham 1997a; Hansford 1947, 1949).

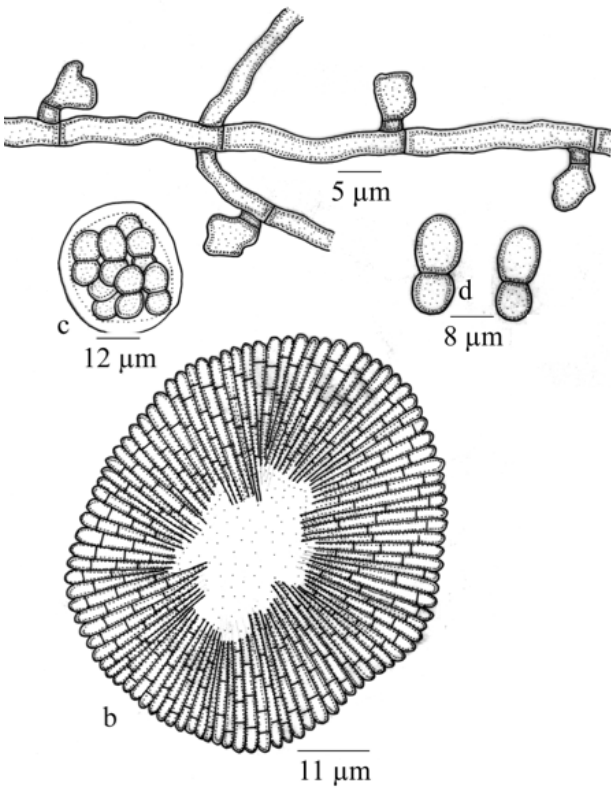


Figure-172. ***Asterina viburnicola***
a - Appressorium; b - Thyriothecium; c - Ascus; d - Ascospores

The genus *Ishwaramyces*

Ishwaramyces Hosag., J. Econ. Taxon. Bot. 28: 183, 2004; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala, p. 169, 2011; Hosag., Mycosphere 2(5): 779, 2012.

Leaf parasites. Mycelium ectophytic, appressoria appears in clusters, setae absent. Thyriothecia orbicular with radiating cells, astomatous, dehisce stellately at the center; asci globose, octosporous, bitunicate; ascospores conglobate, uniseptate, brown.

Type sp. *I. flacourtiae* Hosag., *et al*.

The genus *Ishwaramyces* differs from the genus *Asterina* in having axilliary clusters of appressoria (Muller & Arx, 1962; Arx & Muller, 1975).

Ishwaramyces flacourtiae Hosag., Kamar. & Sabu in Hosag.,C.K. Biju & Abraham, J. Econ. Taxon. Bot. 28: 183, 2004;Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 169, 2011; Hosag., Mycosphere 2(5): 780, 2012. (Fig. 174).

Material examined: TBGT 6648, 6.iii.2008, on leaves of *Flacourtia montana* Graham (Flacourtiaceae), Palcherry, coll. P.J. Robin et al.

Colonies epiphyllous, subdense to dense, up to 2mm in diameter, confluent and cover an entire upper surface of the leaves. Hyphae straight to substraight,

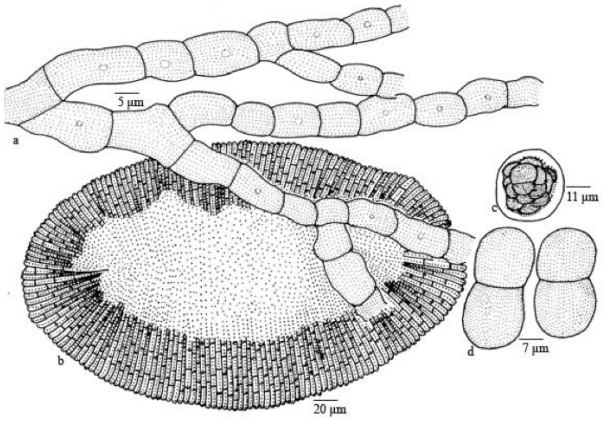


Figure 173. ***Asterolibertia vateriae***
a - Mycelium with intercalary appressoria; b - Thyriothecium; c - Ascus; d - Ascospores

branching opposite to closely reticulate, cells 16–20x4–5 µm. Appressoria opposite, 1–2 smaller at the axilliary, antrorse, two celled, 8–12 µm long; stalk cells cylindrical to cuneate, 3–4 µm long; head cells ovate, globose, entire, 4–8x7–9 µm. Thyriothecia descrete to cuneate, orbicular, up to 345µm in diameter, stellately dehisced at the center, margin crenate to fimbriate; asci numerous, globose, octosporous, 45–56 µm in diameter; ascospores conglobate, initially hyaline, brown at maturity, uniseptate, deeply constricted at the septum, 30–37x19–21 µm, wall smooth. Pycnothyria similar to thyriothecia, smaller; pycnothyriospores oblong to pyriform, brown, 26–30x17–19 µm, wall smooth.

The genus *Meliolaster*

Meliolaster Hohnel, Ber. Deutsch. Bot. Ges. 35:701, 1918; Hosag., Chandraprabha &Agarwal, Asterinales of Kerala**,** p. 171, 2011; Hosag, Mycosphere 2(5): 780, 2012.

Leaf parasites. Mycelium ectophytic, appressoria lateral. Thyriothecia orbicular with radiating cells, astomatous, dehisce stellately at the centre; asci globose to ovate, octosporous, bitunicate; ascospores brown, 2- septate, upper cell globose, the lower two cells narrowed and tapering at the base.

Type sp.: *M. clavisporus* (Pat.) Hohn.

Meliolaster aporusae Hosag., Harish & Archana, Indian J. Sci. Techn. 2: 6, 2009; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 171, 2011; Hosag, Mycosphere 2(5): 781, 2012 (Image 15, Fig. 175).

Material examined: HCIO 48296, TBGT 3015, 6.xii.2006, on leaves of *Aporusa lindleyana* (Wight) Baill. (Euphorbiaceae), Kunkichira, Periya, coll. M. Harish et al.

Colonies epiphyllous, thin, crustose, up to 4mm in diameter, confluent. Hyphae straight, rarely slightly undulate, branching opposite to irregular at acute to wide angles, loosely reticulate, cells 12–22×5–7 µm. Appressoria alternate, unilateral, unicellular, sessile, cylindrical, straight to curved, antrorse, subantrorse, entire, rounded at the apex, 9–11×4–7 µm. Thyriothecia uniformly scattered, orbicular, up to 250µm in diameter, margin crenate to fimbriate, fringed hyphae straight to slightly undulate and devoid of appressoria, thyriothecia stellately to irregularly dehisced at the centre; asci globose to ovate, octosporous, 54–61×49–55 µm; ascospores brown, oblong, 2-septate, upper cell globose, the lower two cells narrowed and tapering at base, constricted only at the upper septum, 41–45×12–14 µm, wall smooth. Pycnothyriospores brown, oblong, unicellular, 9–13×4–7 µm.

The genus *Prillieuxina*

Prillieuxina Arn., Ann. Ecol. Nat. Agric.Montpellier 16:161, 1918; Hansf., Mycol. Pap. 15: 169, 1946; Muller & Arx, Beitr. Krypt. Schw. 11:132, 1962; Luttrell in

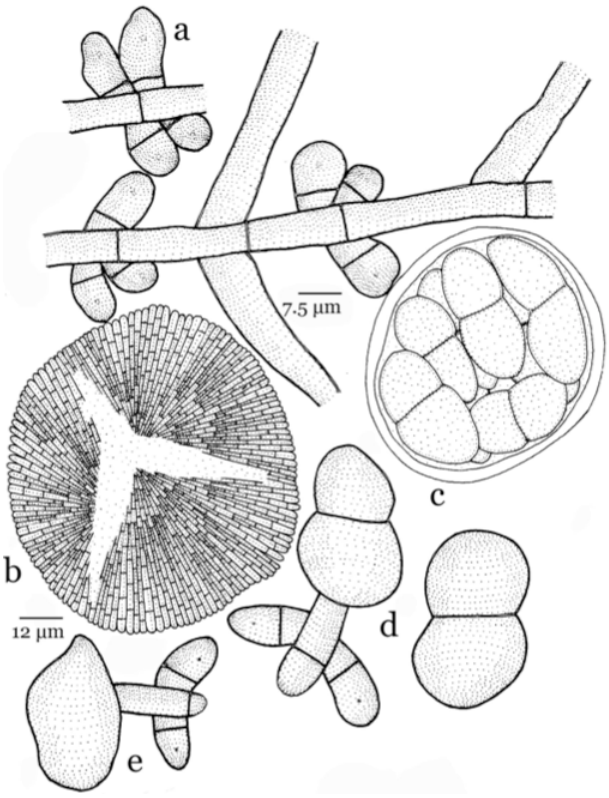


Figure 174. ***Ishwaramyces flacourtiae***
a - Whorled appressoria; b - Thyriothecium; c - Ascus; d - Ascospores; e - Pycnothyriospore

Ainsworth *et al*. (eds.). The Fungi. An advanced Treatise 4: 207, 1973; Arx & Muller, Stud. Mycol. 9: 44, 1975; Bilgrami, Jamaluddin & Rizwi, Fungi of India p. 407, 1991; Hosag., Abraham & C.K. Biju, J.Mycopathol. Res. 39: 62, 2001; Singh, Duke, Bhandari & Jain, J. Econ. Taxon. Bot. 30: 191, 2008; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala, p. 173, 2011; Hosag, Mycosphere 2(5), 782, 2012

Leaf parasites. Mycelium ectophytic, appressoria and setae absent. Thyriothecia orbicular with radiating cells, astomatous, dehisce stellately at the center; asci globose, octosporous, bitunicate; ascospores brown, conglobate, uniseptate.

Type sp. *P. winteriana* (Pazschke) Arn.

Prillieuxina ixorigena Hosag. & Chandraprabha, Indian J. Sci. Technol. 2(6): 18, 2009; Hosag., Chandraprabha & Agarwal,Asterinales of Kerala**,** p. 178, 2011; Hosag, Mycosphere 2(5), 787, 2012. (Fig. 176).

Material examined: TBGT 6190, 10.iii.2010, on leaves of *Ixora coccinea* L. (Rubiaceae), Wayanad, coll. M.C. Riju.

Colonies amphigenous, dense, up to 2mm in diameter. Hyphae crooked, branching irregular at acute to wide angles, loosely to closely reticulate, cells 18–26 µm long and up to 4µm broad. Appressoria absent. Thyriothecia scattered to grouped in the center of the colonies, orbicular, up to 100µm in diameter, stellately dehisced at the center, margin crenate; asci globose, octosporous, up to 30µm in diameter; ascospores oblong, conglobate, uniseptate, constricted at the septum, 20–26x7–11 µm, wall smooth; pycnothyriospores ovate, pyriform, 11–26x7–13 µm, wall smooth.

Prillieuxina ixorae (Ryan) Ryan and *Prillieuxina distinguenda* (Sydow) Ryan are known on the members of the family Rubiaceae (Stevens & Ryan, 1939). However, the present species differs from *Prillieuxina ixorae* in having larger ascospores (20–26×7–11 µm) in contrast to 9x2–7 µm. It also differs from *Prillieuxina distinguenda* in having smaller thyriothecia (up to 100µm in diameter) in contrast to 152–225x100–170 µm and larger ascospores (20–6×7–11µm) in contrast to 12–14x5–7µm.

Prillieuxina loranthi (Syd. & P. Syd.) Syd., Philippine J. Sci. 21(2): 141, 1922; Hosag., Sabeena & Jacob Thomas, Plant Pathology & Quarantine 1(1):7, 2011.

Asterinella loranthi Syd. & P. Syd., Philippine J. Sci. C. 8: 490, 1913.

Asterostomula loranthi Theiss., Ann. Mycol. 14: 270, 1916 (Fig. 177).

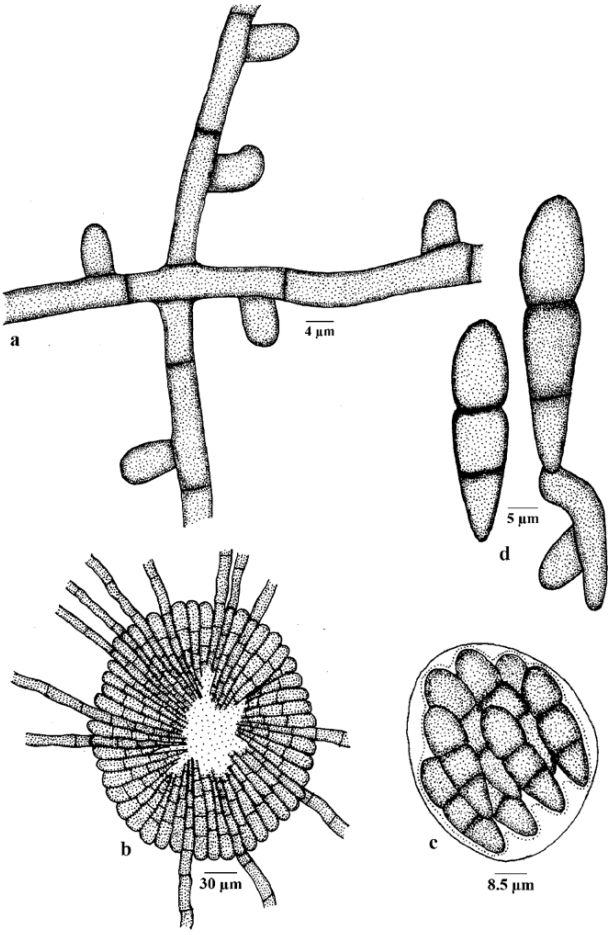


Figure 175.*Meliolaster aporusae*
a.Appressoriate mycelium, b. Thyriothecium, c. Ascus, d. Ascospores

Materials examined: TBGT 6243, 5.xi.2009, on leaves of *Loranthus* sp. (Loranthaceae), Gurukulam Botanic Garden, Periya, coll. A. Sabeena & M.C. Riju.

Colonies amphigenous, subdense to dense, up to 4mm in diameter, confluent. Hyphae flexuous to crooked, branching irregular at acute to wide angles, reticulate, cells 25–40×3–5 µm. Appressoria lacking. Thyriothecia scattered to connate, orbicular, up to 120µm in diameter, stellately dehisced at the centre, margin crenate to fimbriate; asci globose, octosporous, up to 29µm in diameter; ascospores conglobate, uniseptate, constricted at the septum, 20–22x10–15 µm. Pycnothyria many, orbicular, joined together marginally, up to 180µm in diameter, dehiscing stellately at the centre, margin crenate to fimbriate, fringed hyphae flexuous; pycnothyriospores unicellular, pyriform, ovate, 20–25x12–17 µm, wall smooth.

This fungus mostly persists in its anamorph state but a few thyriothecia are mixed with pycnothyria.

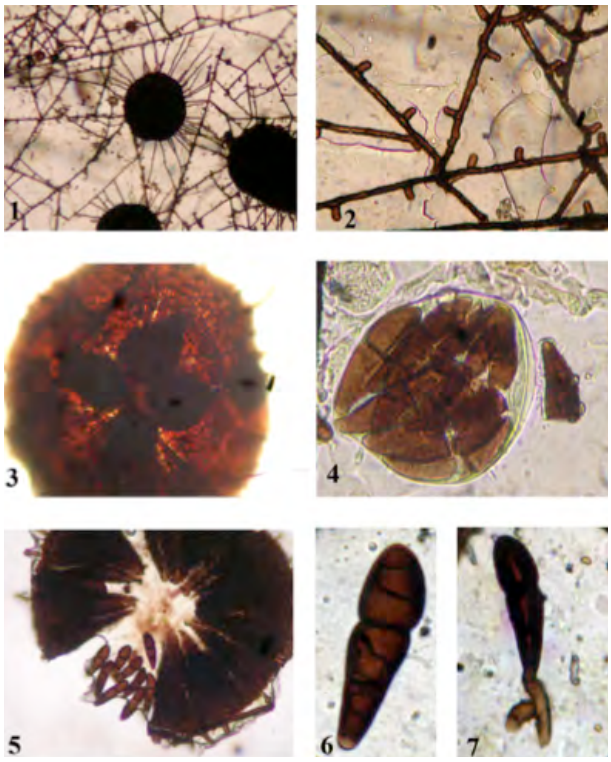


Image 15. *Meliolaster aporusae*
1 - Fungal colony with thyriothecia; 2 - Appressoriate mycelium; 3 - Thyriothecium with asci; 4 - Ascus; 5 - Dehisced thyriothecium; 6 - Ascospore; 7 - Germinating ascospore

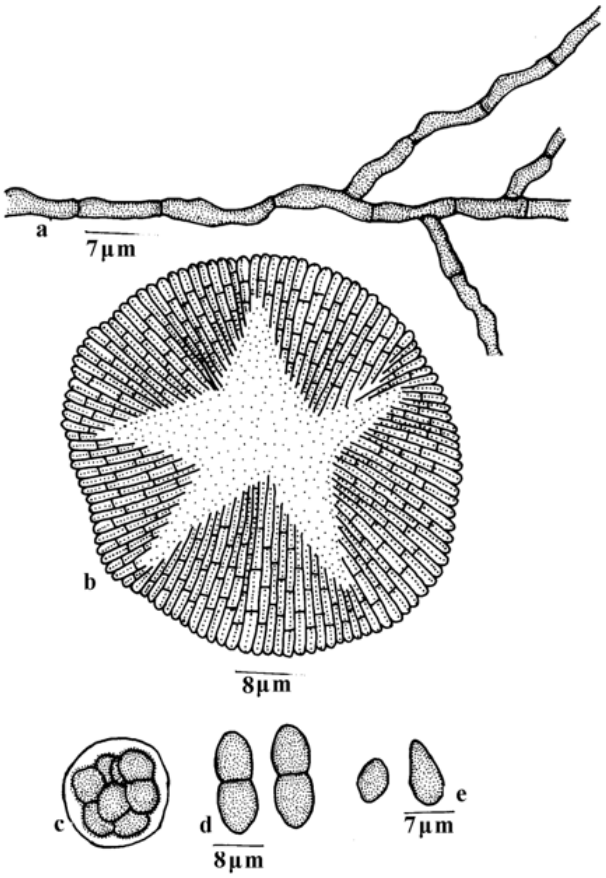


Figure 176. *Prillieuxina ixorigena*
a - Mycelium; b - Thyriothecium; c - Ascus; d - Ascospores; e - Pycnothyriospores

***Prillieuxina* sp.**

Materials examined: HCIO 47438, TBGT 2476, 21.iv.2003, on leaves of *Ixora coccinea* L. (Rubiaceae), Periya, coll. G. Rajkumar & P.A. Jose; HCIO 47448, TBGT 2486, 14.ix.1999, on *Lasianthus* sp. (Rubiaceae), Chembra peak, coll. C.K. Biju; HCIO 47467, TBGT 2505, 12.viii.1998, *Oxyceros rugulosus* (Thwaites) (Rubiaceae), Tirunelly Shola, coll. C.K. Biju.

Key to the Anamorphic Genera

1. Appressoria absent.....*Asterostomula*
1. Appressoria present 2
2. Pycnothyriospores pyriform, ovate.....
.....*Asterostomella*
2. Pycnothyriospores angular, truncate at the base
.....*Mahanteshamyces*

The genus *Asterostomella*

Asterostomella Speg., Ann. Soc. Cien. Arg. 22: 198, 1886; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 224, 2011; Hosag, Mycosphere 2(5): 822, 2012.

Leaf parasites. Mycelium ectophytic, appressoria lateral, setae absent. Pycnothyria orbicular with radiating cells, astomatous, dehisce stellately at the center; pycnothyriospores ovate, pyriform, brown.

Type sp. *A. paraguayensis* Speg.

This genus represents here with a single species.

Asterostomella boehmeriae Hosag., Balakr. & Goos, Mycotaxon 58: 491, 1996; Hosag., Zoos' Print J. 18: 1285, 2003; 21: 2412, 2006; Hosag., Chandraprabha & Agarwal Asterinales of Kerala**,** p. 226, 2011; Hosag, Mycosphere 2(5): 823, 2012. (Fig.178).

Material examined: HCIO 44791, TBGT 1028, 27.xii.2002, on leaves of *Boehmeria* sp. (Urticaceae), Chandanathode, coll. M. Kamarudeen & P.A. Jose.

Colonies hypophyllous, black, velvety, later ash-coloured, mostly confluent, giving a dusty appearance, corresponding upper surface of the infected leaf portion turn brick red, severely infected leaves roll dorsally so

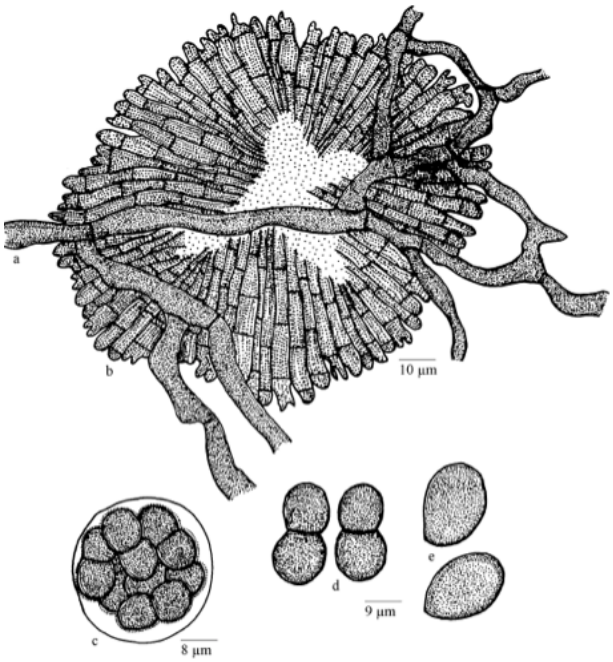


Figure 177. ***Prillieuxina loranthi***
a - Mycelium; b - Thyriothecium; c - Ascus; d - Ascospores; e - Pycnothyriospores

as to cover the infected parts by exposing the ventral surface. Hyphae pale yellow, strongly appressed to the host epidermis, straight to flexuous, branching opposite to irregular at acute angles, loosely reticulate, cells 12–18.5x5–6.5 µm. Appressoria one to two celled, sessile to stalked, alternate, 6–18.5 µm long; stalk cells (when two celled) cylindrical to cuneate, 6–6.5 µm long; head cells ovate, globose, entire to angular (in sessile), 9–12.5x6–8 µm. Pycnothyria scattered to mostly grouped, orbicular, 90–155 µm in diameter, margin crenate, dehiscing stellately at the centre; pycnothyriospores brown, numerous, ellipsoidal, unicellular, tapered to broadly rounded at the apex, straight to slightly curved, a hyaline band often present in the middle, 18–31x12–15.5 µm, wall smooth.

The infected leaves were rolled around.

The genus *Asterostomula*

Mycelium superficial, septate, lacking appressoria (Batista & Ciferri 1959). Pycnothyria scutate, orbicular, with radiating cells on the upper surface, stellately dehiscing at the centre, with a crenate to fimbriate margin (Batista & Ciferri 1959). Pycnothyriospores brown, unicellular, ovate, clavate, and pyriform to cylindrical.

Type sp. *A. loranthi* Theiss.

Asterostomula pavettae Hosag. & A. Sabeena, Mycosphere 2(5): 837, 2012. (Fig. 179).

Material examined: TBGT 6203, 23.xii.2008, on leaves of *Pavetta indica* L. (Rubiaceae), Wayanad, coll. M.C. Riju**.**

Colonies amphigenous, thin, up to 2mm in diameter, confluent. Hyphae flexuous to crooked, branching irregular at acute to wide angles, cells 20–37x5–7 µm. Pycnothyria scattered to connate, orbicular, up to 140µm in diameter, stellately dehisced at the centre, margin mostly crenate; pycnothyriospores ovate to pyriform, 17–27x10–12 µm.

This is the only species known on this host genus.

The genus *Mahanteshamyces*

Mahanteshamyces Hosag., J. Econ. Taxon. Bot. 28: 189, 2004; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p.241, 2011; Hosag., Mycosphere 2(5): 839, 2012.

Foliicolous, ectophytic, parasitic. Mycelium brown, superficial, appressoriate. Pycnothyria scutate, dimidiate, radiate, orbicular, stellately dehisced at the center; pycnothyriospores brown, angular, wall straight to sinuate.

Type sp. *M. agrostistachydis* Hosag. & C.K. Biju.

The genus *Mahanteshamyces* differs from the genus *Asterostomella* in having roundedly projected and shallowly lobate, angular and thick walled pycnothyriospores (Batista and Cifferri, 1959; Sivanesan, 1981; Sutton, 1980). Hofmann & Pipenbaring (2008) showed that this is an anamorph of the genus *Asterina*.

Mahanteshamyces agrostachydis Hosag. & C.K. Biju in Hosag.,C.K. Biju & Abraham, J. Econ. Taxon. Bot. 28: 189, 2004; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 241, 2011; Hosag, Mycosphere 2(5): 839, 2012 (Fig. 180).

Material examined: HCIO 43993, TBGT 403, 14.iv.1999, on leaves of *Agrostistachys indica* Dalz. (Euphorbiaceae), towards the stream side of Chembra hills, coll. C.K. Biju.

Colonies hypophyllous, thin to subdense, spreading, up to 5mm in diameter, confluent. Hyphae straight to substraight, branching alternate to opposite at acute angles, loosely to closely reticulate, cells 4–16x1.5–2.5 µm. Appressoria unicellular, alternate, about 20% opposite, ovate, globose, oblong, irregularly sublobate to lobate, 6–8x4–6.5 µm. Pycnothyria scattered, orbicular, up to 80µm in diameter, margin crenate, stellately dehisced to widely opened at the center;

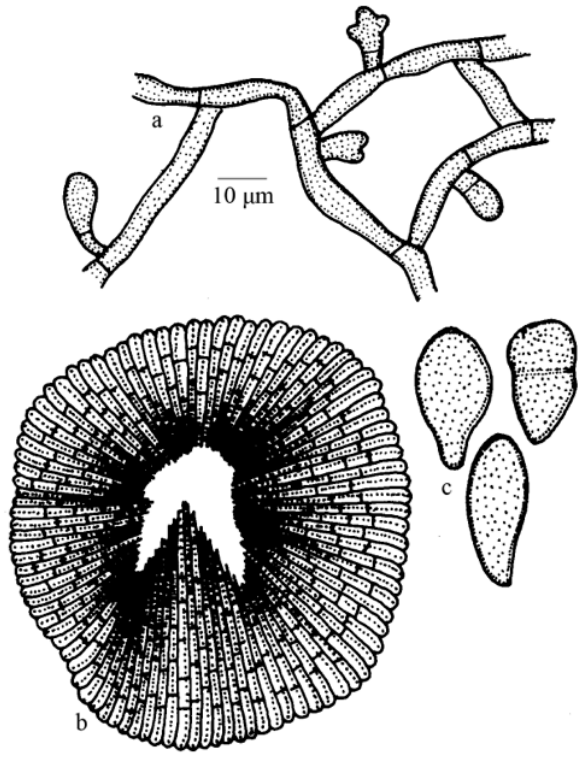


Figure 178. *Asterostomella boehmeriae*
a - Appressoriate mycelium; b - Pycnothyrium; c - Pycnothyriospores

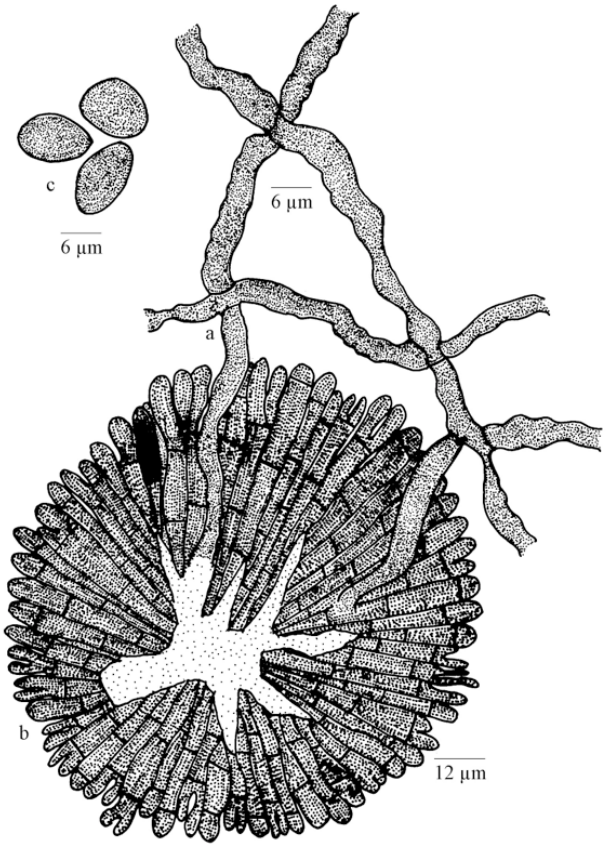


Figure 179. *Asterostomula pavettae*
a - Mycelium; b - Pycnothyrium; c - Pycnothyriospores

pycnothyriospores brown, unicellular, truncate at the base, apex more or less flattened, 1–3 rounded projection or shallowly lobate, angular, 12–15x11–13 µm, smooth, thick walled.

This is the anamorph of the genus *Asterina.*

The family Lembosiaceae

Lembosiaceae Höhn., Ann. Mycol. 16: 146, 1918. Lembosiaceae Hosag. in Abraham & C.K. Biju, J. Mycopathol. Res. 39: 62, 2001.

Leaf parasites. Mycelium ectophytic, with or without appressoria, nutrient mycelium and leaf permeating stroma present. Ascomata ectophytic, dimidiate, oval, ellipsoidal, "X" or "Y" shaped, elongated with radiating cells, astomatous, dehisce longitudinally at the center; asci globose, spherical, octosporous, bitunicate; ascospores two to many septate, conglobate, hyaline to brown.

Type genus - *Lembosia* Lev.

Key to the genera of Lembosiaceae

1. Appressoria present.....*Lembosia*
1. Appressoria absent.....*Echidnodella*

Key to the species

Araceae
Lembosia
Single species.....*L. malabarensis*

Myrtaceae
Lembosia
Single species.....*L. hosagoudarii*
Melastomataceae
Echidnodella
Single species.....*E. memecyli*

The genus *Echidnodella*

Echidnodella Theiss. & Sydow, Ann. Mycol. 15: 422, 1917; Muller & Arx, Beitr. Krypt. Schw. 11:118, 1962; Luttrell in Ainsworth *et al*. (eds.): The Fungi. An advanced

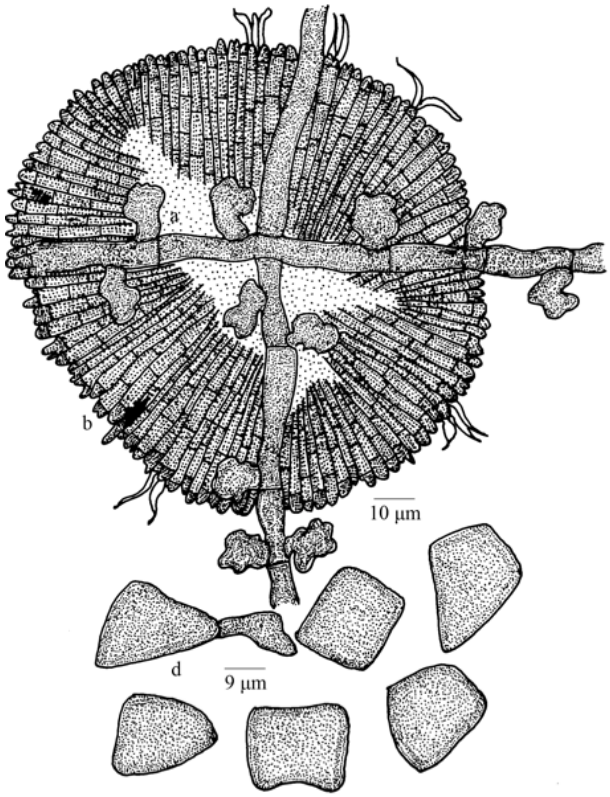


Figure 180. ***Mahanteshamyces agrostachydis***
a - Appressoriate mycelium; b - Pycnothyrium; c - Pycnothyriospores

Treatise 4: 207, 1973; Arx & Muller, Stud. Mycol. 9: 46, 1975; Bilgrami, Jamaluddin & Rizwi, Fungi of India p. 185, 1991; Hosag., Abraham & C.K. Biju, J. Mycopathol. Res. 39: 62, 2001; Singh, Duke, Bhandari & Jain, J. Econ. Taxon. Bot. 30: 187, 2008; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 194, 2011; Hosag, Mycosphere 2(5): 799, 2012.

Leaf parasites. Mycelium ectophytic, appressoria absent, hypostroma absent. Thyriothecia oval, ellipsoidal, X or Y shaped, elongated with radiating cells, astomatous, dehisce longitudinally at the center; asci oval, octosporous, bitunicate; ascospores brown, conglobate, uniseptate.

Type sp: *E. linearis* (Sydow) Theiss. & Sydow

Echidnodella memecyli Hosag. & Abraham, J. Mycol. Res. 102: 185, 1998; Hosag., C.K. Biju & Abraham, J. Econ. Taxon. Bot. 25: 306, 2001; Hosag., Zoos' Print J. 18: 1283, 2003; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 194, 2011; Hosag., Mycosphere 2(5): 801, 2012 (Fig. 181)

Material examined: TBGT 5988, 19.xi.2003, on leaves of *Memecylon* sp. (Melastomataceae), Banasuramala, coll. C.K. Biju.

Colonies hypophyllous, subdense, spreading, up to 5mm diameter, widely confluent; Hyphae substraight, flexuous to crooked, branching opposite to irregular at acute to wide angles, loosely reticulate, cells 24–29x2.5–3.5 µm. Appressoria absent. Thyriothecia scattered, rarely connate, ovate, elongate, straight or curved to acutely sinuate or variously branched, 530–635x31–36 µm, longitudinally split at the centre, mostly crenate at the margin and rarely fimbriate, fringed hyphae very small; asci ovate, clavate, globose, 8-spored, 33–36x19–24 µm; ascospores conglobate, 1-septate, constricted at the septum, lower cell slightly attenuated and upper rounded, 12–14.5x4–6 µm, wall smooth.

Echidnodella memecyli Hosag. & Abraham, *Echidnodella miconiae* Ryan and *E. melastomatacearum* Ryan have been reported on *Miconia* spp. from Puerto Rico (Stevens & Ryan 1939). *E. memecyli* differs from both in having different shaped, larger thyriothecia and smaller ascospores.

The genus *Lembosia*

Lembosia Lev., Ann. Sci. Nat. Bot. Ser., 3, 3: 58, 1845; Hansf., Mycol. Pap. 15: 189, 1946; Muller & Arx, Beitr. Krypt. Schw. 11: 111, 1962; Luttrell in Ainsworth *et al.* (eds.): The Fungi. An advanced Treatise 4: 207, 1973; Arx & Muller, Stud. Mycol. 9: 43, 1975; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala, p. 204, 2011; Hosag, Asterinales of India. Mycosphere 2(5): 805, 2012.

Heraldoa Bat., Att. Est. Bot. Lab. Critr. Univ. Pavia 16:105, 1959.

Lembosidium Speg., Biol. Acad. Nac. Cien. Cordova. 26:342, 1923.

Lembosiellina Bat. & Maia, Atas Inst. Mycol. Recife 1:329, 1960.

Morenoella Speg., Fungi Guar. 1: 258, 1883.

Leaf parasites. Mycelium ectophytic, appressoria lateral. Thyriothecia oval, ellipsoidal, X or Y shaped, elongated with radiating cells, astomatous, dehisce longitudinally at the center; asci oval, octosporous, bitunicate; ascospores conglobate, uniseptate, brown.

Type sp.: *L. melastomatum* Mont.

Lembosia hosagoudarii Sivanesan & Shivas, Fungal Diversity 11: 163, 2002; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 205, 2011; Hosag., Mycosphere 2(5): 808, 2012.

Lembosia syzygiicola Hosag., Indian J. Forestry 18: 276, 1995 (Fig. 182).

Material examined: HCIO 49999, TBGT 4151, 20.ix.2008, on leaves of *Syzygium* sp. (Myrtaceae), Periya, coll. P.J. Robin et al.; HCIO 49810,TBGT 3962, 15.ii.2009, coll. Gireesh et al.,

Colonies amphigenous, mostly epiphyllous, dense, crustose, up to 3mm in diameter, rarely confluent. Hyphae straight to substraight, branching alternate to irregular at acute to wide angles, loosely reticulate, cells 31–38×3–5 µm. Appressoria two celled, scattered, alternate, straight to curved, 9–18 µm long; stalk cells cylindrical to cuneate, 4–7 µm long; head cells ovate, globose, entire, 4–11×4–7 µm. Thyriothecia scattered to grouped, rarely connate, initially circular, linear to elliptical at maturity, carbonaceous black, margin crenate to fimbriate, fringed hyphae flexuous, thyriothecia dehiscing by a longitudinal slit at the center, 640–930×214–286 µm; asci globose initially, cylindrical to clavate at maturity, octosporous, 71–84×37–46.5 µm; ascospores deep brown, conglobate, uniseptate, constricted at the septum, both cells mostly equal in size and shape, 21–28×9–12.5 µm, wall smooth.

Many species of the genus *Eugenia* have been brought under the genus *Syzygium*. So far, three species, namely, *Lembosia eugeniae* Rehm, *L. robinsonii* Sydow and *L. tenella* Lev. are reported on the host species of the genus *Eugenia*. The present species differsfrom *L. eugeniae* Rehm in having larger thyriothecia, asci and ascospores; *L. robinsonii* Sydow in having smaller ascospores and from *L. tenella* Lev. in having larger asci and narrower ascospores (Stevens & Ryan, 1939).

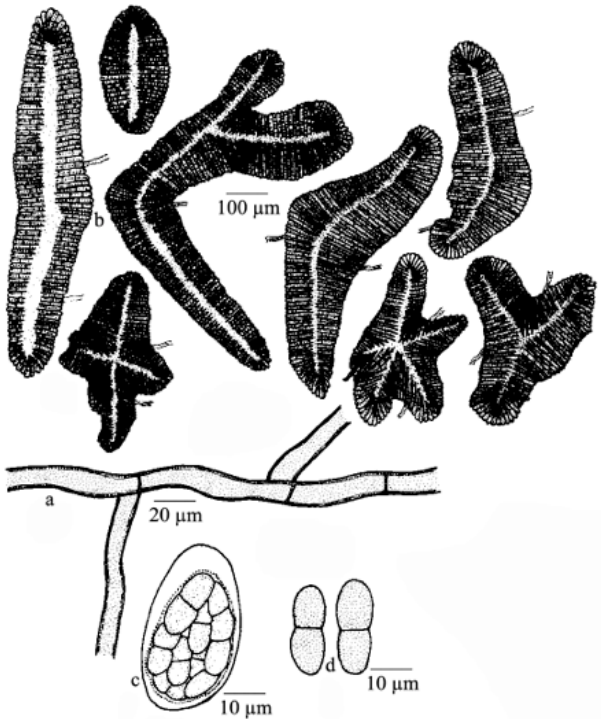


Figure 181. ***Echidnodella memecyli***
a - Mycelium; b - Thyriothecia; c - Ascus; d - Ascospores

Lembosia malabarensis (Sydow & Sydow) Hosag. & Goos, Mycotaxon 52: 472, 1994; Song Bin & Hosag., Guizhou Science 21: 94, 2003; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala**,** p. 213, 2011; Hosag., Mycosphere 2(5): 813, 2012.

Asterina malabreansis Sydow & Sydow in Sydow, Sydow & Butler, Ann. Mycol. 9: 391, 1911.

Asterinla malabarensis (Sydow & Sydow) Theiss., Broteria 10: 106, 1912.

Prilliexina malabarensis (Sydow & Sydow) Ryan in Stevens & Ryan, Illinois Biol. Monographs 17: 80, 1939 (Image 16).

Material examined: TBGT 6209, 26.iii.2009, on leaves of *Pothos scandens* L. (Araceae), Kandeykayal, coll. M.C. Riju.

Colonies hypophyllous, on sheaths, up to 3mm in diameter, confluent. Hyphae flexuous to crooked, branching irregular at acute to wide angles, loosely to closely reticulate, cells 15–23×3–4 µm. Appressoria alternate, unilateral, opposite, unicellular, cylindrical, straight, curved, flexuous, zig-zag to uncinate, broadly rounded at the apex, 19–24×4–5 µm. Thyriothecia initially orbicular, later elongated, straight to curved, 500–1000×290–400 µm, dehisce longitudinally at the centre or sub centre, margin crenate to fimbriate, fringed hyphae compact, flexuous; asci few, globose to ovate, octosporous, 40–60×25–40 µm; ascospores oblong, conglobate, brown, uniseptate, constricted at the septum, 26–30×16–18 µm, wall smooth. Pycnothyria mixed with thyriothecia, similar to thyriothecia, smaller; pycnothyriospores oval, oblong, brown, 28–30×16–18 µm.

This is the only species of the genus known on the members of the family Araceae. Malabar is the type locality of this fungus. Pycnothyriospores are reported for the first time for this species. This species was collected by E. J. Butler from Kanouth of Malabar region.

Elongated thyriothecia with a central longitudinal slit and the presence of appressoria are characteristic of the genus *Lembosia.*

Schiffnerulaceae

Black colonies formed on the leaf surface, mycelium brown, superficial, septate, appressoriate; appressoria unicellular, formed laterally. Thyriothecia orbicular, cells

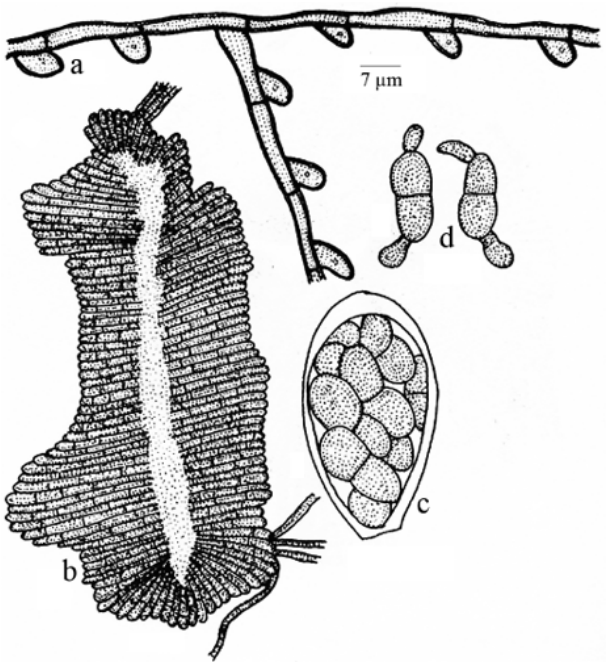


Figure 182. ***Lembosia hosagoudarii***
a - Appressoriate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores

on the upper surface radiating, dissolve at the centre at maturity; asci globose, bitunicate, 8-spored; ascospores conglobate, brown, uniseptate, constricted at the septum.

Type genus: *Schiffnerula* Hohnel

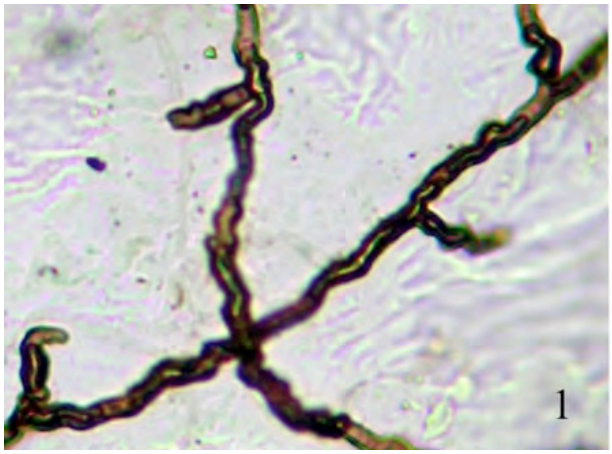
(Synamorphs: *Digitosarcinella*, *Mitteriella*, *Questieriella* and *Sarcinella*).

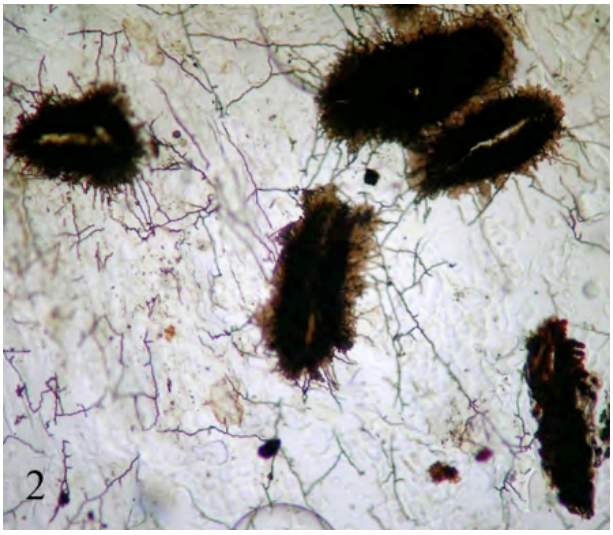
Teleomorph and the latter two form genera (*Questieriella* and *Sarcinella*) are known in the present work.

Key to the genera

1.Teleomorph present.....*Schiffnerula*
1.Known only with anamorphs.....2
2.Black, sarciniform conidia present.....*Sarcinella*
2.Subhyaline to brown, 3-septate, ellipsoidal or fusiform, straight to curved conidia present.....*Questieriella*

Form genus *Sarcinella* is considered as advanced than *Questieriella*. If the fungus possesses both *Questieriella* and *Sarcinella* conidia, the fungus is placed under the form genus *Sarcinella*.





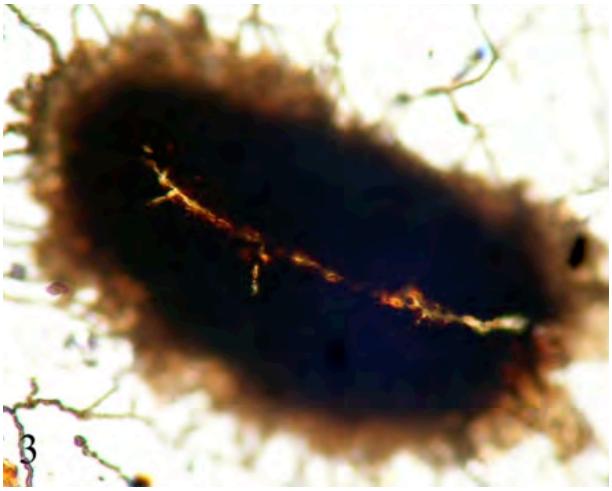


Image 16. ***Lembosia malabarensis***
1 - Appressoriate mycelium; 2 - Thyriothecia in the colony; 3 - Thyriothecium

Key to the species

ASTERACEAE
Schiffnerula
1. On *Spilanthus*.....*S. spilanthi*
1. On *Vernonia*.....*S. vernoniae*

BUXACEAE
Questieriella
Single species.....*Q. sarcococcae*

CAESALPINIACEAE
Schiffnerula
Single species.....*S. tamarindi*

CELASTRACEAE
Schiffnerula
Single species.....*S. celastri*

EUPHORBIACEAE
Schiffnerula
1.On *Bridelia*.....*S. brideliae*
1.On *Ricinus*.....*S. ricini*

FABACEAE
Sarcinella
Single species.....*S.dalbergiae*

ICACINACEAE
Sarcinella
Single species.....*S. hughesii*

LYTHRACEA
Schiffnerula
Single species.....*S. lagerstroemiae*

SAPINDACEAE
Sarcinella
Single species.....*S. allophyli*

SOLANACEAE
Schiffnerula
Single species.....*S. palodensis*

THEACEAE
Schiffnerula
Single species.....*S. camelliae*

VERBENACEAE
Schiffnerula
Single species.....*S. tectonae*

The genus *Questieriella*

Questieriella Arn. ex Hughes, Can. J. Bot. 61: 1729, 1983; Hosag., Plant Pathology & Quarantine 1(2): 136, 2011.

Colonies black, hyphae superficial, brown, branched, septate, appressoriate. Appressoria lateral, unicellular. Conidiophores micronematous, mononematous, lateral, 0–2-septate. Conidiogenous cells monoblastic to polyblastic, integrated, terminal, lateral or incorporated in the hyphae. Conidia blastic, terminal, solitary, narrowly ellipsoidal to obovoidal, curved, falcate, sigmoid, truncate at the base, 3-septate.

Type: *Q. pulchra* Hughes .

This genus represents here with a single species.

Questieriella sarcococcae Hosag., Manoj. & H. Biju, Indian Phytopath. 58: 203, 2005; Hosag., Plant Pathology & Quarantine 1(2):140, 2011 (Fig. 183).

Material examined: TBGT 6179, TBGT 6181, 4.i.2010, on leaves of *Sarcococca* sp. (Buxaceae), Periya, coll. M.C. Riju.

Colonies epiphyllous, thin, spreading, up to 3mm in diameter, confluent. Hyphae straight to substraight, branching alternate to irregular at acute angles, loosely to closely reticulate, cells 16–23x4–7 µm. Appressoria alternate, about 5% opposite, oval, globose, entire, 8–12x8–10 µm. Tip of the mycelium converted as conidiophores, pale yellow, micronematous, mononematous, 0–2-septate, simple, 5–15x5–6 µm. Conidiogenous cells monoblastic, terminal, integrated, conidia blastic, solitary, fusiform, straight to slightly curved, pale yellow, 3-septate, slightly constricted at the septa, end cells attenuated to broadly rounded at the tip, 45–56x9–11 µm.

This species appears to be restricted to high altitudinal areas.

Questieriella strychni Hosag., J. Econ. Taxon. Bot. 28: 196, 2004. Hosag., The genus *Schiffnerula* in India. Plant Pathology & Quarantine 1(2), 140, 2011 (Fig. 184).

Material examined: TBGT 4044, 20.ix.2008, on leaves of *Strychnos nux-vomica* L. (Strychnaceae), Pulpalli, coll. M. Harish & P.J. Robin.

Colonies amphigenous, dense, up to 5 mm in diameter, confluent. Hyphae substraight to flexuous, branching irregular at acute angles, loosely to closely reticulate, cells 17–21x4–5 µm. Appressoria numerous to scarce, scattered, alternate to about 5% opposite,

globose, entire, 8–10 µm in diameter. *Questieriella* type of conidia produced from the pore of hyphal cells, fusiform, pale brown, 3-septate, straight to curved, sigmoid, often constricted at the middle, end cells pale, conoid, smaller, 40–45x9–10 µm.

This fungus was associated with the dark colonies of *Meliola* sp. However, when *Meliola* colonies matured, a whitish coating formed on the black colonies and it may be due to the production of enormous number of *Questieriella* conidia. The end cells of the conidia were much smaller and paler than the central two cells. Later, these two end cells wrinkle and disappear as the spore starts germinating.

This species differs from *Schiffnerula spigeliae* Hansf. known on *Spigelia anthelmia* from Sierra Leone in having larger falcate conidia (Hansford 1949, Sivanesan 1984).

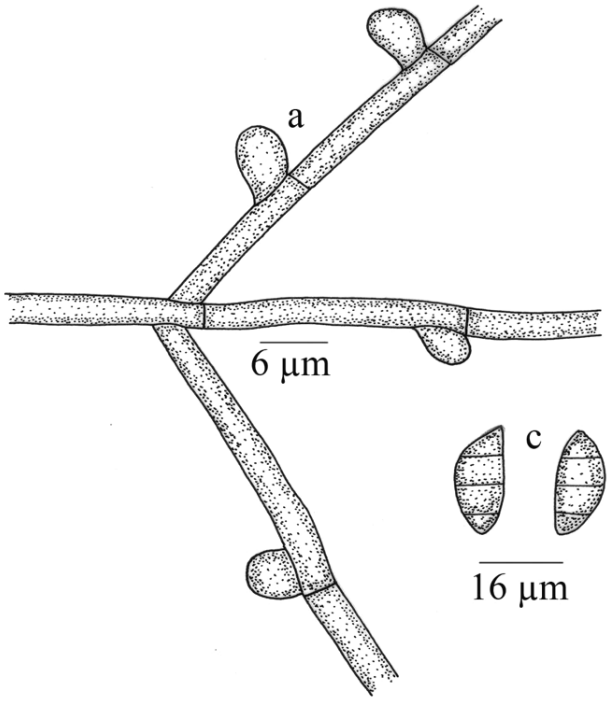


Figure 183.*Questieriella sarcococcae*
a - Appressorium; b - Three septate conidia

The genus *Sarcinella*

Sarcinella Sacc., Michelia 2: 31, 1880; Hosag., Plant Pathology & Quarantine 1(2):144, 2011.

Colonies black. Hyphae superficial, branched, septate, appressoriate. Appressoria lateral, unicellular. Conidiophores macronematous, semimacronematous, simple to branched. Conidiogenous cells monoblastic, integrated, terminal, intercalary, determinate. Conidia solitary, acrogenous or acropleurogenous, subspherical, sarciniform, dark brown to reddish brown, smooth, constricted at the septa.

Type – *S. heterospora* Sacc.

Sarcinella allophyli Hosag., J. Mycopathol. Res. 44: 20, 2006; Hosag. & Riju, Indian J. Sci. & Techn. 2(6): 7, 2009; Hosag., Plant Pathology & Quarantine 1(2):144, 2011 (Fig. 185).

Material examined: HCIO 48179, TBGT 2915, 9.xi.2007, on leaves of *Allophylus* sp. (Sapindaceae), 16th mile, Padinharathara, coll. M.C. Riju; HCIO 49908, TBGT 4060, 11.xi.2007, coll. A. Chandraprabha.

Colonies amphigenous, mostly hypophyllous, dense, spreading, up to 3mm in diameter. Hyphae straight to flexuous, pale brown, branching irregular at acute to wide angles, loosely reticulate, cells 17–24x3–5 µm. Appressoria scattered, alternate, unilateral, rarely opposite, ovate to mostly globose, entire, 7–9x6–11 µm. Conidiophores produced lateral to the hyphae, simple, branched, straight to flexuous, micronematous to semi-macronematous, 9–32x4–6 µm. Conidiogenous cells terminal, intercalary, monoblastic, integrated, determinate, cylindrical. Sarciniform conidia solitary, dry, simple, subspherical to oval, 2–10-celled, brown to charcoal black, muriform, constricted at the septa, 24–32 µm in diameter, wall smooth.

Schiffnerula allophyli Hansf. is known on *Allophylus* sp. from Uganda (Hansford, 1946, Hosagoudar 2003a,b) and the present fungus is only with the *Sarcinella* state.

Sarcinella dalbergiae Hosag. & Agarwal, Indian Phytopath. 55: 501, 2002; Hosag., Plant Pathology & Quarantine 1(2): 150, 2011 (Fig. 186).

Material examined: HCIO 43806, TBGT 391, 19.iv.1999, on leaves of *Dalbergia* sp. (Fabaceae), Banasuran mala, coll. C.K. Biju.

Colonies epiphyllous, subdense, up to 2mm in diameter, confluent. Hyphae flexuous to crooked, branching irregular at acute angles, loosely reticulate and form loose mycelial net, cells 12–21x3–5 µm. Appressoria alternate, very few opposite, unicellular, globose, broad based, entire, 9–12 µm broad and 6–7 µm high. Conidiophores micronematous, mononematous simple, straight, cylindrical, 18–22x11–12 µm. Conidiogenous cells integrated, terminal, monoblastic, determinate, cylindrical, conidia solitary, simple, acrogenous, spherical to subspherical, 4–12 celled, sarciniform, deeply constricted at the septa, charcoal black, 19–30 µm in diameter, wall smooth.

Sarcinella cassiae Butler is known on *Cassia tora*

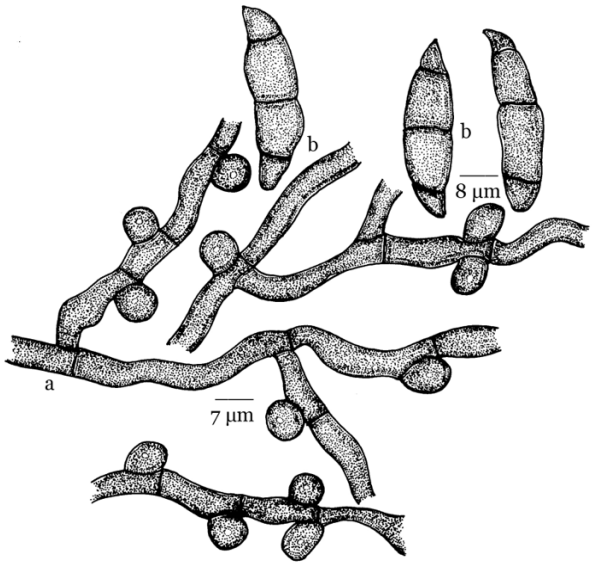


Figure 184. *Questieriella strychni*
a - Appressoriate mycelium; b - Conidia of *Questieriella*

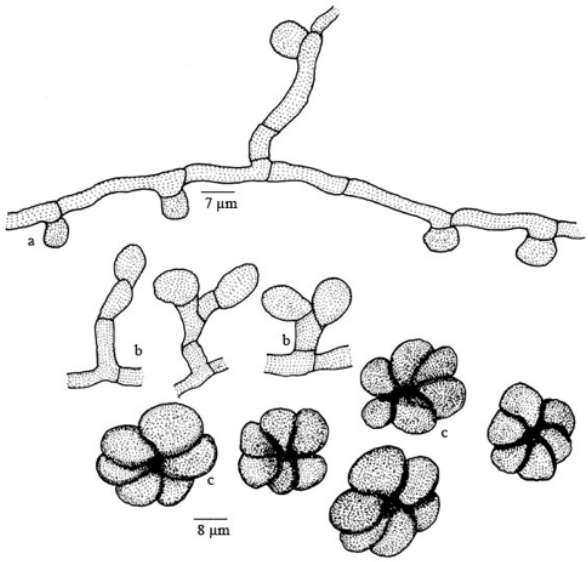


Figure 185.*Sarcinella allophyli*
a - Appressoriate mycelium; b - Conidiophores; c - Sarciniform conidia

(Ceasalpiniaceae). Loosely net forming hyphae and few opposite, globose and larger apressoria distinguishes the present anamorph from it.

Sarcinella hughesii Hosag. & Venkanna, J. Econ. Taxon. Bot. 17: 457, 1993; Hosag., Plant Pathology & Quarantine 1(2): 154, 2011 (Fig. 187).

Material examined: HCIO 51232, TBGT 5112, 23.xii.2008, on leaves of *Nothopodytes* sp. (Icacinaceae), Padinharathara, coll. M.C. Riju.

Colonies amphigenous, thin, scattered, up to 2mm in diameter. Hyphae flexuous, branching opposite to unilateral at acute to wide angles, loosely reticulate, cells 17–30x6–7 µm. Appressoria alternate to unilateral, globose, broad based, entire, 5–12x7–12 µm. *Questieriella* conidia few, scattered, ellipsoidal, straight to sigmoid, 3-septate, slightly constricted at the septa, 37–45x9–11 µm. *Sarcinella* conidiophores simple, micronematous, mononematous, unicellular to septate, 5–25x4–6 µm; conidiogenous cells monoblastic, terminal. Conidia solitary, subspherical to oval, sarciniform, 2–5-celled, constricted at the septa, 15–30x15–32 µm.

Sarcinella tamarindi Hosag. & Riju, Mycosphere 2(2): 157, 2011; Hosag., Plant Pathology & Quarantine 1(2): 154, 2011 (Image.17; Fig. 188).

Material examined: HCIO 50595, TBGT 4512 (holotype); 10.x.2010, on leaves of *Tamarindus indica* L. (Caesalpiniaceae), 16th mile, Padinharathara, coll. M.C. Riju; HCIO 51032, TBGT 4949 11.x.2011 coll. M.C. Riju; HCIO 51035, TBGT 4952, 8.x.2010, 16th mile, Padinharathara, coll. M.C. Riju.

Colonies amphigenous, thin, scattered, up to 3mm in diameter. Hyphae substraight, branching mostly opposite, alternate to irregular at acute to wide angles, loosely reticulate, cells 15–28x2–5 µm. Appressoria alternate to unilateral, one celled, globose, broad based, entire, 7–8x5–8 µm. *Questieriella* conidia few, monoblastic, polyblastic, terminal, cylindrical; conidia solitary, acrogenous, subspherical, oval, sarciniform, 2–7 celled, constricted at the septa, 25–38x18–32 µm, wall smooth, brown in colour.

This fungus was associated with the colonies of *Meliola tamarindi*.

The genus *Schiffnerula*

Schiffnerula Hohnel, Sber, Akad. Wiss. Wien, math. Nat.kl., I, 118: 867, 1909; Arx & Mueller, Stud. Mycol. 9: 48, 1975; Hughes, Can. J. Bot. 61: 1763, 1983; Hosag., Plant Pathology & Quarantine 1(2):167, 2011.

Clypeolella Hohnel, Sber. Akad. Wiss. Wien., math.-nat.kl. I, 119: 403, 1910.

Phaeoschiffnerula Theiss., Broteria 12: 21, 1917.

Questieria Arn., Les Asterinees 1: 186, 1918.

Diathrypton Sydow, Philippine J. Sci. 21: 137, 1922.

Coniosporiella Bat., Atas Inst. Univ. Recife 3: 113, 1966.

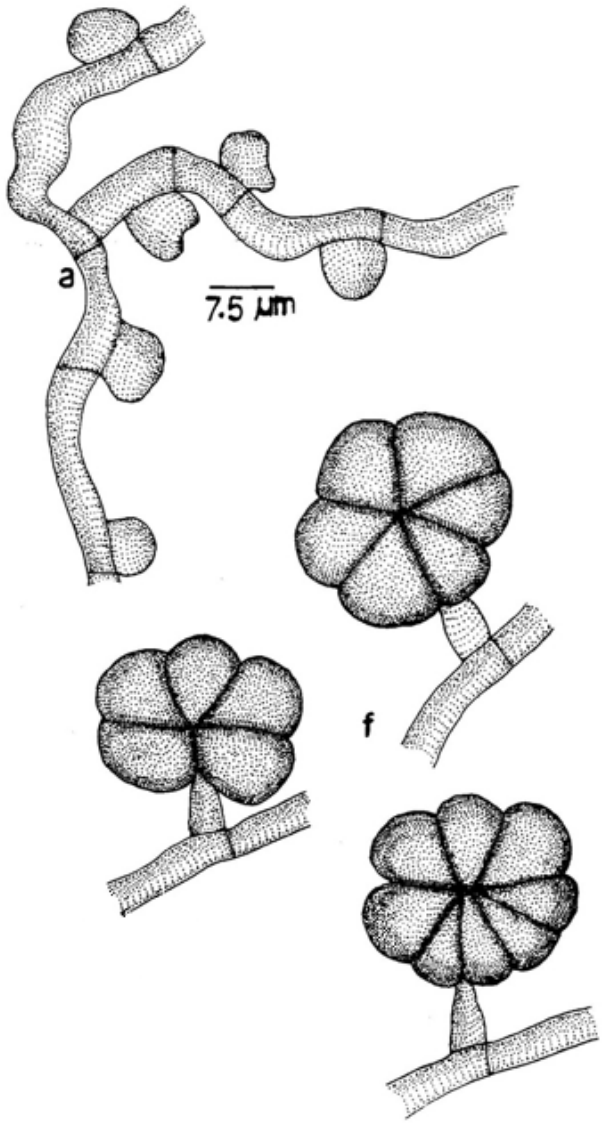


Figure 186.*Sarcinella dalbergiae*
a - Appressoriate mycelium; f - Sarciniform conidia

Hypahe superficial, colonies foliicolous, brown, appressoriate, appressoria unicellular. Ascomata arise from the short lateral branches, initially with radiating cells but the cells dissolve when the ascomata start resuming globose appearance. Asci few, bitunicate, broadly ellipsoid to globose, sessile, octosporous, exposed after deliqusing the ascomatal wall; ascospores brown, 1-septate, constricted at the septum.

Type – *S. mirabilis* Hohnel

Schiffnerula brideliae Hansf., Proc. Linn. Soc. London 153(1): 12, 1941; Hosag. & Riju, Indian J. Sci. & Techn. 2(6): 7, 2009; Hosag., Plant Pathology & Quarantine 1(2): 172, 2011 (Fig. 189).

Material examined: HCIO 48169, TBGT 2905; HCIO 48172, TBGT 2908, 10.xi.2007, on leaves of *Bridelia* sp. (Euphorbiaceae), 16th mile, Padinharathara, coll. M. C. Riju.

Colonies amphigenous, thin, up to 2mm in diameter, confluent. Hyphae substraight to flexuous, branching opposite, alternate to unilateral at acute to wide angles, loosely reticulate, cells 13–38x4–7 µm. Appressoria alternate, unilateral, globose, mammiform, entire, 6–13x6–11 µm. Conidia of *Questieriella* scattered in the colonies, curved, 3-septate, slightly constricted at the septa, taper towards both ends, 28–30x8–11 µm. Conidiophores of *Sarcinella* produced lateral to the hyphae, single, straight to flexuous, macronematous, mononematous, 0–3 septate, 4–7x6–9 µm; conidiogenous cells terminal, monoblastic, integrated, cylindrical; conidia blastic, terminal, mostly sessile, solitary, dry, ovate to globose, sarciniform, cruciately septate, 4–8 celled, constricted at the septa, 26–40 µm in diameter, wall smooth. Thyriothecia scattered, globose, ovate, peridial cells initially radiating, later central portion dissolved by exposing asci, up to 121

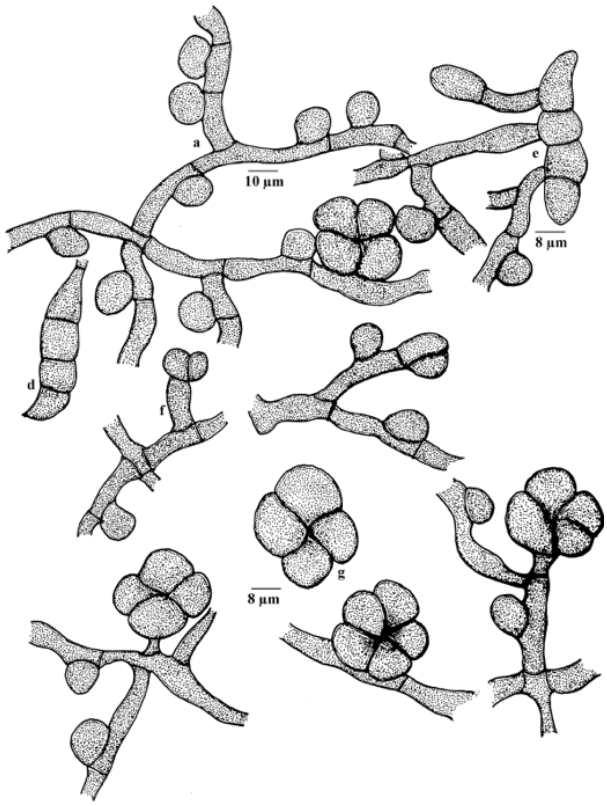


Figure 187. *Sarcinella hughesii*
a - Appressoriate mycelium; d - Conidia of *Questieriella*; g - Conidia of *Sarcinella*

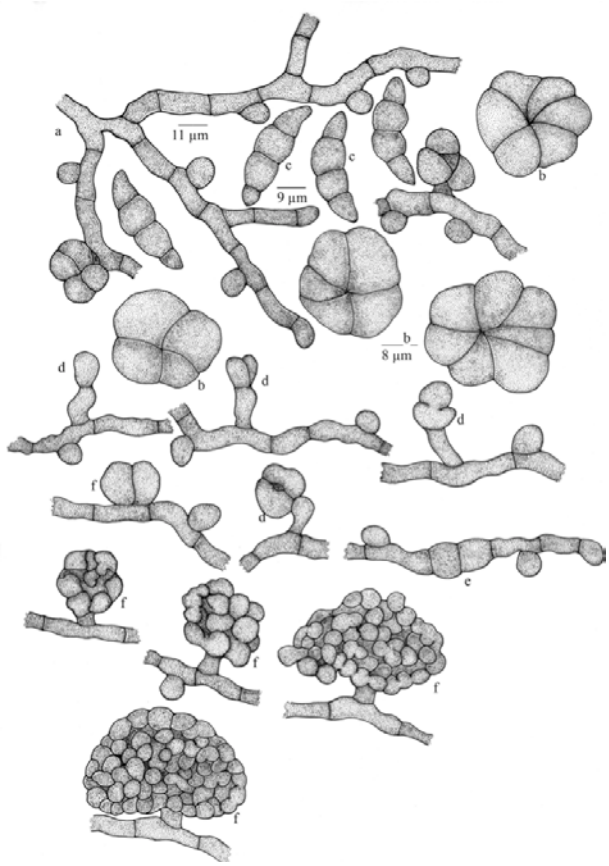


Figure 188. *Sarcinella tamarindi*
a - Appressoriate mycelium; b - *Sarcinella* conidia; c - *Questieriella* conidia; d - Development of *Sarcinella* conidia; e - Germinating *Questieriella* conidia; f - Developing thyriothecium

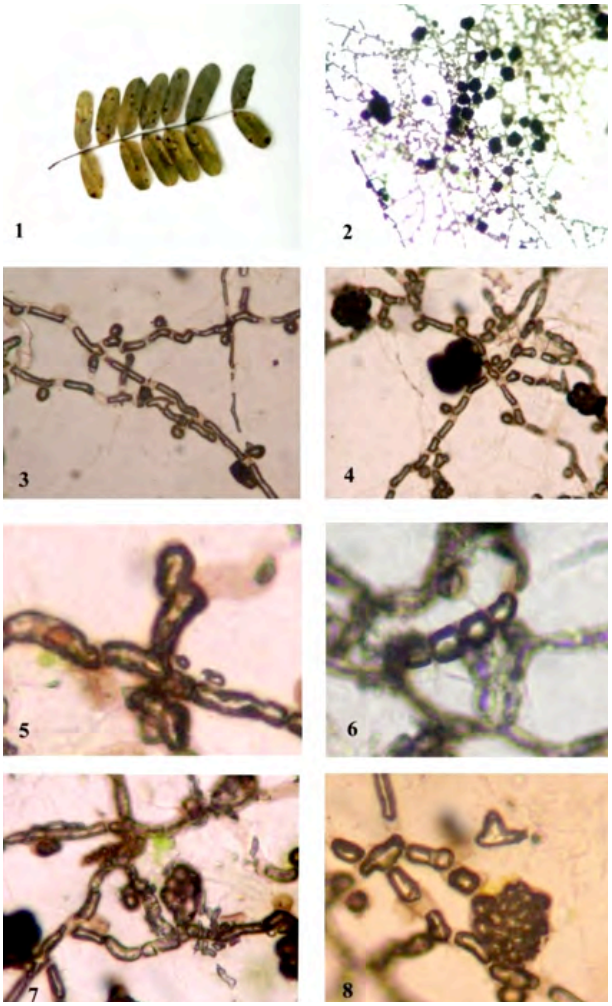


Image 17. a.*Sarcinella tamarindi*
1 - Infected leaves; 2 - Fungal colony; 3 - Appresoriate mycelium; 4 - Hyphae with sarciniform conidia; 5 - Conidiophore of *Sarcinella*; 6 - *Questieriella* conidia; 7&8 - Developing thyriothecium.

µm in diameter; asci 3–4 per thyriothecia, globose, octosporous, bitunicate, 27–32 µm in diameter; ascospores oblong, conglobate, uniseptate, constricted at the septum, 8–13x5–7 µm, remain hyaline for some time but turn brown at maturity, wall smooth.

This fungus was known on *Bridelia macrantha* from Uganda (Hansford 1941a, b).

Schiffnerula camelliae (Sydow, Sydow & Butler) Hughes, Pleomorphic Fungi. The Diversity and its Taxonomic Implications, p. 133, 1987; Hosag., J. Mycopath. Res. 37: 27, 1999; Hosag., Plant Pathology & Quarantine 1(2): 173, 2011.

Asterina camelliae Sydow, Sydow & Butler, Ann. Mycol. 9: 389, 1911.

Clypeolella camelliae (Sydow, Sydow & Butler) Hansf., Reinwardtia 3: 127, 1954 (Fig. 190).

Material examined: HCIO 50820, TBGT 4737; HCIO 50822, TBGT 4739; HCIO 50824, TBGT 4741, 5.xi.2009, on leaves of *Thea sinensis* (L.) Kuntze (Theaceae), Periya, coll. M.C. Riju & A. Sabeena.

Colonies epiphyllous, rarely amphigenous, caulicolous, dense, velvety, crustose, up to 5mm in diameter, confluent. Hyphae straight to substraight, outer surface tubercled to crenulated, branching alternate, opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 32–40x7–9 µm. Appressoria scattered, alternate, unilateral, globose, oval, broad based, unicellular, entire, crenulated to rarely sublobate, 12–18x14–16 µm. *Questieriella* type of conidia were few, fusiform, curved, 3-septate, central cells darker, distal cells paler, attenuated towards the tip and acute to obtusely rounded at the apices, 80–93x9–10 µm. Thyriothecia scattered to connate, dimidiate, orbicular, up to 150µm in diameter, spreading marginally, dehisce stellately and dissolve at the centre;

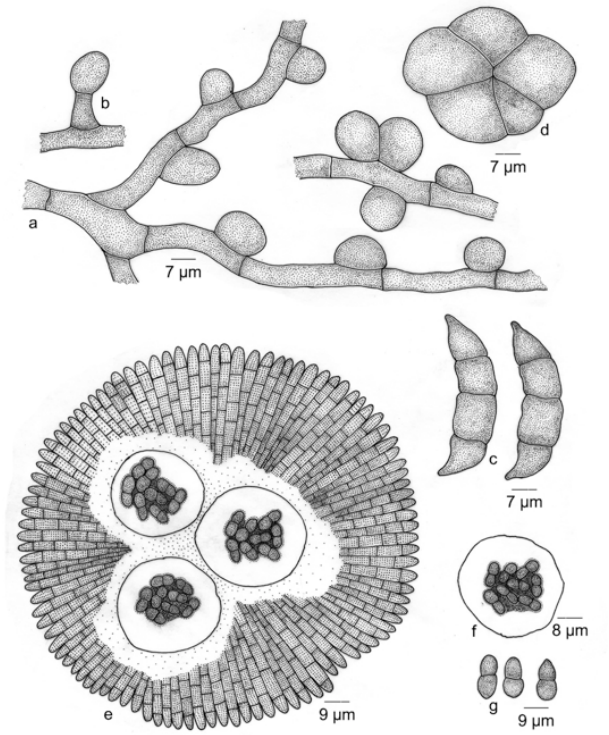


Figure 189. ***Schiffnerula brideliae***
a - Appressoriate mycelium; b - Conidiophore; c - Conidia of *Questieriella*; d - Conidia of *Sarcinella*; e - Thyriohtecium; f - Ascus; g - Ascospores

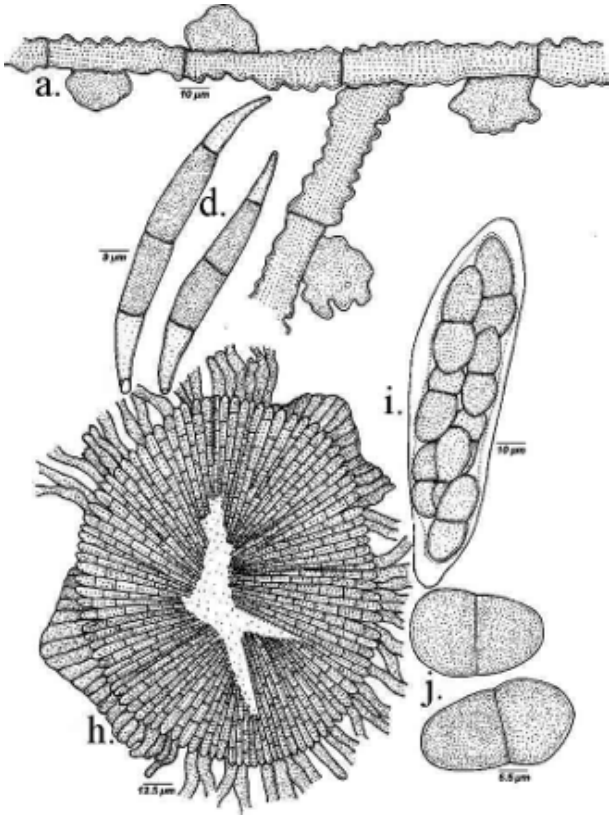


Figure 190.*Schiffnerula camelliae*
a - Appressoriate mycelium; d - Conidia of *Questieriella*; h - Thyriothecium; i - Ascus; j - Ascospores

asci many, cylindrical, octosporous, 100–120x30–35 µm, sessile; ascospores biseriate, 1–septate, brownish, upper cell smaller and globose, lower cell oval and slightly attenuated, 30–37x15–17 µm, wall smooth.

Schiffnerula celastri Hosag., Riju & Sabeena, Indian J. Sci. Techn. 2(6): 8, 2009; Hosag., Plant Pathology & Quarantine 1(2): 177, 2011.

Stigmella palawanensis Sydow, Philippine J. Sci. 9: 189, 1914; Sahni, Mycopath. Mycol. Appl. 23: 332, 1964.

Sarcinella palawanensis (Sydow & Sydow) Sahni, Mycopath. Mycol. Appl. 29: 241, 1966.

Sarcinella paniculatae Verma, Tripathi & R. K. Choudhary, Indian Phytopath. 52: 379, 1999.

Clypeolella inversa Hohn. *sensu* Thite & Kulkarni, Indian Phytopath. 26: 76, 1973; (Image 18; Fig. 191).

Material examined: HCIO 48181, TBGT 2917, 16.iii.2007, on leaves of *Celastrus paniculatus* Willd. (Celastraceae), Padinharathara, coll. M.C. Riju; HCIO 48229, TBGT 2966, 30.ix.2007, Padinharathara, coll. M.C. Riju; HCIO 48230, TBGT 2968, 23.i.2008, Padinharathara, coll. M.C. Riju; TBGT 4303, 8.xii.2009, on the way to Chungattara, Mepadi, coll. Sam P. Mathew; TBGT 4667, 6.xi.2009, Padinharathara, coll. A. Sabeena & M.C. Riju; HCIO 48061, TBGT 2844, 16.iii.2007, coll. M.C. Riju; TBGT 5567, 30.ix.2007, coll. M.C. Riju.

Colonies amphigenous, up to 4mm in diameter, confluent. Hyphae substraight to flexuous, branching opposite, alternate to unilateral at acute to wide angles, loosely reticulate, cells 13–35x3–4 µm. Appressoria opposite, globose, mammiform, entire, 3–6x6–9 µm. Conidia of *Questieriella* were scattered, not attached, curved, 3-septate, slightly constricted at the septa, taper towards both ends, 33–55x6–9 µm. *Sarcinella* conidiophores produced lateral to the hyphae, single, straight to flexuous, macronematous, mononematous, 0–2 septate, 11–31x4–6 µm. Conidiogenous cells terminal, monoblastic, integrated, cylindrical. *Sarcinella* conidia blastic, terminal, mostly sessile, solitary, dry, ovate to globose, sarciniform, sarcinately septate, 2–8 celled, constricted at the septa, 13–26 µm in diameter, wall smooth. Thyriothecia scattered, orbicular, ovate, initially radiating, later central portion dissolved by exposing asci, up to 174µm in diameter, marginal cells radiating; asci 5–8 per thyriothecia, globose,

octosporous, bitunicate, 15–28 µm in diameter; ascospores oblong, conglobate, uniseptate, constricted at the septum, 17–26x6–13 µm, remain hyaline for some time but turn brown at maturity.

Schiffnerula lagerstroemiae Hosag. & Riju, Bioscience Discovery 2 (2):272, 2010**;** Hosag., Plant Pathology & Quarantine 1(2): 186, 2011.

Sarcinella lagerstroemiae Hosag. & Mohanan, New Botanist 22: 31, 1995 (Fig. 192).

Material examined: HCIO 48130, TBGT 2967, 10.x.2007, on leaves of *Lagerstroemia microcarpa* Wight (Lythraceae), 16th mile, Padinharathara, coll. M.C. Riju; HCIO 48231, TBGT 2969; HCIO 43813, TBGT 392; HCIO 48233, TBGT 2971, 19.xi.1999 on *Lagerstroemia* sp., Banasuranmala, coll. C.K.Biju; HCIO 48235, TBGT 2973, 9.xi.2007, Mananthavady, coll. M.C. Riju.

Colonies epiphyllous, dense, confluent, up to 2mm in diameter. Hyphae substraight to undulating, branching opposite to alternate at acute to wide angles, loosely to closely reticulate, cells 11–26x4–7 µm. Appressoria alternate, unilateral, globose, mammiform, entire, 6–9x8–11 µm. Conidia of *Questieriella* type were few, scattered, attached directly to the hyphae, curved, 3-septate, slightly constricted at the septa, taper towards both ends, 28–37x8–11 µm. *Sarcinella* conidiophores produced lateral to the hyphae, single, straight, flexuous, macronematous, mononematous, 0–3 septate, 20–31x4–6 µm; conidiogenous cells terminal, monoblastic, integrated, cylindrical. *Sarcinella* conidia blastic, terminal, mostly sessile, solitary, dry, ovate to globose, sarciniform, 2–8 celled, constricted at the septa, 17–40 µm in diameter, wall smooth. Thyriothecia scattered, globose, orbicular, peridial cells initially radiating, later central portion dissolved by exposing the asci, up to 66µm in diameter, marginal cells radiating; asci 1–2 per thyriothecia, globose, 4–6- spored, bitunicate, 17–26 µm in diameter; ascospores cylindrical, oblong, uniseptate, constricted at the septum, 17–22x6–9 µm, remain hyaline for some time but turn brown at maturity.

Schiffnerula palodensis Hosag. & Riju, Bioscience Discovery 2(2): 272, 2011; Hosag., Plant Pathology & Quarantine 1(2): 191, 2011 (Fig. 193 & Image 19).

Material examined: HCIO 51067, TBGT 4984; HCIO 51069, TBGT 4986; HCIO 51071, TBGT 4988, 6.xi.2009, on leaves of *Solanum* sp. (Solanaceae), Padinharathara, coll. A. Sabeena & M.C. Riju.

Colonies epiphyllous, thin, up to 2mm in diameter, confluent. Hyphae substraight, branching alternate to irregular at acute to wide angles, loosely reticulate,

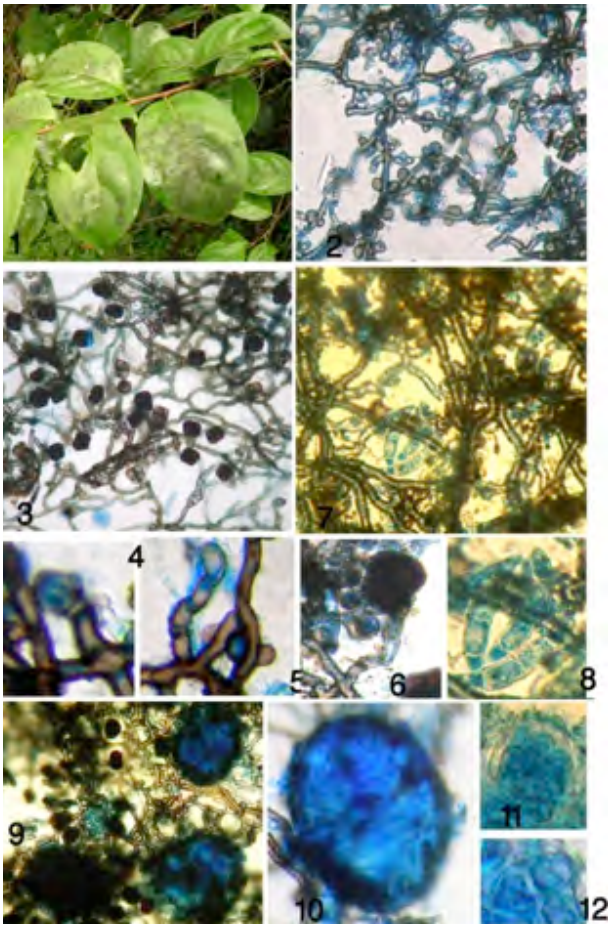


Image 18. a. *Schiffnerula celastri*
1 - Infected leaves; 2 - Appressoriate mycelium; 3 - Colony with sarciniform and *Questieriella* conidia; 4 - Conidiophores; 6 - Sarciniform conidia; 7-8 - Conidia of *Questieriella*; 9 - Thyriothecia, 10 - Centrally dissolved thyriothecium; 11 - Ascus; 12 - Ascospore

cells 8–20x4–6 µm. Appressoria alternate to unilateral, ovate, globose to mammiform, entire, 8–10x6–10 µm. Conidia of *Questieriella* were scattered, not attached, curved, 3-septate, slightly constricted at the septa, taper towards both ends, 14–31x8–11 µm. *Sarcinella* conidiophores produced lateral to the hyphae, single, straight to flexuous, micronematous, mononematous, 0–1 septate, 5–22x3–5 µm; conidiogenous cells terminal, monoblastic, integrated, cylindrical. *Sarcinella* conidia blastic, terminal, mostly sessile, solitary, dry, ovate to globose, sarciniform, sarcinately septate, 3–7 celled, constricted at the septa, 19–33 µm in diameter, wall smooth. Thyriothecia scattered, orbicular, ovate, peridial cells initially radiating, later central portion dissolved by exposing the asci, up to 75µm in diameter, marginal cells radiating; asci 2–5 per thyriothecia, globose, octosporous, bitunicate, 12–24 µm in diameter;

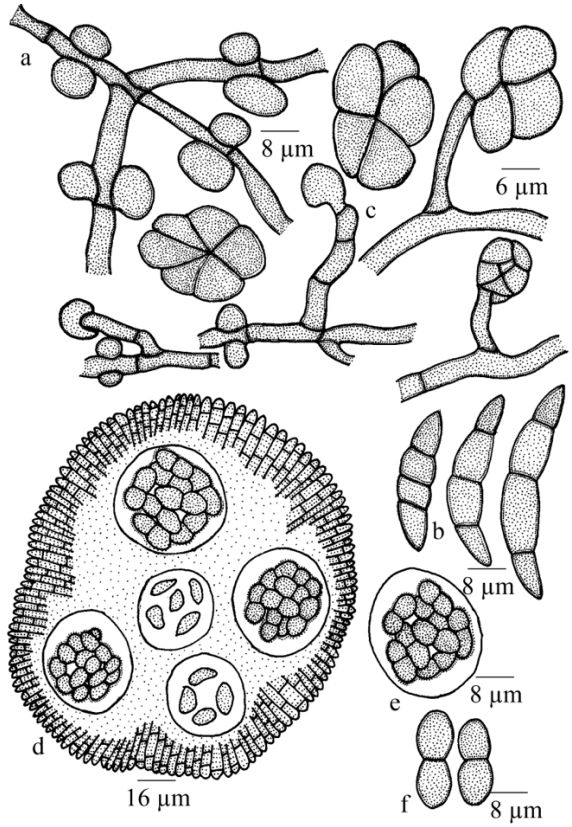


Figure 191. ***Schiffnerula celastri***
a - Appressoriate mycelium; b - Conidia of *Questieriella*; c - Conidiophore and conidia of *Sarcinella*; d. Thyriothecium; e - Ascus; f - Ascospores

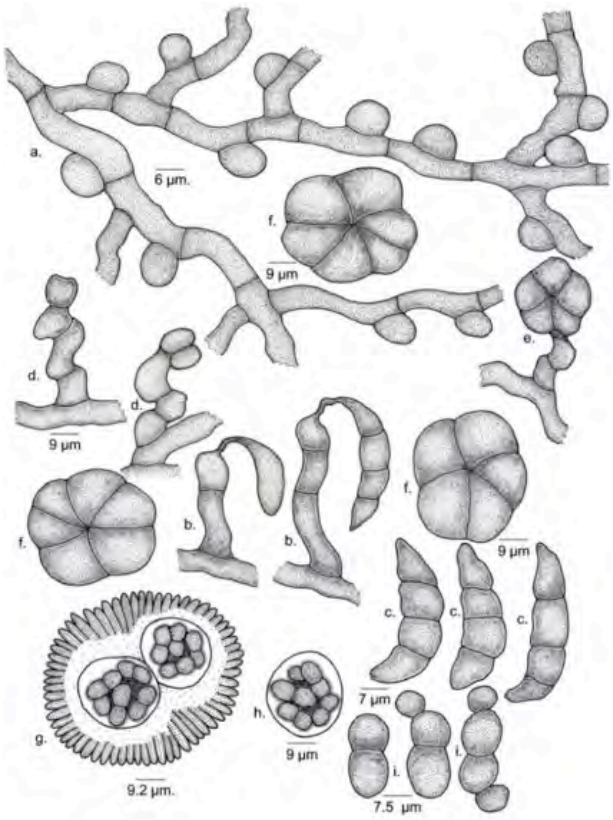


Figure 192.*Schiffnerula lagerstroemiae*
a - Appressoriate mycelium; b - Conidiophores of *Questieriella;* c - Conidia of *Questieriella;* d - Conidiophores of *Sarcinella*, e. *Sarcinella* conidia on conidiophores; f - Conidia of *Sarcinella*; g - Thyriotheicum; h - Ascus; i - Ascospores

ascospores oblong, conglobate, uniseptate, constricted at the septum, 20–23x10–12 µm, brown at maturity, wall smooth.

Schiffnerula ricini Hansf., Proc. Linn. Soc. London 160: 117, 1947-48; Hosag., H. Biju & Appaiah, J. Mycopathol. Res. 4: 23, 2006; Hosag. & Riju, Indian J. Sci. & Techn. 2(6): 7, 2009; Hosag., Plant Pathology & Quarantine 1(2): 193, 2011 (Fig. 194).

Material examined: HCIO 48180, TBGT 2916, 10.xi.2007, on leaves of *Ricinus communis* L. (Euphorbiaceae), Puthuserikadavu, Padinharathara, coll. M. C. Riju.

Colonies amphigenous, up to 3mm in diameter, epiphyllous colonies subdense, confluent, hypophyllous colonies crustose, some times confluent. Hyphae substraight to flexuous, branching opposite, irregular at acute to wide angles, loosely reticulate, cells 8–33x2–5 µm. Appressoria alternate, unilateral, globose, mammiform, entire, 6–9 x 6–10 µm. Conidia of *Questieriella* were scattered, mostly not attached, curved, 3-septate, slightly constricted at the septa, taper towards both ends, 26–31x8–11 µm. *Sarcinella* conidiophores produced lateral to the hyphae, single, straight to flexuous, macronematous, mononematous, 0–2 septate, 9–12x2–5 µm, conidiogenous cells terminal, monoblastic, integrated, cylindrical; conidia present mostly on the lower surface of the leaves, blastic, terminal, solitary, dry, ovate to globose, sarciniform, cruciately septate, 4–8 celled, constricted at the septa, 19–31 µm in diameter, brown and turn to dark at maturity, wall smooth. Thyriothecia mostly on the upper surface of the leaves, scattered, globose, orbicular to ovate, peridial cells initially radiating, later central portion dissolved by exposing asci, up to 110µm in diameter, marginal cells mostly persist and radiate; asci 4–8 per thyriothecia, globose, octosporous, bitunicate, 22–29 µm in diameter; ascospores oblong, conglobate, uniseptate, constricted at the septum, 19–22x8–11 µm, remain hyaline for some time but turn brown at maturity.

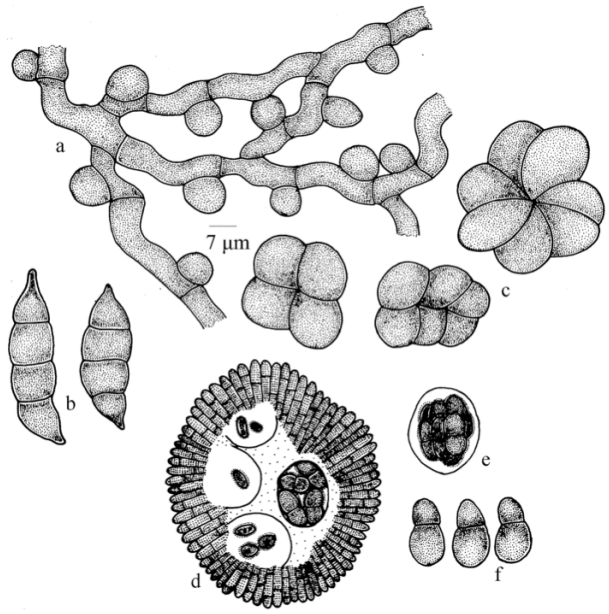


Figure 193.*Schiffnerula palodensis*
a - Appressoriate mycelium; b - Conidia of *Questieriella*; c - Conidia of *Sarcinella;* d - Thyriothecium; e - Ascus; f - Ascospores

Schiffnerula spilanthi Hosag., Sabeena & Riju, Indian Phytopath. 63: 321, 2010; Hosag., Plant Pathology & Quarantine 1(2): 193, 2011 (Image 20; Fig. 195).

Material examined: HCIO 49106, TBGT 3361, 23.xii.2008, on leaves of *Spilanthes radicans* Jaca. (Asteraceae), Padinharathara, coll. M.C. Riju; HCIO 49108, TBGT 3363; HCIO 49109, TBGT 3364, 9.i.2009, 16th mile, Padinharathara, coll. M.C. Riju.

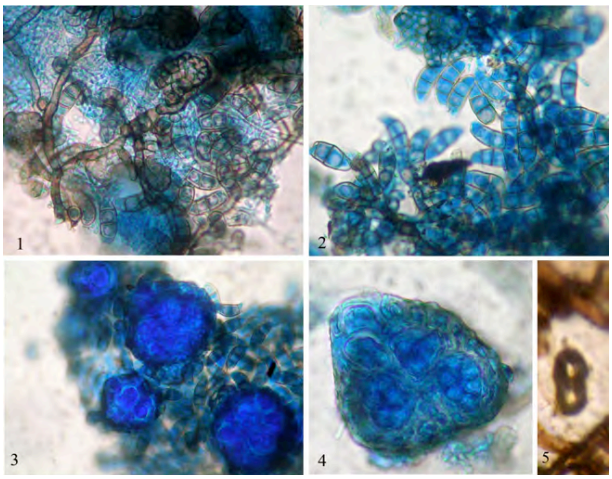


Image.19 *Schiffnerula palodensis*
1 - Colony with thyriothecia and *Questieriella* conidia; 2 - *Questieriella* conidia; 3 - Thyriothecia; 4 - Arrangement of asci in the thyriothecium; 5 - Ascospore

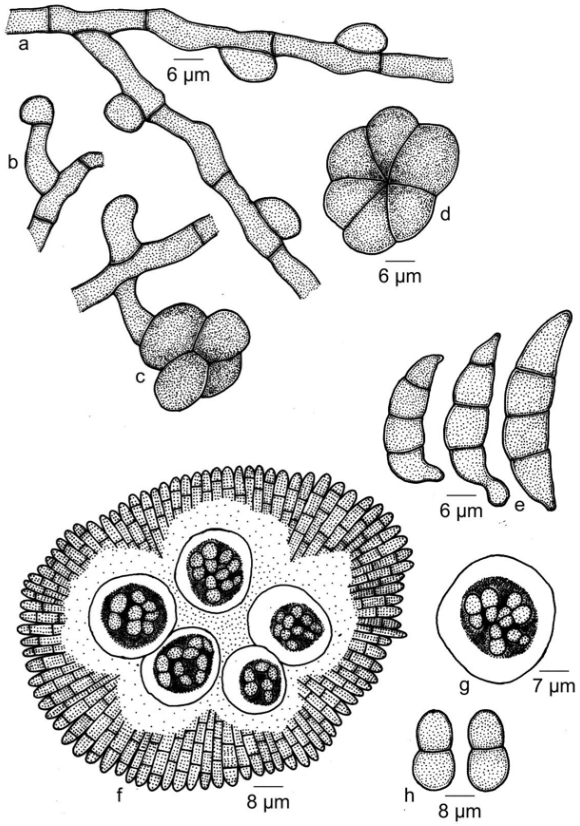


Figure 194. *Schiffnerula ricini*
a.Appressoriate mycelium, b.Conidiophore, c. *Sarcinella* conidia on conidiophore, d. Conidia of *Sarcinella*, e. Conidia of *Questieridiella*, f. Thyriothecium, g. Ascus, h. Ascospores

Colonies epiphyllous, thin, scattered to confluent, up to 3mm in diameter. Hyphae substraight to flexuous, branching opposite, alternate to unilateral at acute to wide angles, loosely to closely reticulate, cells 10–38x5–8 µm. Appressoria scattered, alternate, unilateral, rarely opposite, globose, ovate, unicellular, entire, 10–15x10–14 µm. Conidia of *Questieriella* were scattered, not attached, curved, 3-septate, slightly constricted at the septa, taper towards both ends, 37–43x10–15 µm. *Sarcinella* state not found. Thyriothecia scattered, ovate, orbicular, peridial cells initially radiating, later the central portion dissolved by exposing asci, 25–63 µm in diameter, marginal cells radiating; asci 2–4 per thyriothecia, globose, octosporous, 25–35 µm in diameter; ascospores oblong, conglobate, uniseptate, constricted at the septum, 20–23x10–13 µm, wall smooth.

Schiffnerula tectonae (Thite & Patil) Hosag., Zoos Print J. 18: 1077, 2003; Hosag., Plant Pathology & Quarantine 1(2): 196, 2011.

Clypeolella tectonae Thite & Patil, Geophytology 15: 84, 1985.

Stat. Anamorph: *Sarcinella tectonae* Hosag. & Manoj., Zoos' Print J. 19: 1389, 2004; Hosag., Plant Pathology & Quarantine 1(2): 196, 2011 (Fig. 196).

Material examined: HCIO 49978, TBGT 4130, 14.iii.2007, on leaves of *Tectona grandis* L. (Verbenaceae), Puthuserykadavu, coll. M.C. Riju; HCIO 49982, TBGT 4134, HCIO 50879, TBGT 4796, Padinharathara, 4.xi.2009, coll. A. Sabeena & M.C. Riju.

Colonies amphigenous, mostly epiphyllous, dense, up to 1mm in diameter, rarely confluent. Hyphae pale brown, slightly flexuous, branching alternate to irregular at acute angles, loosely to closely reticulate, cells 12–20x4–7 µm. Appressoria brown, scattered, alternate, globose to slightly ovate, entire, 9–12 µm in diameter; conidiophores simple, micronematous, mononematous, pale, entire, 5–8 µm long; conidiogenous cells integrated, monoblastic, terminal; conidia solitary, dry, acrogenous, simple, globose, sarciniform, 4–12-celled, carbonaceous black, septa not visible, slightly constricted at the septa, 16–40 µm in diameter, wall smooth. Thyriothecia scattered, orbicular, cells radiating at the upper portion, up to 200 µm in diameter, dissolved at the central portion by exposing asci; asci ovate to globose, eight spored, 30–50x12–22 µm; ascospores oblong, conglobate, uniseptate, constricted at the septum, 10–20x9–11 µm.

Colonies were hyperparasitized by *Acremoniula sarcinellae*.

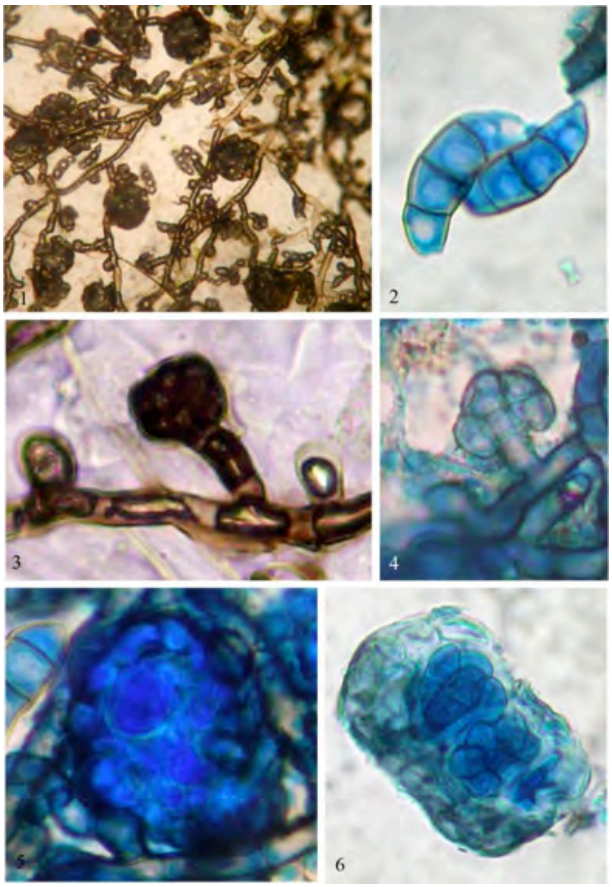


Image 20. *Schiffnerula spilanthi*
1 - Colony with thyriothecia and *Questieriella* conidia; 2 - *Questieriella* conidia; 3-4 - Developmental stages of thyriothecia; 5 - Thyriothecia with asci; 6 - Asci with ascospores

Schiffnerula vernoniae Hosag., Sabeena & Riju, Indian Phytopath. 63: 3231, 2010; Hosag., Plant Pathology & Quarantine 1(2): 198, 2011.

Sacinella vernoniae (Dearn. & Barth.) Hughes, Can. J. Bot. 61: 1748, 1983; Hosag., C.K. Biju & Abraham, J. Econ. Taxon. Bot. 25: 281, 2001.

Piricauda vernoniae (Dearn. & Barth.) Moore, Rhodora 61:106, 1959 (Fig. 197; Image 21).

Material examined: HCIO 49105, TBGT 3360, 23.xii.2008, on leaves of *Vernonia anthelmintica* (L.) Willd. (Asteraceae), Padinharathara, coll. M.C. Riju; HCIO 49107, TBGT 3362, 9.i.2009, 16th mile, Padinharathara, coll. M.C. Riju; Anamorphs: HCIO 44789, TBGT 1026, 12.xii.2002, on leaves of *V. conyzoides* DC., Chandanathode, coll. M. Kamarudeen & P.A. Jose; HCIO 44410, TBGT 667, 7.xi.2001, on *Vernonia* sp., Brahmagiri, coll. S.Shiburaj.

Colonies epiphyllous, thin, up to 2mm in diameter, confluent. Hyphae substraight to undulating, branching alternate, unilateral to opposite at acute to wide angles, loosely reticulate, cells 7–38x5–7 µm. Appressoria scattered, alternate, unilateral, opposite to subopposite, globose, mammiform, entire, 7–13x7–12 µm. Conidia of *Questieriella* scattered, 3-septate, straight, slightly constricted at the septa, taper towards both ends, 30–35x10–13 µm. *Sarcinella* conidiophores produced lateral to the hyphae, single, straight, flexuous, micronematous, mononematous, 8–14x5–7, conidiogenous cells terminal, monoblastic, integrated, cylindrical. *Sarcinella* conidia blastic, terminal, mostly sessile, solitary, dry, ovate to globose, sarciniform, 2–7 celled, constricted at the septa, 30–38 µm in diameter, wall smooth. Thyriothecia scattered, ovate, orbicular, peridial cells initially radiating, later central portion dissolved by exposing the asci, up to 83 µm in diameter, marginal cells radiating; asci 2–4 per thyriothecia, globose, octosporous, 20–23 µm in diameter; ascospores oblong, conglobate, uniseptate, constricted at the septum, 20–25x10–13 µm, wall smooth.

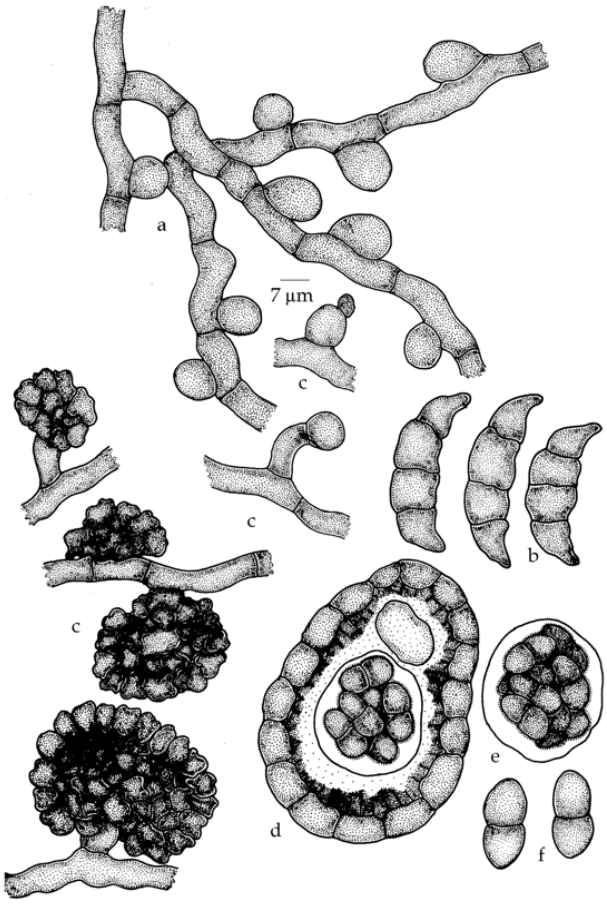


Figure 195. ***Schiffnerula spilanthi***
a - Appressoriate mycelium; b - Conidia of *Questieriella*; c - Thyriothecium initials; d - Thyriothecium; e - Ascus; f - Ascospores

Phyllachorales

Stromata absent to well developed, immersed in plant tissue, clypeate; ascocarps perithecial, thin walled; interascal tissue simple, thin walled, wide paraphyses, may be deliquescent; asci cylindrical, thin walled, persistent, apical ring inconspicuous; scospores hyaline, one celled, rarely ornamented, parasitic on leaves and stems, some necrotrophic, a few saprophytic; anamorphs coelomycetous. This order represents here a single family.

Phyllachoraceae

Stromata well developed, immersed in plant tissue, clypeate, black, very rarely bright coloured, ascocaps perithecial, thin walled, ostiolate; paraphyses thin walled; asci cylindrical, thin walled, persistent, apical ring inconsicuous; ascospores hyaline, non septate to septate, rarely ornamented, parasitic on living leaves and young stems; anamorphs coelomycetous.

The members of this family produce “tar spot” disease symptoms. Perithecia completely buried in the host tissues, globose, membranous to leathery, dark, more or less aggregated with clypeus, formed by the filling of the epidermal layers of the host with dark, dense fungus tissue, through which the ostioles of the perithecia open (Hansford, 1946).

Type genus: *Phyllachora* Nitschke ex Fuckel

The genus ***Phyllachora***

Phyllachora Nitschke ex Fuckel, Jb. Nassau. Ver Naturk. 23-24: 217, 1870.

Catacauma Theiss. & Sydow, Ann. Mycol. 12: 280, 1914.

Clypeostigma Hohnel, Sitx. Ber. K. Akad. Wiss. Wien. Math. Nat. Kl. 1. Abt. 128: 556, 1919.

Clypeotrabutia Seav. & Chard., Scient. Surv. Porto Rico Virg. Isl. 8/1, Bot. 60, 1926.

Diplosporis Clem., Gen. Fung. 27, 1909.

Discomycopsella P. Henn., Hedwigia 41: 146, 1902.

Endodothella Theiss. & Sydow, Ann. Mycol. 13: 582, 1915.

Endophyllachora Rehm, Philippine J. Sci. 7:197, 1913.

Endotrabutia Chard., J. Agric. Porto Rico 14:270, 1930.

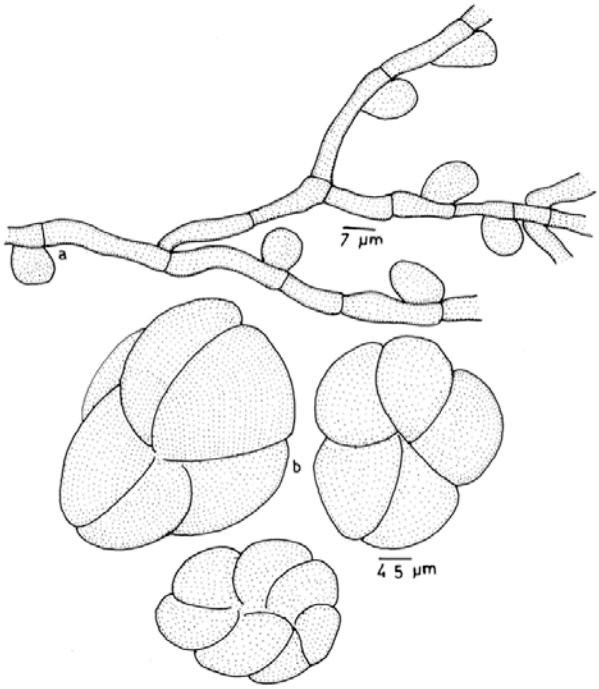


Figure 196 ***c.f. Schiffnerula tectonae***
a - Appressoriate mycelium; b - Sarciniform conidia

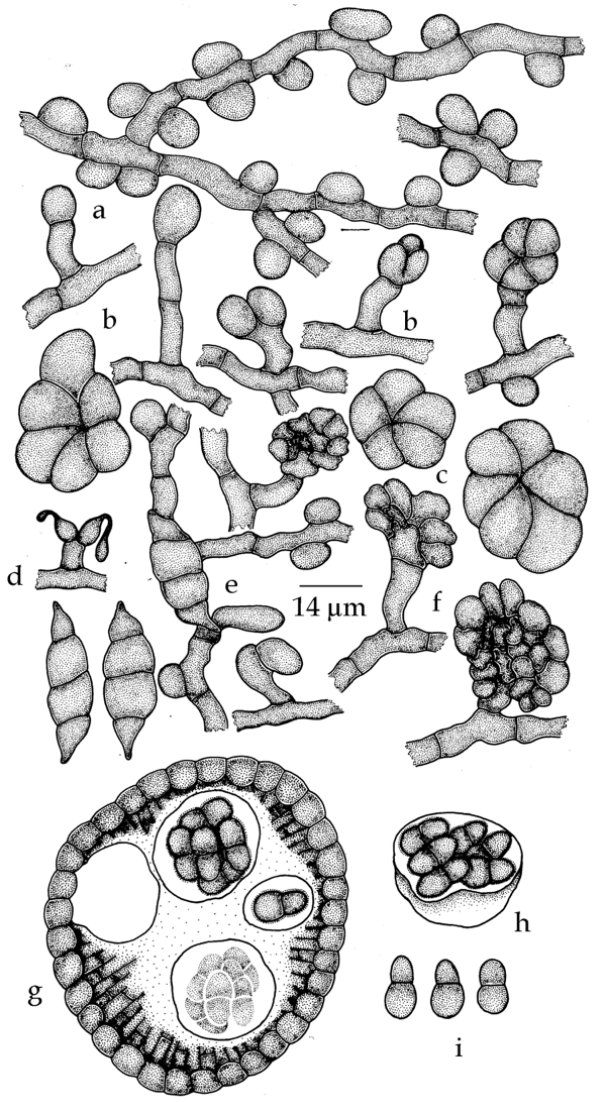


Figure 197 *Schiffnerula vernoniae*
a.Appressoriate mycelium, b. Conidiophores, c. Conidia of *Sarcinella*, d. Conidiophore, e. Germinating conidia of *Questieriella*, f. Thyriothecium initials, g. Thyriothecium, h. Ascus, i. Ascospores

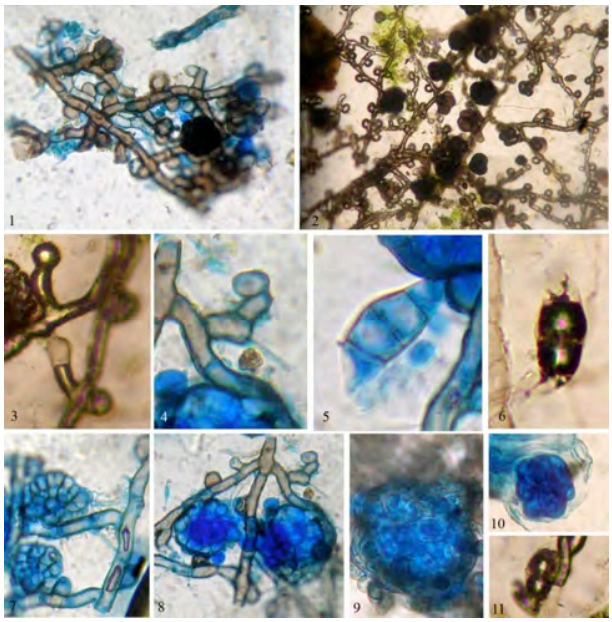


Image 21, *Schiffnerula vernoniae*
1. Appressoriate mycelium, 2. Mycelium with Sarcinella conidia, 3-4. Conidiophore of *Sarcinella*, 5-6. *Questieriella* conidia, 7-8, Developmental stages of thyriothecium, 9. Thyriothecium with asci, 10. Ascus, 11. Ascospore

Geminispora Pat., Bull. Soc. Mycol. France 9: 151, 1893.

Halstedia Stev., Bot. Gaz. 69: 253, 1920.

Metachora Sydow & Butler, Ann. Mycol. 9: 400, 1911.

Phaeotrabutia Garces, Caldasia (Columbia) 1: 77, 1941.

Phaeotrabutiella Theiss. & Sydow, Ann. Mycol. 13: 360, 1915.

Phragmocarpella Theiss. & Sydow, Ann. Mycol. 13: 602, 1915.

Plectastroma Theiss. & Sydow, Ann. Mycol. 12: 269, 1914.

Plectosphaera Theiss., Ann. Mycol. 32: 413, 1934.

Pseudomelasmia P. Henn., Hedwigia 41: 115, 1902.

Sirentiloma P. Henn., Hedwigia, p. 319, 1895.

Toledíella Viegas, Bragntia 3: 128, 1943.

Trabutiella Theiss. & Sydow, Ann. Mycol. 12: 180, 1912.

Infection produces “tar-spots”. Clypei dark-brown to black, develop in the epidermal cells and sometimes beneath the perithecial; perithecial wall pseudoparenchymatous, perithecia ostiolate, ostioles extending through the clypeus. Asci unitunicate, peristant, clavate to cylindrical, possessing crown at the apex, slightly or distinctly stipitate. Ascospores hyaline, single celled, oval, ovoid to truncate, uniseriate to biseriate but may be irregular at maturity. Spermogonia frequently found (Parbery, 1967).

Type: *P. graminis* (Pers.: Fr.) Nke.

Key to the species

1. On the members of Asclepiadaceae..... .....*Phyllachora gymnemae*
1. On the members of other families.....2
2. On Moraceae.....3
2. On the members of other families.....4
3. Stroma epiphyllous, cause depression on the lower surface... .....*Phyllachora catarvaria*

3. Not so.....*Phyllachora infectoriae*
4. On *Glycosmis*.....Phyllachora glycosmidis
4. On *Symplocos*.....*Phyllachora symploci*

Phyllachora catarvaria (Berk.) Sacc., Syll. Fung. 2: 598, 1883; Theiss. & Sydow, Ann. Mycol. 13: 469, 1915; Kamat, Seshadri & Pande, A Monographic study of Indian species of *Phyllachora*, p. 20, 1978; Hosag., Indian Phytopathol. 38: 447, 1985; J. Econ. Taxon. Bot. 13: 121, 1989.

Phyllachora topographica Sacc., Syll. Fung. 14: 669, 1899.

Phyllachora fici- hispidae Seshadri, Mycopath. Mycol. Appl. 34: 318, 1968.

Materials examined: HCIO 49882, TBGT 4034, 7.ix.2008, on leaves of *Ficus hispida* L. (Moraceae), Periya, coll. Harish et al.

Infection hypophyllous, rarely amphigenous, black, 1–2 mm in diameter, rarely confluent. Stromata hypophyllous, black, raised, shiny, up to 1mm in diameter, loculate. Perithecia 1–5 per stroma, immersed, oval to irregular, 216–506x54–146 µm; asci many, cylindrical, octosporous, stipitate, 58–84x8–10 µm; ascospores uniseriate to biseriate, hyaline, globose, 5–9 µm in diameter.

This infection starts soon after the emergence of the young leaves and makes the infected leaves to roll inwardly, making the infected leaves distinct from rest of the leaves and can be detected even from a distance. Often cause depression and pseudo blisters of the infected leaves.

Phyllachora glycosmidis Petch. in Saccardo, Syll Fung. 24: 603, 1926; Ramakrishnan, T. S. & Ramakrishnan, K., Proc. Indian Acad. Sci. Sect. B, 32: 100, 1950; Ananthakrishnan, S., Mycopath. Mycol. appl., 11, 1964.

Materials examined: HCIO 49399, TBGT 3644, 12.ii.2009, on leaves of *Glycosmis pentaphylla* (Retz.) DC. (Rutaceae), Thirunelly, coll. P.J.Robin et al.

Infection spots epiphyllous, gregarious in circular beaded spots, showing corresponding eruptions on the lower sides. Stromata black, minute, shining, scattered, uni- to biloculate. perithecia innate, ostiolate, flask- shaped, 151–345x138–290 µm; asci cylindrical, pedicellate, octosporous, but often 6- spored, 92.8–112.0x5–7 µm; ascospores ellipsoid, monostichous, thin walled, 9.6–12.8x5.6–7.2 µm.

Phyllachora gymnemae Hosag. & Jacob Thomas, J. Appl. Nat. Sci. 2(1):104, 2010.

Materials examined: HCIO 49423, TBGT 3668, 14.ii.2009, on leaves of *Gymnema* sp. (Asclepiadaceae), Thirunelly, coll. Harish et al.

Stromata epiphyllous, caulicolous, up to 5mm in diam., shining, black, raised; perithecia 1–3 per stromata, oval, globose to craterviform, ostiolate, 105–220x130–180 µm; asci numerous, cylindrical, paraphysate, unitunicate, up to 94µm long; ascospores uniseriate, oval, hyaline, elongated and slightly pointed at both ends, 9–14x4–7 µm.

Phyllachora infectoriae Cooke, Grevillea 13: 63, 1885; Sacc., Syll. Fung. 9: 1013, 1891; Sydow & Butler, Ann. Mycol. 9: 396, 1911; Kamat, Seshadri & Pande, A Monogrphic Study of Indian species of *Phyllachora*, p. 46, 1978; Hosag., Indian Phytopath. 38: 449, 1985; J. Econ. Taxon. Bot. 13: 122, 1989.

Materials examined: HCIO 49883, TBGT 4035, 19.ix.2008, on leaves of *Ficus infectoria* Roxb. (Moraceae), Baveli, coll. Robin et al.

Infection foliicolous, epiphyllous in big patches, black, corresponding lower surface depressed, rarely amphigenous, 5–10 mm in diameter. Stromata epiphyllous, black, shining, raised, clypeate, up to 10mm in diameter, often coalesced, loculate. perithecia 1–10 per stroma, spherical to flask shaped, 210–520x214–276 µm; asci cylindrical, many, unitunicate, stipitate, octosporous, 89–112x14–16 µm; ascospores hyaline, oval, uniseriate to irregular, 12–19x7–9 µm, contents granular.

This species stands distinct in having largely spreading epiphyllous stromata and the corresponding opposite surface of the infected portion got depressed.

Phyllachora symploci Pat. in Sacc., Syll, Fung., II: 371, 1895; Ananthanarayanan, Mycopath. Mycol. Appl. 22: 6, 1964.

Phyllachora ectophytica Tilak, Sydowia 12: 186, 1958.

Materials examined: HCIO 50840, TBGT 4757; HCIO 50842, TBGT 4759, 5.xi.2009, on leaves of *Symplocos* sp. (Symplocaceae), Gurukulam Botanical Garden, coll. M.C. Riju & A. Sabeena.

Infection spots prominent, epiphyllous,in beaded circular outline, scattered, 1–4 mm or even more in diam. Stromata epiphyllous, black, cushion shaped, highly developed, scattered. Perithecia typically bowl-shaped, hemispherical, ostiolate, subcuticular, 637–728 µm; asci cylindrical, pedicellate, octosporous, obtuse at the apex, in basal layers, paraphysate, 86–99x15–17 µm; ascospores 8, monostichous, oblong to ellipsoid, 21–22x8–10 µm.

Phyllachora sp.

Materials examined: HCIO 47423, TBGT 2461, 19.xi.1999, on leaves of *Ficus* sp. (Moraceae), Banasuran Hills, coll. C.K. Biju; HCIO 47470, TBGT 2508, 15.xi.1999, *Caryota urens L.*(Arecaceae)., Chembra peak, coll. C.K. Biju; HCIO 47524, TBGT 2546, 14.ix.1999, *Flacourtia* sp. (Flacourtiaceae), Chembra peak, coll. C.K.Biju.

Other Ascomycetes

1.Produce tar spots. ascomata innate.....*Rehmidothis*
1.Produce superficial ascomata, cause leaf rolling.....
.....*Leptosphaerulina*

The genus ***Leptosphaerulina***

Leptosphaerulina McAlpine, Fungus diseases of stone fruit trees in Australia, p. 103, 1902.

Ascomata ostiolate, uniloculate, perithecoid, pseudothecium superficial but appressed on the host with hyphae, apex erumpent at maturity. Ascoma composed of pseudo parenchymatous cells, cells of outer layer are brown and thick walled, interior cells hyaline and thin walled. Centrum pseudoparenchymatous. Asci few, bitunicate, saccate, thick walled, eight spored. Ascospores brown, ellipsoidal, 3–4-horintally septate on the host but the central cells produce vertical septa in cultures, thin gelatinous sheath formed around the spores.

Type: *L. crassiasca* (Sechet) C.R. Jackson & Bell

This genus respresents a single species.

Leptosphaerulina australis McAlp., Fung. Dis. 103, 1902; Barr, Preliminary studies on the Dothideales in the Temperate North America, p. 541, 1972.

Materials examined: HCIO 47455, TBGT 2493, 13.vii.1998, on leaves of *Crotalaria* sp. (Fabaceae), Thirunelly, coll. C.K. Biju; HCIO 47457, TBGT 2495, 12.viii.1998, coll. C.K. Biju.

Infection epiphyllous. Ascomata superficial, firmly placed on the host epidermis, globose, 40–70 µm in diameter; asci few to many, clavate, octosporous, 50–90x30–45 µm, persistent; ascospores hyaline, transversely septate on the host but deep brown with 1–3-septate vertical septa in the middle cells when grown in culture, 25–40x10–15 µm.

This is one of the most common diseases on this host genus. Infected plants can be easily recognised by their unusually folded or rolled leaves. The upper surface of the infected leaves are being articulately and uniformly arranged with a dark perithecia and can be easily sensed by gently moving the fingers on the infected leaf surface.

The genus ***Rehmidothis***

Rehmidothis Theiss. & Sydow, Ann. Mycol. 12:192, 1914.

Stromata amphigenous, black, raised, shining. Perithecia in stroma, oval, ostiolate; asci clavate to cylindrical, unitunicate, flattened at the base, octosporous, persistent; ascospores uniseriate, biseriate to irregular at maturity, ovoid, hyaline, uniseptate at the basal part, slightly constricted at the septum and give the spore proper pinch-off appearance.

Type: *R. osbeckiae* (Berk. & Broome) Theiss. & Sydow

This genus represents here with a single species

Rehmidothis osbeckiae (Berk. & Broome) Theiss. & Sydow, Ann. Mycol. 12: 192, 1914.

Trabutia osbeckiae Ramakr. & Sundaram, Proc. Indian Acad. Sci. 40: 19, 1954.

Materials examined: HCIO 47459, TBGT 2497, 19.xi.1999, on leaves and stems of *Osbeckia* sp. (Melastomataceae), Banasuranmala, coll. C.K. Biju.

Stromata amphiphyllous, caulicolous, mostly epiphyllous, black, raised, shining, scattered to often coalesced, up to 2mm diameter. Perithecia 1–3 per stroma, oval, 150–220x100–160 µm, ostiolate; asci clavate to cylindrical, unitunicate, flattened at the base, octosporous, 25–52x12–16 µm at the basal portion and 14–22 µm broad at the apical portion, persistent; ascospores uniseriate, biseriate to irregular at maturity, ovoid, hyaline, uniseptate at the basal part, slightly constricted at the septum and give the spore proper pinch-off appearance, 12–18x5–7 µm.

This is a very common fungus on this host genus and cause tar spot disease.

Key to the Hyphomycetes

1.Parasiticfungi.....4
1.Hyperparasites.....2
2.On *Sarcinella*.....*Acremoniula*
2.On other fungi.....3
3. On *Balladyna*.....*Acrodictys*
3. On Meliolaceae members.....6
4. Lateral ampulliform appressoria present.....
.....*Ampullifera*
4. Not so.....5
5. On *Gmelina*.....*Passalora*
5. On *Terminalia*.....*Colemaniella*
6. On *Armatella*.....*Spiropes armatellicola*
6. On other fungi.....7
7. Conidiophore zig-zag at fertile portion.....

.....*Spiropes guareicola*
7. Conidiophore not so.....
..... *Spiropes capensis*

Acremoniula sarcinellae (Pat. & Har.) Arn. ex Deight., Mycol. Pap. 118: 3, 1969; Hosag., Biju, C.K. and Abraham, J. Econ.Taxon. Bot. 25: 283, 2001; Hosag., Zoos´ Print J. 21: 2322, 2006.

Acremoniela sarcinellae Pat. & Har., J. Bot. Paris 14: 245. 1900.

Acremoniula sarcinellae (Pat. & Har.). Arnaud, Bull. Trimest. Soc. Mycol. France 69: 268. 1954.

Dicoccum pulchrum Thumen, Revu Mycol. 1: 11. 1879.

Domingoella pycnopeltarum Batista, Anais IV congr. Bot. Brasil: 77. 1953 (Fig. 198).

Materials examined: HCIO 44789, TBGT 1026, 27.xii.2002, colonies of *Sarcinella vernoniae* (Dearn. & Barth.) Hughes, *Vernonia conyzoides* DC. (Asteraceae), Chandanathode, coll. V.B. Hosagoudar et. al.

Hyphae hyaline, branched, septate, up to 3µm wide. Conidiophores arise one to many from the single hyphal cells, micronematous, mononematous, mostly straight, hyaline, aseptate, 3–9x3-5 µm; conidiogenous cells monoblastic, integrated, terminal, determinate, cylindrical; conidia solitary, dry, unicellular, brown to deep black, globose, oval to pyriform, 10–14 µm in diameter, wall smooth, a portion of hyaline conidiophore often attached with the base.

Acrodictys balladynae (Hansf.) M.B. Ellis Dematiaceous Hyphomycetes, p. 129, 1971.

Acrospeira balladynae Hansf., Proc. Linn. Soc. London 157: 40, 1945.

Material examined: HCIO 4515, TBGT 801, 5.ii.2002, on *Balladyna* sp. infected leaves of *Pavetta* sp. (Rubiaceae), Chandanathode forest, coll. M. Kamarudeen.

Colonies amphigenous, mostly hypophyllous, dense, crustose to velvety, up to 5mm in diameter. Hyphae superficial, pale, branched, septate, 1.5–2.5 µm broad. Conidiophores macronematous, mononematous, simple, cinnamon brown, erect, straight, smooth, rarely septate, slightly tapering towards apex, 30-40 µm long; 3–5 µm broad at the base; 1.5–3 µm broad at the tip. Conidia solitary, dry, terminal, obpyriform, clavate, broadly triangular, brown to black, upper stratum with 2–3-cells, second stratum with two cells and the lowest basal cell pale, 17–20 µm long; 13–15 µm broad at the upper portion, 9–12 µm broad at the second cell layer and up to 3µm broad at the basal cell.

This species was known from Ghana, Sierra Leone and Uganda (Ellis 1971).

Ampullifera foliicola Deight., Mycol. Pap. 78: 36, 1960; Ellis, Dematiaceous Hyphomycetes, p. 96, 1971.

Material examined: HCIO 43463, TBGT 286, 19.xi.1999, on leaves of *Neolitsea scrobiculata* (Meisner) Gamble (Lauraceae), Banasuran Hills, coll. C.K. Biju.

Colonies mixed with other parasites. Hyphae superficial, cinnamon brown, straight to substraight, branching alternate to irregular at acute to wide angles, loosely to rarely closely reticulate, septate, often constricted at the septa, cells cylindrical, 8–10x5–7 µm. Appressoria (Hyphopodia) almost have similar colour to that of hyphal cells, often deep brown, initially globose, later ampulliform, neck pale and elongated, 6–10x4–7 µm. Conidiophores few to many, arise laterally, later perpendicular to the hyphae, dark brown, straight to slightly curved, macronematous, mononematous, septate, often constricted at the septa, 16–40x3–5 µm; conidiogenous cells integrated, terminal, monoblastic, percurrent; conidia produced in chains of 1–7 numbers, ovate, versiform, rarely globose, pale brown to cinnamon brown, 8–10x4–6 µm.

This genus was associated with *Meliola neolitseae* Yamam. and *Armatella* sp. and was known on various plants from Brazil, Ghana, Malaya, Sahah, San Domingo, Sarawak and Sierra Leone.

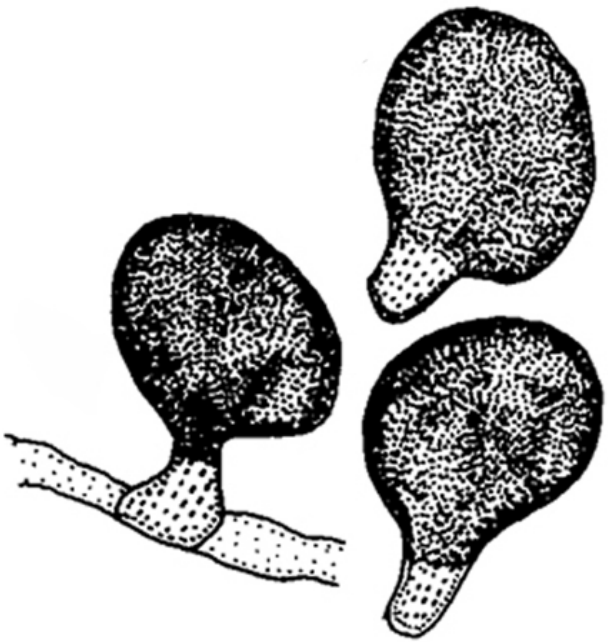


Figure 198. *Acremoniula sarcinellae*-Black conidia

Colemaniella osoori Agnihothrudu, J. Coffee Res. 4: 3, 1974; Ellis, More Dematiaceous Hyphomycetes,366, 1976; Karandikar & Patwardhan, Biovigyanam 11: 143, 1985 (Image 21).

Material examined: HCIO 49776, TBGT 3928, 12.ii.2009; TBGT 3931, 18.ii.2009, on leaves of *Terminalia* sp. (Combretaceae), Muthanga, coll. Jacob Thomas et al.

Colonies hypophyllous, black, velvety, up to 3mm in diameter. Hyphae ectophytic, brownish black, septate, branched at acute to wide angles, loosely reticulate, cells 10–20x3–5 µm. Appressoria few, scattered, lateral and intercalary, mostly globose, entire, 8–12x10–12 µm. Conidiophores micronematous, 1-2-celled, mostly straight, 8–10X4–6 µm. Conidiogenous cells integrated and terminal on short branches, enteroblastic, cyathiform, striated, 14–20x7–20 µm. Conidia solitary, dry, straight to slightly curved, broadly ellipsoidal to obovoidal, dark brown to black, 3–5 horizontal septa with a vertical one, outer wall constricted at the septa, 24–50x16–25 µm, protruded and bluntly pointed towards the tip, hyaline to pale brown, up to 10µm long.

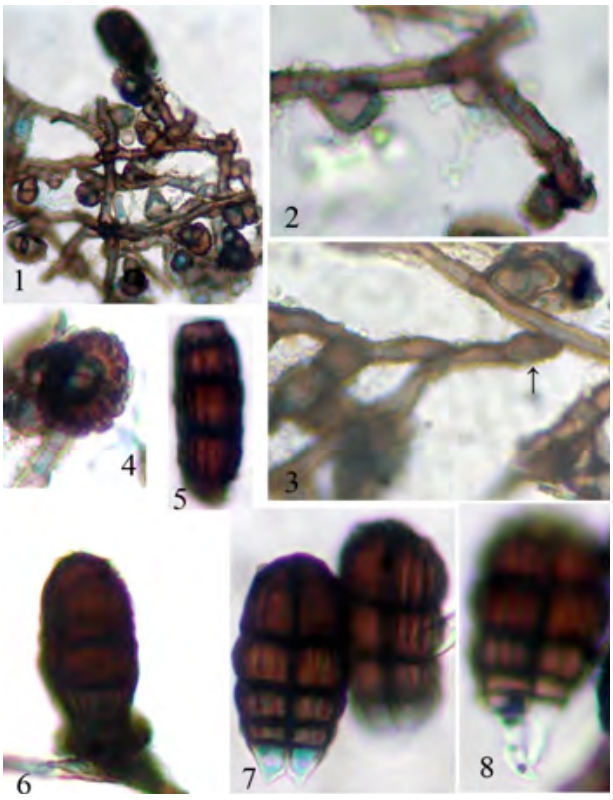


Image 21. *Colemaniella osoori*
1 - Fungal colony; 2 - Hyphae with lateral appressoria; 3 - Hyphae with intercalary appressorium; 4 - Coniogenous cell; 5 - Conidium; 6 - Conidium on conidiogenous cell; 7&8 - Conidia with hyaline hinged base

The genus *Passalora*

Passalora Fries, Summa Veg. Scane. p. 500, 1849.

Colonies usually hypophyllous, effuse, olivaceous, velvety, sometimes causing leaf spots. Mycelium immersed. Stroma none. Setae and appressoria absent. Conidiophores macronematous, mononematous, caespitose, emerging through stomata, unbranched or occasionally branched, straight to flexuous, olivaceous brown, smooth. Conidiogenous cells polyblastic, sympodial, integrated, terminal, becoming intercalary, cicatrized; scars slightly but distinctly thickened, not or very slightly prominent. Conidia solitary, dry, acropleurogenous, obclavate, pale olivaceous brown, smooth, mostly 1-septate, the proximal cell swollen and long ellipsoidal, the distal cell narrow, sybcylindrical to very long ellipsoidal, rarely 2-3 septate.

Type: *Passalora bacilligera* (Mont. & Fr.) Mont. & Fr.

Passalora gmelinae-arboreae (A.K. Sarbhoy, Hosag. & N. Ahmad) Braun & Crous, *Mycospherella* and its anamorphs:1. Names published in *Cercospora* and *Passalora*: 454, 2003.

Mycovellosiella gmelinae-arboreae A.K. Sarbhoy, Hosag. & N. Ahmad, J. Econ. Taxon Bot. 7 (3): 521, 1986 (Fig. 199).

Material examined: HCIO 51050, TBGT 4967, 8.x.2010, on leaves of *Gmelina arborea* Roxb. (Verbenaceae), Vetarinary College Campus, Pookot, Vythiri, coll. M.C. Riju.

Colonies hypophyllous, greyish brown, velvety, 1–4 mm in diameter, often confluent. Mycelium superficial, olivaceous brown, septate, 6–8 µm broad. Conidiophores macronematous, repeatedly branched, flexuous, intertwining, olivaceous brown, 72–88x4–6 µm. Conidiogenous cells terminal, sympodial, scars conspicuous. Conidia solitary, rarely in chains, straight or curved, subhyaline to olivaceous brown, smooth, 1–8 septate, rarely up to 12- septate, 72–88x4–6 µm.

Spiropes armatellicola Hosag. & D.K. Agarwal, J: Econ. Taxon. Bot. 26: 603, 2002 (Fig. 200).

Material examined: HCIO 43592, TBGT 287.2509, 16.iv.1999, on the colonies of *Armatella* sp., on *Actinodaphne* sp. (Lauraceae), Banasuran Hills, coll. C.K.Biju.

Colonies mostly epiphyllous, dense, up to 5mm in diameter, confluent. Hyphae superficial, pale brown, branched, surrounded around appressoria and mycelium of the host, 1–2µm broad. Conidiophores solitary, simple, mononematous, erect, straight, brown,

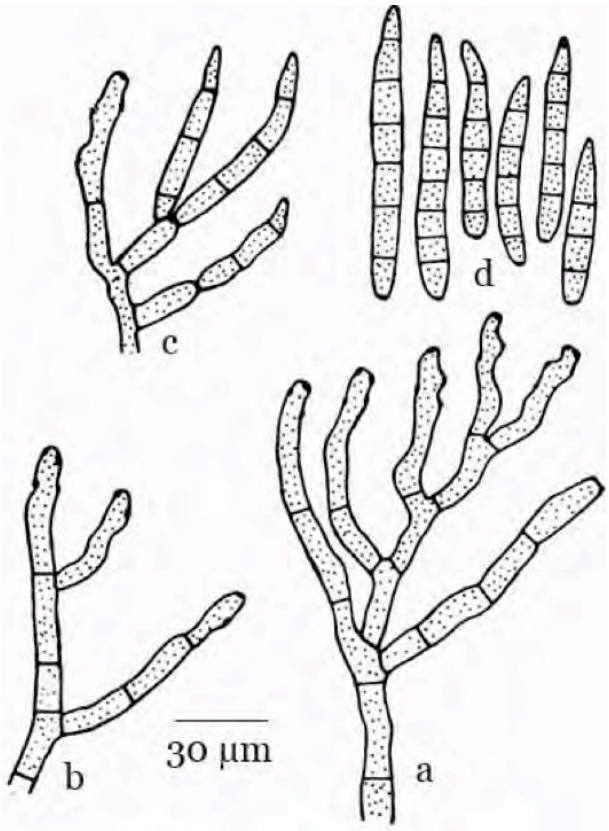


Figure 199. *Passalora gmelinae-arboreae*
a - Profusely branched conidiophores; b - Conidiophore with conidiogenous cells; c - Conidia attached to conidiogenous cells; d - Conidia

straight to flexuous and paler towards apex, conidial scars scattered, 60–112x4–6.5 µm. conidiogenous cells polyblastic, integrated, terminal and intercalary, conspicuous. Conidia straight to slightly curved, obclavate, rostrate at the apex, truncate at the base, pale brown, uniseptate, rostrate above the septum, ovate below the septum, slightly hinged at the base, 24–29 µm long, 6–8µm broad at the broadest portion, up to 3µm broad at the base, beak 8–16 µm long and up to 1.5µm broad at the tip.

Spiropes capensis M.B. Ellis, Mycol. Pap. 114: 5, 1968; Dematiaceous Hyphomycetes p. 252, 1971 (Fig. 201).

Material examined: HCIO 44412, TBGT 665, 20.x.2001, on Meliolaceae member, on leaves of *Glycosmis pentaphylla* (Retz.) DC. (Rutaceae), Wayanad, coll. M. Kamarudeen; HCIO 44642, TBGT 924, 20.v.2002, *Mallotus* sp. (Euphorbiaceae), Thirunelly, coll. S. Shiburaj; HCIO 44883, TBGT 1111, 26.xii.2002, on Meliolaceae member on *Glycosmis pentaphylla* (Retz.) DC., Periya,

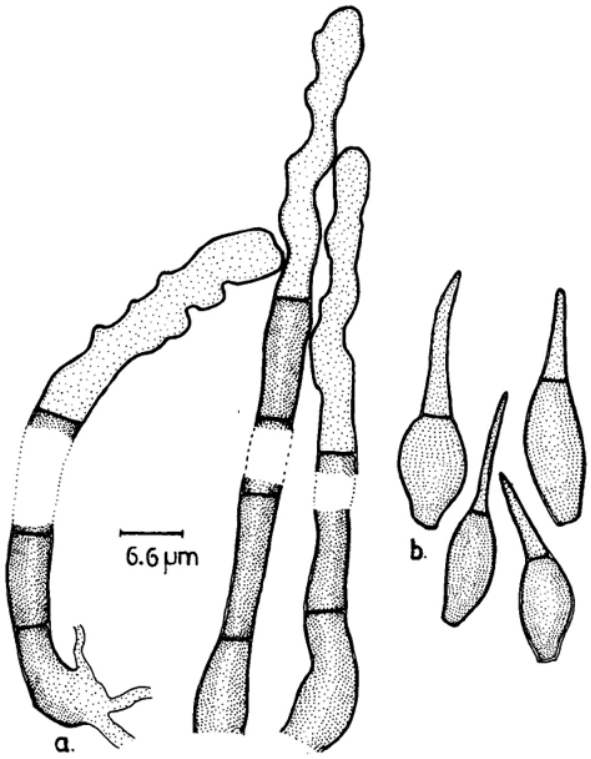


Figure 200.*Spiropes armatellicola*
a - Conidiophore; b - Conidia

coll. Kamarudeen & P.A. Jose.

Colonies mostly hypophyllous, dense, velvety, up to 5mm in diameter, confluent and cover most of the leaf area. Hyphae superficial, branched, pale to pale brown, smooth, cells 11–21X1.5–5 µm. Appressoria and setae absent. Conidiophores macronematous, mononematous, solitary and also in groups but not synnematous, simple, brown, septate, paler towards the apex, 224–400X6–7 µm; conidiogenous cells polyblastic, terminal and intercalary, sympodial, cylindrical, cicatrized, scars numerous and conspicuous; conidia solitary, dry, acropleurogenous, simple, broadly obclavate to ellipsoidal, straight to slightly curved-pale yellow to brown, 3–5 septate, mostly pseudoseptate, 41–53 µm long, 6–8 µm broad at the widest part, 1.5–4µm broad at the apical portion and 4–5 µm wide at the basal portion, wall smooth.

This species was reported from several countries and is reported here for the first time from India (Bilgrami et al. 1991; Ellis, 1971).

Spiropes guareicola (Stev.) Cif., Sydowia 9: 303, 1955; Ellis, Dematiaceous Hyphomycetes p. 250, 1977. (Fig. 202).

Material examined: HCIO 50843, TBGT 4760,

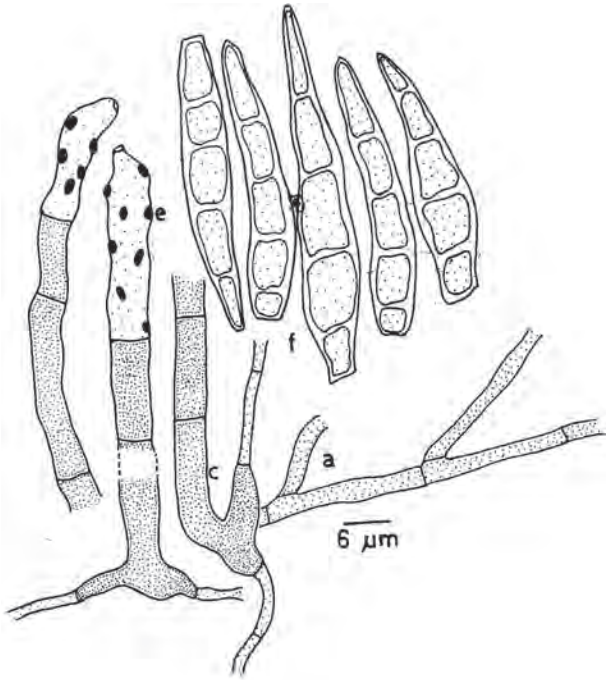


Figure 201. ***Spiropes capensis***
a - Septate mycelium; c - Conidiophores; e - Conidiogenous cells; f - Conidia

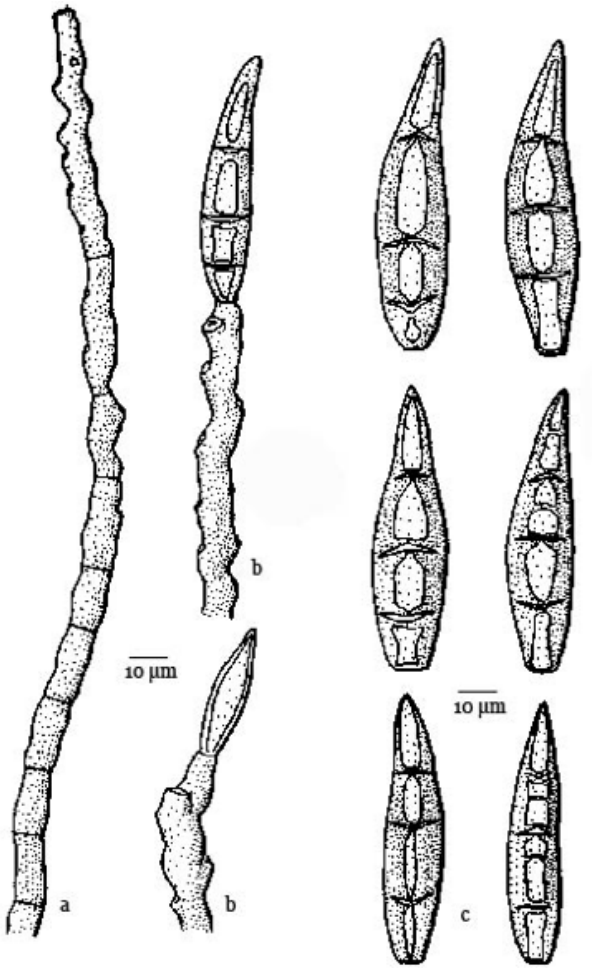


Figure 202. ***Spiropes guareicola***
a - Conidiophore; b - Conidiogeneous cells; c - Conidia

6.xi.2009, on leaves of *Citrus* sp. (Rutaceae), Padinharathara, coll. M.C. Riju & A. Sabeena; HCIO 49888, TBGT 4040, 18.ix.2008, *Atalantia* sp., (Rutaceae) Thirunelly, Gireesh et al.

Colonies black, velvety. Mycelium superficial, pale, olivaceous brown, branched, septate, appressed to the hyphae of the host fungus, 3–4 µm wide. Conidiophores arise singly or in loose groups from the hyphae, simple, straight to flexuous at the basal portion, zigzag in the upper fertile portion, septate, olivaceous brown, 250-300x7–9 µm, conidial scars numerous, distinct. Conidia solitary, fusiform, taper towards the apex, slightly narrower towards the truncate base, 3-pseudoseptate, not constricted, olivaceous brown, 37–55x10–13 µm.

This species is common on most of the meliolaceous fungi.

REFERENCES

Biju, C.K., V.B. Hosagoudar & T.K. Abraham (2005). Meliolaceae of Kerala, India – XV. *Nova Hedwigia* 80: 465–502.

Bilgrami, K.S., M. Jamaluddin & M.A. Rizwi (1991). *Fungi of India. List and References.* Today and Tomorrow's Printers & Publishers, New Delhi, 798pp.

Cooke, M.C. (1884). Some exotic fungi. *Grevillea* 12:85.

Doidge, E.M. (1942). A revision of the South African Microthyriaceae. *Bothalia* 4: 273–344.

Hansford, C.G. (1941a). Contribution towards the fungal flora of Uganda II. Some Uganda Ascomycetes. *proceedings of the Linnean Society of London* 19: 14–52.

Hansford, C.G. (1941b). Contribution towards the fungal flora of Uganda III. Some Uganda Ascomycetes. *proceedings of the Linnean Society of London* 1: 4–52.

Hansford, C.G. (1945). Contribution towards the fungus flora of Uganda–VII. New records and revision. *proceedings of the Linnean Society of London* 157: 20–212.

Hansford, C.G. (1947). New or interesting tropical fungi-I. *Proceedings of the Linnean Society of London* 158: 28–50.

Hansford, C.G & M.J. Thirumalachar (1948). Fungi of south India. *Farlowia* 3: 285–314.

Hansford, C.G. (1949) . Tropical fungi III. New species and revision. *proceedings of the Linnean Society of London* 160: 116–153.

Hansford, C.G. (1954a). Some Microthyriales and other fungi from Indonesia. *Reinwardtia* 3: 113–144.

Hansford, C.G. (1954b). Australian fungi–II. New records and revisions. *proceedings of the Linnean Society of New South Wales* 79: 3–4 & 97–141.

Hansford, C.G. (1957). New or interesting tropical fungi – VI. *Sydowia* 10: 41–100.

Hansford, C.G. (1961). The Meliolineae. A Monograph. *Sydowia Beihefte* 2: 1–806.

Hosagoudar, V.B. (1988). Uredinales of Kerala. *Journal of Economic and Taxonomic Botany.* 12: 265–272.

Hosagoudar, V.B., K.M. Kaveriappa, P.A. Raghu & R.D. Goos (1994).

Meliolaceae of southern India - XVI. *Mycotaxon* 51: 107–118.

Hosagoudar, V.B. (1996). *Meliolales of India*. Botanical Survey of India, Calcutta, 363pp.

Hosagoudar, V.B., N.P. Balakrishnan & R.D. Goos (1996). Some *Asterinella, Asterostomella* and *Echidnodella* species from southern India. *Mycotaxon* 58: 489–498.

Hosagoudar, V.B., N.P. Balakrishnan & R. D.Goos (1996b) . Some *Asterina* species from Southern India. *Mycotaxon* 59: 167–187.

Hosagoudar, V.B. & R.D. Goos (1996). Some foliicolous fungi from Southern India. *Mycotaxon* 59: 149–166.

Hosagoudar, V.B. & T.K. Abraham (1997a). A new species of *Asterolibertia* from Kerala, India. *Journal of Mycopathological Research.* 35: 55–56.

Hosagoudar, V.B., C.K. Biju & T.K. Abraham (2002a). Diversity of foliicolous micro mycobionts in Munnar and Wyanad forest regions of Kerala. *Journal of Mycopathological Research* 40: 191–196.

Hosagoudar, V.B., A. Sabeena & D.K. Agarwal (2009) . Two new species and a new generic record of Asterinaceae on *Mimusops elengi* from Kerala. *Indian Phytopathology* 62: 229–232.

Hosagoudar, V.B. & D.K. Agarwal (2008). *Taxonomic studies of Meliolales. Identification Manual.* International Book Distributors, Dehra Dun, 263pp.

Hosagoudar, V.B. (2005). Studies on foliicolous fungi–XIX. *Indian Phytopathology* 58: 194–204.

Hosagoudar, V.B. (2008). *Meliolales of India.* Vol. II. Botanical Survey of India, Calcutta, 390pp.

Hosagoudar, V.B. & T.K. Abraham (2000). A list of *Asterina* Lev. species based on the literature. *Journal of economic taxonomic Botany* 24: 557–587.

Hosagoudar, V.B., T.K. Abraham & P. Pushpangadan (1997). *The Meliolinae A suppliment*. Tropical Botanic Garden and Research Institute, Palode, Kerala, 201pp.

Hosagoudar, V.B., C.K. Biju & T.K. Abraham (2001c). Diversity in the foliicolous micro mycobionts in Peppara and Neyyar Wildlife Sanctuaries, Thiruvananthapuram, Kerala, India. *Journal of economic taxonomic Botany* 25: 297–307.

Hu, Y., Y. Ouyang, S. Bin & G. Jiang (1996). *Flora Fungorum Sinicorum. Vol. 4. Meliolales (1)*. Science Press Beijing, 270pp+plate IV.

Hu, Y., S. Bin, Y. Ouyang & G. Jiang (1999). *Flora Fungorum Sinicorum. Vol. 11. Meliolales (2)*. Science Press Beijing, 252pp.

Hughes, S.J. (1952). Fungi from the Gold Coast.Mycological Papers 48, 1–91.

Kamat, M.N., V.S. Seshadri & A. Pande (1978). *A Monographic study of Indian species of Phyllachora.* University of Agricultural Sciences, Hebbal, Bangalore, 100pp.

Kapoor, J.N. (1967). Notes on Indian Meliolaceae. *Indian Phytopath*. 20: 151–160.

Kar, A.K. & S.N. Ghosh (1986). New *Asterina* species from West Bengal. *Indian Phytopathology* 39: 204–220.

Kar, A.K. & M.K. Maity (1970). New *Asterina* species from West Bengal. *Transactions of the British Mycological Society* 54: 435–444.

Katumoto, K. (1975). The Hemisphaeriales in Japan. *Bulletin Faculty of Agriculture, Yamaguti University* 26: 45–122.

Katumoto, K. (1991). Three Ascomycetous fungi from the Ryukyu Islands, Japan.*Transactions of the Mycological Society of Japan* 32: 37–43.

Mibey, R.K. & D.L. Hawksworth (1997). Meliolaceae and Asterinaceae of Shimba Hills, Kenya. *Mycological Papers* 174: 1–108.

Petrak, F. & R. Cifferri 1932 . Fungi dominicani–II. *Annales Mycologici* 30: 149–353.

Petrak, F. (1954). Beitrage zur Pilzflora von Britisch Nord, Borneo. *Sydowia* 8: 12–26.

Sarbhoy, A.K., J.L. Varshney & D.K. Agarwal (1996). *Fungi of India*. CBS Publishers and Distributors New Delhi.

Sharma, J.K., C. Mohanan & M. Florence (1985). *Kerala Forest Research Report* 36: 248.

Sivanesan, A. (1984). *The Bitunicate Ascomycetes*. International Books & Periodical Supply Service, New Delhi.

Stevens, F.L. & M.H. Ryan (1939). The *Microthyriaceae*. *Illinois Biol. Monograph.* 17: 1–138.

Sydow, H. & P. Sydow (1913). Enumeration of Philippines fungi with notes and description of new species. *Philippines Journal of Science* 8: 475–508.

Sydow, H. & P. Sydow (1914). Fungi from northern Palawan. *Philippines Journal of Science* 9: 157–189.

Sydow, H. & P. Sydow (1915). Novae fungorum species-XIII. *Annales Mycologici* 13: 35–43.

Sydow, H. (1930). Fungi venezuelani. *Annales Mycologici* 28: 29–224.

Sydow, H. & F. Petrak (1931) . Micromycetes Philippinensis II. *Annales Mycologici* 29: 145–279.

Sydow, H. (1938). Novae fungorum species-XXVI. *Annales Mycologici* 36: 156–197.

Theissen, F. (1913). Die Gattung *Asterina*. *Bibliotheca Mycologica* 10: 1–130.

Yamamoto, W. (1956). The Formosan species of Microthyriaceae − I. *Science Reporter Hyogo University Agriculture Series, Agriculture Biology* 2: 33–36.

Yamamoto, W. (1957) .The Formosan species of Microthyriaceae − II. *Science Reporter Hyogo University Agriculture Series, Agriculture Biology* 3: 23–31.

Yates, H.S. (1918a). Some recently collected Philippine fungi − I. *Philippine Journal of Science* 12: 61–80.

Yates, H.S. (1918b). Some recently collected Philippine fungi – II. *Philippine Journalof Science*13: 361–384.

Table 1. Key to the Species

	ACANTHACEAE	
Asteridiella 3101.3220	Colonies epiphyllous, dense, hyphae substraight to flexuous; appressoria alternate, antrorse to closely antrorse, head cells ovate to globose, entire, angular to stellately lobate; phialides mixed with appressoria; perithecial wall cells conoid.	***A. phaulopsidis***
	ANACARDIACEAE	
Meliola 3111.5223	Colonies amphigenous, dense, velvety; hyphae straight; appressoria alternate, 2% unilateral, straight to variously curved, head cells cylindrical, versiform, attenuated and rounded at the apex, entire to subangular, straight to curved; phialides few, mixed with appressoria; mycelial setae fairly numerous, scattered, simple, straight, acute, obtuse to dentate at the tip	***M. mangiferae***
3111.4223	Colonies amphigenous, mostly epiphyllous, subdense; hyphae of the epiphyllous colonies straight, while the hyphae of the hypophyllous colonies crooked; appressoria alternate, subantrorse to antrorse, head cells cylindrical, versiform, slightly angulose, entire; phialides mixed with appressoria; mycelial setae scattered to grouped around perithecia, straight, simple, acute at the tip	***M. nothopegiae***
3111.6333	Colonies hypophyllous, dense, velvety; hyphae strongly appressed to the host surface, crooked; appressoria scattered, alternate to unilateral, antrorse to reflexed, variously curved, head cells ovate, versiform, angulose, entire to lobate, straight to curved; phialides few, mixed with appressoria; mycelial setae numerous, straight, flexuous, simple, acute to obtuse at the tip	***M. holigarnae***
	ANNONACEAE	
Amazonia 3101. 4320	Colonies predominantly hypophyllous, subdense to dense; hyphae straight, appressoria alternate, antrorse to closely antrorse, head cells ovate, oblong to cylindrical, phialides not seen. Perithecia flattened-globose, radiating.	***A. goniothalami***
Meliola 3123.4232	Colonies amphigenous, dense, velvety; hyphae straight; appressoria opposite, rarely alternate and unilateral, closely antrorse to antrorse, head cells ovate, cylindrical, broadly rounded to attenuated at the apex, entire; phialides mixed with appressoria; mycelial setae numerous, densely scattered, simple, uncinate, sickle-shaped, septate, obtuse at the tip	***M. unonicola***
	APOCYNANCEAE	
Meliola 3111.3223	Colonies mostly epiphyllous, subdense; hyphae straight to flexuous; appressoria alternate, antrorse to closely antrorse, head cells ovate, globose, slightly attenuated to truncate at the apex, mostly entire, rarely sublobate; mycelial setae simple, straight, curved, acute to obtuse at the tip.	***M. ichnocarpi-volubili***
31¼1.3221	Colonies hypophyllous, scattered, dense, velvety; hyphae straight to substraight; appressoria alternate, unilateral, straight, antrorse, head cells ovate, globose, mycelial setae numerous, simple, straight, few slightly curved to uncinate, obtuse, bifid, trifid, often subdentate to furcate to branched at the tip	***M.kamettiae***
	ARALIACEAE	
Meliola 31¼1.3232	Colonies epiphyllous, crustose; hyphae straight to flexuous; appressoria alternate, unilateral, antrorse to subantrorse, head cells globose, subglobose, entire; phialides mixed with appressoria; mycelial setae simple, straight, obtuse, clavate, inflated, notched to bifid at the apex, ends broadly rounded	***M. abdulkalamii***
	ARISTOLOCHIACEAE	
Meliola 3113.3222	Colonies epiphyllous, thin to dense; hyphae substraight to flexuous; appressoria alternate to about 3% opposite, antrorse to subantrorse, head cells ovate to globose, entire; phialides mixed with appressoria; mycelial setae scattered, simple, straight, acute to obtuse at the tip	***M. aristolochigena***
	ASCLEPIADACEAE	
Meliola 3111.4222	Colonies epiphyllous, dense, scattered; hyphae straight to slightly flexuous; appressoria alternate to unilateral, antrorse to subantrorse, head cells subglobose to cylindrical, entire, narrowed and broadly rounded at the apex; phialides borne on a separate mycelial branch; mycelial setae straight to slightly curved, simple, acute to obtuse at the tip	***M. gymnemae***
	BIGNONIACEAE	
Meliola 3111.3221	Colonies epiphyllous, thin to subdense, subvelvety; hyphae straight to substraight; appressoria alternate, antrorse to subantrorse, straight to curved, head cells globose to subglobose, subangular, entire; phialides mixed with appressoria; mycelial setae numerous, scattered, straight, simple, subacute to obtuse at the tip	***M. crescentiae***

	CAESALPINIACEAE	
Meliola 3113.4232	Colonies amphigenous, mostly epiphyllous; hyphae undulate to tortuous; appressoria alternate to 5% opposite, antrorse, spreading, straight to curved; head cells ovate, angulose, entire to sublobate, straight to curved; phialides mixed with appressoria; mycelial setae scattered to grouped around perithecia, simple, obtuse at the tip	***M. tamarindi***
	CELASTRACEAE	
Meliola 3111.5322	Colonies hypophyllous, dense, velvety; hyphae straight, slightly undulate; appressoria alternate, antrorse, subantrorse, spreading, retrorse, head cells ovate, clavate, lobate to stellately lobate; phialides mixed with appressoria; mycelial setae numerous, scattered, simple, acute to obtuse at the tip	***M. celastrigena***
	COMBRETACEAE	
Asteridiella 3101.4220	Colonies epiphyllous, subdense; hyphae substraight to undulate; appressoria alternate, straight, antrorse, head cells globose, entire, angular; phialides borne on a separate mycelial branch; perithecial cells mammiform.	***A. combreti*** var. ***leonensis***
	CONVOLVULACEAE	
Meliola 3113.4221	Colonies epiphyllous, dense, velvety; hyphae undulate to slightly crooked; appressoria opposite, 20% alternate, straight to curved, closely antrorse to spreading; head cells globose to subglobose, ovate, entire; phialides mixed with appressoria; mycelial setae grouped around perithecia, straight, simple, acute to obtuse at the tip	***M. malacotricha***
3112.3222	Colonies amphigenous, mostly epiphyllous, dense, velvety; hyphae straight to slightly crooked; appressoria mostly opposite, about 5% unilateral, antrorse to spreading, straight to curved, head cells ovate to subglobose, entire; phialides mixed with appressoria; mycelial setae fairly numerous, scattered to grouped around perithecia, simple, straight, acute to obtuse at the tip	***M. malacotricha*** var. ***major***
3141.4231	Colonies amphigenous, caulicolous, mostly epiphyllous, dense; hyphae undulate to tortuous; appressoria alternate to unilateral, antrorse, spreading, straight to curved, head cells ovate, versiform, angulose, rarely irregularly sublobate; phialides mixed with appressoria; mycelial setae numerous, uniformly scattered, dichotomously branched, obtuse to acute at the tip	***M. quadrispina***
	ELAEOCARPACEAE	
Asteridiella 3101.4220	Colonies epiphyllous, subdense; hyphae substraight to undulate; appressoria alternate, straight to curved, antrorse, head cells globose, ovate, truncate at the apex, entire; phialides borne on a separate mycelial branch; perithecial cells conoid, curved, acute at the apex	***A. elaeocarpi-tuberculati***
	ERYTHROPALACEAE	
Meliola 3111.4222	Colonies amphigenous, caulicolous, dense, velvety; hyphae straight to slightly undulate; appressoria alternate to unilateral, straight, antrorse, spreading, head cells ovate, globose, slightly curved, entire; phialides few, mixed with appressoria; mycelial setae scattered, grouped around perithecia, numerous, simple, straight, acute at the tip	***M. erythropali***
	EUPHORBIACEAE	
Asteridiella 3101.3220	Colonies hypophyllous; hyphae flexuous; appressoria alternate, antrorse to subantrorse, head cells ovate to globose, entire, rarely angular; phialides mixed with appressoria	***A. wyanadensis***
Meliola 3113.4221	Colonies amphigenous, caulicolous, mostly hypophyllous; hyphae straight to substraight; appressoria opposite, solitary, about 15% alternate, head cells oblong to cylindrical, angular to slightly sublobate, often entire; mycelial setae many, scattered, simple, straight, slightly curved and often flexuous, acute at the tip	***M. actephilae***
3113.4222	Colonies amphigenous, mostly hypophyllous, crustose; hyphae straight to substraight; appressoria alternate, about 15% opposite, antrorse to subantrorse, spreading, head cells ovate, clavate, globose, entire to 2-5-times lobate, often slightly angular; phialides mixed with appressoria; mycelial setae few, simple, straight, obtuse at the tip	***M. aporusae***
31½1.5222	Colonies epiphyllous, subdense; hyphae straight to substraight; appressoria densely arranged, alternate, antrorse, subantrorse to closely antrorse, head cells ovate, globose, entire; phialides mixed with appressoria; mycelial setae numerous, closely scattered, simple, straight, about 10% uncinate, acute at the tip	***M. phyllanthigena***
	FABACEAE	
Asteridiella 3101.4320	Colonies hypophyllous, subdense; hyphae substraight to flexuous; appressoria alternate, straight to curved, antrorse to subantrorse, head cells straight to variously curved, ovate, oblong, entire to angular, sublobate to lobate; phialides mixed with appressoria; perithecial wall cells conoid, mammiform	***A. millettiicola***
Meliola 3111.3222	Colonies epiphyllous, thin, scattered; hyphae flexuous to crooked; appressoria alternate to unilateral, up to 1% opposite, antrorse, subantrorse to retrorse, head cells globose, ovate, straight to curved; phialides mixed with appressoria; mycelial setae scattered to grouped around perithecia, simple, straight, acute at the tip	***M. abri***
3113.4223	Colonies epiphyllous, subdense, velvety; hyphae substraight to crooked, branching opposite to irregular at wide angles, loosely to closely reticulate; appressoria alternate, opposite, antrorse, mostly spreading, straight to curved; head cells globose, subglobose, mostly curved, entire to slightly angular; phialides mixed with appressoria; mycelial setae grouped around perithecia, simple, straight, acute to obtuse at the tip	***M. buteae***

3111.3222	Colonies foliicolous, epiphyllous, thin, scattered; hyphae flexuous to undulate; appressoria alternate, unilateral, rarely opposite, straight to slightly curved, antrorse, subantrorse to retrorse, head cells ovate, globose; phialides mixed with appressoria; mycelial setae scattered to grouped around perithecia, simple, straight to slightly curved, acute to obtuse at the tip	***M. canavaliae***
31⅓3.3222	Colonies epiphyllous, dense, crustose to velvety; hyphae substraight to flexuous; appressoria alternate, about 20% opposite, antrorse, subantrorse to rarely recurved, head cells globose, entire, rarely truncate at the apex; phialides mixed with appressoria; mycelial setae scattered to grouped around perithecia, simple, straight, obtuse, dentate to cristate at the apex	***M. flemingiicola***
3113.3222	Colonies amphigenous, mostly epiphyllous, subdense to dense; hyphae straight to flexuous, branching mostly opposite at acute to wide angles, loosely to closely reticulate; appressoria alternate, opposite, subantrorse to spreading; head cells globose, rarely ovate, straight to slightly curved, entire; phialides mixed with appressoria; mycelial setae scattered to grouped around perithecia, simple, straight, acute at the tip	***M. gliricidiicola***
31⅓3.4222	Colonies amphigenous, thin to crustose; hyphae straight to substraight; appressoria alternate and opposite, straight to curved, antrorse to spreading, head cells ovate, globose to subglobose, entire; phialides mixed with appressoria; mycelial setae fairly numerous, scattered, straight to curved but not uncinate, acute, obtuse to minutely dentate at the tip	***M. millettiae-chryosophyllae*** var. ***indica***
3113.3222	Colonies foliicolous, fructicolous, epiphyllous, thin, scattered; hyphae undulating; appressoria alternate, unilateral, up to 3%, opposite, straight to slightly curved, subantrorse to retrorse, head cells ovate, globose; Phialides mixed with appressoria; mycelial setae scattered, simple, straight to slightly curved, acute to obtuse	***M. psophocarpi***
	FLACOURTIACEAE	
Asteridiella 3103.4220	Colonies amphigenous, dense, crustose; hyphae straight to substraight; appressoria alternate, about 1% opposite in loosely reticulated colonies while about 5% opposite in densely reticulated colonies, antrorse; phialides mixed with appressoria; perithecial cells mammiform, straight to curved	***A. scolopiae***
Amazonia 3101.4220	Colonies amphigenous, thin to subdense; Hyphae substraight to flexuous; appressoria alternate, straight, rarely curved, antrorse, head cells ovate, entire; phialides mixed with appressoria	***A. flacourtiae***
	HIPPOCRATACEAE	
Meliola 3111.4221	Colonies amphigenous, mostly epiphyllous, dense, velvety; hyphae substraight to flexuous; appressoria alternate, antrorse to subantrorse, straight to rarely curved, head cells ovate, globose, angular, sublobate to irregularly lobate; phialides mixed with appressoria; mycelial setae numerous, simple, mostly straight, often curved, acute at the tip	***M. oligomera***
	ICACINACEAE	
Meliola 3113.4222	Colonies amphigenous, caulicolous, mostly epiphyllous, velvety, cover almost all the part of upper surface of the leaf; hyphae substraight to undulate; appressoria alternate, about 1% opposite, straight to curved, spreading, mostly antrorse, head cells subglobose, ovate, angular to sublobate; phialides borne on a separate mycelial branch; mycelial setae numerous, scattered to grouped around perithecia, straight, simple, acute to obtuse at the tip	***M. chandrasekharanii***
3113.4223	Colonies epiphyllous, subdense, subvelvety; hyphae flexuous, branching opposite to irregular at acute to wide angles, loosely to closely reticulate; appressoria alternate and unilateral, rarely opposite, straight to curved, antrorse to reflexed, spreading, head cells globose, ovate, curved, entire; phialides mixed with appressoria; mycelial setae numerous, scattered, often grouped around perithecia, straight, simple, acute.	***M. dimidiatae***
	LAURACEAE	
Armatella 11x3.3240	Colonies amphigenous, thin to subdense; hyphae flexuous to crooked, branching irregular at acute to wide angles; appressoria alternate, rarely opposite, straight to variously curved, antrorse to sub antrorse; head cells ovate, oblong, straight to curved mostly entire, but rarely sinuate	***A. apollonigena***
11x2.2232	Colonies epiphyllous, thin to subdense, crustose; hyphae crenulated, straight to substraight; appressoria alternate, antrorse to spreading, straight to curved, head cells ovate, broadly conoid, rarely globose	***A. cinnamomicola***
11x2.3222	Colonies epiphyllous, thin, crustose; hyphae smooth walled, straight to substraight; appressoria alternate, antrorse to spreading, head cells ovoid, conoid, slightly angular, entire, outer wall crenulated	***A. cryptocaryae***
11x2.3231	Colonies hypophyllous, thin, crustaceous; hyphae smooth walled, substraight to undulate; appressoria alternate, about 5% opposite, antrorse, straight to curved, head cells globose, stellately sublobate	***A. litseae***
11x2.3234	Colonies hypophyllous, thin, scattered, diffused; hyphae smooth walled, flexuous to crooked; appressoria alternate, variously curved, head cells ovate to globose, entire to stellately lobate	***A. katumotoi***
11x3.432	Colonies ColColonies hypophyllous thin, spreading; hyphae smooth walled, crooked, branching alternate to irregular at acute angles, closely reticulate; head cells globose, narrowly ovate, angular, entire	***A. balakrishnanii***

Meliola 31½1.5333	Colonies hypophyllous, dense, velvety; hyphae flexuous; appressoria alternate, straight to variously curved, antrorse to reflexed, head cells globose, ovate, angular, entire; phialides mixed with appressoria; mycelial setae numerous, scattered, straight, simple, acute to variously dentate at the tip	***M. beilschmiediae*** var. ***cinnamomicola***
3111.3223	Colonies epiphyllous, subdense; hyphae substraight; appressoria alternate, antrorse, head cells ovate, versiform, entire; phialides mixed with appressoria; mycelial setae few, mostly grouped around perithecia, simple, acute	***M. litseae*** var. ***keralensis***
3111.4223	Colonies epiphyllous, dense, velvety; hyphae straight to undulate; appressoria alternate, straight to curved, antrorse, rarely spreading, head cells versiform, obovate, rarely truncate, entire; phialides mixed with appressoria; mycelial setae few, straight, simple, acute at the tip	***M. litseae*** var. ***rotundipoda***
3111.5332	Colonies hypophyllous, dense, velvety; hyphae crooked and geniculate; appressoria alternate to unilateral, straight to curved, antrorse, spreading, head cells ovate, globose, slightly angular, truncate, entire; phialides mixed with appressoria, alternate to unilateral; mycelial setae numerous, scattered to grouped around perithecia, straight, simple, acute at the tip	***M. machili***
31½1.5333	Colonies hypophyllous, subdense, subvelvety; hyphae substraight to tortuous; appressoria alternate to unilateral, straight to curved, antrorse, spreading, head cells clavate, versiform, angulose, entire to slightly lobate; phialides mixed with appressoria; mycelial setae scattered, straight, simple, acute to 2-3 dentate	***M. neolitseae***
3111.4234	Colonies hypophyllous, thin, scattered, spreading; hyphae crooked; appressoria scattered, alternate, antrorse, subantrorse to retrorse, straight to curved, head cells globose, entire; phialides mixed with appressoria mycelial setae mostly grouped around perithecia, simple, straight to flexuous, acute at the tip	***M. pushpangadanii***
	LECYTHIDACEAE	
Meliola 3113.4222	Colonies epiphyllous, dense; hyphae straight to substraight; appressoria opposite, about 3% alternate, head cells ovate, rarely globose, entire; phialides mixed with appressoria; mycelial setae scattered to grouped around the perithecia, simple, straight, acute at the tip	***M. careya***e var. ***indica***
	MAGNOLIACEAE	
Asteridiella 3101.3230	Colonies epiphyllous, thin; appressoria alternate, antrorse, mostly straight, head cells ovate, oblong, angular to sublobate; phialides mixed with appressoria; perithecial wall cells mammiform, obtuse at the tip	***A. micheliae***
	MALPHIGIACEAE	
Irenopsis 3403.5320	Colonies amphigenous, subdense; hyphae straight to substraight; appressoria alternate, unilateral to 3-4% opposite, antrorse to subantrorse, head cells ovate, entire, mostly angular to rarely sublobate; phialides mixed with appressoria; perithecial setae simple, straight, obtuse at the tip	***I. hiptages*** var. ***indica***
	MALVACEAE	
Irenopsis 3401.3220	Colonies epiphyllous, thin, subvelvety; hyphae substraight to undulate; appressoria alternate, antrorse to spreading, straight to curved, head cells ovate, subglobose, entire, subangular to slightly sublobate; phialides mixed with appressoria, perithecial setae few, 10-16 in number, simple, straight to slightly flexuous, septate, smooth, obtuse to subacute at the tip	***I. molleriana***
3403.3220	Colonies amphigenous, mostly epiphyllous, subdense to dense; hyphae straight to flexuous; appressoria alternate, about 5% opposite, antrorse, subantrorse to rarely retrorse, head cells ovate to globose, entire, angular to truncate at the apex, straight to curved; phialides mixed with appressoria; perithecial setae 0-12 in numbers, simple, straight, acute at the apex, deep brown, septa not visible	***I. sidae*** var. ***indica***
	MELASTOMATACEAE	
Meliola 3111.3223	Colonies hypophyllous, very thin; hyphae substraight to undulate; appressoria alternate, distantly arranged, straight to curved, mostly antrorse, head cells ovate, pointed towards the apex with broadly rounded ends, entire; phialides mixed with appressoria; mycelial setae grouped around perithecia, straight, simple, acute	***M. affinis*** var. ***indica***
	MELIACEAE	
Irenopsis 3401.4220	Colonies epiphyllous, subdense, scattered; hyphae straight to flexuous, appressoria alternate, unilateral, antrorse to subantrorse, head cells globose, angular, sublobate to deeply lobate phialides mixed with appressoria, perithecial setae 0-5 in number, straight, simple, obtuse at the apex	***Irenopsis trichiliae***
Meliola 3112.5333	Colonies epiphyllous, dense, velvety; hyphae substraight to slightly crooked; appressoria opposite, crowded after intervals, rarely solitary, antrorse, subantrorse, recurved, head cells ovate, globose, angular, truncate, straight to curved, entire; phialides mixed with appressoria; mycelial setae mostly grouped around perithecia, simple, straight, acute to obtuse	***M. aphanamixidis***
31⅓3.3231	Colonies epiphyllous, dense, velvety; hyphae substraight to crooked; appressoria alternate, unilateral, opposite, antrorse, subantrorse to retrorse, head cells globose, subglobose, entire to rarely truncate; phialides mixed with appressoria; mycelial setae scattered, simple, straight, acute, 2–3-times dentate at the tip	***M. dysoxyligena***
3111.3222	Colonies epiphyllous, minute; hyphae straight, substraight to flexuous; appressoria alternate, antrorse to subantrorse, head cells ovate, broadly rounded at the apex, straight to curved, entire; phialides mixed with appressoria; mycelial setae few, grouped around perithecia, straight, flexuous, acute to obtuse at the tip	***M. nairii***

	MENISPERMACEAE	
Meliola 3111.3222	Colonies amphigenous, mostly epiphyllous, subdense to dense; hyphae substraight to slightly undulate; appressoria alternate to unilateral, straight, antrorse, head cells ovate, versiform, slightly and bluntly pointed at the apex, entire; phialides borne on a separate mycelial branch, alternate to opposite, conoid to ampulliform; mycelial setae scattered to grouped around the perithecia, simple, acute at the tip	***M. cycleae***
31½1.3221	Colonies epiphyllous, dense, velvety; hyphae substraight, flexuous to crooked; appressoria alternate, antrorse, head cells ovate, oblong, clavate, often attenuated at the apex, entire; phialides borne on a separate mycelial branch; mycelial setae mostly grouped around perithecia, simple, straight, flexuous to curved, up to 2% uncinate, obtuse at the tip	***M. subramanyaensis***
	MORACEAE	
Irenopsis 3401.4220	Colonies amphigenous, mostly epiphyllous, subdense to dense; hyphae straight to undulate; appressoria alternate, antrorse to subantrorse, spreading, head cells globose, subangulose to irregularly sublobate; phialides mixed with appressoria and also born on a separate mycelial branch, perithecial setae 4-8, straight, spreading, dark-brown at base and pale brown towards the apex, obtuse and mostly straight at the tip	***I. benguetensis***
Meliola 3121.5322	Colonies epiphyllous, dense, velvety; hyphae straight to substraight; appressoria alternate, antrorse, head cells ovate, angular to sublobate; phialides borne on separate mycelial branch, 1% mixed with appressoria; mycelial setae densely scattered, simple, curved, obtuse at the tip	***M. artocarpi***
	MYRSINACEAE	
Amazonia 3101.4230	Colonies amphigenous, mostly hypophyllous, crustaceous; hyphae straight to undulating; appressoria alternate to unilateral, very closely arranged, antrorse, straight to curved, head cells globose, entire; phialides mixed with appressoria	***A. peregrina***
Meliola 3111.3222	Colonies epiphyllous, dense, crustose; hyphae straight to substraight; appressoria alternate, closely placed, straight to curved, mostly antrorse, rarely retrorse, head cells oblong, cylindrical, rarely broadly ovate, entire, straight to slightly curved; mycelial setae scattered, simple, straight, acute at the tip	***M. ardisiicola***
3113.5221	Colonies hypophyllous, subdense to dense; hyphae substraight; appressoria alternate, up to 30% opposite to unilateral, antrorse to subantrorse, head cells ovate, globose, entire, phialides mixed with appressoria; mycelial setae simple, straight, acute to obtuse at the tip	***M. ardisiigena***
31⅓3.3221	Colonies mostly hypophyllous, dense, velvety; hyphae straight to flexuous; appressoria alternate, about 30% opposite, antrorse to subantrorse, head cells predominantly globose, rarely ovate, entire; phialides few, mixed with appressoria; mycelial setae densely scattered, simple, straight to flexuous, acute, obtuse to acute at the tip	***M. groteana*** var. ***maesae***
	MYRTACEAE	
Amazonia 3101.4220	Colonies amphigenous, subdense, crustose to slightly velvety; hyphae substraight to slightly undulate; appressoria alternate, straight, antrorse to spreading, head cells ovate to subglobose, entire; phialides mixed with appressoria	***A. syzygii***
Meliola 3121.4221	Colonies hypophyllous, dense, velvety; hyphae substraight to tortuous; appressoria alternate, straight to variously curved, antrorse to spreading, head cells straight to curved, ovate, cylindrical, entire to angular; phialides mixed with appressoria; mycelial setae fairly numerous, simple, broadly uncinate to arcuate above, very few are straight, acute to obtuse at the tip	***M. densa***
3111.4221	Colonies hypophyllous, dense, velvety; hyphae straight to substraight; appressoria alternate, less than 1% opposite, antrorse, subantrorse, retrorse, straight, curved to uncinate, head cells ovate, oblong, cylindrical, straight to curved, entire, broadly rounded to truncate at the apex; phialides few, mixed with appressoria mycelial setae numerous, scattered, simple, straight, acute at the tip	***M. syzygiigena***
	OLEACEAE	
Asteridiella 3101.4220	Colonies epiphyllous, dense, crustose; hyphae substraight to undulate; appressoria alternate, mostly antrorse, rarely recurved, head cells ovate, globose, deeply and irregularly lobate; phialides mixed with appressoria, conoid to ampulliform, perithecial cells conoid to mammiform	***A. americana***
Meliola 3112.4223	Colonies amphigenous, mostly epiphyllous, dense; hyphae straight to slightly undulate; appressoria opposite (very few unilateral), straight to slightly curved, closely antrorse, head cells subglobose to ovate, entire; phialides few, mixed with appressoria; mycelial setae fairly numerous, scattered to mostly grouped around perithecia, straight, simple, acute to obtuse at the tip	***M. gamellipoda***
3111.3221	Colonies amphigenous, subdense to dense; hyphae substraight to flexuous; appressoria alternate, straight to curved,antrorse to subantrorse, head cells oblong to cylindrical, broadly rounded to rarely truncate at the apex, entire; phialides mixed with appressoria; mycelial setae scattered, simple, straight, acute to slightly obtuse at the tip	***M. glanduliferae***
3111.3222	Colonies amphigenous, mostly epiphyllous, dense, velvety; hyphae straight to substraight; appressoria alternate, straight, antrorse, head cells ovate, entire; phialides borne on a separate mycelial branch; mycelial setae fairly numerous, scattered, straight, simple, acute to obtuse	***M. jasmini***
3111.2221	Colonies amphigenous, thin; hyphae straight to substraight; appressoria alternate, antrorse, rarely 3-celled, straight, head cells ovate to clavate, entire to sublobate; phialides borne on a separate mycelial branch; mycelial setae few, grown from the subiculum of perithecia, acute to obtuse at the apex, simple, straight	***M. jasmini*** var. ***microspora***
3111.4222	Colonies epiphyllous, thin, scattered; hyphae crooked; appressoria alternate to unilateral, antrorse, subantrorse to retrorse, head cells ovate, clavate, oblong to cylindrical, entire, angular and crenately lobate to sublobate; phialides mixed with appressoria, mycelial setae numerous, simple, straight, acute at the tip	***M. jasminigena***

3111.3231	Colonies amphigenous, subdense; hyphae flexuous; appressoria alternate, spreading, antrorse, straight to curved, head cells globose, cylindrical, versiform, angulose, entire; phialides mixed with appressoria; mycelial setae fairly numerous, scattered, simple, acute to obtuse at the tip	***M. ligustri***
3111.2221	Colonies amphigenous, moistly epiphyllous, thin; hyphae substraight to undulate; appressoria alternate, straight to slightly curved, head cells ovate to obovate, attenuated and broadly rounded towards apex, entire; phialides borne on a separate mycelial branches; mycelial setae few, grouped around perithecia, simple, straight, flexuous to curved, acute at the apex	***M. ligustricola***
3111.3222	Colonies hypophyllous, thin; hyphae straight to slightly undulate; appressoria alternate, straight to curved, antrorse to spreading, head cells ovate, globose, cylindrical, often curved, slightly truncate at the apex, entire; phialides mixed with appressoria; mycelial setae grouped around perithecia, straight, simple, acute at the tip	***M. malabarensis***
3111.4221	Colonies epiphyllous, dense; hyphae straight to flexuous; appressoria alternate, antrorse, reflexed to spreading, mostly straight, head cells cylindrical, ovate, entire, angular to sublobate; phialides mixed with appressoria; mycelial setae grouped around perithecia, straight, simple, acute to obtuse	***M. mayapeae***
3111.4322	Colonies epiphyllous, rarely hypophyllous, dense, crustose to velvety; hyphae substraight; appressoria alternate, antrorse to recurved, head cells ovate, cylindrical, entire, rarely angular to sublobate; phialides mixed with appressoria, mycelial setae grouped around perithecia, straight to curved, simple, acute at the tip	***M. mayapeicola*** var. ***indica***
31½1.3222	Colonies hypophyllous, dense, scattered; hyphae flexuous to crooked; appressoria alternate, antrorse, retrorse, spreading, curved towards hyphae; head cells ovate, oblong, entire, rarely angular to sublobate, straight, curved to uncinate; phialides mixed with appressoria; mycelial setae numerous, scattered, simple, straight, flexuous, sigmoid, curved, uncinate, subobtuse to obtuse at the tip	***M. oleacearum***
3111. 3211	Colonies epiphyllous, thin to subdense; hyphae straight to substraigh; appressoria alternate to unilateral, antrorse to subantrorse, head cells, ovate, clavate, entire; phialides mixed with appressoria; mycelial setae scattered, simple, straight, acute to obtuse at the tip	***M. oleicola***
	PERIPLOCACEAE	
Meliola 3111.3223	Colonies epiphyllous, dense, confluent and cover the entire upper leaf surface; hyphae straight to slightly flexuous; appressoria alternate, antrorse to subantrorse; head cells ovate, globose, entire; phialides mixed with appressoria; mycelial setae fairly numerous, scattered, simple, straight, acute at the tip	***M. hemidesmicola***
	PIPERACEAE	
Meliola 31½1.4221	Colonies amphigenous, predominantly epiphyllous, dense; hyphae straight to flexuous; appressoria alternate, antrorse to subantrorse, head cells globose, minutely and irregularly lobate; phialides borne on a separate mycelial branch; mycelial setae scattered to grouped around perithecia, simple, straight to uncinate, acute to broadly rounded at the apex	***M. lepianthedis***
3111.4223	Colonies hypophyllous, thin, spreading; hyphae substraight to slightly crooked; appressoria alternate to unilateral, straight to curved, antrorse to spreading, head cells truncate, angular to slightly lobate; Phialides borne on a separate mycelial branch; mycelial setae simple, straight, acute at the tip	***M. stenospora***
3111.4223	Colonies mostly epiphyllous, subdense, thinly velvety; hyphae substraight to slightly undulate; appressoria alternate, about 1% opposite, spreading to antrorse, straight to curved, head cells subglobose with crenate to lobulate margin; phialides borne on a separate mycelial branch; mycelial setae mostly grouped around perithecia, straight, simple, acute	***M. stenospora*** var. ***major***
	POACEAE	
Meliola 3141.4221	Colonies epiphyllous, rarely amphigenous, subdense to dense, velvety; hyphae straight to tortuous, straight hyphae run along the veins and tortuous hyphae cross the straight hyphae; appressoria alternate, unilateral, antrorse, spreading, head cells ovate, globose, angular to sublobate; phialides few, mixed with appressoria; mycelial setae straight, dichotomously branched at the tip	***M. cymbopogonis***
3111.3222	Colonies epiphyllous, dense; hyphae straight to substraight; appressoria alternate, straight to curved antrorse to recurved, head cells ovate, globose, entire, angular to sublobate; phialides borne on a separate mycelial branch; mycelial setae few, straight, simple, acute to obtuse	***M. panici***
3111.5222	Colonies mostly epiphyllous, dense, crustose; hyphae substraight to crooked; appressoria alternate, more scattered, antrorse to recurved, head cells ovate to globose, entire, angular, sublobate to irregularly and deeply lobate; phialides mixed with appressoria; mycelial setae numerous, scattered to grouped around perithecia, simple, straight, acute to broadly obtuse at the tip	***M. themedicola***
	RHAMNACEAE	
Meliola 31⅓3.3222	Colonies amphigenous, mostly epiphyllous, thin; hyphae straight to substraight; appressoria alternate to opposite, straight, spreading, antrorse, head cells globose, entire; phialides mixed with appressoria, alternate to opposite, ampulliform; mycelial setae scattered and grouped around perithecia, straight, simple, acute to variously dentate at the tip	***M. ziziphi***
	ROSACEAE	
Appendiculella 2101.4230	Colonies amphigenous, mostly epiphyllous, dense, crustose; hyphae mostly straight; appressoria alternate, antrorse to spreading, head cells globose, irregularly sublobate; phialides mixed with appressoria; perithecial appendages many, cylindrical to conoid twisted, rounded at the apex	***A. calostroma***
	RUBIACEAE	
Meliola 31½1.3221	Colonies epiphyllous, thin; hyphae substraight to undulate; appressoria closely arranged, alternate, unilateral, closely antrorse, head cells ovate, globose, entire, slightly angular; phialides mixed with appressoria; mycelial setae scattered to grouped around perithecia, straight to curved, simple, rounded to bifid at the tip, often show knobs in the middle	***M. anceps***

3111.4332	Colonies amphigenous, mostly epiphyllous, dense, velvety; hyphae straight to flexuous; appressoria alternate, antrorse to closely antrorse, head cells ovate, oblong, entire, angular to slightly lobate, attenuated and broadly rounded to truncate at the apex; phialides borne on a separate mycelial branch; mycelial setae scattered, simple, straight to rarely curved, acute at the tip	***M. canthiicola***
3111.4222	Colonies hypophyllous, thin; hyphae substraight to flexuous; appressoria alternate, straight to variously curved, head cells semilunar, versiform, ovate, angular, straight to mostly curved; phialides mixed with appressoria; mycelial setae thinly scattered, simple, straight, acute	***M. plectroniae***
3111.4222	Colonies amphigenous, mostly hypophyllous, subdense, subvelvety; hyphae sinuous to crooked; appressoria alternate, spreading, antrorse; head cells ovate, narrow towards apex, slightly angular, entire; phialides borne on a separate mycelial branch; mycelial setae few, grouped around perithecia, simple, straight, acute to subacute at apex	***M. wendlandiae***
	RUTACEAE	
Asteridiella 3101.4210	Colonies amphigenous, crustose; hyphae substraight; appressoria alternate, antrorse to closely antrorse, head cells straight to curved, ovate, cylindrical to globose, rarely entire, sublobate to deeply and irregularly lobate; phialides mixed with appressoria, numerous in some colonies	***A. glycosmidis***
Meliola 31⅓3.42x3	Colonies amphigenous, mostly hypophyllous, crustaceous; hyphae straight to substraight to crooked; appressoria alternate, about 20% opposite, straight to curved, subantrorse to spreading, head cells ovate, conoid, rounded at the apex, entire; phialides mixed with appressoria, mycelial setae scattered, straight, often curved, simple, acute to 2-3 dentate to cristate	***M. atalantiae***
31⅓3.4233	Colonies amphigenous, mostly epiphyllous, dense; hyphae straight to undulate; appressoria alternate to opposite, antrorse, curved; head cells ovate, clavate, cylindrical, often curved, entire; phialides mixed with appressoria; mycelial setae scattered, straight, acute to dentate	***M. butleri***
31⅓3.3223	Colonies amphigenous, mostly epiphyllous, dense, velvety, scattered, cover all the upper surface of the leaves; hyphae straight to substraight; appressoria alternate and opposite, crowded, straight to curved, antrorse to spreading, head cells ovate, globose to subglobose, entire, rounded at the apex; phialides mixed with appressoria; mycelial setae numerous, scattered, straight, simple, acute to dentate at the tip	***M. cadigensis*** var. ***glycosmidis***
3113.3223	Colonies amphigenous, dense; hyphae substraight to flexuous; appressoria alternate, 5 % opposite, antrorse to closely antrorse, head cells mostly ovate, entire; mycelial setae scattered to grouped around perithecia, simple, predominantly straight, few curved, acute to obtuse at the tip	***M. cadigensis*** **var. *toddaliae***
3113. 4223	Colonies epiphyllous, dense; hyphae straight to substraight; appressoria alternate, 5% opposite, antrorse to subantrorse, head cells oblong, clavate, cylindrical, entire to rarely slightly angular; phialides mixed with appressoria mycelial setae scattered, simple, straight, acute at the tip	***M. cannonicola***
31⅓3.4223	Colonies amphigenous, caulicolous, mostly hypophyllous, dense, velvety; hyphae substraight to undulate; appressoria alternate, opposite, antrorse, spreading, straight to curved; head cells ovate, cylindrical, entire, straight to curved; phialides mixed with appressoria; mycelial setae scattered, straight, simple, obtuse to variously dentate at the tip	***M. citricola***
31⅓3.4303	Colonies amphigenous, mostly hypophyllous, crustose; hyphae straight, substraight to crooked; appressoria alternate, about 20% opposite, straight to curved, subantrorse to spreading, head cells ovate, conoid, rounded at the apex, entire; phialides mixed with appressoria; mycelial setae scattered, straight, often curved, simple, acute, 2-3 dentate to cristate	***Meliola cranei***
3111.4223	Colonies epiphyllous, dense, scattered, hyphae straight; appressoria alternate, straight to curved, antrorse to subantrorse, head cells oblong to cylindrical, often clavate, entire; phialides mixed with appressoria; mycelial setae scattered to grouped around perithecia, simple, straight, acute at the tip	***M. tecleae*** var. ***toddaliae-asiaticae***
3141.5221	Colonies amphigenous, thin to subdense, velvety; hyphae straight to undulate; appressoria alternate, subantrorse to spreading, straight to curved, head cells cylindrical to clavate, usually curved, entire; phialides few, mixed with appressoria; mycelial setae scattered, straight, dichotomously branched	***M. tenella***
3111.4221	Colonies amphigenous, dense, velvety; hyphae straight; appressoria alternate, rarely unilateral, often crowded, antrorse, straight, head cells ovate, angular, sinuately lobate to deeply lobate; phialides mixed with appressoria; mycelial setae straight to slightly curved, scattered to grouped around perithecia, obtuse at the tip	***M. vatsavayae***
3121.5332	Colonies epiphyllous, dense; hyphae straight to slightly flexuous; appressoria alternate, antrorse, head cells globose, ovate, stellately sublobate to lobate; phialides mixed with appressoria; mycelial setae densely scattered all over the colonies, simple, sickle-shaped, curved to very closely arcuate, acute to obtuse at the tip	***M. zanthoxyli***
	SAPINDACEAE	
Meliola 31⅓3.3223	Colonies epiphyllous, scattered, dense; hyphae straight; appressoria opposite, crowded after an interval, antrorse to subantrorse, recurved, head cells globose, cylindrical, entire; phialides mixed with appressoria; mycelial setae grouped around perithecia, simple, straight, acute, obtuse to dentate at the tip	***M. allophyli – concanici***
3113.4223	Colonies hypophyllous, subdense, crustose; hyphae straight, rarely crooked; appressoria opposite, about 5% alternate, antrorse to subantrorse, mostly straight, rarely curved, head cells globose, ovate, rounded to rarely truncate at the apex, entire; mycelial setae moderately numerous, to grouped around perithecia, scattered simple, straight to curved, acute to obtuse at the tip	***M. allophyli-serrulati***
31⅓3.4223	Colonies mostly epiphyllous, rarely amphigenous, dense, velvety; hyphae straight to undulate; appressoria alternate, opposite, antrorse, straight to curved, head cells ovate, globose, entire; phialides mixed with appressoria; mycelial setae numerous, scattered, simple, straight, acute, obtuse to dentate at the tip	***M. capensis*** var. ***allophylicola***

31½2.3223	Colonies amphigenous, mostly hypophyllous, dense, velvety; hyphae straight; appressoria regularly opposite, subantrorse to antrorse, head cells conoid, bluntly pointed towards the apex, entire; phialides mixed with appressoria; mycelial setae scattered to grouped around perithecia, simple, acute, obtuse to variously dentate at the tip	***M. capensis*** var. ***malayensis***
31½2.3222	Colonies mostly epiphyllous, rarely amphigenous, dense, velvety; hyphae straight; appressoria opposite, head cells conoid, rounded at the apex, entire; phialides mixed with appressoria; mycelial setae scattered, straight, acute to dentate at the tip	***M. capensis*** var. ***schleicherae***
	SANTALACEAE	
Meliola 3111.3221	Colonies amphigenous, dense, velvety; hyphae substraight to undulate; appressoria alternate, subantrorse to antrorse, head cells ovate to subglobose, rarely subangular, entire; phialides mixed with appressoria; mycelial setae numerous, scattered, straight to slightly curved, flexuous, simple, acute to obtuse at the tip	***M. scleropyri***
	SIMAROUBACEAE	
Meliola 31⅓3.3221	Colonies epiphyllous, scattered, dense, velvety; hyphae straight, rarely substraight; appressoria alternate, straight, antrorse, head cells ovate to cylindrical, entire; phialides mixed with appressoria; mycelial setae numerous, straight to slightly curved but not uncinate, simple, acute to 2-3 times dentate at the tip	***M. ailanthi***
31⅓1.4222	Colonies hypophyllous, thin, hyphae crooked, appressoria alternate to unilateral, straight to curved, antrorse, subantrorse to retrorse, head cells ovate, globose, truncate to slightly lobate, phialides mixed with appressoria, mycelial setae scattered, simple, straight, acute, obtuse to 2-5 dentate at the tip	***M. ailanthicola***
	SMILACACEAE	
Meliola 3111.4233	Colonies epiphyllous, dense, crustose; hyphae substraight to crooked; appressoria alternate, straight to curved, antrorse to spreading, head cells ovoid to globose, straight to curved, often bluntly pointed at the apex, entire, phialides mixed with appressoria; mycelial setae few, straight, simple, acute to obtuse at the apex	***M. gamblei***
	STERCULIACEAE	
Meliola 3111.3222	Colonies amphigenous, dense, spreading; hyphae straight to substraight; appressoria alternate, antrorse to closely antrorse, head cells ovate, globose, entire; phialides mixed with appressoria mycelial setae thinly scattered, simple, straight, acute at the tip	***M. sterculiacearum***
	STRYCHNACEAE	
Meliola 31½1.3222	Colonies amphigenous, mostly hypophyllous, subdense; hyphae substraight, flexuous to crooked; appressoria alternate, less than 1% opposite, antrorse, subantrorse to recurved, head cells ovate, oblong, entire to angular, attenuated to truncate at the apex; phialides numerous, mixed with appressoria; mycelial setae scattered to grouped around perithecia, simple, straight, curved to uncinate, acute at the tip	***M. cannonii***
	SYMPLOCACEAE	
Asteridiella 3101.3230	Colonies amphigenous, subdense; hyphae straight to substraight; appressoria alternate to unilateral, antrorse to subantrorse, head cells globose to ovate, entire; phialides mixed with appressoria; perithecial wall cells conoid to mammiform	***A. symploci-microphyllae***
31½1.5222	Colonies hypophyllous, subdense, velvety; hyphae substraight to flexuous; appressoria alternate to unilateral, straight to variously curved, antrorse, spreading, head cells globose, angulose, truncate, variously curved, entire; phialides mixed with appressoria; mycelial setae grouped around perithecia, straight, simple, acute, very few 2-3 dentate	***Meliola symplocicola***
	THEACEAE	
Amazonia 3101.3220	Colonies mostly epiphyllous, subdense; hyphae straight to substraight; appressoria alternate, about 1% opposite, antrorse to subantrorse, head cells ovate, rarely oblong to globose, entire, rarely angular to truncate at the apex, phialides mixed with appressoria	***A. gordoniicola***
Irenopsis 3401.4230	Colonies amphigenous, mostly epiphyllous, subdense, scattered; hyphae undulate to tortuous; appressoria alternate, mostly straight, antrorse, head cells globose, entire to sublobate; phialides mixed with appressoria; perithecial setae 6-8, straight, spreading, continuous, curved or uncinate at the apex, apex obtuse	***I. triumfettae***
3401.4220	Colonies amphigenous, dense; hyphae straight to flexuous; appressoria alternate, antrorse to subantrorse, head cells globose to slightly ovate, entire; phialides numerous mixed with appressoria; perithecial setae 6-8, simple, straight to slightly curved, tortuous to beaded and granulose towards the apex, obtuse at the apex	***I. triumfettae*** var. ***indica***
	VACCINIACEAE	
Amazonia 3101.3220	Colonies amphigenous, mostly epiphyllous; hyphae straight to substraight; appressoria alternate, straight to slightly curved, antrorse to spreading, head cells oblong to globose, straight to slightly curved, entire to sublobate; phialides mixed with appressoria but apparently on separate mycelial branches; Perithecia hidden in the radiating mycelium, flattened-globose, fringed hyphae appressoriate	***A.vaccinii***

	VERBENACEAE	
Asteridiella 3101.4320	Colonies epiphyllous, thin; hyphae substraight to undulate, branching alternate at wide angles; appressoria alternate, straight to curved, antrorse, spreading, head cells ovate, clavate, entire to sublobate; phialides borne on a separate mycelial branch, mostly opposite, rarely unilateral, often two; phialides borne very closely to a single mycelial cell; perithecial wall cells obtusely conoid	***A. formosensis***
3101.3230	Colonies epiphyllous, subdense to dense; hyphae flexuous to crooked; appressoria alternate to unilateral, straight to mostly curved, antrorse to spreading, head cells ovate, globose, entire to angulose; phialides few, mixed with appressoria, perithecial cells conoid to mammiform	***A. vivekananthanii***
Meliola 3111.3221	Colonies amphigenous, mostly epiphyllous, dense, scattered; hyphae flexuous, undulate to tortuous; appressoria alternate to unilateral, straight to curved, antrorse to reflexed, head cells ovate, globose, entire; phialides mixed with appressoria; mycelial setae grouped around perithecia, simple, acute to obtuse at the tip	***M. clerodendricola***
3121.3221	Colonies epiphyllous, velvety; hyphae flexuous to crooked; appressoria alternate, unilateral, antrorse to subantrorse, head cells globose, subglobose, entire to sublobate; phialides mixed with appressoria; mycelial setae scattered, simple, straight, slightly curved to uncinate	***M. premnigena***

Table 2. Host family, host and fungus

Family of the host plant	Host plant	Fungi
Acanthaceae	*Justicia betonica*	*Asterina betonicae*
	Adhatoda vasica	*Asterina tertia*
	Phallopsis micranthus	*Asteridiella phaulopsidis*
Alangiaceae	*Alangium salvifolium* *Alangium sundanum*	*Asterina perpusilla*
Anacardiaceae	*Holigarna ornottiana*	*Meliola holigarnae*
	Mangifera indica	*Meliola mangiferae*
	Nothopegia sp.	*Meliola nothopegiae*
Annonaceae	*Goniothalamus wayanadensis*	*Amazonia goniothalami*
	Meiogyne pannosa	*Meliola unonicola*
Apocynaceae	*Quirivelia frutescens*	*Meliola ichnocarpi-volubili*
	Kamettia caryophyllata	*Meliola kamettiae*
Araceae	*Pothos scandens*	*Lembosia malabarensis*
Araliaceae	*Aralia* sp.	*Meliola abdulkalamii*
Aristolochiaceae	*Thottea siliquosa*	*Asterina thotteae*
	Aristolochia grandiflora	*Meliola aristolochigena*
Asclepiadaceae	*Gymnema sylvestre*	*Asterina gymnemae*
	Wattakaka volubilis	*Asterina travancorensis*
	Gymnema sylvestre	*Meliola gymnemae*
	Gymnema sylvestre	*Phyllachora gymnemae*
Asteraceae	*Vernonia conizoides*	*Acremoniula sarcinellae*
	Spilanthes radicans	*Schiffnerula spilanthi*
	Vernonia anthelmintica	*Schiffnerula vernoniae*
Bignoniaceae	*Oroxylum* sp	*Meliola crescentiae*
Buxaceae	*Sarcococca* sp.	*Questieriella sarcococcae*
Caprifoliaceae	*Viburnum cylindricum*	*Asterina viburnicola*
Caesalpiniaceae	*Tamarindus indica*	*Meliola tamarindi*
	Tamarindus indica	*Sarcinella tamarindi*
Celasteraceae	*Microtropis latifolia*	*Asterina microtropidicola*
	Celasteraceae member	*Meliola celastrigena*
	Celastrus paniculatus	*Schiffnerula celastri*
Chloranthaceae	*Sarcandra chloranthoides*	*Asterina sarcandrae*
Convolvulaceae	*Argyereia speciosa*	*Meliola malacotricha*
	Argyereia sp.	*Meliola malacotricha* var. *major*
	Merremmia unbellata	*Meliola quadrispina*
Combretaceae	*Terminalia* sp.	*Asteridiella combreti* var. *leonensis*
Dipterocarpaceae	*Vateria indica*	*Asterolibertia vateriae*
Elaeocarpaceae	*Elaeocarpus tuberculatus*	*Asterina elaeocarpi* var. *ovalis*
	Elaeocarpus variabilis *Elaeocarpus tectorius*	*Asterina gamsii*
	Elaeocarpus tuberculatus	*Asteridiella elaeocarpi-tuberculati*
Erythropalaceae	*Erythropalum populifolium*	*Asterina erythropalicola*
	Erythropalum populifolium	*Meliola erythropali*
Euphorbiaceae	*Aporusa lindleyana*	*Asterina aporusae*
	Glochidion sp.	*Asterina lobulifera* var. *indica*
	Mallotus sp.	*Asteridiella wyanadensis*
	Agrostistachys indica	*Mahanteshamyces agrostachydis*
	Actephila excelsa	*Meliola actephilae*
	Aporusa sp.	Meliota aporusoe
	Phyllanthus sp.	*Meliola phyllanthigena*
	Aporusa lindleyana	*Meliolaster aporusae*
	Bridelia sp.	*Schiffnerula brideliae*
	Ricinus communis	*Schiffnerula ricini*
Fabaceae	*Milletita* sp.	*Asteridiella millettiicola*
	Crotalaria sp.	*Leptosphaerulina australis*

Family of the host plant	Host plant	Fungi
	Abrus pulchellus	*Meliola abri*
	Butea parviflora	*Meliola buteae*
	Canavalia sp.	*Meliola canavaliae*
	Flemingia sp	*Meliola flemingiicola*
	Gliricidia sp.	*Meliola gliricidiicola*
	Derris benthamii	*Meliola millettiae-chrysophyllae* var. *indica*
	Psophocarpus tetragonolobus	*Meliola psophocarpi*
	Dalbergia sp.	*Sarcinella dalbergiae*
Flacourtiaceae	*Flacourtia* sp.	*Amazonia flacourtiae*
	Flacourtia montana	*Asterina arkemibeyi*
	Scolopia crenata	*Asteridialla scolopiae*
	Flacourtia montana	*Ishwaramyces flacourtiae*
Gentianaceae	*Enicostema axillare*	*Asterina enicostematis*
Hippocrateaceae	*Hippocratea* sp.	*Meliola oligomera*
Icacinaceae	*Nothapodytes nimmoniana*	*Meliola chandrasekharanii*
	Nothopodytes nimmoniana	*Meliola dimidiatae*
	Nothopodytes sp.	*Sarcinella hughesii*
Lauraceae	*Neolitsea scrobiculata*	*Ampullifera foliicola*
	Litsea sp	*Asterina litseae-ligustrinae*
	Litsea floribunda	*Asterina cryptocariicola*
	Apolonias sp.	*Armatella apollonigena*
	Cinnamomum malabatrum	*Armatella balakrishnanii*
	Cinnamomum malabatrum	*Armatella cinnamomicola*
	Litsea coriacea	*Armatella cryptocaryae*
	Persea macrantha (*Machilus macrantha*)	*Armatella katumotoi*
	Cinnamomum malabathrum	*Armatella litseae*
	Cinnamomum macrocarpum	*Meliola beilschmiediae* var. *cinnamomicola*
	Litsea sp.	*Meliola l itsea* var. *keralensis*
	Actinodaphnae sp.	*Meliola litseae* var. *rotundipoda*
	Persea macrantha	*Meliola machili*
	Neolitsea sp.	*Meliola neolitseae*
	Persea sp.	*Meliola pushpangadanii*
	Actinodaphne sp.	*Spiropes armatellicola*
Lecythidaceae	*Careya arborea*	*Meliola careyae* var. *indica*
Loranthaceae	*Loranthus* sp.	*Asterina deightonii*
	Loranthus sp.	*Prillieuxina loranthi*
Lythraceae	*Lagerstroemia microcarpa*	*Schiffnerula lagerstroemiae*

Family of the host plant	Host plant	Fungi
Magnoliaceae	*Michelia chempaka*	*Asterina micheliifolia*
	Michelia chempaka	*Asterina micheliigena*
	Michelia champaka	*Asteridiella micheliae*
Malvaceae	*Hibiscus rosa-sinensis*	*Asterina hibisci*
	Hibiscus furcatus	*Irenopsis molleriana*
	Sida sp.	*Irenopsis sidae* var. *indica*
Malphigiaceae	*Hiptage* sp.	*Irenopsis hiptages* var. *indica*
Melastomataceae	*Memecylon* sp.	*Asterina memecylonis*
	Memecylon sp.	*Meliola affinis* var. *indica*
	Memecylon sp.	*Echidnodella memecyli*
	Ficus infectoria	*Phyllachora infectoriae*
	Osbeckia wightiana	*Rehmidothis osbeckiae*
Meliaceae	*Cipadessa baccifera*	*Asterina cipadessae*
	Trichilia connaroides	*Asterina trichiliae*
	Trichilia sp.	*Irenopsis trichiliae*
	Aphanamixis polystachya	*Meliola aphanamixidis*
	Dysoxylum sp.	*Meliola dysoxyligena*
	Aphanamixis polystachya	*Meliola nairii*
Menispermaceae	*Cyclea peltata*	*Meliola cycleae*
	Cyclea peltata	*Meliola subramanyaensis*
Moraceae	*Ficus exaspirata*	*Irenopsis benguetensis*
	Artocarpus heterophyllus	*Meliola artocarpi*
	Ficus hispida	*Phyllachora catarvaria*
	Ficus infectoria	*Phyllachora infectoriae*
Myrsinaceae	*Maesa indica*	*Amazonia peregrina*
	Ardisia missionis	*Meliola ardisiicola*
	Ardisia sp.	*Meliola ardisiigena*
	Maesa indica	*Meliola groteana* var. *maesae*
Myrtaceae	*Syzygium* sp.	*Amazonia syzygii*
	Syzygium sp.	*Asterina jambolana*
	Syzygium cumini	*Asterina claviflori*
	Syzygium sp.	*Lembosia hosagoudarii*
	Syzygium sp	*Meliola densa*
	Syzygium sp.	*Meliola syzygigena*
	Syzygium cumini	*Meliolina pulcherrima*

Family of the host plant	Host plant	Fungi
Oleaceae	*Ligustrum travencoricum*	*Asterina ligustricola*
	Jasminum cordifolium *Jasminum malabaricum* *Jasminum sambac*	*Asterina erysiphoides*
	Jasminum sambac	*Asterina pongalaparensis*
	Linoceira malabarica	*Asteridiella americana*
	Jasminum sp.	*Meliola gemellipoda*
	Olea glandulifera	*Meliola glanduliferae*
	Jasminum-rottlerianum *Jasminum cordifolium*	*Meliola jasmini*
	Jasminum sp.	*Meliola jasmini* var. *microspora*
	Jasminum bignoniaceum	*Meliola jasminigena*
	*Ligustrum walk*eri ssp. *walke*ri	*Meliola ligustri*
	Ligustrum perrottettii	*Meliola ligustricola*
	Olea dioica	*Meliola malabarensis*
	Ligustrum sp.	*Meliola mayapeae*
	Chionanthus mala-elengi *Linociera malabarica*	*Meliola mayapiicola* var. *indica*
	Olea dioica	*Meliola oleacearum*
	Ligustrum sp.	*Meliola oleicola*
	Olea dioica	*Zhaghounia oleae*
Passifloraceae	*Adenia hondala*	*Asterina adeniicola*
Periplocaceae	*Hemidesmus indicus*	*Meliola hemidesmicola*
Piperaceae	*Lepianthes umbellata*	*Asterina lepianthis*
	Piper sp.	*Asterina piperina*
	Lepianthes umbellata	*Meliola lepianthedis*
	Piper sp.	*Meliola stenospora*
	Piper sp.	*Meliola stenospora* var. *major*
Poaceae	*Cymbopogon* sp.	*Meliola cymbopogonis*
	Poaceae (Grass)	*Meliola panici*
	Themeda triandra	*Meliola themedicola*
Ranunculaceae	*Naravelia zeylanica*	*Asterina naraveliae*
Rhamnaceae	*Ziziphus* sp.	*Meliola ziziphi*
Rosaceae	*Rubus ellipticus*	*Appendiculella calostroma*
Rubiaceae	*Pavetta* sp.	*Acrodictys balladynae*
	Pavetta indica	*Asterostomula pavettae*
	Mussaenda philippica	*Meliola anceps*
	Canthium rheedii	*Meliola canthiicola*
	Canthium dicoccum	*Meliola plectroniae*
	Wendlandia thyrsoidea	*Meliola wendlandiae*
	Ixora coccinea	*Prillieuxina ixorigena*

Family of the host plant	Host plant	Fungi
Rutaceae	*Melicope lunu-ankenda* *Euodia lunu-ankenda*	*Asterina clausenicola*
	Euodia luna-ankenda	*Asterina melicopecola*
	Glycosmis sp.	*Asterina glycosmidis*
	Glycosmis pentaphylla	*Asterina glycosmidigena*
	Toddalia sp.	*Asterina toddaliae*
	Glycosmis pentaphylla (*G. cochinchinensis*)	*Asteridiella glycosmidis*
	Acronychia pedunculata	*Asterina acronychiae*
	Atlantia sp.	*Meliola atalantiae*
	Citrus sp.	*Meliola butleri*
	Glycosmis mauritiana	*Meliola cadigensis* var. *glycosmidis*
	Toddalia sp.	*Meliola cadigensis* Yates var. *toddaliae*
	Toddalia asiatica	*Meliola cannonicola*
	Citrus sp.	*Meliola citricola*
	Atalantia sp.	*Meliola cranei*
	Toddalia asiatica	*Meliola tecleae* Hansf. var. *toddaliae-asiaticae*
	Zanthoxylum rhetsa	*Meliola vatsavayae*
	Zanthoxylum tetraspermum	*Meliola zanthoxyli*
	Glycosmis pentaphylla	*Phyllachora glycosmidis*
Sabiaceae	*Meliosma simplicifolia*	*Asterina sabiacearum*
Sapindaceae	*Allophylus* sp.	*Meliola allophyli – concanici*
	Allophylus cobbe	*Meliola allophyli-serrulati*
	Allophylus sp.	*Meliola capensis* var. *allophylicola*
	Nephelium longan	*Meliola capensis* var. *malayensis*
	Schleichera oleosa	*Meliola capensis* var. *schleicherae*
Sapindaceae	*Allophyllus* sp.	*Sarcinella allophyli*
Santalaceae	*Santalum* sp.	*Asterina congesta*
	Scleropyrum pentandrum	*Meliola scleropyri*
Simaroubaceae	*Ailanthus malabarica*	*Meliola ailanthi*
	Ailanthus triphysa	*Meliola ailanthicola*
Smilacaceae	*Smilax* sp.	*Meliola gamblei*
Solanaceae	*Solanum* sp.	*Schiffnerula palodensis*
Sterculiaceae	*Sterculia* sp.	*Meliola sterculiacearum*
Strychnaceae	*Strychnos nux-vomica*	*Meliola cannonii*
	Strychnos nux-vomica	*Questieriella strychni*
Symplocaceae	*Symplocos rosea*	*Asterina indica*
	Symplocos macrophylla	*Asteridiella symploci-microphyllae*
	Symplocos cochinchinensis	*Meliola symplocicola*
	Symplocos sp.	*Phyllachora symploci*

Family of the host plant	Host plant	Fungi
Ulmaceae	*Trema orientalis*	*Asterina dallasica*
Urticaceae	*Boehmeria* sp.	*Asterostomella boehmeriae*
Vacciniaceae	*Vaccinium* sp.	*Amazonia vaccinii*
Verbenaceae	*Premna serratifolia*	*Asterina pusilla*
	Clerodendrum viscosum	*Asteridiella formosensis*
	Callicarpa sp.	*Asteridiella vivekananthanii*
	Clerodendrum viscosum	*Meliola clerodendricola*
	Premna glaberrima	*Meliola premnigena*
	Tectona grandis	*Schiffnerula tectonae*
Theaceae	*Gordonia* sp.	*Amazonia gordoniicola*
	Triumfetta sp.	*Asterina triumfetticola*
	Thea sinensis	*Schiffnerula camelliae*
Tiliaceae	*Triumfetta rhomboidea*	*Irenopsis triumfettae*
	Triumfetta sp.	*Irenopsis triumfettae* var. *indica*