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MONOGRAPH

Black mildews of Kodagu, Karnataka, India

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Abstract: The systematic survey of the foliicolous fungi of Kodagu was initiated by one of the authors (VBH) in the year 2002, conducted four field tours to the area and subsequently taken over by the other authors (CJT & MCJ). Of these, only black mildews are presented here. More than 400 collections of black mildews are collected from Kodagu recorded on 265 host plants belonging to 65 families of flowering plants represented three fungal groups: Meliolales, Asterinales and Schiffnerulaceae belonging to 20 fungal genera: *Amazonia* - 4, *Appendiculella* - 1, *Armatella* - 4, *Asterdiella* - 21, *Asterina* - 61, *Asterolibertia* - 2, *Asterostomella* - 5, *Cirsosia* - 2, *Echidnodella* - 2, *Eupelte* - 1, *Irenopsis* - 11, *Ishwaramyces* - 1, *Lembosia* - 4, *Mahanteshamyces* - 1, *Meliola* - 82, *Meliolaster* - 1, *Prillieuxina* - 2, *Questieriella* - 3, *Sarcinella* - 6, *Schiffnerula* - 9. Of these, *Asteridiella kodavae*, *Meliola coorgiana, Meliola kodaguensis*, *Meliola madhucae*, *Meliola cauveriana* and *Meliola goniothalami* are new species. The area forms type locality for several taxa. This is the first of its kind for the area and forms a base for the subsequent work.

Keywords: Fungal taxonomy, India, Karnataka, Western Ghats

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Author Contribution: All have contributed equally.

Author Details: C. Jagath Thimmaiah has been teaching mycology for the past 15 years and has published 10 research papers on foliicolous fungi in reputed journals. V.B. Hosagoudar has more than 30 years of research experience in foliicolous fungi, and has published 16 book and 410 papers. M. Jayashankar has been teaching microbiology for the past 10 years and has published two books and 25 papers.

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INTRODUCTION

India is the seventh largest country by area and the second most populous country with over 1.2billion people, and the most populous democratic republic in the world, located in South Asia, bound by the Indian Ocean on the south, the Arabian Sea on the south-west, and the Bay of Bengal on the south-east, it shares land borders with Pakistan to the west; China, Nepal, and Bhutan to the north-east; and Burma and Bangladesh to the east. In the Indian Ocean, India is in the vicinity of Sri Lanka and the Maldives; in addition, India's Andaman and Nicobar Islands share a maritime border with Thailand and Indonesia. India lies to the north of the equator between 6^{0}44' & 35^{0}30' north latitude and 68^{0}7' & 97^{0}25' east longitude with a of 7,517km (4,700 mile) long coastline; of this, 5,423Km (3,400 mile) belong to peninsular India and 2,094Km to the Andaman, Nicobar, and Lakshadweep island chains. According to the Indian naval hydrographic charts, the mainland coastline consists of the following: 43% sandy beaches; 11% rocky shores, including cliffs; and 46% mudflats or marshy shores.

The Indian climate is strongly influenced by the Himalayas and the Thar Desert, both of which drive the economically and culturally pivotal summer and winter monsoons. The Himalayas prevent cold Central Asian katabatic winds from blowing in, keeping the bulk of the Indian subcontinent warmer than most locations at similar latitudes. The Thar Desert plays a crucial role in attracting the moisture-laden south-west summer monsoon winds that, between June & October, provide the majority of India's rainfall. Four major climatic groupings predominate in India: tropical wet, tropical dry, subtropical humid, and montane.

India lies within the Indomalaya ecozone and contains three biodiversity hotspots. One of the 17 megadiverse countries, it hosts 8.6% of all mammalian, 13.7% of all avian, 7.9% of all reptilian, 6% of all amphibian, 12.2% of all piscine, and 6.0% of all flowering plant species. Endemism (33%) is high among plants, and among ecoregion such as the shola forests. Habitat ranges from the tropical rainforest of the Andaman Islands, Western Ghats, and northeastern India to the coniferous forest of the Himalaya. Between these extremes lie the moist deciduous sal forest of eastern India; the dry deciduous teak forest of central and southern India; and the babul-dominated thorn forest of the central Deccan and western Gangetic plain. Less than 12% of India's landmass bears thick jungle. Many Indian species descend from taxa originating in Gondwana, from which the Indian plate separated more than 105million years before present.

India consists of 320million hectares of land and 200 million hectares of exclusive economic zone in the sea, within which are distributed about 120,000 known and perhaps another 400,000 as yet to be described species of microbes, plants and animals. Although several species are known to exist in tight association with their habitats, some species are more wide ranging, and may occur in a wider variety of habitats. Western Ghats are the important one among the two biodiversity rich areas, starting from the Tapti in Gujarat, running all the along the western side of peninsular India, merging in the Kanniyakumari District in Tamil Nadu by traversing the states Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu, having scrub jungles to evergreen forests, harbouring more than 40,000 flowering plants. Except the few sporadic accounts, a systematic survey of the microbes is yet to be set into. To fill this lacuna, a systematic survey of the black mildews of Kodagu was initiated by the authors since 2003.

Kodagu or Coorg is the land of Kodavas, speaking a distinct Kodava language, is the land of origin of the river Cauvery, and a place and the major source of Indian Coffee. Kodagu occupies a prominent position in the humid tropical belt of Western Ghats and is situated to the south-west in Karnataka State between 11^{0}56'–12^{0}15'N and 75^{0}22'–76^{0}11'E (Image 1). It is bounded on the north by Hassan District and the east by Mysore District, on the west by Dakshina Kannada District and on the south by Kannur District of Kerala State. The district has total land area of 4102km^2. The district name Coorg is anglicized from "Kodagu" derived from "Kodimale naad" meaning dense forest land on steep hills. Kodagu is also known as "Kroda Desha" because it is said that the ancestors made the land cultivable with bare hands.

The district has a mountainous configuration with varied physical features. The main part of the district is composed of mighty ranges of Western Ghats which run parallel to the west coast, rise almost abruptly from the plains in the west and gradually merge into table land of Mysore District. The Western Ghats ranges in this district are more or less crescent shaped and include some of the loftiest peaks, between Himalaya and the Nilgiris. It stretches to about 97km from Pushpagiri in north- west to Bramhagiri ranges in the south. From this main chain several lateral spur run from west to east.

Climate: The district shows high variation in temperature, rainfall because the district lies in Western Ghats. High humidity, heavy rainfall and an equitable pleasant climate are the characteristics.

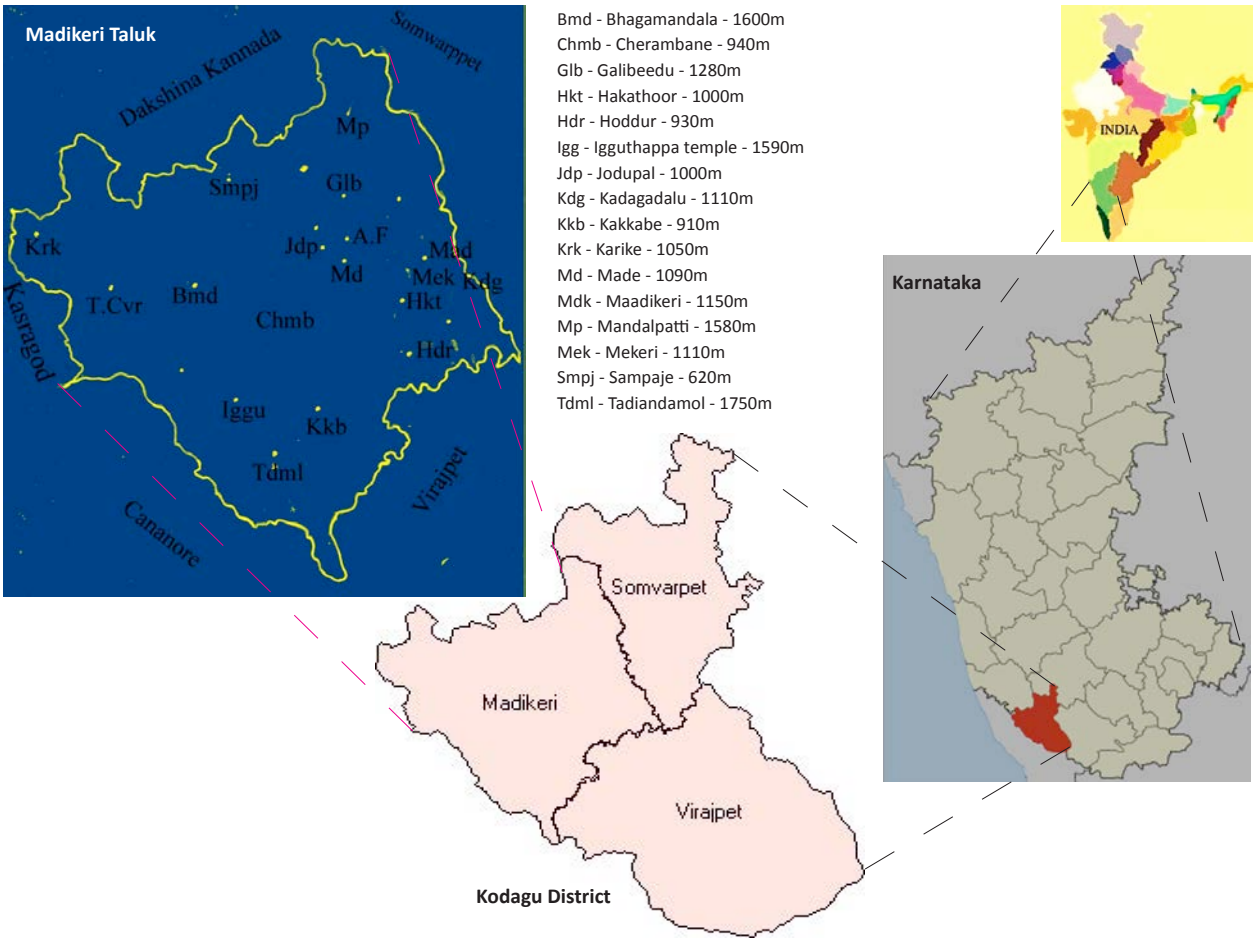


Image 1. Location of Kodagu

Rainfall: The average rainfall in the district is 2840.3mm falling on average of 144 rainy days. The heaviest rainfall months are June to August. Rain fall decreases from west towards east due to hills and valleys.

Temperature: Extreme in eastern Coorg District and adjoining areas (max 32°c min12°c) while the uplands show moderate temperature (max 25°c and min 10°c) Temperature increases from March to April with minimum of 17°c. Temperature is lowest during January. The average relative humidity (RH) about 84.4%.

Rivers: The Kodagu rivers are not noted either for their width or depth. Since the source of these rivers are in the mountain peaks and flow with great rapidity generally over rocky beds, they are unsuited for navigation of any kind. Most of the rivers flow in an easterly direction towards the Bay of Bengal, but a few mountain streams of the western declivities flow westward. The principal and largest river in the district is the Cauvery which takes its origin on the Brahmagiri at Talacauvery and runs to a length of about 80.5km in the district. It flows in the easterly direction almost along the central axis of the district, thus dividing the district into equal northern and southern parts. The principal tributaries of this river are the Hemavathy, Lakshmanathirtha, Kakkabe and Harangi (or Suvarnavathi). The Barapole is one of the important rivers that flow to the east followed by Najikal and Kumaradhara streams.

The district is devoid of a true lake or tank except in Virajpet Taluk where a few natural reservoirs called 'Kolli' with a perennial water.

Soil: Due to the geological heterogeneities, the soil type also varies in the district. In addition to the natural soil of the old rock formation, alluvial deposits also occur along the streams and riverbeds. The district possesses good fertile soil mixed with decomposed forest products. In the eastern region of the district the soils are clayey, comparatively darker, shallow, hard, becomes muddy in monsoon and crack in summer. This type receives relatively low rainfall and possesses scrubby vegetation. In the central region which receives modest to heavy rainfall and where the vegetation is very dense, the soils are of red loamy type and are of sedentary

origin being derived from crystalline. In the western region, i.e., Bhagamandala, Madikeri, Napoklu receive heavy rainfall and soils are of lateritic type.

Flora and fauna: Much of the district is agriculturally cultivated. Characteristic scenery has rice fields in valley bases, with plantation crops with tree cover in the surrounding hills. The most common plantations are coffee (especially *Coffea canephora* although some parts of southern Kodagu grow *Coffea arabica*); however, many other crops are also grown, including black pepper, para rubber, teak, and cocoa. In many regions, there are still naturally grown forests, especially the forest reserves in the south and east. The vegetation is somewhat similar to that of other areas in southern India.

Kodagu is rich in wildlife. The district has three wildlife sanctuaries: Bramhagiri Wildlife Sanctuary, Talacauvery Wildlife Sanctuary and Pushpagiri Wildlife Sanctuary and Nagarahole or Rajiv Gandhi National Park.

The flora of the jungle includes *Michelia champaka* (Champak), Mesua (Ironwood), Diospyros (Ebony and other species), *Toona ciliata* (Indian mahogany), *Chuckrasia tabularis* (Redcedar), *Calophyllum angustifolium* (Poon spar), *Canarium strictum* (Black Dammar), Artocarpus, Dipterocarpus, Garcinia, Euonymus, Cinnamomum, Myristica, Vaccinium, Myrtaceae, Melastomataceae, Rubus (three species), and a rose. In the undergrowth are found cardamom, Areca, plantains, canes, wild black pepper, tree and other ferns, and arums. In the forest of the less thickly-wooded bamboo country in the west of Kodagu the most common trees are the *Dalbergia latifolia* (Black wood), *Pterocarpus marsupium* (Kino tree), *Terminalia tomentosa* (Matthi), *Lagerstroemia parviflora* (Benteak), *Anogeissus latifolia* (Dindul), *Bassia latifolia*, *Butea monosperma*. The vegetation along the streams and rivulets exhibit a specialized ecosystem and consists of tree species like: *Bambusa arundinacea* (Retz.) Roxb., *Calophyllum apetalum* Wiild., *Hopea parviflora* Bedd., *Lophopetalum wightianum* Arn., *Madhuca neriifolia* (Moon) Lam., *Salix tetrasperma* Roxb. and *Vaccinium neilgherrense* Wt. In between the rock boulders, plants like *Cyperus corymbosus* Rottb., *Homonoia retusa* Muell.-Arg. and *H. riparia* Lour. are conspicuous. The members of Podostemaceae like *Zeylanidium johnsonii* (Wt.) Engl. and *Z. lichenoides* (Kurz) Engl., colonise the rocks when the water recedes in rivers.

Endemic plants: Some characteristic endemic taxa of the Western Ghats like *Adenoon indicum* Dalz., *Aporusa lindleyana* (Wt.) Baill., *Baccaurea courtallensis* (Wight) Muell.-Arg., *Chionanthus malabarica* (Wall. ex G. Don) Bedd., *Cinnamomum riparium* Gamble, *Cynometra travancorica* Bedd., *Daphniphyllum neilgherrense* (Wight) Rosenth., *Erythropalum populifolium* (Arn.) Mast., *Farenheitia zeylanica* (Thw.) Airy Shaw, *Holigarna nigra* Bourd., *Jerdonia indica* Wight., *Knema attenuata* (Hook.f. & Thwaites) Warb., *Moullava spicata* (Dalz.) Baill., *Pittosporum dasycaulon* Miq. and *Vernonia indica* Cl., occur in the district. Besides the above, it is found that *Impatiens dendricola* Fisch., *Ligustrum decaisnei* Cl. var. beddomei Gamble and *Nilgirianthus campanulatus* (Wight) Bremek. are exclusively endemic to Kodagu.

The vegetation of Madikeri taluk is broadly classified into:

1) Moist deciduous: Found in lower parts of Karike and Sampaje, where rainfall is moderate.

2) Semi-evergreen and Evergreen: Found where altitude ranges from 600–1500 m and rainfall 270–650 cm in Bhagamandala, Hoddur, Napoklu, Kakkabe, etc.

3) Sholas and Grassland type: Shola comprises of both tropical and sub temperate general mixed together. They are isolated, compact with evergreen trees. They are seen along the elevation of 1200m and above. Found in the ranges of Bramhagiri, Madikeri, Mandalpatti, Tadiandamol, and Talacauvery (Images 2–8). Large numbers of ferns, orchids and insectivorous plants are also found.

Kodagu is a picturesque high land country on the summits and slopes of Western Ghats. The district is rugged and covered with forest abounding in some parts in sandal and other valuable woods, but overgrown in others with a dense jungle. It is the resort of wild animals and beasts of prey. Kodagu is fondly referred to as Scotland of India and also as Kashmir of southern India for its scenic beauty.

The tropical forests of India especially the Western Ghats is supposed to be rich in microbial diversity. Kodagu, a tiny district has congenial climate for the luxuriant growth of fungi. This area has high potentiality for the fungal study and other aspects of fungi. Madikeri taluk represents all the different types of vegetation of the district, except deciduous type. It includes evergreen forests, grasslands, shola vegetation, tropical and subtropical vegetation mixed together (Keshavamurthy & Yoganarasimhan, 1990). The altitude of Madikeri Taluk ranges from 750–1300 m and up to 1750 m altitude.

Tadiandamol hills, which is the second highest peak of Karnataka after Mullayyanagiri. Temperature of the area ranges between 15–33 ^{0}C. Different parts of the taluk like Talacauveri, Tadiandamol, Sampaje Ghats, Abbey falls, Mandalpatti, Galibeedu, Vanachalu, Kadagadalu, Hoddur, Kakkabe and a few sacred grooves were selected as collection sites. In the lower altitudes of Madikeri taluk, plantation areas where crops are grown amongst

Image 2. Talacauvery, origin of the river Cauvery - Life of Kodagu

Image 5. Shola forest flanked with grass lands at Mandalpatti

Image 3. Shola forest flanked with grass lands at Tadiandamol

Image 6. Evergreen forest at Talacauvery

Image 4. Shola forest restricted to crevices of hills at Tandiandamol

Image 7. Evergreen forest and the sholas in the crevices at Ghats on the way from Makutta to Virajpet

Image 8. Lake at Perumbadi

wild trees and its hedges served as the important sites of collection. Sacred grooves are present in most villages of the taluk which are bioreserves and have helped to protect and conserve natural vegetation and are very good source of microbial diversity and floristic composition. All these factors together make the study area as one of the potential locations to understand the rich variety of Black mildews and other foliicolous fungi. Field trips were conducted to the different parts of the district since 2003 in order to cover all the regions during all seasons of the year. The foliicolous fungi mainly infect leaves, soft stems and tender shoots. They infect herbaceous plants to trees of 30 – 40 meters in height. Many trees possess the crown only at the top portion and this made it difficult in noticing the disease. In such cases, the recently shed leaves were examined, collected and the concerned tree was traced, twig or the reproductive parts were collected for the host identity. Local names also helped us to identify the plants. Infected plant parts, preferably flowering twigs were collected and placed individually in polythene bags. Colony characters of fungus, description of the host plant (tree, shrub, liana; morphology of the leaves such as, simple or compound; plant with milky latex or otherwise), altitude, locality, date of collection, name of the collector, type of forests, etc. were recorded.

After the collection, infected samples were dried in-between blotters by daily changing the materials to fresh blotters. Regular transfer of the collections to the fresh and dry blotters ensured the dryness of the collected specimens. In case of thick samples, materials were changed to fresh blotters twice a day to avoid any secondary infection. After ensuring their dryness, they were they were used for the microscopic study.

After ensuring dryness of the materials, the host identification was confirmed with the help of experts and also by matching the materials with the authentic herbarium materials, Flora of Coorg and other published literatures.

Nail polish technique (Hosagoudar & Kapoor 1984) was used for the preparation of permanent slides to study the structural and morphological characters of the fungi. A drop of high quality natural coloured or well transparent nail polish was applied to the selected colonies with the help of a fine brush without disturbing the colonies. Colonies with hyperparasites (wooly nature) were avoided. As the nail polish dries (in 2-5 minute), a thin colourless “film” or “flip” is formed with the colonies firmly embedded in it. For soft host parts, flip was lifted up with a slight pressure on the upper side of the leaves or just below the colonies. In case of hard host parts, the flip was eased-off with the help of a razor or scalpel. A drop of DPX was smeared on clear slide and the flip was spread properly on it. Care was taken to avoid air bubbles while mounting. One or two more drops of DPX were again added on the flip and clean cover glass was placed over it. A gentle pressure over the cover glass oozes out the excess DPX. These slides were labeled and placed in the dust free chamber for one to two days for drying. The excess DPX on the slide was removed after drying.

In case of ectophytic fungi, scrapes were made directly from the infected host parts and mounted in Lactophenol (prepared according to Rangaswamy, 1975). A tinge of Cotton blue was added to Lactophenol to stain hyaline fungi. Dematiaceous fungi were first mounted in 10% KOH solution and later transferred to Lactophenol. Both mountants worked efficiently and made the septa visible.

The slides were observed under Labovison KL10B binocular microscope for further details. Microphotographs were taken using Sony Digital 12MP camera DSC-W220. Pencil drawings were prepared by using mirror type camera Lucida. Studied materials were deposited in the TBGT (Jawaharlal Nehru Tropical Botanic Garden and Researach Institute, Thiruvananthapuram) and FM-KMCC (Field Marshal K.M. Cariappa College Herbarium), Department of Botany, Madikeri, Kodagu.

BLACK MILDEWS

Black mildews are the ectophytic dematiaceous black colony forming fungi having ecto or endophytic brown or black mycelium with or without appressoria. The fungi which produce appressoria produce haustorium in to the epidermal cells of the hosts plants. The fungi which are devoid of appressoria produce nutritive

hyphae in to the host cells. Often, supplemented with conidiophores and which in turn produce conidia (Hyphomycetes or mitosporic fungi). These fungi often produce two celled appressoria and Phialides (Meliolales), globose perithecia with bitunicate asci (*Balladyna* and similar genera), produce branched conidiophores and always 3-septate ascospores (Meliolinaceae), produce external mycelium with astomatous but dehiscing thyriothecia (Asterinales), pleomorphic anamorphs (Schiffnerulaceae) or ostiolate thyriothecia (Microthyriaceae), devoid of mycelium but thyriothecia dehisce stellately at the centre (Parmulariaceae), etc. However, the present work is restricted here with only three groups: Meliolales, Asterinales and Schiffnerulaceae (Images 9–12).

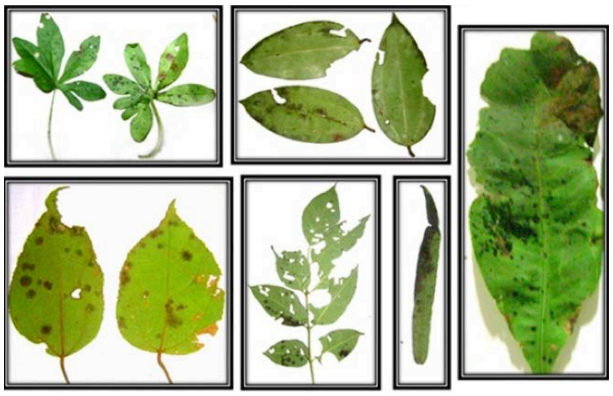


Image 9. Infection pattern

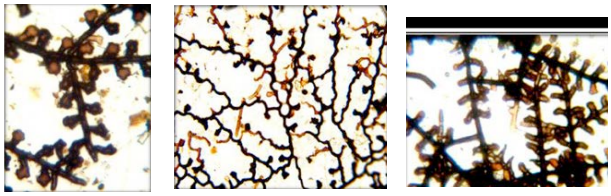


Image 10. Nature of mycelium. Oppositely branched, Irregularly branched, crooked, Straight mycelium, with substraight mycelium, mycelium oppositely placed appressoria

Key to black mildews

1. Fruiting body perithecium.....2
1. Fruiting body thyriothecium.....3
2. Appressoria two celled.....Meliolales
2. Appressoria one celled.....Balladynocallia
3. Anamorph pycnothyria.....Asterinales
3. Anamorph mitosporic.....Schiffnerulaceae

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.

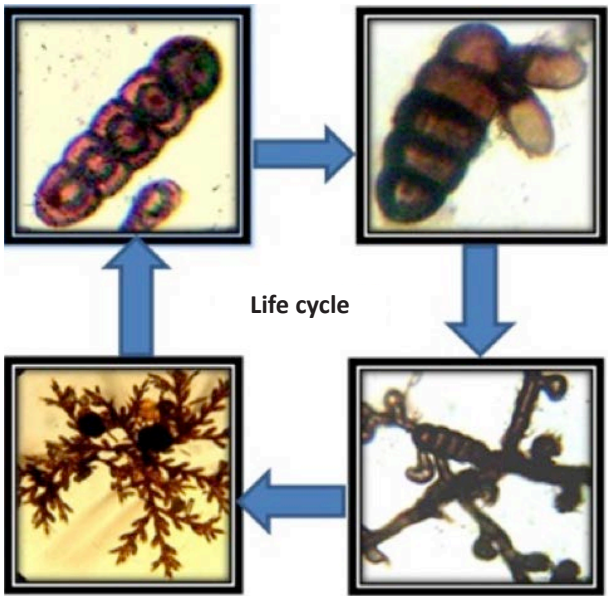


Image 11. Ascospores forming colony

Type family: Meliolaceae

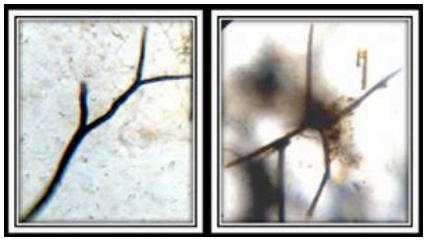
Key to the families

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

ARMATELLACEAE

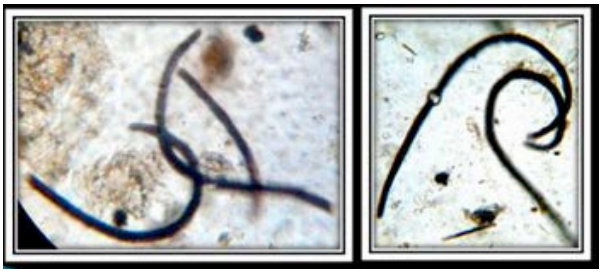
Armatellaceae Hosag., Sydowia 55: 162, 2003; Hosag., Meliolales of India 2: 28, 2008; Hosag. & Agarwal, Taxonomic studies of Meliolales. Identification Manual, p. 3, 2008.

Simple, straight setae acute at the apex

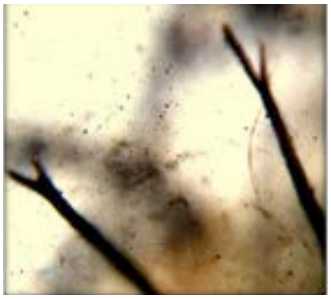


Branched mycelial setae

Cristate

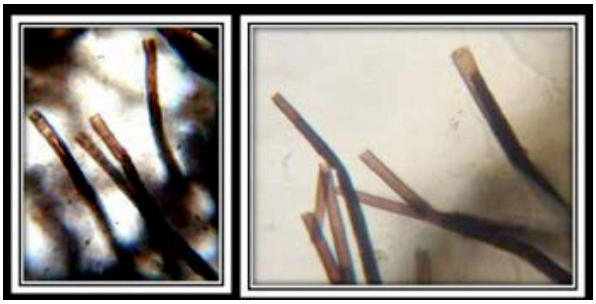


Uncinate to coiles mycelial setae

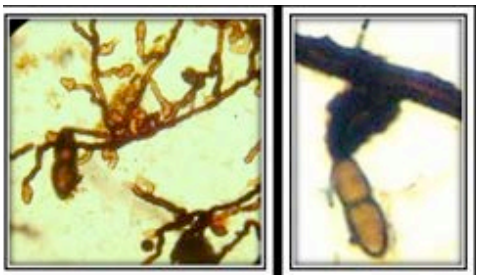


Forked

Dentate

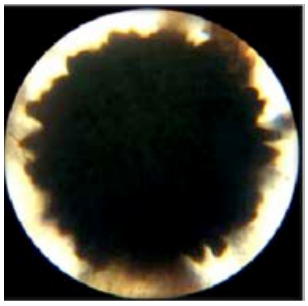


Straight mycelial setae: Perithecial wall cells, setae and appendages



1- Septate

Ascospores

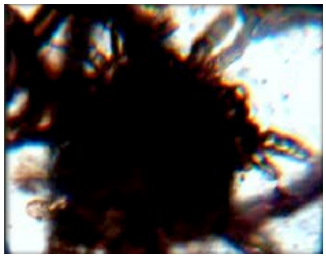


Perithecial wall cells

Perithecial setae

3- Septate

4- Septate



Perithecial appendages

Germinating Spores

Image 12. Nature of mycelial setae

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*
5. 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 8 digits. The first 4 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 4 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 & dentate setae is denoted by (1/3) , while, species having straight and uncinate setae are designated as ½. The Beeli's digital formula is modified here to accommodate the genus Armatella having 1-septate ascospores. Further, for Prataprajella, the second digit becomes ¾ or so.

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

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 monograph, relevant synonyms (if any) based on the monographs 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 FMKMCC Herbarium, Madikeri. 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.

Genus *Amazonia*

Amazonia Theiss., Ann. Mycol. 11: 499, 1913; Theissen & Sydow, Ann. Mycol. 15: 421, 1917; Hansford, Sydowia Beih. 2: 25, 1961; Hosag., Meliolales of India, p.64, 1996; Meliolales of India 2: 69, 2008.

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, and 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.

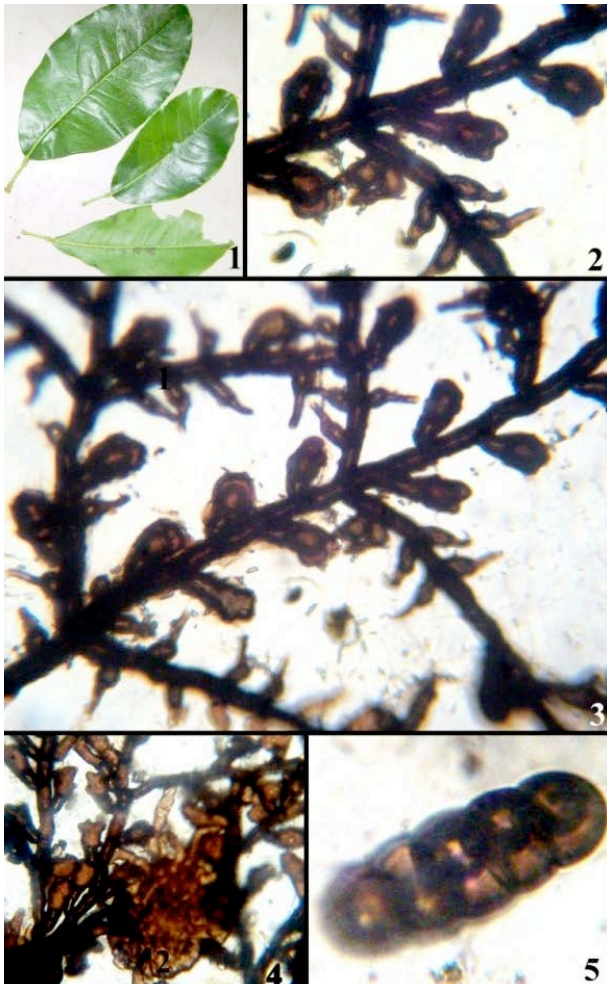


Image 13. *Amazonia acronychiae*
1 - Infected leaves; 2&3 - Mycelium with appressoria & phialides; 4 - Young perithecium; 5 - Ascospore

Descriptions of species

Amazonia acronychiae Hosag. & Goos, Mycotaxon 36: 230, 1989; Hosag., Meliolales of India, p. 65, 1996. (Image 13).

Materials examined: TBGT 5375, FMKMCC 01, 26.xi.2008, on leaves of Acronychia longipedunculata (L.) Miq. (Rutaceae), Hakathur, C. Jagath Thimmaiah.

Colonies amphigenous, mostly epiphyllous, subdense, up to 3mm in diameter, confluent. Hyphae substraight, branching opposite at wide angles, closely reticulate, cells 22–30x8–10 µm. Appressoria alternate, closely antrorse, straight to curved, 24–44 µm long; stalk cells cuneate, 10–22 µm long; head cells ovate, clavate, angular to irregularly sublobate, 18–22x14–18 µm. Phialides numerous, mixed with appressoria, conoid to ampulliform, 22–30x8–10 µm. Perithecia scattered,

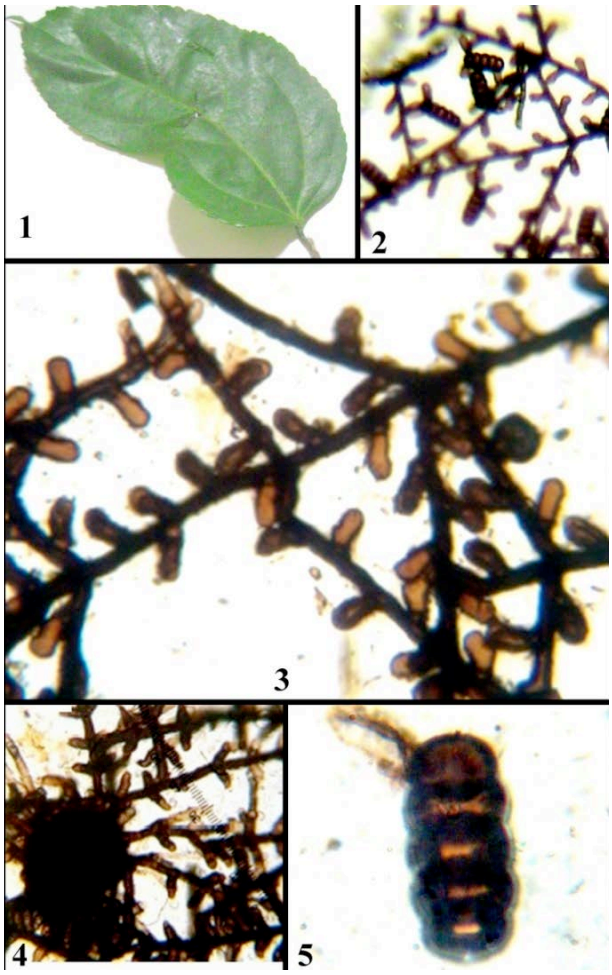


Image 14. *Amazonia flacourtiae*.
1 - Infected leaf; 2&3 - Appressoriate mycelium; 4 - Young perithecium & phialides; 5 - Ascospore

flattened-globose, up to 110µm in diam.; ascospores obovoidal, 4-septate, constricted at the septa, 42–46x20–22 µm.

Amazonia flacourtiae Hosag., Siddappa & Udaiyan, Nova Hedwigia 56:193, 1993; Hosag., Meliolales of India, p. 68, 1996. (Image 14)

Materials examined: TBGT 5346, FMKMCC 3; TBGT 5357, FMKMCC 4, 24.xi.2008, on leaves of *Scolopia crenata* (Wight & Arn.) Clos (Flacourtiaceae), Vanachalu, Galibeedu, C. Jagath Thimmaiah; TBGT 5320 FMKMC 02; 25.xi.2008, Talacauvery, Jagath Thimmaiah.

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 diam.; ascospores obovoidal, 4-septate, strongly constricted at the septa, 34–46.5x12.5–18.5 µm.

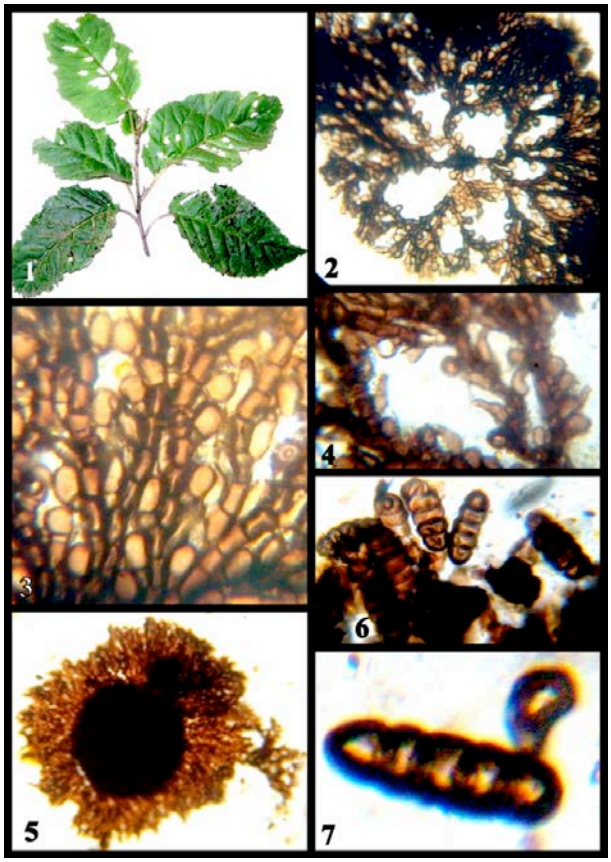


Image 15. *Amazonia peregrina*
1 - Infected leaves; 2 - Single spore formed colony; 3 - Compactly placed appressoriate mycelium; 4 - Appressoria & phialides; 5 - Flattened-globose perithecium; 6 - Ascospores; 7 - Germinating ascospore

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. (Image 15)

Materials examined: TBGT 5458, FMKMCC 05, 22.xi.2009, on leaves of Maesa indica (Roxb.) DC. (Myrsinaceae), Mallamatti, C. Jagath Thimmaiah.

Colonies amphigenous, mostly hypophyllous, crustaceous, up to 2mm in diameter, confluent. Hyphae straight to flexuous, branching alternate to opposite at acute angles, closely reticulate, forming solid mycelial

mat, cells 8–13x5–7 µm. Appressoria alternate to unilateral, 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, 13–20x6– 6.5 µm. Perithecia loosely grouped, flattened-globose, up to 350µm in diameter; ascospores cylindrical to obovoidal, 4-septate, constricted at the septa, 35–43x13–17 µm.

The colonies of this fungus are very much significant, mostly associated with the colonies of Meliola groteana Sydow & Sydow but can be distinguished easily by their crustose colonies in contrast to woolly colonies.

Amazonia syzygii Hosag. in Hosag. & Goos, Mycotaxon 36: 236, 1989; 42: 126, 1991; Hosag., Dayal & Goos, Mycotaxon 46: 202, 1993; Hoasg., Meliolales of India, p. 340, 1996. (Image 16)

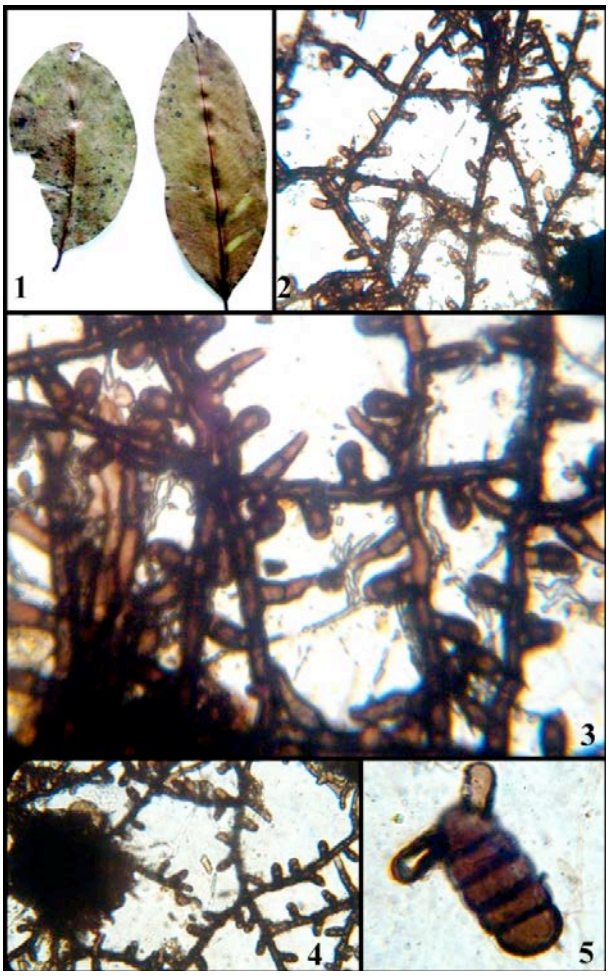


Image 16. *Amazonia syzygii*
1 - Infected leaf; 2 - Colony; 3 - Mycelium with appressoria & Phialides; 4 - Young perithecium; 5 - Ascospore

Materials examined: TBGT 5332, FMKMCC 06, 24.xi.2008, on leaves of seedlings of *Syzygium* sp. (Myrtaceae), Sampaje forest nursery, Sampaje; HCIO 30841 22.xii. 1991, B.R. Dayal; *S. cumini* (L.) Skeels, Vanachalu, C. Jagath Thimmaiah.

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 diam.; ascospores obovate, 4-septate, slightly constricted, 44–48x16–20 µm.

Genus *Appendiculella*

Appendiculella Hohn. in Sitz. K. Akad. Wiss. Wien, Math.-naturw. Kl. 128: 556, 1919; Hansf., Sydowia Beih. 2: 25, 1961; Hosag., Meliolales of India, p. 77, 1996; Meliolales of India 2: 80, 2008.

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. Kl. 138: 556, 199; Kapoor, Indian phytopathol. 20: 151, 1967; Kar & Maity, Norw. J. Bot. 19: 248, 1972; Hosag., Meliolales of India, p. 77, 1996.

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

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

Irenina rubi Stev. & Rold. var. angulosa Stev. & Rold., Philippine J. Sci. 56: 52, 935.

Irenopsis crataegi Bose, Indian Phytopathol. 13:144, 1962 (Image 17).

Materials examined: TBGT 5323, FMKMCC 07, 24.xi.2008, on leaves of *Rubus glomeratus* Bl. (Rosaceae), Vanachalu, C. Jagath Thimmaiah.

Colonies amphigenous, mostly epiphyllous, dense, crustose, up to 2mm in diameter. Hyphae mostly straight, branching mostly opposite at wide angles, loosely re-

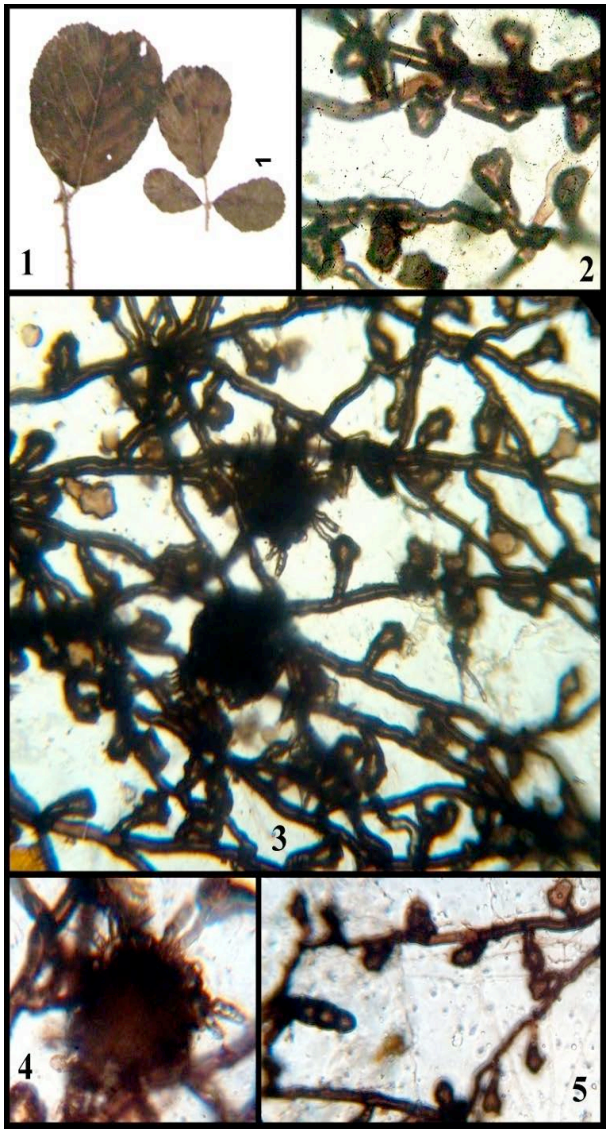


Image 17. *Appendiculella calostroma*
1 - Infected leaves; 2&3 - Mycelium with appressoria; 4 - Developing perithecium; 5 - 3- septate ascospore

ticulate, 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, 12–15.5x18–25µm. 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 diam.; perithecial appendages many, cylindrical to conoid, twisted, rounded at the apex, 49–95x18–25 µm; ascospores ellipsoidal, mostly curved, 3-septate, 40–43.5x15-18 µm.

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; Meliolales of India 2: 87, 2008.

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, with or without ostiole, thick walled, verrucose. Mycelial setae, perithecial setae and perithecial appendages lacking. Asci usually 4–8 spored; ascospores initially hyaline, later turn brown and one septate at maturity.

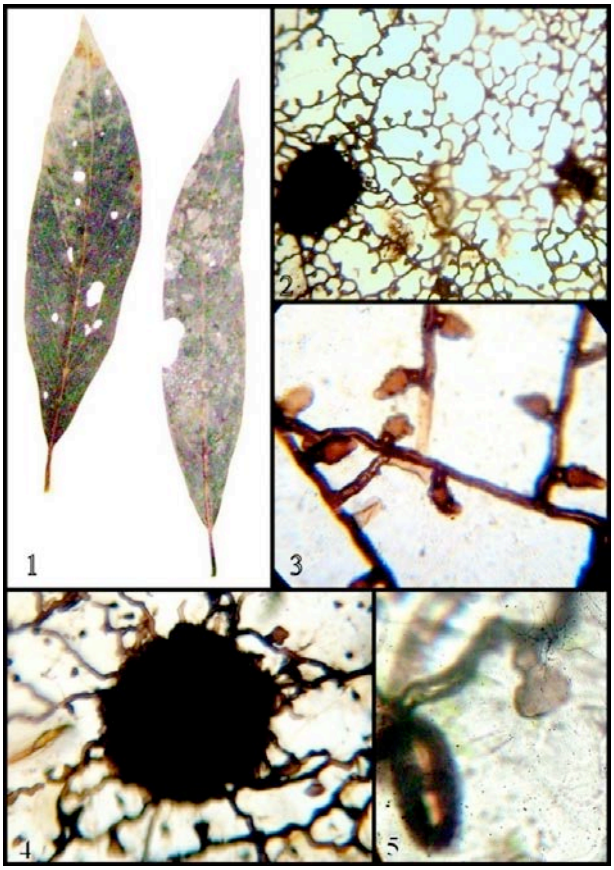


Image 18. *Armatella actinodaphnes*
1 - Infected leaves; 2&3 - Mycelium with appressoria; 4 - Perithecium; 5 - 1- septate ascospore

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

Armatella actinodaphnes Hosag., C.K. Biju & Abraham, Nova Hedwigia 80: 472, 2005; Hosag., Meliolales of India 2: 101, 2008. (Image 18).

Materials examined: TBGT 5439, FMKMCC 08, 1.xi.2009 on leaves of *Cinnamomum* sp. (Lauraceae), Hoddur, C. Jagath Thimmaiah.

Colonies hypophyllous, subdense, up to 6mm in diameter. Hyphae undulate, branching alternate at subacute angles, loosely reticulate, cells 21–30x5–7 µm. Appressoria alternate to unilateral, antrorse to retrorse, 16–27 µm long; stalk cells cylindrical to cuneate, 4–9 µm long; head cells ovate, cylindrical, hooked, crenate, angulose, truncate, rarely entire, few sickle shaped, sublobate to bilobate, 12–18x7.5–15 µm. Perithecia scattered, globose, up to 160µm in diameter; ascospores elliptical, 1-septate, constricted at the septum,18–21x8–9.5 µm.

Armatella cinnamomi Hansf. & Thirum., Farlowia 3: 286, 1948; Hosag., J. Econ. Taxon. Bot. 15: 197, 1991; Meliolales of India 2:105, 2008. (Fig. 1)

Material examined: HCIO 45815, TBGT 1672, 12.xi.2003, on leaves of *Cinnamomum* sp. (Lauraceae), Jodupal, V.B. Hosagoudar et al.

Colonies hypophyllous, thin to dense, up to 5mm in diameter. Hyphae substraight to crooked, branching irregular at acute to wide angles, loosely to rarely closely reticulate, cells 17–19x4–5 µm. Appressoria alternate, mostly perpendicular to the hyphae, often antrorse to retrorse, 11–16 µm long; stalk cells cylindrical to cuneate, 3–7 µm long; head cells globose, often ovate, straight to curved, entire, angular, crenately lobate to few deeply lobate, 8–10x6–10 µm. Perithecia scattered, globose, up to 144µm in diam.; perithecial wall cells conoid, straight to curved, obtuse at the tip, up to 16µm long; asci not seen; ascospores conglobate, brown, uniseptate, slightly constricted at the septum, 20–22x10–12 µm, wall smooth.

Except for the shorter appressoria, this collection matches well with the assigned species.

Armatella cryptocariae Hosag., J. Taxon. Bot. 15: 198, 1991; Sarbhoy, Agarwal & Khan, Mycotaxon 56: 350, 1995; Hosag., C.K.Biju & Abraham, J. Econ. Taxon. Bot. 25: 298, 2011; Hosag., J. Econ. Taxon. Bot. 29: 436, 2005; Zoos' Print J. 21: 2323, 2006; Meliolales of India 2: 108, 2008. (Image 19).

Materials examined: TBGT 5321, FMKMC 09, 23.xi.2008, on leaves of *Litsea* sp. (Lauraceae), Vanachalu, Kodagu, C. Jagath Thimmaiah; TBGT 5467, FMKMCC 10, 21.xi.2009 in the campus of Bharatiya Vidya Bhavan High School, Madikeri, C. Jagath Thimmaiah.

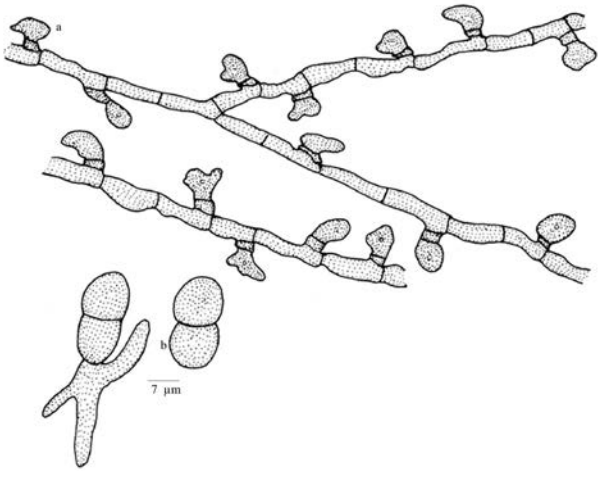


Figure 1. ***Armatella cinnamomi***
a - Appressorium; b - Ascospores (one germinating)

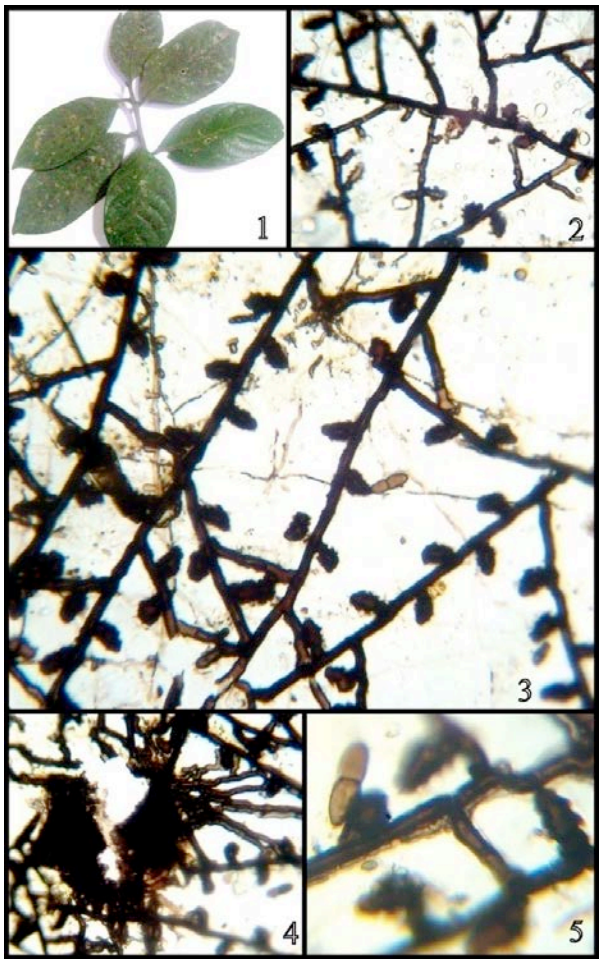


Image 19. ***Armatella cryptocariae***
1 - Infected leaves; 2&3 - Mycelium with appressoria; 4 - Perithecium; 5 - 1- septate ascospore

Colonies epiphyllous, dense, up to 3mm in diameter. Hyphae substraight to flexuous, branching subopposite, irregular at wide angles, closely reticulate, cells 10–15x5–6 µm. Appressoria alternate, antrorse, 15–20 µm long; stalk cells cylindrical to cuneate, 2–10 µm long; head cells ovoid, conoid, slightly angular, rarely entire, hamate, outer wall crenate, 12–14x7–9 µm. Perithecia scattered, globose, seated on exappressoriate mycelium, up to 120µm in diameter; ascospores ellipsoidal, 1-septate, brown, 20–22x4–6 µm.

Conoid and crenately lobate head cells of the appressoria distinguishes this species from others.

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; Hosag., Meliolales of India 2: 111, 2008 (Image 20).

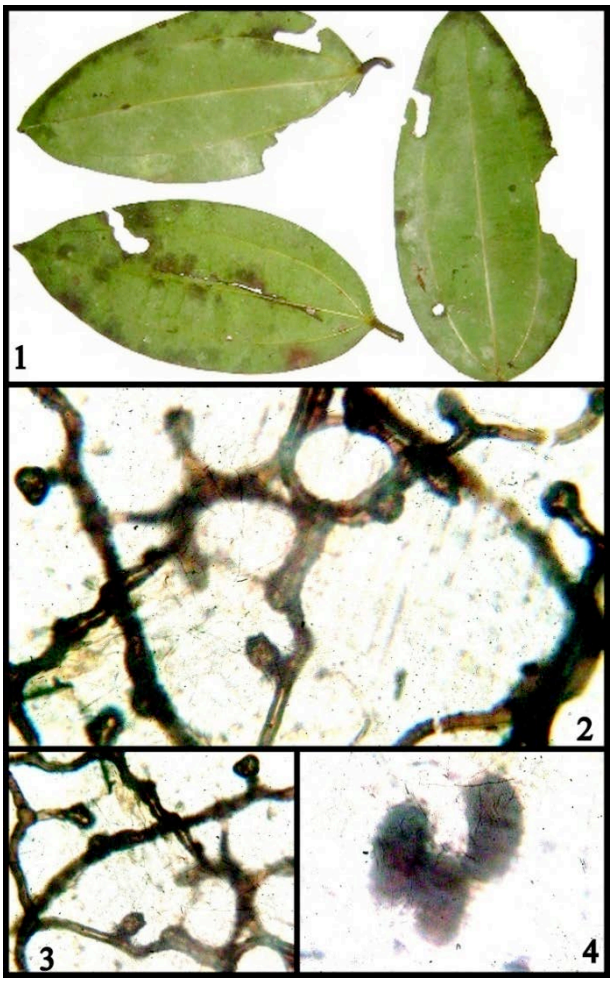


Image 20. *Armatella katumotoi*
1 - Infected leaves; 2&3 - Mycelium with appressoria; 4 - 1- septate ascospores

Materials examined: TBGT 5438, FMKMCC 11, 1.xi.2009, on leaves of *Cinnamomum* sp. (Lauraceae), Hoddur, C. Jagath Thimmaiah.

Colonies hypophyllous, subdense, up to 9mm in diameter. Hyphae smooth walled, flexuous, branching alternate at wide angles, closely reticulate, cells 32–35x2.5–5 µm. Appressoria alternate to unilateral, straight to variously curved, antrorse to retrorse, 14–26 µm long; stalk cells aseptate to several septate flexuous to crooked 6–40 µm long; head cells ovate to globose, few truncate, entire to stellately lobed, 6.5–10x8–11µm. Perithecia scattered, seated on exappressoriate mycelium, up to 160µm in diameter; ascospores brown ellipsoidal, 1-septate, 23–28x11–14 µm.

Genus *Asteridiella*

Asteridiella McAlpine, Proc. Linn. Soc. New South Wales, p. 38, 1897; Theiss. & Sydow, Ann. Mycol. 15: 482, 1917; Hansf., Sydowia Beih. 2: 25, 1961; Hosag., Meliolales of India, p. 79, 1996; Meliolales of India 2: 103, 2008.

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* Mc Alpine

Descriptions of species

Asteridiella acanthacearum Hosag., J. Mycopathol. Res. 44: 3, 2006; Meliolales of India 2: 119, 2008. (Fig. 2).

Material examined: HCIO 45765 (holotype), TBGT 1385 (isotype), 12.xi.2003, on leaves of Acanthaceae member, Jodupal, V.B. Hosagoudar et al; HCIO 45722, TBGT 1471, 12.xi.2003, *Lepidagathis* sp. (Acanthaceae), Jodupal, V.B. Hosagoudar et al.

Colonies epiphyllous, thin to subdense, up to 2mm in diameter, confluent. Hyphae straight to substraight, branching irregular at acute angles, loosely reticulate, cells 19–24x6–8 µm. Appressoria alternate to unilateral, antrorse to subantrorse, straight to curved, 16–23 µm long; stalk cells cylindrical to cuneate, 3–7 µm long; head cells ovate, globose, entire, angular to 2–3 times sublobate, 11–16x9–11 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 14–20x5–7 µm. Perithecia scattered to loosely grouped, up to 150µm in diameter; perithecial wall cells conoid to mammiform,

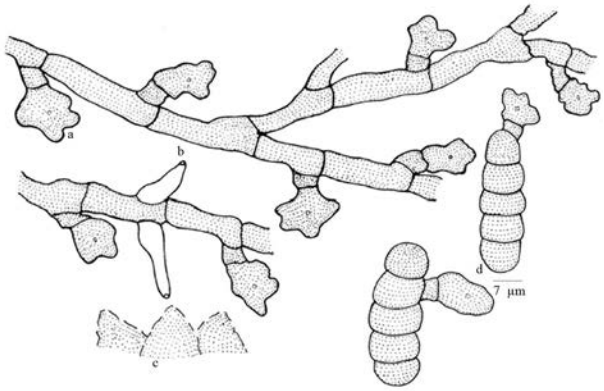


Figure 2. *Asteridiella acanthacearum*
a - Appressorium; b - Phialide; c - Perithecial wall cells; d - Ascospores

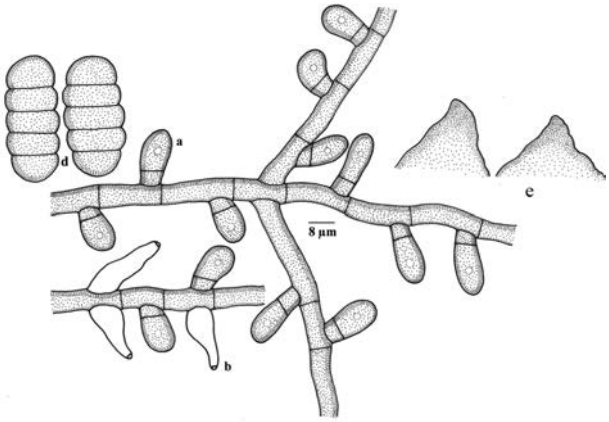


Figure 3. *Asteridiella brahmagiriensis*
a - Appressorium; b - Phialide; c - Perithecial wall cells; d - ascospores

up to 15µm long; ascospores oblong, cylindrical, straight to slightly curved, 4-septate, constricted at the septa, 32–38x10–12 µm.

Based on the Beeli formula, *A. acanthacearum* is similar to *A. anastomosana* Wint. var. *macilenta* (Wint.) Hansf. known on Brillantaisia patula from San Thome but differs from it in having entire to sublobate head cells of appressoria. It also differs from *A. thunbergiae-chrysopes* (Hansf. & Deight.) Hansf. known on Thunbergia chrysopes from Sierra Leone in having shorter appressoria with entire to sublobate head cells (Hansford, 1961).

Asteridiella brahmagiriensis Hosag., Archana. & Agarwal, Indian Phytopath. 60: 237, 2007. (Fig. 3).

Material examined: HCIO 46967 (holotype), TBGT 2184 (isotype), 13.xi.2003, on leaves of Syzygium sp. (Myrtaceae), MPCA, Brahmagiri, Talacauveri, V.B.Hosagoudar et al.

Colonies amphigenous, subdense, 2mm in diameter, confluent. Hyphae substraight to flexuous, branching opposite to irregular at acute to wide angles, cells 14–38x4–7 µm. Appressoria alternate to unilateral, antrorse to subantrorse, straight to slightly curved, 9–27 µm long; stalk cells cylindrical to cuneate, 3–8 µm long; head cells oblong, ovate, globose, entire, 6–19x6–11µm. Phialides mixed with appressoria, opposite to alternate, ampulliform, 11–24x4–8 µm. Perithecia globose, scattered to grouped, up to 284µm in diameter; perithecial wall cells conoid to mammiform, up to 35µm long; ascospores obovoidal, 4-septate, constricted at the septa, 36–43x14–19 µm.

Based on the Beeli formula, this species is closer to Asteridiella zeheri (Doidge) Hansf. known on Eugenia zeheri from South Africa (Hansford, 1961) but differs from it in having entire margin of the head cells of appressoria in contrast to angular to lobate. Asteridiella eugeniae-fruticosae Jana et al. is known on Eugenia fruticosa from Nagaland (Jana et al., 2005). However, A. brahmagiriensis differs from it in having longer appressoria (10–27 µm against 12–17 µm), head cells entire in contrast to angular, larger perithecia (284µm against 105µm) and having larger ascospores (36–43x14–19 µm against 27–35x10–16 µm).

Asteridiella callista (Rehm) Hansf., Sydowia 10: 47, 1957; Sydowia Beih. 2: 687, 1961; Hosag. & Abraham, Indian Phytopathol. 51: 301, 1998; Hosag., C.K.Biju & Abraham, J. Econ. Taxon. Bot. 25: 298, 2001; Zoos' Print J. 21: 2324, 2006; Hosag., Meliolales of India 2: 122, 2008.

Meliola callista Rehm, Leafl. Philippine Bot. 6: 2191, 1914.

Irenina callista (Rehm) Hansf., Proc. Linn. Soc. London 157: 169, 1946. (Fig. 4 & Image 21).

Colonies epiphyllous, subdense, up to 2mm in diameter. Hyphae substraight, flexuous, branching opposite to unilateral at subacute angles, loosely reticulate, cells 29–40x6–8.5 µm. Appressoria alternate to unilateral, antrorse to retrorse, 21–36 µm long; stalk cells cylindrical to cuneate, 7–16 µm long; head cells ovate, few cylindrical, angulose, sublobate, few attenuated at the apex, few curved, 14–20x12–19 µm. Phialides many, mixed with appressoria, opposite to unilateral, few alternate, ampulliform, neck elongated, 14–20x3–6 µm. Perithecia grouped, globose, up to 160µm in diameter, perithecial margin conoid to mammiform, up to 15µm long; ascospores oblong, 4-septate, constricted at the septa, 35–41x12–16 µm.

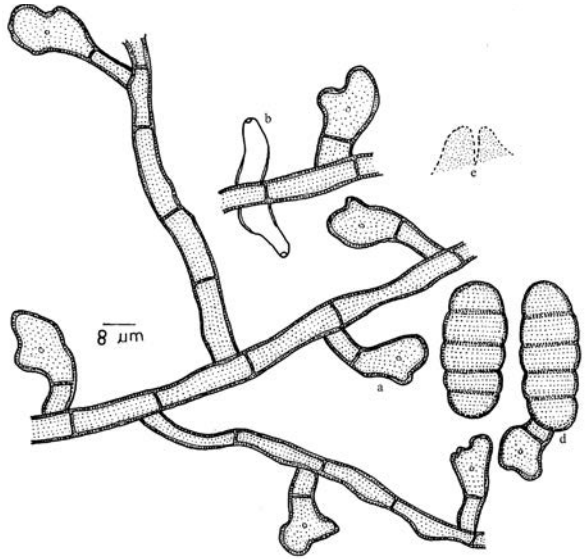


Figure 4. *Asteridiella callista*
a - Appressorium; b - Phialide; d - Ascospores; e - Peridial wall cells

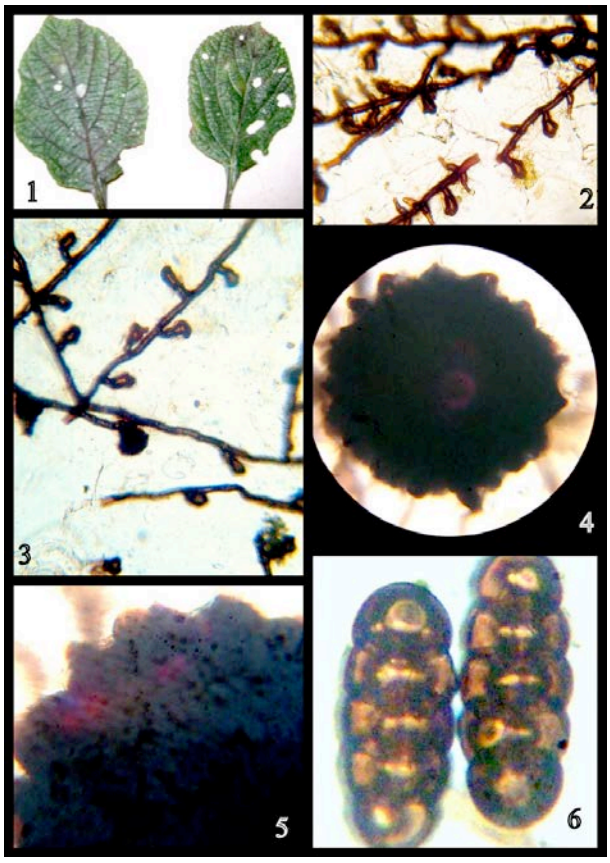


Image 21. *Asteridiella callista*
1 - Infected leaves; 2&3 - Mycelium with appressoria & phialides; 4&5 - Perithecial wall cells; 6 - Ascospores

Materials examined: HCIO 45610, TBGT 1353, 12.xi.2003, on leaves of *Stachytarpheta jamaicensis* (L.) Vahl (Verbenaceae), Jodupal, V.B. Hosagoudar et al ; HCIO 45801, TBGT 1550, 11.xi.2003, Nishane motta, V.B. Hosagoudar et al; TBGT 5450, FMKMCC 12, 23.xi,2009 Field Marshal Cariappa College Campus, Madikeri, C. Jagath Thimmaiah.

Asteridiella capparidigena Hosag., J. Mycopathol Res. 44: 3, 2006; Hosag., Meliolales of India 2:124, 2008. (Fig. 5).

Material examined: HCIO 45637 (holotype), TBGT 1381 (isotype), 11.xi.2003, on leaves of Capparaceae member, Nishanemotta, Madikeri, V.B. Hosagoudar et al.

Colonies amphigenous, mostly epiphyllous, dense, minute, up to 1mm in diameter. Hyphae straight to undulate, branching alternate to opposite at wide angles, loosely to closely reticulate, cells 28–32x6–8 µm. Appressoria alternate, not crowded, antrorse to subantrorse, 19–24 µm long; stalk cells cylindrical to cuneate, 4–6 µm long; head cells ovate, oblong to cylindrical, mostly entire, rarely angular to sublobate, 14–20x9–12 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 14–18x8–10 µm. Perithecia scattered to grouped, up to 160µm in diameter; perithecial wall cells mammiform, up to 20µm long; ascospores

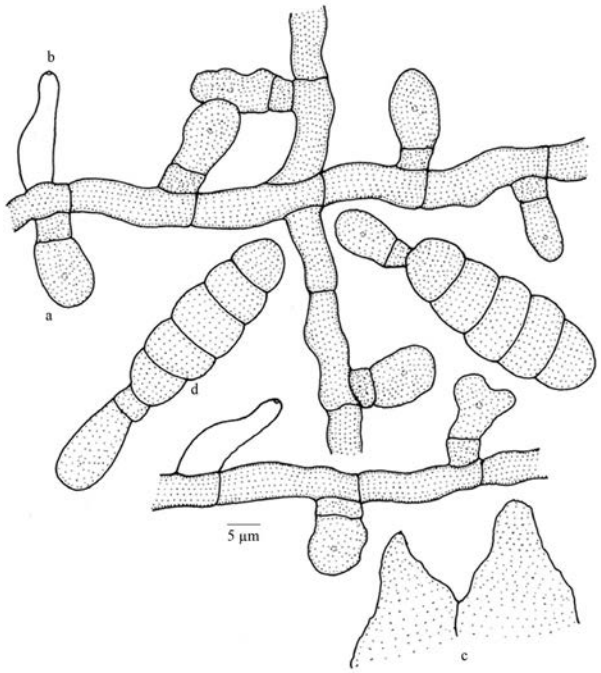


Figure 5. *Asteridiella capparidigena*
a - Appressorium; b - Phialide; c - Perithecial wall cells; d - Ascospores

oblong, cylindrical, 4-septate, slightly constricted at the septa, 30–37x12–16 µm.

Asteridiella combreti* (Stev.) Hansf. var. *leonensis Hansf., Sydowia Beih. 20: 160, 1961; Hosag. & Goos, Mycotaxon 36: 238, 1989; Hosag., Meliolales of India, p, 83, 1996. (Fig.6)

Material examined: HCIO 45672, TBGT 1419, 12.xi.2003, on leaves of *Calycopteris florubunda* Lam. (Combretaceae), Jodupal, V.B. Hosagoudar et al.

Colonies epiphyllous, subdense, up to 4mm in diameter, confluent. Hyphae substraight to slightly undulate, branching alternate to opposite at wide angles, loosely reticulate, cells 20–34x6–8 µm. Appressoria alternate, straight, antrorse, 20–26 µm long; stalk cells cylindrical to cuneate, 6–8 µm long; head cells globose, entire to angular, 12–18x12–16 µm. Phialides numerous, borne on a separate mycelial branch, opposite, ampulliform, 14–24x4–8 µm, tip occasionally twisted and bent variously. Perithecia scattered, verrucose, up to 170µm in diam.; perithecial cells mammiform, 8–10 µm long; ascospores obovoidal, 4-septate, constricted at the septa, 36–42x12–18 µm.

Asteridiella cyclopoda (Stev.) Hansf., Sydowia 10: 47, 1957; Sydowia Beih. 2: 419, 1961; Hosag. & Goos, Mycotaon 36: 239, 1989; 42: 127, 1991; Hosag., Meliolales of India 2: 86, 1996. (Image. 22)

Materials examined: TBGT 5479, FMKMCC 13, 4.xii.2009, on leaves of Vernonia arborea Buch.-Ham. (Asteraceae), Devarakadu, Hoddur, C. Jagath Thimmaiah

8.i.2010, FMKMCC 14, V. monosis C.B.Clarke (Asteraceae), Igguthappa Temple, C. Jagath Thimmaiah.

Colonies amphigenous, subdense to dense, up to 5mm in diameter. Hyphae undulate, branching alternate to opposite at acute angles, loosely reticulate, cells 21–30x8–10 µm. Appressoria alternate and unilateral, antrorse, spreading, 22–28 µm long; stalk cells cuneate to cylindrical, 4–12 µm long; head cells globose, entire and rarely angular, 14–18x12–14 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 16–22x8–10 µm. Perithecia scattered to grouped, up to 190µm in diameter; perithecial wall cells mammiform, up to 10µm long; ascospores ellipsoidal, 4-septate, constricted at the septa, 32–42x12–16 µm.

Asteridiella chowrirae Hosag., Jagath. & Jayashankara, Mycosphere 2(6): 611, 2011. (Image 23)

Materials examined: TBGT 5708 (holotype), FMKMCC 15 (isotype), 29.xi.2009, on leaves of *Euphorbia pulcherrima* Willd. ex Klotz. (*Poinsettia pulcherima* Graham) (Euphorbiaceae), Chowrira House, Hoddur, C. Jag-

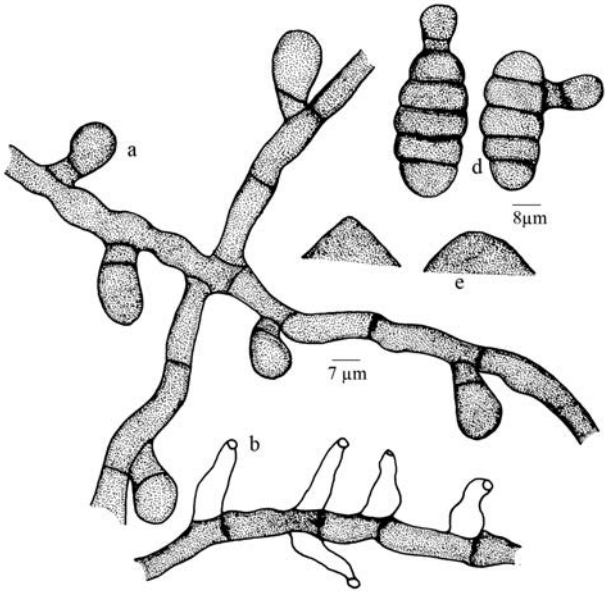
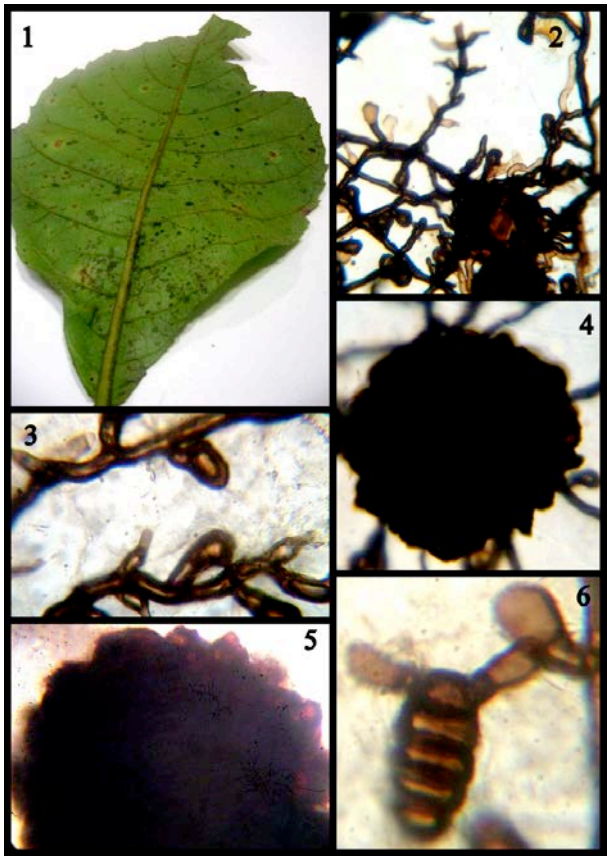


Figure 6. *Asteridiella combreti* var. *leonensis*
a - Appressorium; b - Phialide; d - ascospores; e - Perithecial wall cells



Imag 22. *Asteridiella cyclopoda*
1 - Infected leaf; 2&3 - Mycelium with appressoria & phialides; 4&5 - Perithecium with mammiform cells; 6 - Germinating ascospore

ath Thimmaiah.

Colonies epiphyllous, dense, up to 3mm in diameter. Hyphae substraight to flexuous, branching alternate to opposite at acute to wide angles, loosely reticulate, cells 23–25x6–8 µm. Appressoria alternate, antrorse, subantrorse to reflexed, straight to variously curved, 22–30(–48) µm long; stalk cells cylindrical to cuneate, rarely up to 2- septate, 6–12(–20) µm long; head cells ovate, globose, cylindrical, entire, angular to rarely sublobate, very few attenuated at the apex, 16–23x12–20 µm. Phialides numerous, apparently borne on a separate mycelium but mixed with appressoria, alternate to opposite, ampulliform, 15–30x5–8 µm. Perithecia scattered, up to 120µm in diam; perithecial wall cells conoid, projected, attenuated at the apex, up to 20µm high; ascospores straight to slightly curved, oblong to cylindrical, 4-septate, constricted at the septa, 42–45x16–18 µm.

image 23. ***Asteridiella chowrirae***
1 - Infected leaves; 2-4 - Mycelium with appressoria & phialides; 5 - Perithecium with conoid peridial cells; 6 - Ascospore

Asteridiella depokensis Hansf., Sydowia 10: 47, 1957; Sydowia Beih. 2: 688, 1961; Hosag., Jagath. & Jayashankara, Mycosphere 2(6): 612, 2011. (Image 24)

Materials examined: TBGT 5698, FMKMCC 16, 16.xi.2009, on leaves of Vitex negundo L. (Verbenaceae), Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, dense, up to 7mm in diameter. Hyphae flexuous to crooked, branching alternate to opposite at acute to wide angles, closely reticulate, cells 12–17x6–8 µm. Appressoria alternate, closely placed, antrorse to closely antrorse, often appressed to the hyphae, straight to curved, 14–24 µm long; stalk cells cylindrical to cuneate, 4–13 µm long; head cells globose, clavate, distinctly angular to truncate, rarely rounded, 9–16x12–18 µm. Phialides many, mixed with appressoria, ampulliform, 16–20x6–7 µm. Perithecia scattered, up to 130µm in diam; perithecial cells mammiform, broadly rounded at the apex, up to 12µm long; ascospores oblong to cylindrical, 4-septate, and constricted at the septa, 35–38x14–16 µm.

Angular head cells of the appressoria distinguishes this species from others.

Asteridiella elaeocarpi-tuberculati Hosag., Crypt. Bot. 2/3: 183, 1987; Hosag., Meliolales of India, p.87, 1996. (Fig.7)

Material examined: HCIO 45779, TBGT 1528, 12.xi.2003, on leaves of *Elaeocarpus tuberculatus* Roxb. (Elaeocarpaceae), Jodupal, V.B. Hosagoudar et al.

Colonies epiphyllous, subdense, up to 2mm in diameter, confluent. Hyphae substraight to undulate, branching opposite at wide angles, loosely reticulate, cells 31–

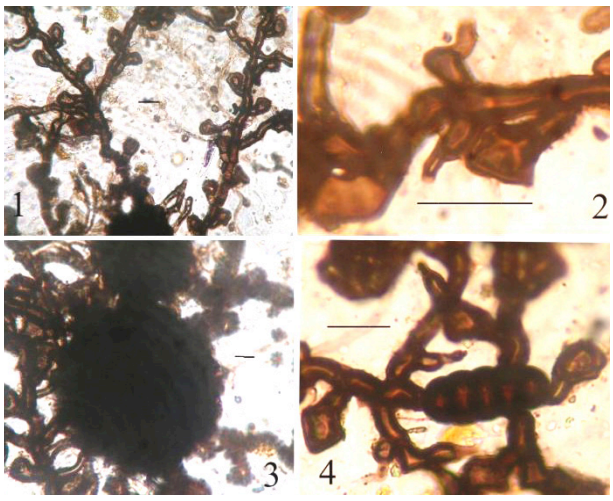


Image 24. ***Asteridiella depokensis***
1 - Appressoriate mycelium; 2 - Phialides; 3 - Perithecium with mammiform wall cells; 4 - Germinating ascospore

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 diam.; perithecial cells conoid, curved, acute at the apex, up to 15µm long; ascospores obovoidal, 4-septate, slightly constricted, 40–46.5x15–18.5 µm.

Asteridiella emciciana Hosag., Robin & Archana, Sydowia 61(2): 244, 2009. (Image 25).

Materials examined: FMKMCC 17, 20.v.2010, on leaves of *Scutia myrtina* Kurz. (Rhamnaceae), Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, dense to subdense, scattered, up to 4mm in diameter. Hyphae straight to substraight, branching opposite at wide angles, loosely reticulate, cells 20–35x5–6 µm. Appressoria alternate, distantly placed, straight, antrorse to retrorse, 17–30 µm long; stalk cells cylindrical to cuneate, 4–7 µm long; head cells globose, oblong, straight to curved, entire to sublobate, 13–18x7–10 µm. Phialides few, mixed with appressoria, opposite, ampulliform, 15–25x6–7 µm. Perithecia scattered, globose, up to 100µm in diameter; perithecial wall cells conoid to mammiform, up to 15µm long; ascospores 4-septate, constricted, brown, cylindrical to oblong, 30–35x11–16 µm.

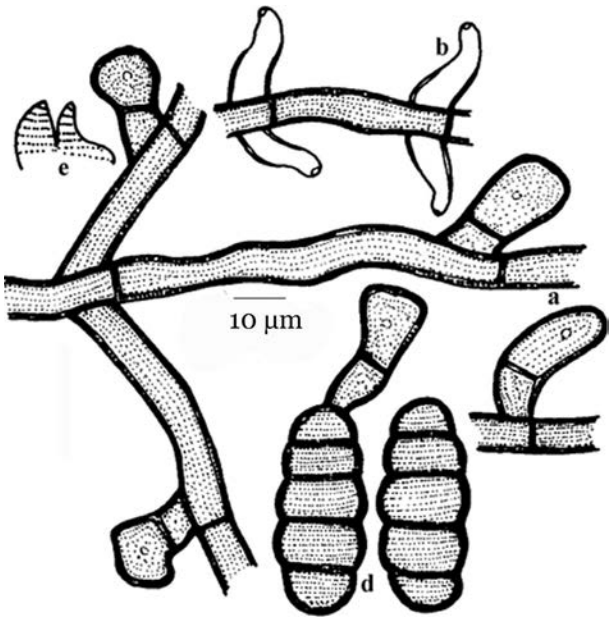


Figure 7. *Asteridiella elaeocarpi-tuberculati*
a - Appressorium; b - Phialide; d - Ascospores; e - Perithecial wall cells

This species was known on *Scutia myrtiana* from Chennai. Now this is located in Kodagu after its type locality and interestingly it is distributed from the coastal region of Chennai to the evergreen forests of more than 1000m.

Asteridiella formosensis (Yamam.) Hansf., Sydowia 10: 48, 1957; Sydowia Beih. 2: 686, 1961; Hoasg. & Goos, Mycotaxon 36: 240, 1989; 42: 128, 1991; Hosag., Kaveriappa, Raghu & Goos, Mycotaxon 51: 109, 1994; Hosag., Meliolales of India, p. 90, 1996. (Image 26)

Materials examined: HCIO 45788, TBGT 1537, 11.xi.2003, on leaves of *Callicarpa* sp. (Verbancaeae), Nishane motta, V.B. Hosagoudar et al; TBGT 5463, FMKMCC 18. 21.xi.2009 ,*C. tomentosa* (L.) Murray, Mallamatti, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense, up to 4mm in diameter. Hyphae undulate, branching unilateral to alternate at subacute angles, loosely reticulate, cells 30–37x6–9 µm. Appressoria alternate, antrorse to retrorse, straight to curved, 17–38 µm long; stalk cells cylindrical to cuneate, 4–20 µm long; head cells globose, few ovate,

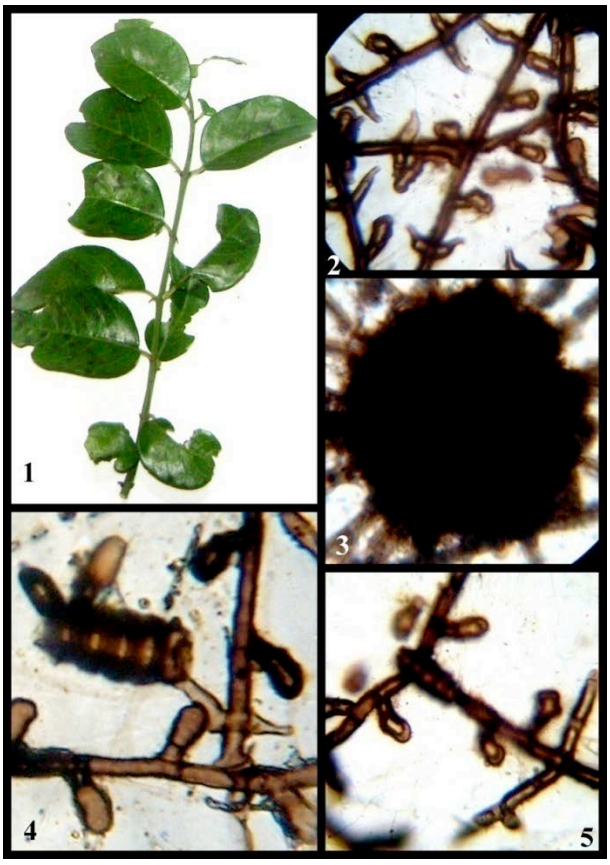


Image 25. *Asteridiella emciciana*
1 - Infected leaves; 2 - Mycelial with appressoria and phialides; 3 - Perithecium; 4&5 - Germinating ascospores.

clavate, entire to angular, 15–18x11–18 µm. Phialides many, borne on a separate mycelial branch, mostly opposite, few unilateral, ampulliform, 14–19x6–8.5 µm. Perithecia scattered, globose, up to 120µm in diameter; perithecial wall cells mammiform, up to 10µm long; ascospores ellipsoidal to oblong, 4-septate, constricted at the septa, 42–46x15–17 µm.

Asteridiella grewiae Patil ex Hosag. in Hosag,, Meliolales of India, p. 91, 1996. (Image 27).

Materials examined: TBGT 5403, FMKMCC 19, 2.viii.2009, on leaves of *Grewia* sp. (*Tiliaceae*), Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, dense, up to 4mm in diameter. Hyphae substraight, slightly flexuous, branching opposite to subopposite at subacute to wide angles, loosely reticulate, cells 25–35x6–8 µm. Appressoria mostly alternate to unilateral (10%), antrorse to retrorse, straight to curved, 23–33 µm long; stalk cells cylindrical to cuneate, 6–16 µm long; head cells globose, oblong, angulose, sublobate, rarely entire, truncate, clavate, few attenuated at the apex, 16–19x14–23 µm. Phialides many, mixed with appressoria, opposite to subopposite, few unilateral, ampulliform, neck elongated, 15–30x3–6 µm. Perithecia scattered, globose, up to 200µm in diameter; perithecial wall cells not distinctly projected; ascospores oblong to cylindrical, 4-septate, constricted at the septa, 43–45x18–20 µm.

***Asteridiella kodavae* sp. nov.**

Hosag. B. Divya & Jagath.

(Fig. 8). (urn:lsid:indexfungorum.org:names:807142)

Materials examined: TBGT 6557 (holotype), 25.ix.2010, on leaves of Mallotus phillipensis (Euphorbiaceae), Hoddur, Medikeri, C. Jagath Thimmaiah

Etymology: Named after the locals, Kodava

Colonies epiphyllous, subdense, spreading, up to 2mm in diameter. Hyphae straight to substraight, branching mostly opposite at wide angles, loosely reticulate, cells 22–27x5–7µm. Appressoria alternate, straight to slightly curved, antrorse, subantrorse to spreading, 20–27 µm long; stalk cells cylindrical to cune-

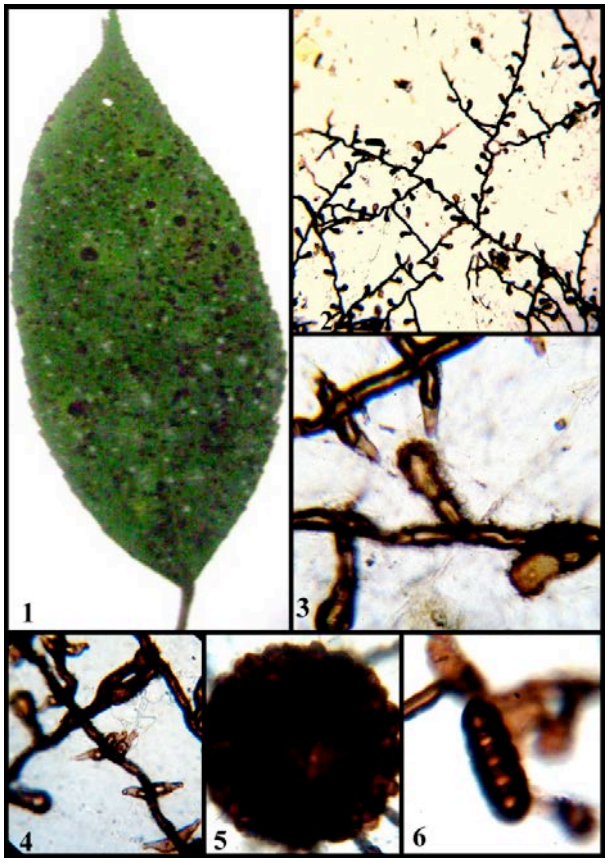


Image 26. *Asteridiella formosensis*
1 - Infected leaf; 2-4 - Mycelium with appressoria & phialides; 5 - Perithecium; 6 - Ascospore

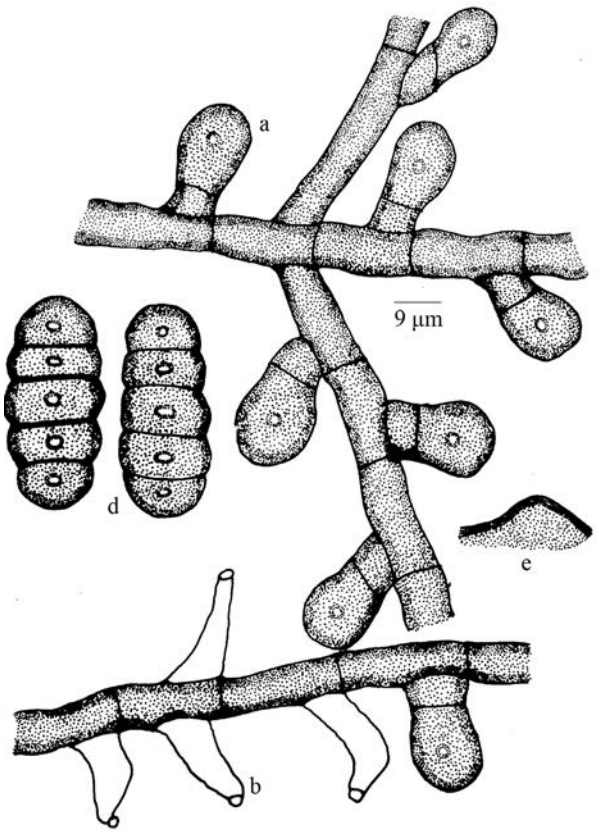


Figure 8. *Asteridiella kodavae* sp. nov.
a.Appressorium; b. Phialide; d. Ascospores; e. Perithecial wall cell

ate, 5–10 µm long; head cells ovate to oblong, straight to curved, entire, 15–20x5–7 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 20–27x 5–7 µm. Perithecia scattered, up to 150µm in diameter, perithecial wall cells not distinct; ascospores oblong to cylindrical, 4-septate, constricted at septa, 40–45x15–17 µm.

This species differs from all the known *Asteridiella* species on the members of *Euphorbiaceae* in having straight mycelium and entire head cells of appressoria (Hansford, 1961; Hosagoudar, 1996, 2008, 2013).

Asteridiella malloti (Hansf. & Thirum.) Hansf., Sydowia 10: 49, 1957; Sydowia Beih, 2: 209, 1961; Patil & Thite, J. Shivaji Univ. 18: 220, 1978; Hosag. & Goos, Mycotaxon 36: 241, 1981; Hosag., Meliolales of India, p. 95, 1996. (Image 28)

Materials examined: TBGT 5417, FMKMCC 20, 21.xi.2009, on leaves of *Mallotus philippensis* (Lam.) Muel.-Arg. (Euphorbiaceae), Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, mainly at the junction of veins, dense, up to 3mm in diameter. Hyphae substraight, branching opposite to alternate at subacute to wide angles, loosely reticulate, cells 25–29x6–9 µm. Appressoria alternate, antrorse, straight to curved, 23–30 µm long; stalk cells cuneate to cylindrical, 5–8 µm long; head cells globose, lobate, angulose, rarely entire, 16–20x15–19 µm. Phialides numerous, borne on a separate mycelial branch, few mixed with appressoria, ampulliform, opposite to alternate, 20–24x5–6 µm. Perithecia scattered, globose, up to 150µm in diameter; perithecial wall cells conoid, twisted variously, up to 20µm long; ascospores cylindrical to oblong, middle cell larger, 4-septate, constricted at the septa, 48–53x20–23 µm.

Asteridiella homaligena Hosag., Jagath. & Jayashankara, Mycosphere 2(6): 611, 2011. (Image 29)

Materials examined: TBGT 5696 (holotype), FMKMCC 21 (isotype), 22.viii.2009, on leaves of Homalium zeylanicum Benth. (Flacourtiaceae), River side, Hoddur, C. Jagath Thimmaiah.

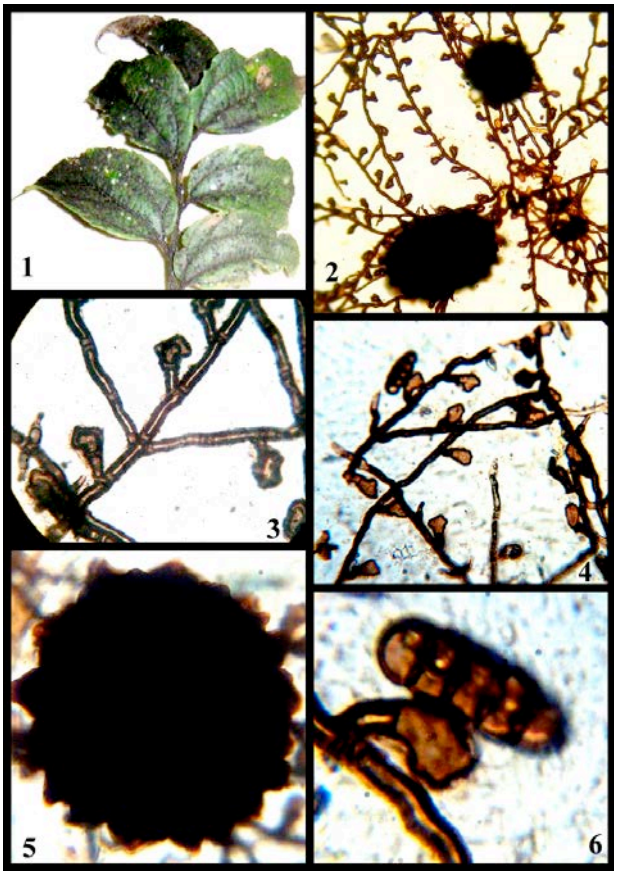


Image 27. *Asteridiella grewiae*
1. Infected leaves; 2-4. Mycelial with appressoria & phialides; 5. Perithecium; 6. Ascospore

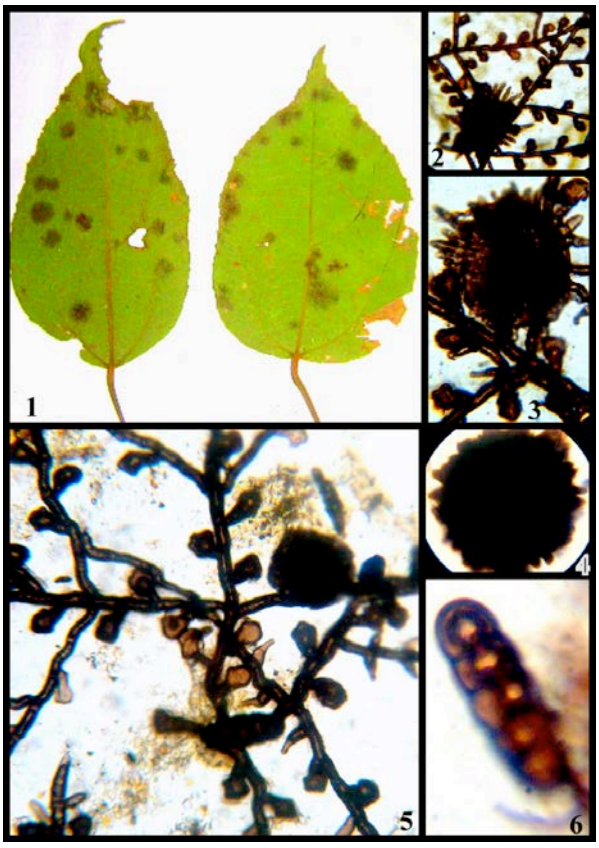


Image 28. *Asteridiella malloti*
1. Infected leaves; 2. Mycelial with appressoria; 3&4 Perithecia; 5. Mycelium with both appressoria & Phialides; 6. Ascospore

Colonies amphigenous, mostly epiphyllous, subdense, up to 4mm in diameter. Hyphae straight to substraight, branching alternate to opposite at acute to subacute angles, loosely reticulate, cells 17–25x6–9 µm. Appressoria alternate, about 5% opposite, antrorse to spreading, 16–25 µm long; stalk cells cylindrical to cuneate, 3–6 µm long; head cells ovate to obovate, entire to slightly angular, 14–20x11–15 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 21–27x4–9µm. Perithecia scattered, up to 130µm in diam., perithecial wall cells mammiform, up to 15µm high; ascospores obovoidal, oblong to cylindrical, 4-septate, constricted at the septa, 37–40x13–16 µm.

Asteridiella homalii-angustifolii (Deighton) Hansf. is known on *Homalium angustifolium* from Sierra Leone. However, *Asteridiella homaligena* differs from it in having entire head cells of the appressoria in contrast to lobate ones (Hansford, 1961, Hosagoudar, 1996, 2008, Hu et al. 1996, 1999).

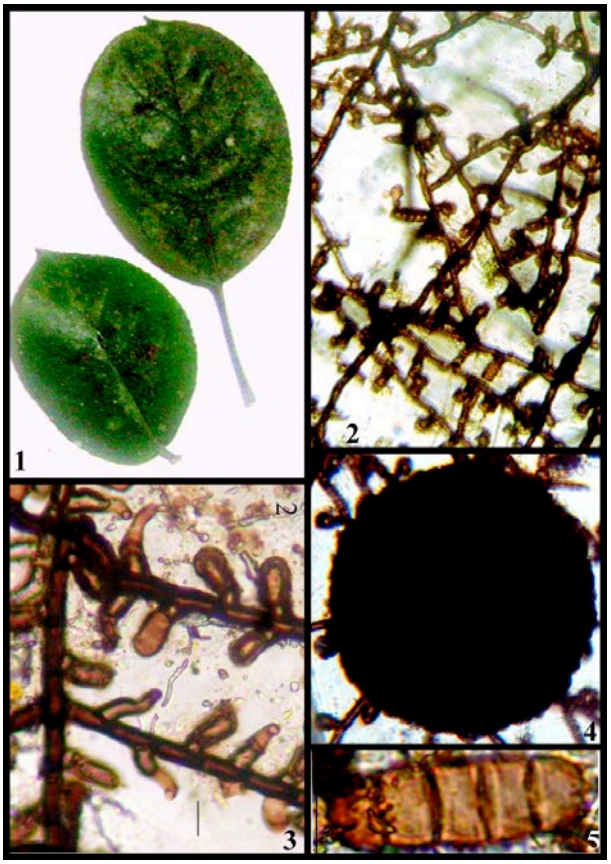


Image 29. *Asteridiella homaligena*
1. Infected leaves; 2-3. Mycelium with appressoria & phialides; 4. Perithecium; 5. Ascospore

Asterdiella hydnocarpigena Hosag. & Jagath., Plant Pathology & Quarantine 3: 2, 2013. (Fig.9)

Materials examined: TBGT 6239 (holotype), 16.iii.2010, on leaves of *Hydnocarpus pentendra* (Ham.) Oken (Flacourtiaceae), Madikeri, March 16, 2010, C. Jagath Timmaih.

Colonies epiphyllous, thin, up to 4mm in diameter. Hyphae straight to substraight, branching mainly opposite to rarely unilateral at acute to wide angles, loosely to closely reticulate, cells 25–42×3–5 µm. Appressoria alternate to unilateral, antrorse to subantrorse, straight to curved, 15–20 µm long; stalk cells cylindrical to cuneate, 5–7 µm long; head cells ovate, clavate, entire, truncate, straight to curved, 7–15×5–15 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 24–26x8–12 µm. Perithecia scattered, globose, up to 105µm in diameter; ascospores ellipsoidal, 3-septate, slightly curved, constricted at the septa, 30–35×12–15 µm.

Asteridiella madikeriensis Hosag., Jagath. & Jayashankara, Mycosphere 2(6): 614, 2011.

Asteridiella depokensis sensu Hosag., Meliolales of India, vol. 2: 127, 2008 (non Hansford, 1957) (Fig.10)

Material examined: HCIO 46240 (holotype), TBGT 1652 (isotype), 14.xi.2003, on leaves of *Premna* sp. (Verbenaceae), Nishane motta, Madikeri, November 14, 2003, V.B. Hosagoudar et al.

Colonies epiphyllous, dense, up to 2mm in diameter. Hyphae flexuous to crooked, branching alternate,

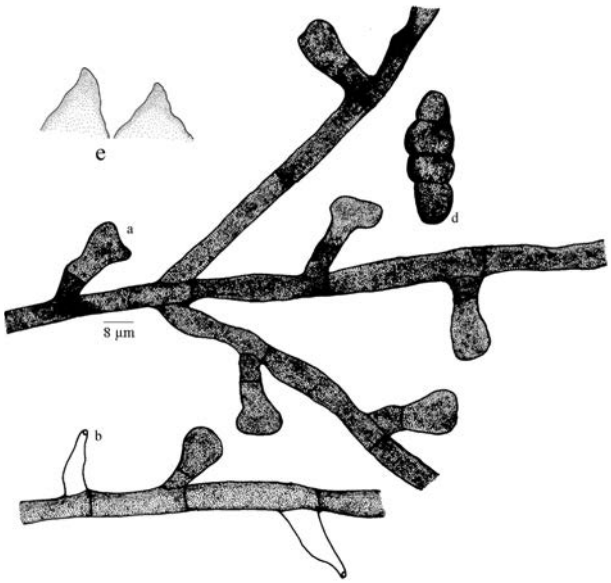


Figure 9. *Asterdiella hydnocarpigena*
a.Appressorium; b. Phialide; d. Ascospores; e. Perithecial wall cells

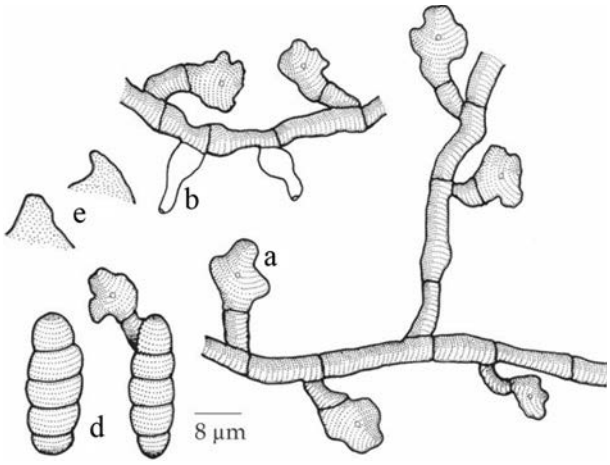


Figure 10. *Asteridiella madikeriensis*
a.Appressorium; b. Phialide; d. Ascospores; e.Perithecial wall cells

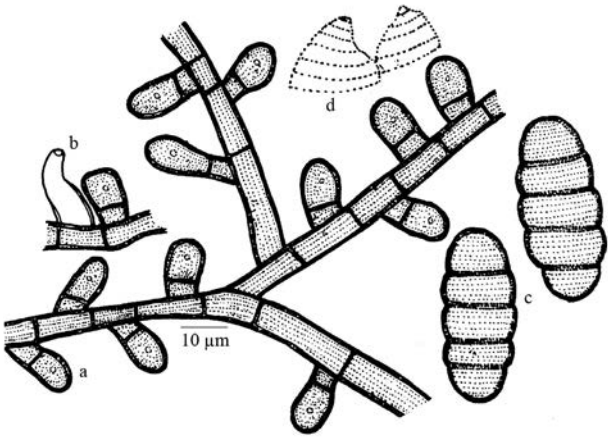


Figure 11.*Asteridiella sapotacearum*
a.Appressorium; b. Phialide; c. ascospores; d. Perithecial wall cells

opposite to irregular at acute angles, loosely to closely reticulate, cells 19–21x8–10 µm. Appressoria alternate, antrorse, subantrorse, retrorse, straight to variously curved, 24–37 µm long; stalk cells cylindrical to cuneate, 8–10 µm long; head cells ovate, oblong, globose, angular to variously sublobate, 16–21x12–14 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 19–23x6–8 µm. Perithecia scattered, up to 196µm in diam.; perithecial wall cells conoid to mammiform, up to 24µm long; ascospores ellipsoidal, 4-septate, constricted at the septa, 41–45x16–18 µm.

This species differs from *Asteridiella depokensis* in having sublobate head cells of the appressoria (Hosagoudar, 2008).

Asteridiella sapotacearum Hansf., sydowia 10: 50, 1957; Sydowia Beih. 2: 501, 1961.

Irene sapotacearum Hansf., sydowia 9: 7, 1955. (Fig. 11).

Materials examined: HCIO 30829, 22.xii.1991 on leaves of seedlings of *Madhuca longifolia* (L.) Macbr. var. latifolia (Roxb.) A. Chev. (Sapotaceae), Sampaje forest nursery, Sampaje, B.R. Dayal.

Colonies amphigenous, dense, crustose to velvety, up to 3mm in diam., rarely confluent. Hyphae substraight, branching alternate, opposite or irregular at acute to wide angles, loosely reticulate, cells 18–34x6–9.5 µm. Appressoria alternate, antrorse to subantrorse, 18–25 µm long; stalk cells cylindrical to cuneate, 6–9.5 µm long; head cells ovate, entire, 12–15.5x9–12.5 µm. Phialides mixed with appressoria, alternate to opposite, conoid to ampulliform, 15–25x9–12.5 µm. Perithecia scattered, globose, up to 155µm in diam.; perithecial wall cells conoid, straight to curved, acute to obtuse at the apex, 10–15 µm long; ascospores obovoidal, 4-septate, slightly constricted at the septa, 34–40.5x15–18 µm.

This collection slightly differs from the type in having amphigenous, dense, crustose to velvet colonies.

Asteridiella scolopiae Hosag., Meliolales of India, p. 104, 1996. (Image 30).

Materials examined: 13.xi.2003, HCIO 45745, TBGT 1494, on leaves of *Scolopia crenata* (Wight & Arn.) Clos (Flacourtiaceae), MPCA, Brahmagiri, Talacauvery, V.B. Hosagoudar et al; HCIO 45700, TBGT 1448; HCIO 45813, TBGT 1563, FMKMCC 22, 11.iv.2011, *Scolopia* sp., Abbe falls, C. Jagath Thimmaiah.

Colonies amphigenous, velvety, up to 5mm in diameter. Hyphae straight to substraight, branching opposite at wide angles, loosely to closely reticulate, cells 15–20–x7–8 µm. Appressoria densely arranged, mostly alternate, opposite, few unilateral, antrorse, 15–20 µm long; stalk cells mostly cuneate, few cylindrical, 2–4 µm long; head cells ovate, angular, entire, 10–18x8–10 µm. Phialides mixed with appressoria, unilateral, opposite, ampulliform, 20–25x6–7 µm. Perithecia globose, dark, up to 250µm in diameter, Peridial cells mammiform, up to 21µm long; ascospores 4-septate, elliptical to cylindrical, brown, 40–49x18–20 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. These colonies were associated with the colonies of Asterina talacauveriana and *Asterostomella scolopiae-crenatae*.

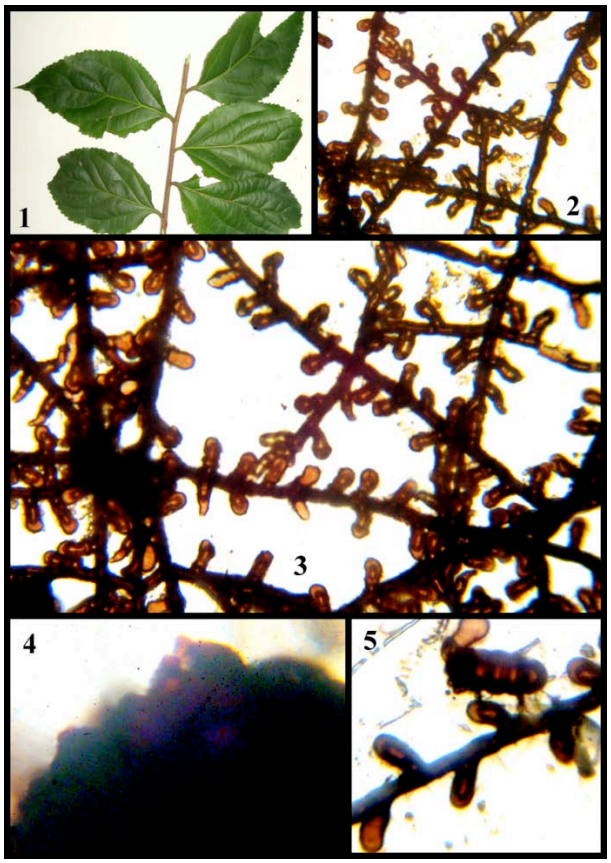


Image 30. *Asteridiella scolopiae*
1 - Infected leaves; 2-3 - Mycelium with appressoria & phialides; 4 - Perithecial wall cells; 5 - Ascospore

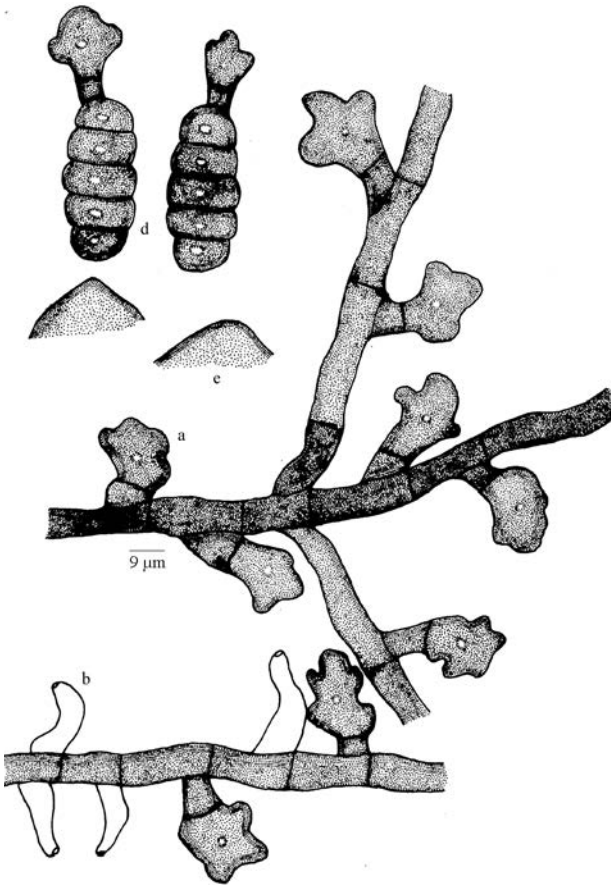


Figure 12 . *Asteridiella tragiae*
a - Apperssorium; b - Phialide; d - Ascospores; e - Perithecial wall cells.

Asteridiella tragiae Hosag. & Jagath., Plant Pathology & Quarantine 3: 3, 2013. (Fig 12).

Materials examined: TBGT 6238b (holotype), 1.i.2010, on leaves of *Tragia* sp. (*Euphorbiaceae*), Medikari, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense, spreading, up to 2mm in diameter. Hyphae straight to substraight, branching mostly opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 20–27×3–5 µm. Appressoria alternate to unilateral, mostly straight to rarely curved, antrorse to subantrorse, 22–27 µm long; stalk cells cylindrical to cuneate, 7–10 µm long; head cells ovate to globose, stellately to irregularly sublobate to deeply lobate, 15–20×12–20 µm. Phialides mixed with appressoria, opposite to alternate, ampulliform, 15–22×3–5µm. Perithecia scattered, up to 120µm in diameter; perithecial wall cells conoid to mammiform, up to 10µm long; ascospores oblong, cylindrical, 4-septate, constricted at the septa, 37–40×12–15 µm.

Asteridiella viticis-negundoi Hosag., Jagath. & Jayashankara, Mycosphere 2(6): 614, 2011.(Image 31)

Materials examined: TBGT 5704 (holotype), FMK-MCC 23 (isotype), 29.xii.2008, on leaves of *Vitex negundo* L. (Verbenaceae), Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, dense, up to 3mm in diameter. Hyphae straight, substraight to flexuous, branching alternate to opposite at acute to wide angles, loosely reticulate, cells 18–23x7–10 µm. Appressoria alternate, antrorse to subantrorse, straight to curved, 20–32 µm long; stalk cells cuneate to cylindrical, 6–12 µm long; head cells globose, ovate, clavate to cylindrical, mostly angular, few sublobate, rarely entire, truncate, 15–23x11–20 µm. Phialides many, apparently borne on a separate mycelial branch but mixed with appressoria, mostly opposite, often unilateral, ampulliform, 16–22x5–7 µm. Perithecia scattered, globose, up to 150µm in diam.; perithecial wall cells mammiform to conoid, attenuated at tip, up to 22µm long; ascospores oblong to cylindrical, 4-septate, constricted at the septa, 48–50x18–21 µm.

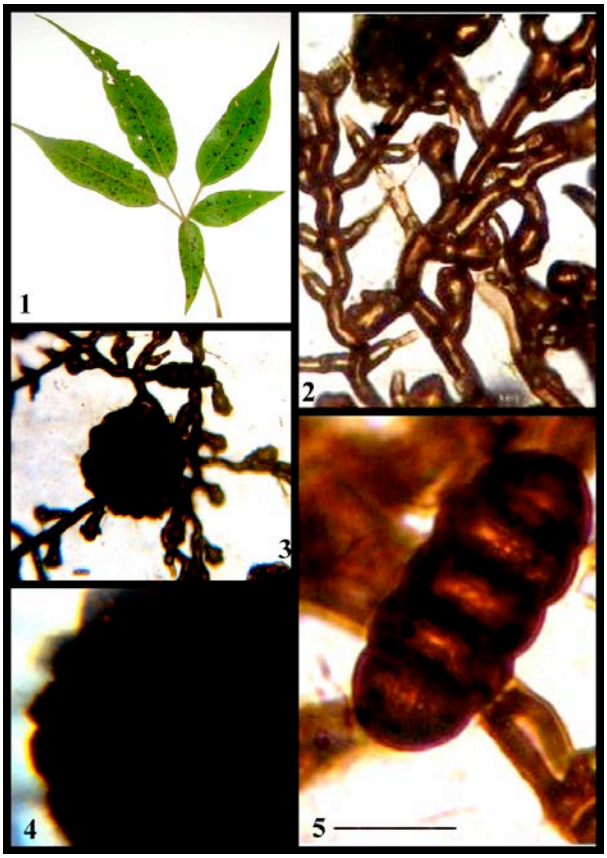


Image 31. *Asteridiella viticis-negundoi*
1 - Infected leaves; 2 - Mycelium with appressoria & phialides; 3 - Perithecium & germinating ascospore; 4 - Mammiform peridial cells of perithecium; 5 - Ascospore

Based on the morphology of appressoria and measurements, this collection can be compared with *Asteridiella lagerheimii* (Gaill.) Hansf. and *A. depokensis* Hansf. known on *Citherexylum ilicifolium* and *Vitex paniculata* and *Premna subglabra* from Eucador, Java and Philippines. However, differs from the former species in having distantly placed and recurved appressoria with typically angular head cells. It differs from the latter species in having flexuous hyphae and larger ascospores (Hansford, 1961).

Genus *Irenopsis*

Irenopsis Stev., Ann. Mycol. 25: 411, 1927; Hansf., Sydowia Beih. 2: 25, 1961; Hosag., Meliolales of India, p. 107, 1996.

Mycelium superficial, brown, septate, branched, appressoriate, mycelial setae absent. Perithecia globose, discrete, ± 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. (Image 32)

Materials examined: HCIO 45658, TBGT 1404, 12.xi,2003, on leaves of *Ficus* sp. (Moraceae), (Moraceae), Jodupal, V.B. Hosagoudar et al; TBGT 5429, FMK-MCC 24, 17.x.2009, Akare, Hoddur, C. Jagath Thimmaiah.

Colonies amphigenous, mostly epiphyllous, dense, up to 3mm in diameter. Hyphae substraight, flexuous, branching alternate at acute angles, loosely reticulate, cells 24–32x6.5–8 µm. Appressoria mostly alternate, few branches unilateral, antrorse to retrorse, straight to curved, crooked, 28–40 µm long; stalk cells cylindrical to cuneate, 8–14 µm long; head cells ovate to globose, cylindrical, angulose, sublobate to lobate, 16–21x14–20 µm. Phialides many, borne on separate mycelial branch, alternate, ampulliform, 14–25x6–8.5 µm. Perithecia scattered, verrucose, up to 70µm in diameter; perithe-

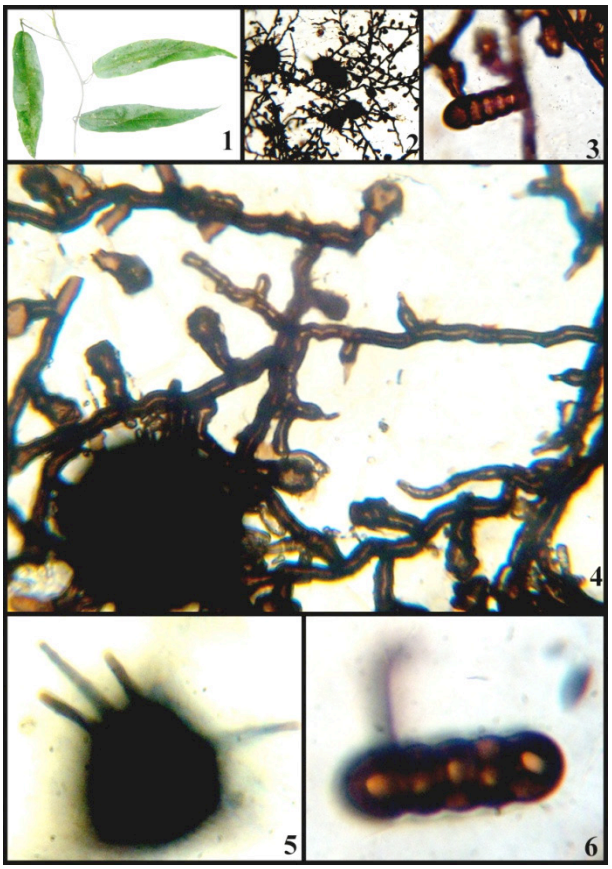


Image 32. *Irenopsis benguetensis*
1 - Infected leaves; 2&3 - Mycelial reticulum; 4 - Appressoria & Phialides; 5 - Perithecium with setae; 6. Ascospore

cial setae 2–5, straight or slightly curved, up to 100µm long; ascospores cylindrical to ellipsoidal, 4-septate, constricted at the septa, 42–45x16–18 µm.

Irenopsis coimbatorica Hosag, Pillai & Raghu in Hosag., Meliolales of India p. 109, 1996. (Image 33).

Materials examined: TBGT 5419, FMKMCC 25, 21.ix.2009, on leaves of *Grewia serrulata* DC. (Tiliaceae), Hoddur, C. Jagath Thimmaiah; FMKMCC 26, 4.xii.2009, *Grewia* sp., Devarakadu, Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense up to 3mm in diameter. Hyphae substraight, slightly flexuous, branching opposite to subopposite at subacute angles, loosely reticulate, cells 29–34x4–7 µm. Appressoria alternate to unilateral, antrorse, straight, up to 17–25 µm long; stalk cells cuneate to cylindrical, up to 4–6 µm cells; head cells ovate, globose, entire, attenuated at the apex, rarely angulose, 13–19x8–11 µm. Phialides many, borne on separate branch, few mixed with appressoria, mostly opposite to unilateral, ampulliform, neck elongated, up to 18–25x6–9 µm. Perithecia grouped, globose, non-ostiolate, up to 195µm in diameter, perithecial setae up to 11 in number, straight to curved, acute to obtuse at the tip, brown, up to 150µm long. Ascospores cylindrical to obovoidal, 4-septate, constricted at the septa up to 33–38x11–15 µm.

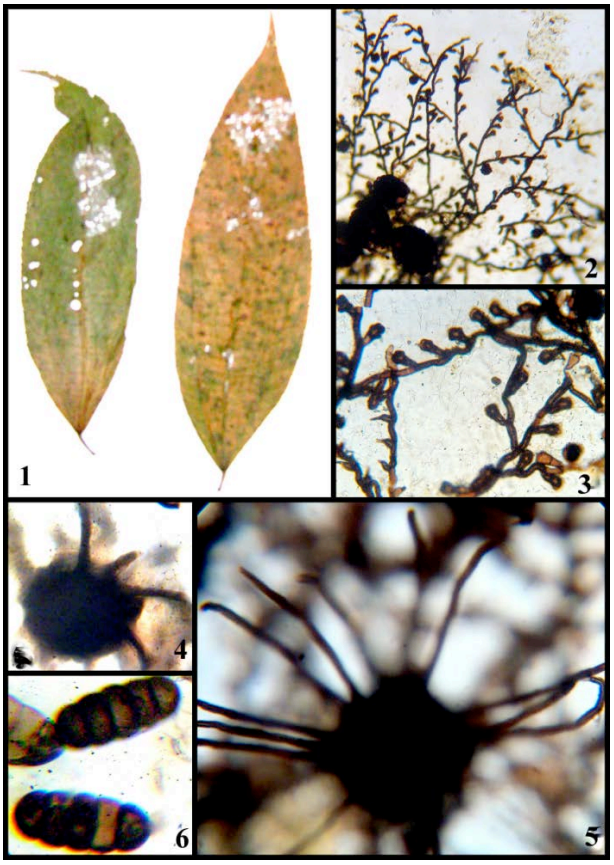


Image 33. ***Irenopsis coimbatorica***
1 - Infected leaves; 2 - Mycelial reticulum; 3 - Appressoria & Phialides; 4& 5 - Perithecium with setae; 6 - Ascospores

Irenopsis indica (Anahosur) Hosag., J. Econ. Tax. Bot. 6:250, 1985. 250, 1985; Hosag., Meliolales of India, p. 111, 1996.

Irene indica Anahosur, Sydowia 23:58, 1970.

Materials examined: AMH 620 (type), 17.x.1967, on leaves of *Aphanamixis polystachya* (Wall.) Parker [Amoora rohituka (Roxb.) Wight & Arn.] (Meliaceae), Coorg, October 17, 1967, K.H. Anahosur.

Colonies hypophyllous, subdense to dense, scattered, up to 3mm in diameter. Hyphae crooked, branching irregular at acute to wide angles, loosely reticulate, cells 24–37x6–9.5 µm. Appressoria alternate, distantly arranged, straight to variously curved, 15–18.5 µm long; stalk cells cuneate to cylindrical, 3–6.5 µm long; head cells ovate, entire to angular, 9.5–12.5x12.5–15.5 µm. Phialides few, mixed with appressoria, alternate, ampulliform, 18.5–25x9–12.5 µm. Perithecia mostly grouped, up to 233µm in diam.; perithecial setae 10–15, straight, simple, septate, acute to obtuse at the tip, 108–140x6–9.5 µm; ascospores obovoidal, 4-septate, constricted, 40–43.5x18.5–22 µm.

Irenopsis leeae Hansf. var. ***indica*** Hosag. in Hosag. & Goos, Mycotaxon 36:243, 1989;Hosag., Meliolales of India, p. 111, 1996. (Image 34)

Materials examined: FMKMCC 27, 9.i.2010 on leaves of Leea indica (Burm.f.) Merr. (Leeaceae), Igguthappa temple, C. Jagath Thimmaiah.

Colonies epiphyllous, thin up to 4mm in diameter. Hyphae straight to substraight, branching opposite to irregular, at wide angles, loosely reticulate, cells 20–30x5–6 µm. Appressoria mostly alternate, few unilateral, straight, antrorse, few curved 18–20x13–15 µm; stalk cells cylindrical 3–5 µm long; head cells globose, ovate, sub- lobate, few curved, 14–15x12–13 µm. Phialides mixed with appressoria, opposite to unilateral, ampulliform, 15–20x6–8 µm. Perithecia globose, dark, scattered up to 100µm in diameter. Perithecial setae 4–8, tortuous to straight, up to 110µm long; ascospores 4-septate, constricted, elliptic to cylindrical, 32–38x11–13 µm.

Irenopsis madumalaiensis Hosag., Crypto. Bot. 2/3: 184, 1991; Hosag., Meliolales of India, p. 114, 1996. (Image. 35).

Materials examined: FMKMC 28, 14.i.2010, on leaves of Kydia calycina Roxb. (Malvaceae), Sampaje Ghat, C.

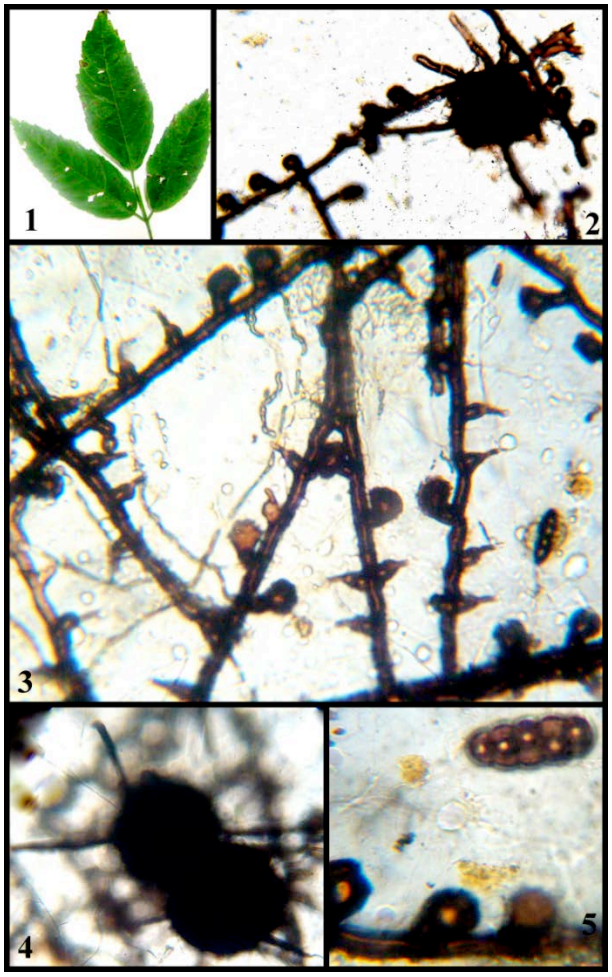


Image 34. *Irenopsis leeae* var. *indica*
1 - Infected leaves; 2-3 - Mycelium with appressoria & phialides; 4 - Perithecium with setae; 5 - Ascospore

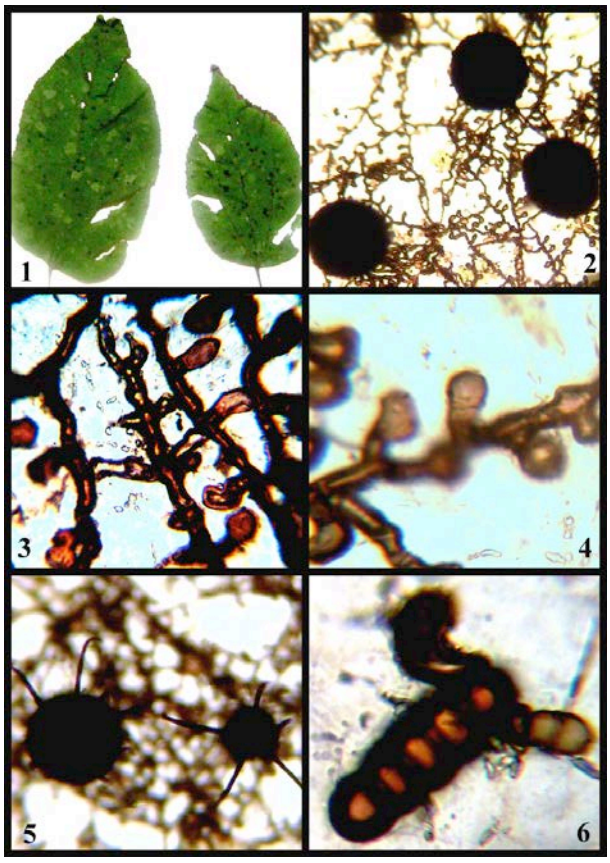


Image. 35. *Irenopsis madumalaiensis*
1. Infected leaves; 2. Mycelium with perithecia; 3-4. Mycelium with appressoria & phialides; 5. Perithecia with setae; 6. Germinating ascospore

Jagath Thimmaiah.

Colonies epiphyllous, subdense, crustose, up to 4 mm in diameter. Hyphae flexuous, branching opposite, unilateral to irregular at wide angles, loosely to compactly reticulate, cells 22–25x5–6 µm. Appressoria mostly unilateral, about 25% alternate, curved, antrorse to retrorse, more or less compactly arranged, 13–22 µm long; stalk cells cylindrical to cuneate, 2–5 µm long; head cells oblong, globose, clavate, triangular, sickle shaped, 12–15x8–10 µm. Phialides few, mixed with appressoria, opposite subopposite to unilateral, ampulliform to conoid, 13–20x5–7 µm. Perithecia scattered to grouped, globose, up to 160µm in diameter; perithecial setae carbonaceous black, few simple, mostly coiled at the apex, obtuse at the tip, up to 100µm long; ascospores 4-septate, brown, cylindrical, oblong, brown, constricted at the septa, 31–38x10–13 µm.

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. et al., Meliolales of India 2: 168, 2008.(Image 36)

Materials examined: TBGT 5455, FMKMCC 29, 2.xii.2009, on leaves of *Urena lobata* L. ssp. *sinuata* L. (Malvaceae), Hoddur, C. Jagath Thimmaiah; FMKMCC 30, 23.xii.2009, *Urena* sp. (Malvaceae), Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense, up to 2mm in diameter. Hyphae flexuous, branching opposite to alternate at wide angles, loosely reticulate, cells 21–35x5–9 µm. Appressoria alternate to unilateral, antrorse to subantrorse, 11–20 µm long; stalk cells cylindrical to cuneate, 2–6 µm long; head cells globose, few ovate, entire, angulose, sublobate, 9–14x10–16 µm. Phialides many, mixed with appressoria, opposite to alternate, ampulli-

form, 18–25x6–9 µm. Perithecia grouped, globose, up to 170µm in diameter; perithecial setae up to 8 in numbers, straight, acute to obtuse at the apex, black, up to 95µm long; ascospores cylindrical, 4-septate, 33–35x12–16 µm.

Irenopsis tenuissima (Stev.) Stev. var. ***major*** Kar & Maity, Sydowia, 24: 66, 1971; Hosag., Meliolales of India, p.116, 1996 (Image 37)

Materials examined: TBGT 5327, FMKMCC 31, 24.xi.2008, on leaves of *Gouania microcarpa* DC. (Rhamnaceae), Vanachalu, C. Jagath Thimmaiah.

Colonies epiphyllous, thin to subdense, up to 4 mm in diameter. Hyphae substraight, branching opposite at wide angles, loosely reticulate. Cells 20-25 x 7-9 µm. Appressoria alternate, few unilateral, antrorse, 19-30 µm long; stalk cells cuneate, 3-5 µm long; head cells ovate, straight, entire, 8-12 x 11-12 µm. Phialides few, mixed with appressoria, mostly opposite, ampulliform, 18-23 x 5-7 µm. Perithecia scattered, globose, up to 250 µm in diameter, perithecial setae 5-6, slightly curve, up to 65 µm long. Ascospores ellipsoidal to cylindrical, 4-septate, constricted at the septa, 40-44 x 10-17 µm.

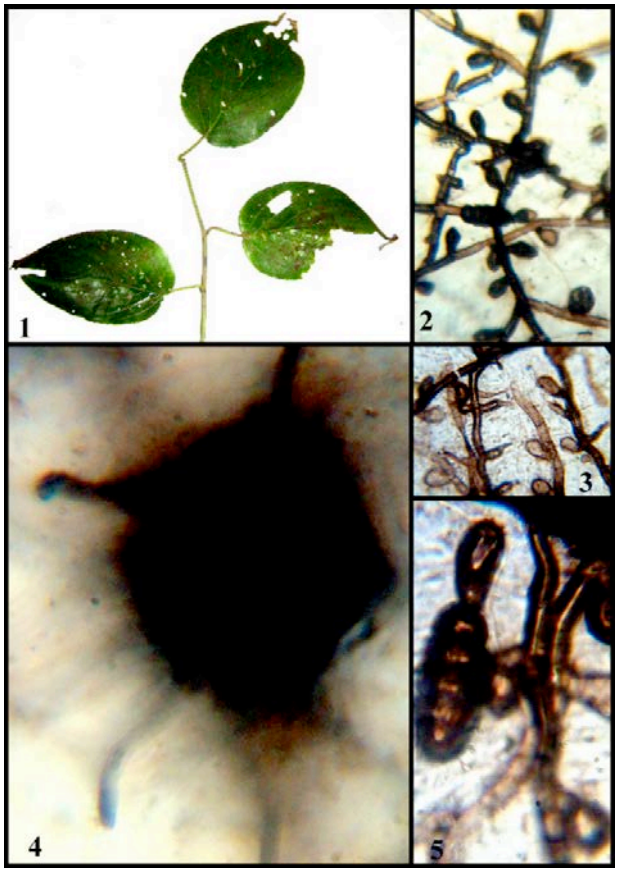


Image 37. *Irenopsis tenuissima* var. *major*
1 - Infected leaves; 2 - Colony formed from the ascospore; 3 - Appressoria & phialides; 4 - Perithecium with setae; 5 - Germinating ascospore

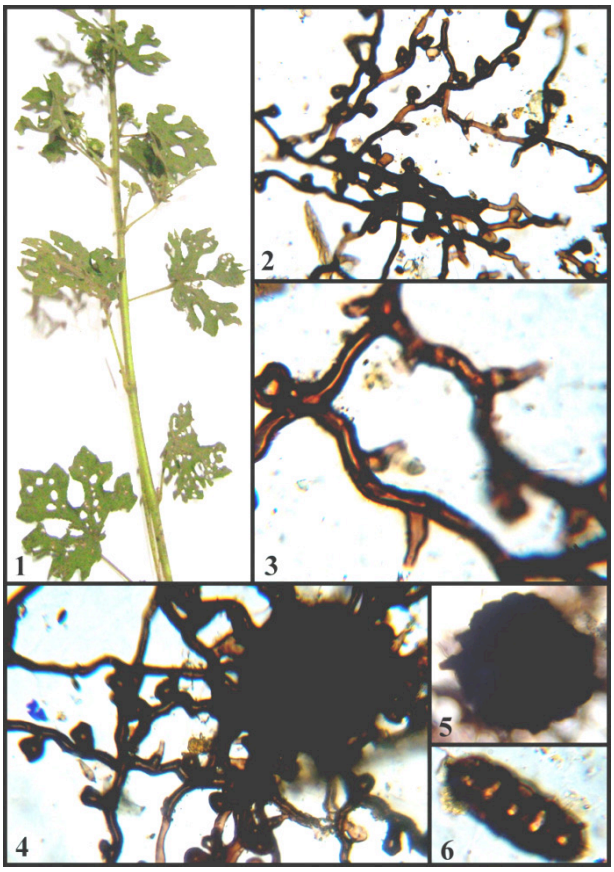


Image 36. *Irenopsis molleriana*
1 - Infected leaves, 2-3 - Mycelium with apressoria & phialides, 4&5 - Perithecia, 6 - Ascospore

Irenopsis trichiliae Hosag. & Riju, J. Threatened Taxa 2(4): 824, 2010 (Image 38)

Materials examined: TBGT 5440, FMKMCC 32, 1.xi.2009, on leaves of Trichilia connaroides (Wight & Arn.) Benth. (Meliaceae), Hoddur, C. Jagath Thimmaiah

Colonies epiphyllous, thin to subdense, up to 4mm in diameter. Hyphae substraight, branching opposite at wide angles, loosely reticulate, cells 20–25x7–9 µm. Appressoria alternate, few unilateral, antrorse, 19–30 µm long; stalk cells cuneate, 3–5 µm long; head cells ovate, straight, entire, 8–12x11–12 µm. Phialides few, mixed with appressoria, mostly opposite, ampulliform, 18–23x5–7 µm. Perithecia scattered, globose, up to 250µm in diameter, perithecial setae 5–6, slightly curve, up to 65 µm long; ascospores ellipsoidal to cylindrical, 4-septate, constricted at the septa, 40-44x10-17 µm.

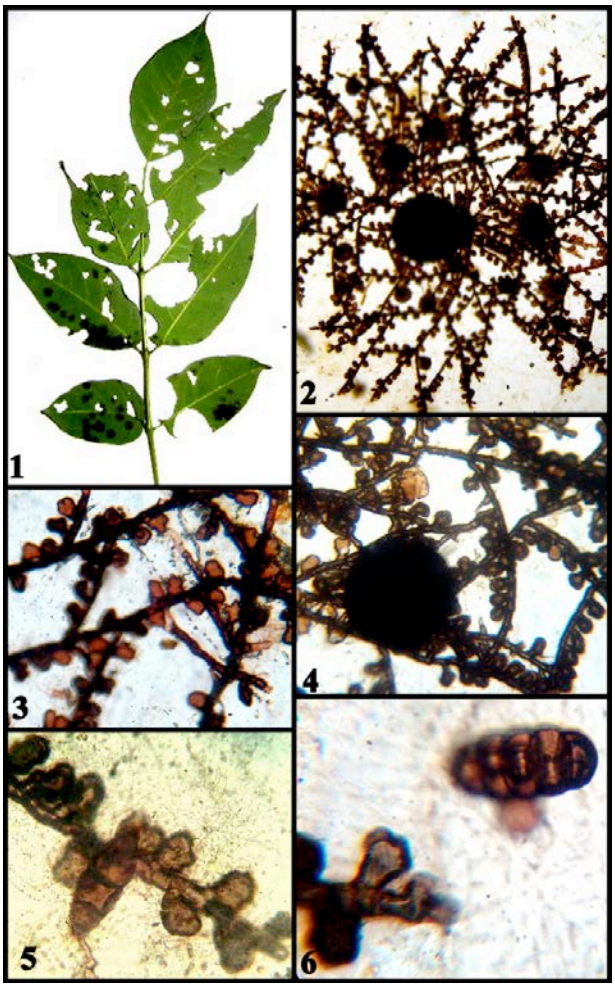


Image 38. *Irenopsis trichiliae*
1 - Infected leaves; 2 -Perithecium with colony; 3-4 - Appressoria, phialides & perithecium; 5-6 - Germinating ascospores

Irenopsis triumfettae (Stev.) Hansf. & Deight. var. ***indica*** Hosag. & Abraham, J. Mycopathol. Res. 36: 98, 1998; Hosag., Meliolales of India 2: 174, 2008. (Image 39)

Colonies epiphyllous, subdense, up to 3mm in diameter. Hyphae substraight branching opposite at acute to wide angles, loosely reticulate, cells 27–35x7–9 µm. Appressoria alternate, antrorse, straight, 18–27 µm long; stalk cells cuneate to cylindrical, 5–8 µm long; head cells globose, ovate, few angulose and sublobate, entire, 13–16x10–14 µm. Phialides many, mixed with appressoria, alternate to opposite, ampulliform, 19–24x7–8 µm. Perithecia grouped, globose, up to 110µm in diameter; perithecial setae up to 7 in numbers, straight, coiled or curved at the apex, up to 50µm long; ascospores cylindrical to ellipsoidal, 4-septate, brown, constricted at the septa, 38–40x13–14 µm.

Materials examined: HCIO 45798, TBGT 1547, 12.xi.2003, on leaves of *Triumfetta* sp. (Tiliaceae), Jodupal, , V.B. Hosagoudar et al; TBGT 5436, FMKMCC 33, 29.xi.2009, *T. rhomboidea* L., Hoddur, C. Jagath Thimmaiah; TBGT 5457, FMKMCC 34, 10.xii.2009, Hoddur, C. Jagath Thimmaiah; FMC Compound, Madikeri.

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

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

Type: *M. psidii* Fries

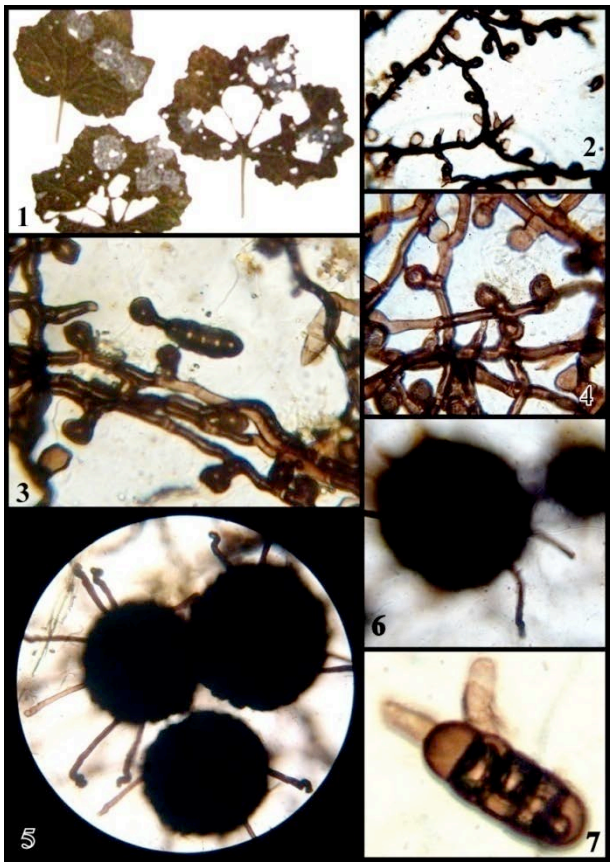


Image 39. *Irenopsis triumfettae* var. *indica*
1 - Infected leaves; 2-4 - Mycelium with appressoria & phialides; 5-6 - Perithecia with setae; 7 - Germinating ascospore.

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

Meliola abrupta Sydow, Ann. Mycol. 15: 181, 1917; Hansf., Sydowia Beih.2: 292, 1961; Hosag., Jacob Thomas & Agarwal, Taprobanica 3(1): 42, 2011.

Meliola derridis Yates, Philippine J. Sci. 13: 368, 1918. (Image 40)

Materials examined: FMKMCC 36, 11.i.2011 On leaves of *Derris* sp. (Fabaceae), Riverside, Hoddur, , C. Jagath Thimmaiah.

Colonies epiphyllous, up to 4mm in diameter, thin. Hyphae substraight, branching mostly opposite, few unilateral at wide angles, loosely reticulate. Cells 13–27x5–7 µm. Appressoria mostly opposite, few alternate and unilateral, straight, antrorse to retrorse; stalk cells cylindrical to cuneate, 3–5 µm long; head cells globose, oblong, entire, 11–13x7–9 µm. Phialides few, mixed with appressoria, alternate to opposite, ampulliform, 15–20x6–8 µm. Mycelial setae many, simple, slightly curved, acute, few obtuse at the tip, up to 300µm. Perithecia scattered, globose, up to 150µm in diameter; ascospores cylindrical, 4-septate, constricted at the septa, brown, 31–35x11–12 µm.

Meliola acanthacearum Hansf. var. ***occidentalis*** Hansf., Sydowia 11: 50, 1957; Sydowia Beih.2: 681, 1961; Hosag. & Goos, Mycotaxon 37: 218, 1990; Hosag., Meliolales of India, p. 120, 1996. (Image 41)

Colonies epiphyllous, dense, up to 3mm in diameter. Hyphae straight, branching opposite at acute angles, closely reticulate, cells 11–21x8–9 µm. Appressoria alternate, antrorse, straight to slightly curved, 19–27 µm long; stalk cells cuneate, 4–9 µm long; head cells cylindrical, few ovate, few attenuated at the apex 15–17x7–9 µm. Phialides few mixed with appressoria, unilateral, ampulliform, 16–20x4–6 µm. Mycelial setae numerous, simple, straight, acute to obtuse at the tip, up to 420µm

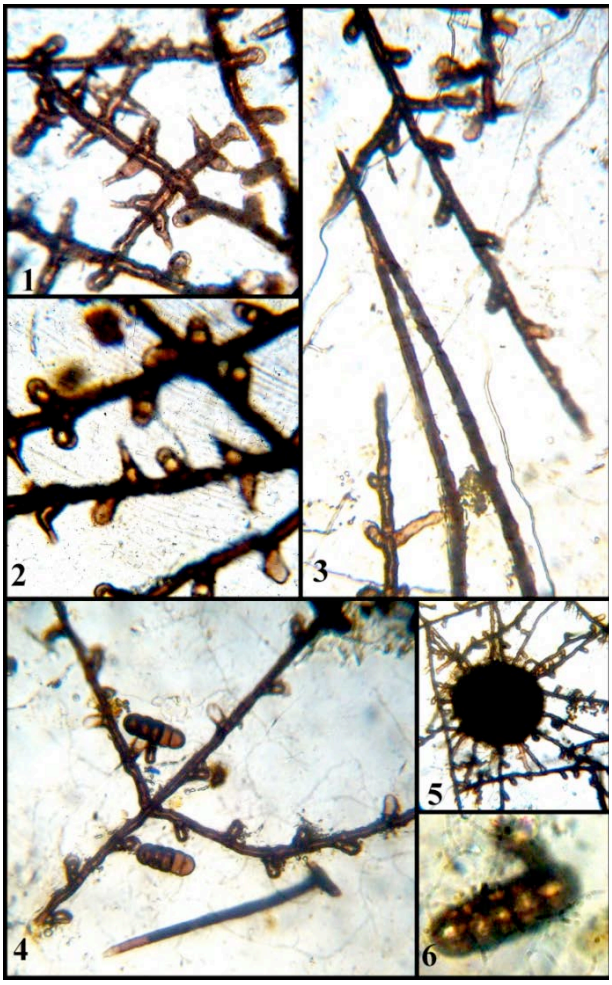


Image 40. *Meliola abrupta*
1&2 - Appressoria & Phialides; 3 - Mycelial setae; 4 - Branched mycelium & ascospores; 5 - Perithecium; 6 - Germinating ascospore

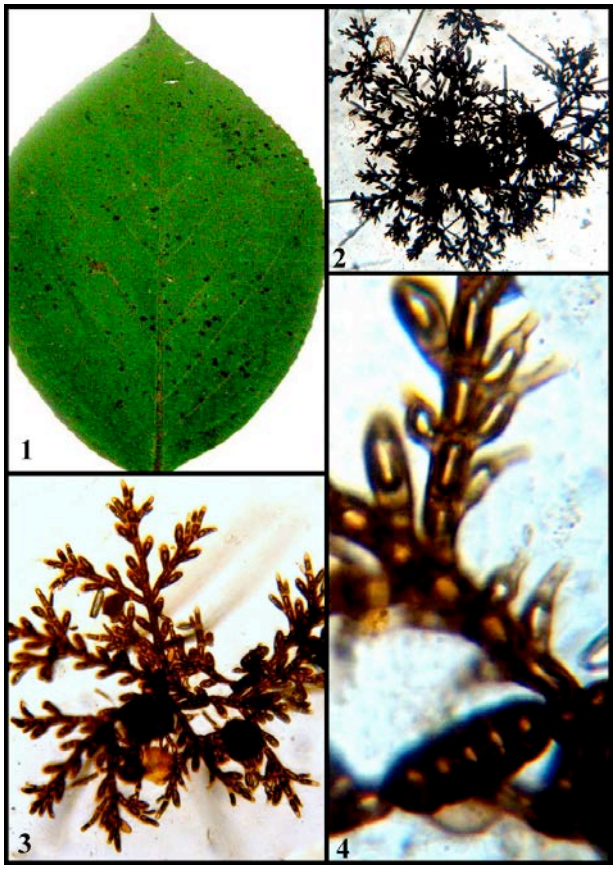


Image 41. Meliola acanthacearum var. occidentalis
1 - Infected leaf; 2 - Colony with perithecia; & Mycelial setae; 3. Enlarged colony; 4 - Appressoria, phialides & Ascospore.

long. Perithecia grouped, globose to ovate, up to 140µm in diameter; ascospores oblong to cylindrical, 4-septate, brown, constricted at the septa, 30–33x14–15 µm.

Materials examined: TBGT 3400, HCIO 49145, 26.xi. 2008, on leaves of *Acanthaceae* member, Madikari, V.B.Hosagoudar et al; TBGT 4109, HCIO 49957, 24.xi.2008, Karikund Estate, Hoddur, V.B. Hosagoudar et al; TBGT 5368, FMKMCC 37, C. Jagath Thimmaiah.

Meliola alstoniae Koord., Verh. Kon. Ned. Akad. Wetensch; Afd. Natuurk; Tweede sect. 13: 170, 1907; Hansf., Sydowia Beih 2: 556, 1961; Thite & Kulkarni, J. Shivaji Univ.(Sci.) 18: 211, 1978; Hosag. & Goos, Mycotaxon 37: 218, 1990; 42: 129, 1991; Hosag., Meliolales of India, p. 128, 1996.

Meliola alstonicola Hansf., Recueil I.N.E.A.C. 2:35, 1945. (Image 42)

Materials examined: FMKMCC 38, 14.i.2010, on leaves of Alstonia scholaris (L.) R. Br. (Apocyanaceae), Sampaje Ghat, C. Jagath Thimmaiah.

Colonies epiphyllous, discrete, subdense, up to 5mm in diameter. Hyphae substraight, branching mostly opposite to few subopposite or unilateral at wide to subacute to wide angles, loosely to closely reticulate, cells 21–27x5–7 µm. Appressoria alternate, straight to slightly curved, antrorse to retrorse, 15–20 µm long; stalk cells cylindrical to cuneate, 4–6 µm long; head cells oblong, clavate, slightly curved, entire, 12–15x7–10 µm. Phialides borne on separate mycelial branches, alternate to unilateral, conoid to ampulliform, 15–18x7–9 µm. Mycelial setae few, simple, slightly curved, acute, up to 390µm long. Perithecia globose scattered to grouped, up to 140µm in diameter; ascospores 4-septate, constricted at the septa, cylindrical to oblong, elliptic, 32–34x12–14 µm.

Meliola altissimae Hoasg. in Hosag. & Goos, Mycotaxon 42: 129, 1991; Hosag., Raghu & Pillai, Nova Hedwigia 58: 536, 1994; Hosag., Meliolales of India, p. 128, 1996. (Image 43).

Materials examined: FMKMCC 39, 5.xi.2009, on leaves of *Vitex altissima* L. (Verbenaceae), Hoddur, C. Ja-

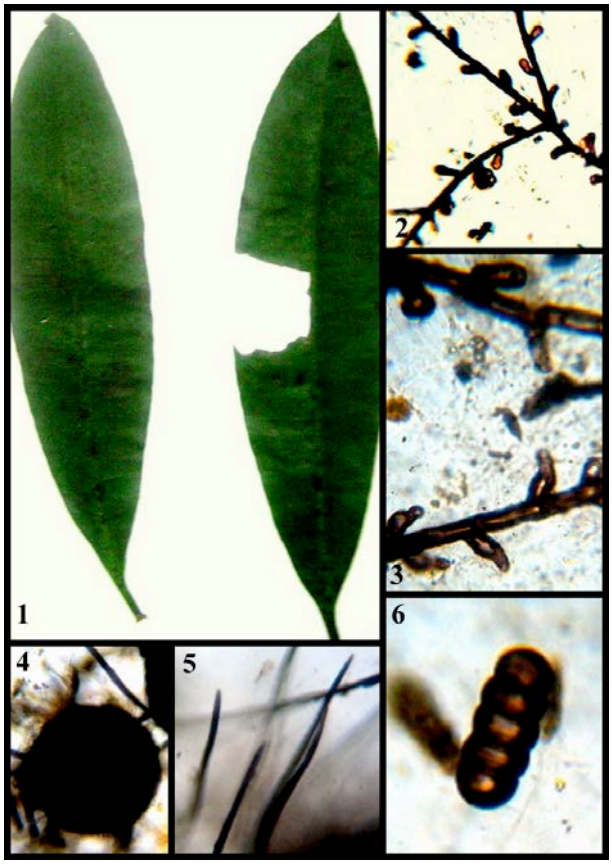


Image 42. *Meliola alstoniae*
1 - Infected leaves; 2 - Branched mycelium; 3 - Appressoria & Phialdes, 4 - Perithecium; 5 - Mycelial setae; 6 - Ascospore

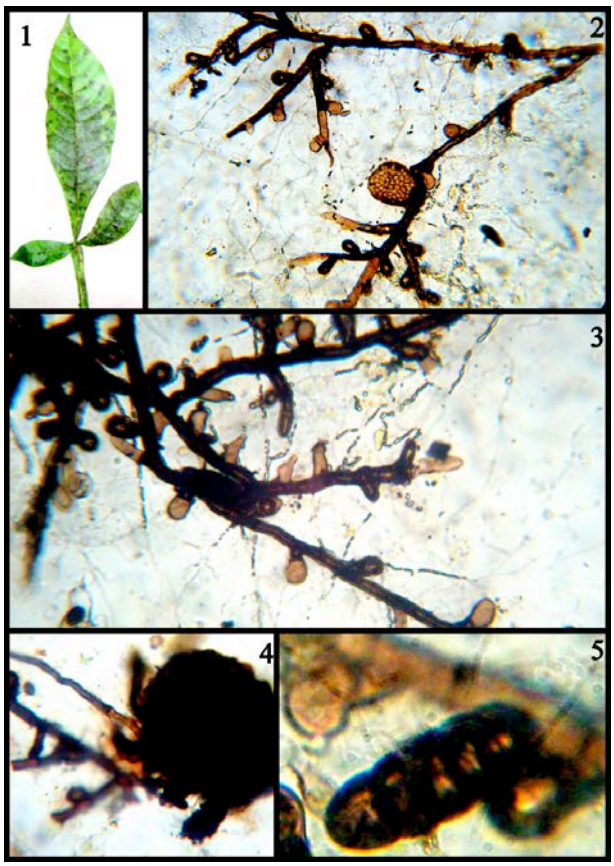


Image 43. *Meliola altissimae*
1 - Infected leaflets; 2 - Branched mycelium; 3 - Appressoria & Phialides; 4 - Perithecium; 5 - Ascospore

gath Thimmaiah.

Colonies epiphyllous, dense, up to 3mm in diameter, more or less covering the surface of the leaf. Hyphae straight to slightly flexuous branching alternate to opposite at acute angles, loosely reticulate, cells 30–39x6–9 µm. Appressoria alternate, antrorse, straight to curved 16–19 µm long; stalk cells cylindrical to cuneate 3–5 µm long; head cells ovate globose, entire, 10–13x12–15 µm. Phialides alternate, mixed with appressoria, ampulliform, 17–25x6–8 µm. Mycelial setae mostly grouped around perithecia, simple, straight, obtuse at the apex, up to 340µm long. Perithecia scattered, globose, up to 120µm in diameter; ascospores 4-septate, constricted at the septa, obovoidal, 32–36x13–15 µm.

Meliola angiopteridis Hansf. var. indica Hosag. in Hosag. & Goos, Mycotaxon 37: 219, 1990; Hosag., Meliolales of India, p. 131, 1996. (Image 44)

Materials examined: BGT 3399, 5354, HCIO 49144; TBGT 5354, FMKMCC 40, 25.xi.2008, on leaflets of *Angiopteris evecta* (Forst.) Hoff. (Angiopteridaceae), Bagamandala, Talacauveri, V.B. Hosagoudar et al T. C. Jagath Thimmaiah.

Colonies hypophyllous, up to 5mm in diameter. Hyphae substraight to flexuous, branching irregular at subacute angles, loosely reticulate, cells 20–25x4–6 µm. Appressoria alternate, unilateral, few opposite, mostly antrorse, few retrorse, curved, 15–18 µm long; stalk cells cuneate, 3–5 µm long; head cells ovate, few curved inwards, entire, 10–12x8–10 µm. Phialides few, mixed with appressoria, cylindrical to ampulliform, 13–16x6–8 µm. Mycelial setae numerous, simple, straight to slightly bent, acute to obtuse at the tip, up to 600µm long. Perithecia scattered, globose, surrounded by mycelial setae up to 120µm diameter; ascospores 4-septate, ellipsoidal, constricted at the septa, 35–40x12–16 µm.

Meliola ardisiicola Hosag., Rajkumar & Jose, Indian Phytopath. 57: 455, 2004; Hosag., Meliolales of India 2: 190, 2008. (Image 45).

Materials examined: FMKMCC 41, 16.xi.2010, on leaves of *Ardisia solanacea* Roxb. (Myrsinaceae), Mandalpatti, C. Jagath Thimmaiah.

Colonies epiphyllous, up to 4mm in diameter. Hyphae undulate to flexuous, branching alternate to irregular, loosely reticulate, cells 13–15x6–7 µm. Appressoria alternate, antrorse, few retrorse, 15–20 µm long; stalk cells cylindrical to cuneate, 3–5 µm long; head cells mostly ovate, clavate, few angular, curved, entire,

Image 44. *Meliola angiopteridis* var. *indica*
1 - Infected leaf lets; 2 - Branched mycelium; 3 - Appressoria; 4 - Mycelial setae; 5 - Perithecium; 6 - Ascospore

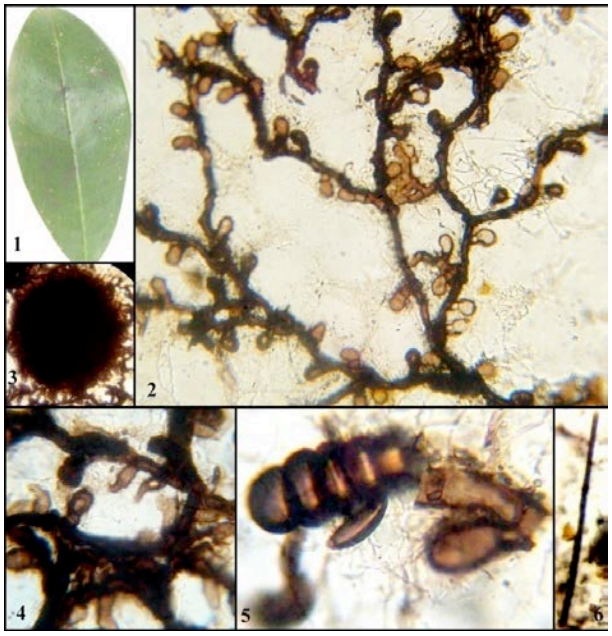


Image 45. *Meliola ardisiicola*
1 - Infected leaf; 2 - Branched mycelium; 3 - Perithecium; 4 - Appressoria & Phialides; 5 - Germinating ascospore; 6 - Mycelial setae

12–15x13–19 µm. Phialides few, mixed with appressoria, unilateral to irregular, ampulliform, 15–20x6–8 µm. Mycelial setae few, straight, obtuse at the apex, up to 300µm long. Perithecia scattered to grouped, carbonaceous, margin fringed, up to 350µm in diameter; ascospores 4-septate, ellipsoidal to cylindrical, constricted, 40–43x14–16 µm.

Meliola artocarpi Yates, Phiippine 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. (Image 46).

Materials examined: TBGT 3426, HCIO 49171, 25.xi.2008, on leaves of *Artocarpus* sp. (Moraceae), Bagamandala, C. Jagath Thimmaiah; TBGT 5349, FMKMCC 42, 25.xi.2008, *A.integrifolius* sensu Gamble, Bhagamandala, C. Jagath Thimmaiah.

Colonies epiphyllous, dense, up to 8mm in diameter. Hyphae straight to substraight, branching alternate at subacute angles, closely reticulate, cells 25–35x7–10 µm. Appressoria alternate, antrorse, straight, 33-40 µm long; stalk cells cylindrical to cuneate 9–14 µm long; head cells ovoid, globose, entire to crenate, angulose 18–23x15–20 µm. Phialides alternate, mixed with appressoria, ampulliform, 20–25x6–8 µm. Mycelial setae numerous, curved, uncinate, simple, mostly obtuse, few acute, up to 300µm long. Perithecia grouped to scattered, globose, up to 140µm in diameter; ascospores cylindrical, 4-septate, constricted at the septa, 35–40x13–15 µm.

Meliola atalantiae Hosag. in Hosag. & Goos, Mycotaxon 37: 220, 1990; Hosag., Meliolales of India, p. 135, 1996. (Image 47)

Materials examined: TBGT 5473, FMKMCC 43, 4.xii.2009, on leaves of *Atalantia monophylla* (L.) DC. (Rutaceae), Devarakadu, Hoddur, C. Jagath Thimmaiah.

Colonies hypophyllous, up to 7mm in diameter.

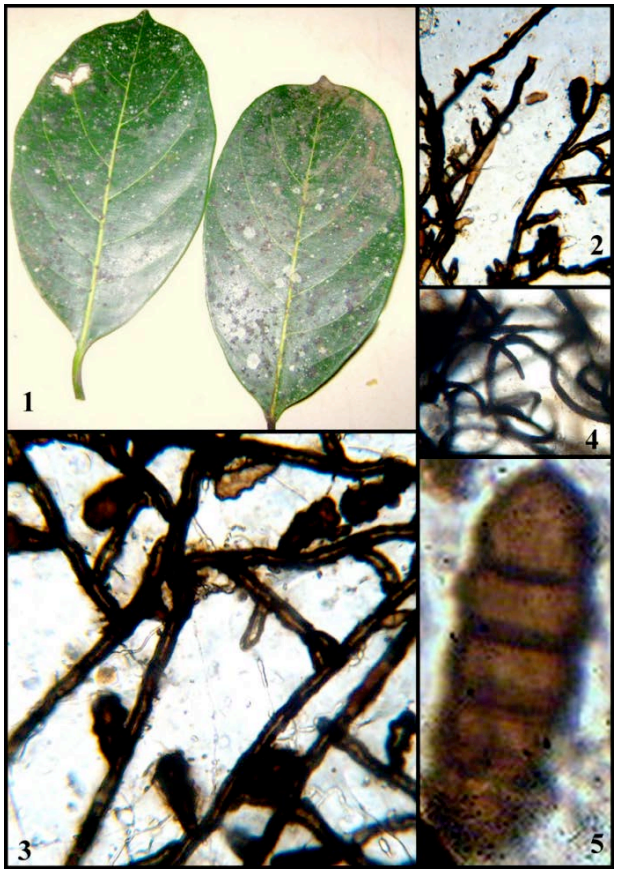


Image 46. *Meliola artocarpi*
1 - Infected leaves; 2 - Branched mycelium; 3 - Appressoria & Phialdes; 4 -Mycelial setae; 5 - Ascospore

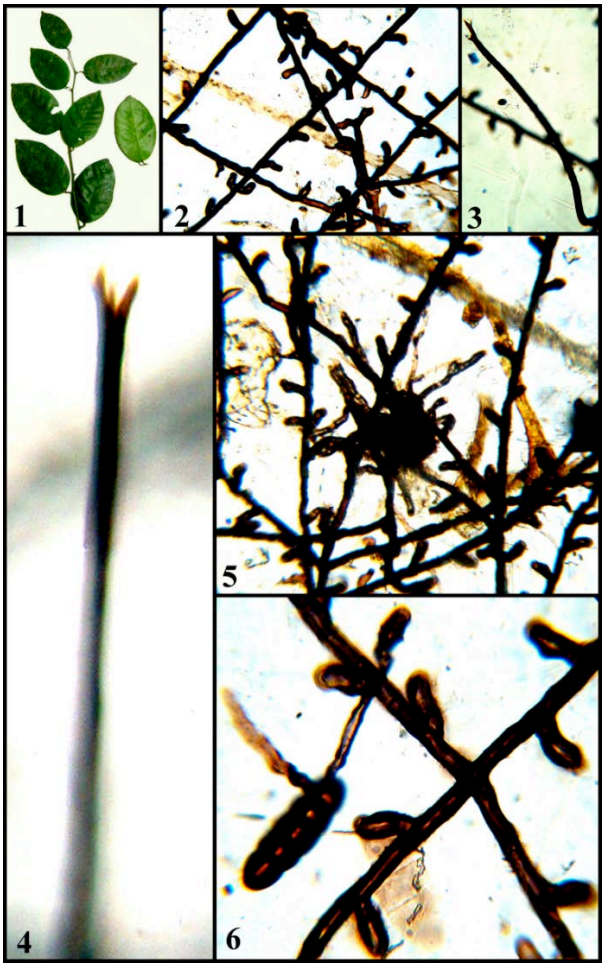


Image 47. *Meliola atalantiae*
1 - Infected leaves; 2 - Branched mycelium; 3&4 - Mycelial setae; 5 - Colony showing perithecium; 6 - Germinating ascospore.

Hyphae substraight to flexuous, branching opposite at subacute angles, loosely reticulate, cells 25–27x6–7 µm. Appressoria alternate to unilateral, straight, antrorse or at right angles to hyphae, cylindrical, 16–19x7–8 µm; stalk cells cylindrical to cuneate, 3–4 µm long; head cells cylindrical to ovate rounded at the apex, entire to sublobate, 10–12x7–8 µm. Phialides mixed with appressoria, opposite to alternate, ampulliform 18–20x6–10 µm. Mycelial setae straight to slightly curved at the apex, simple, acute, obtuse or forked at the tip, up to 670µm long. Perithecia scattered, up 120µm in diam.; ascospores 4-septate, cylindrical to oblong, constricted at the septa, 34–40x10–15 µm.

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

Materials examined: TBGT 5328, FMKMCC 44; TBGT 3421, HCIO 49166, 24.xi.2008, on leaves of *Atylosia lineata* Wight & Arn. (Fabaceae), Vanachalu, V.B. Hosagoudar et al; C. Jagath Thimmaiah.

Colonies epiphyllous, subdense, up to 3mm in diameter. Hyphae substraight, slightly flexuous, branching opposite at acute to subacute angles, loosely reticulate, cells 25–34x6–7.5 µm. Appressoria mostly alternate to unilateral, few opposite, antrorse to subantrorse, few retrorse, straight to curved, 15–20 µm long; stalk cells cuneate to cylindrical, 4–7 µm long head cells ovate, few globose, bent like a hook, entire, 1–13x9–12 µm. Phialides few, mixed with appressoria, opposite, ampulliform, 7–10x16–19 µm. Mycelial setae many, simple, acute at tip, up to 300µm long. Perithecia grouped, globose, up to 120µm in diameter; ascospores cylindrical, brown, constricted at the septa, 4-septate, 42–45x14–16 µm.

Meliola bakeri Sydow, Ann. Mycol. 14: 335, 1916; Hansf., Sydowia Beih.2: 374, 1961; Hosag., Jacob Thomas & Agarwal, Taprobanica 3(1): 42, 2011. (Image 49)

Materials examined: HCIO 49143, TBGT 3398, 6.xi.2008, on leaves of Vitaceae member, V.B.Hosagoudar et al; TBGT 5358, FMKMCC 45, 25.xi.2008, *Cissus repens* Lam. (Vitaceae), Bhagamandala, C. Jagath Thimmaiah; FMKMCC 46, 25.viii.2009, Hoddur, C. Jagath Thimmaiah; TBGT 5358, 26.xi.2008, Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, scattered, up to 3mm in di-

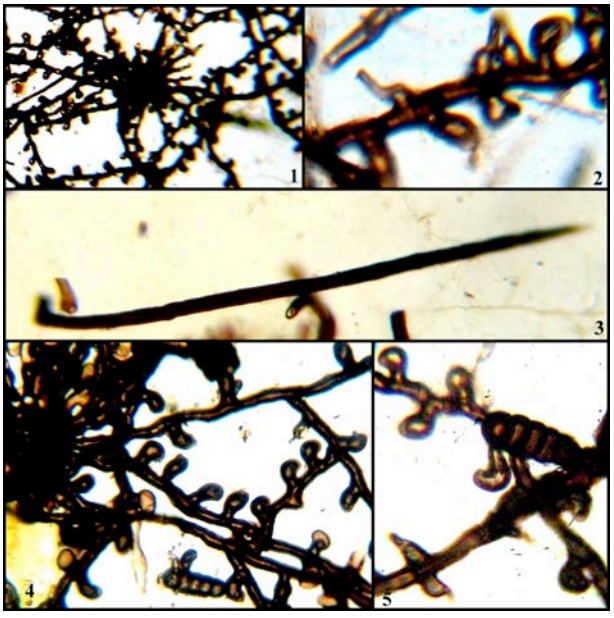


Image 48. *Meliola atylosiae*
1 - Colony; 2 - Appressoria & Phialides; 3 - Mycelial setae; 4 - Colony showing perithecium; 5 - Germinating ascospore

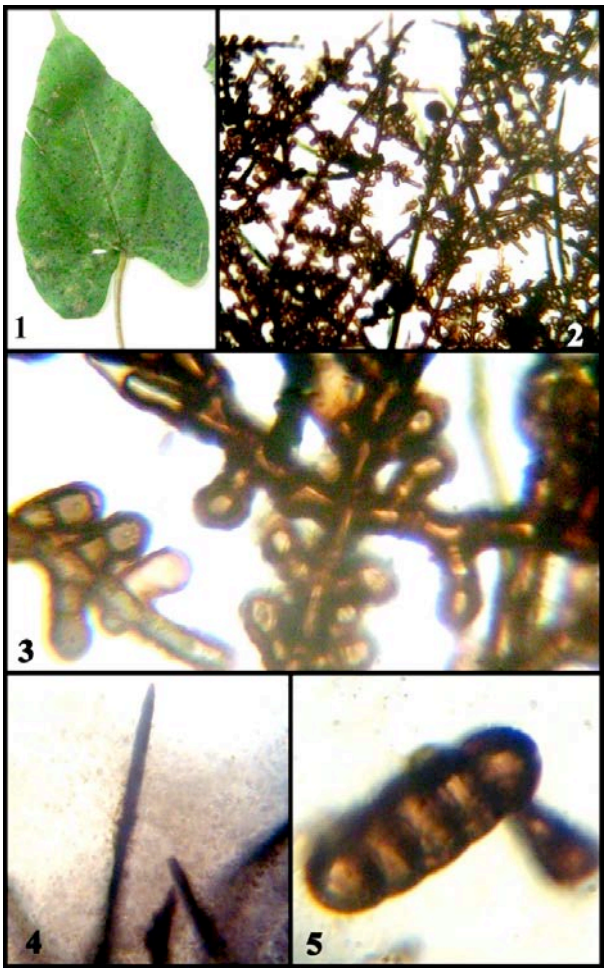


Image 49. *Meliola bakeri*
1 - Infected leaf; 2-3 - Mycelium with appressoria; 4 - Apical portion of mycelial setae; 5 - Germinating ascospore

ameter. Hyphae dense, straight branching opposite at subacute angles, closely reticulate, forms a thick mycelial mat. Cells 11–13x9–12 µm. appressoria mostly opposite, few alternate, antrorse, straight to curved, 15–18 µm long; stalk cells cuneate, 4–6 µm long; head cells ovate, globose, entire, few lobate, 10–12x11–15 µm. Phialides few, mixed with appressoria, ampulliform, 14–16x7–9 µm. Mycelial setae numerous, simple, scattered, straight to curved, acute at the tip, up to 580µm long. Perithecia grouped to scattered, globose up to 130µm in diameter; ascospores 4-septate, cylindrical, constricted at the septa, 33–40x15–17 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. (Image 50)

Materials examined: TBGT 5413, FMKMCC 47, 10.v.2009, on leaves of *Butea monosperma* (Lam.) Taub. (Fabaceae), Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, dense, up to 3mm diameter.

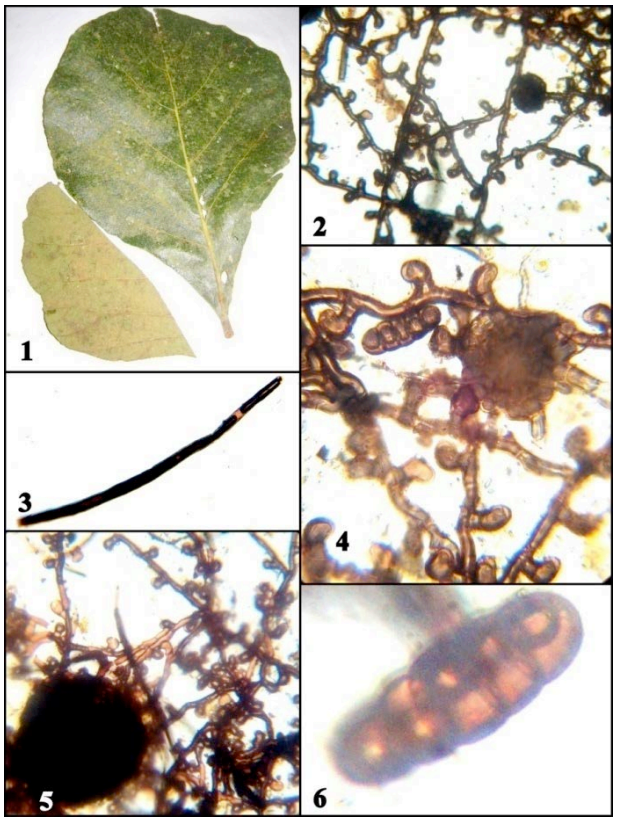


Image 50. *Meliola buteae*
1. Infected leaves; 2 &4. Mycelium with appressoria; 3. Mycelial setae; 4. Colony showing perithecia; 6. Ascospore

Hyphae substraight, flexuous, branching opposite at wide angles, closely to loosely reticulate, cells 28–32x5–8.5 µm. Appressoria mostly alternate to opposite, antrorse to subantrorse, few retrorse, straight to curved, 14–23 µm long; stalk cells cuneate to cylindrical, 4–7 µm long; head cells ovate, few globose, angulose, entire, 13–16x12–14 µm. Phialides many, mixed with appressoria, opposite to unilateral, ampulliform, 16–22x7–9 µm. Mycelial setae numerous, mostly grouped around perithecia, simple, straight, acute to obtuse, up to 550µm long. Perithecia globose, grouped, up to 270µm in diameter; ascospores 4-septate, cylindrical, constricted at the septa, 39–42x15–17 µm.

Meliola butleri Sydow, Ann. Mycol. 9: 379, 1911; Hansf., Sydowia Beih. 2: 382, 1961; Srinivasalu, Nova Hedwigia Beih. 47: 423, 1974; Hosag., J. Econ. Taxon. Bot. 9: 375, 1987; Hosag., Meliolales of India, p.148, 1996. (Image 51)

Materials examined: HCIO 45667, TBGT 1414, 12.xi.2003, on leaves of *Citrus* sp. (Rutaceae), Jodupal, V.B. Hosagoudar et al.; TBGT 5387, FMKMCC 49 25.vii.2010, Hoddur, C. Jagath Thimmaiah; TBGT 5410, FMKMCC 50, 12.ix.2009, FMC campus Madikeri, Jagath Thimmaiah; FMKMCC 48, 28.xii.2008, *C. limon* (L.) Burm. f., Hoddur, C. Jagath Thimmaiah.

Colonies hypophyllous, dense, up to 4mm in diameter. Hyphae straight to substraight, branching opposite at subacute to wide angles, closely reticulate, cells 15–22x7–9 µm. Appressoria opposite to alternate (40%), antrorse, straight to slightly curved, up to 11–26 µm long; stalk cells cuneate to cylindrical, up to 2–6 µm; head cells ovate, cylindrical, clavate, few curved, entire, rarely sublobate, up to 9–18x9–12 µm. Phialides many, borne on separate mycelial branch, rarely mixed with appressoria, mostly opposite to alternate, ampulliform, neck elongated, 7–20x4–7 µm. Mycelial setae numerous, simple, straight, acute, obtuse to dentate, up to 750µm long. Perithecia scattered, globose, up to 230µm in diameter; ascospores cylindrical to oblong, 4-septate, constricted at the septa, 43–45x16–18 µm.

Meliola canarii Sydow, Ann. Mycol. 2:550, 1914; Hansf., Sydowia Beih. 2: 399, 1961; Hosag., Dayal & Goos, Mycotaxon 46: 204, 1993; Hosag., Meliolales of India, p.150, 1996.

Meliola nigro-rufescens Sacc., Att. Acad. Ven.- Trent. Istr. 10: 60, 1914. (Image 52)

Materials examined: FMKMCC 51, 23.ii.2011, on leaves of *Canarium strictum* Roxb. (Bursaraceae), Mandrane Estate, Hoddur, C. Jagath Thimmaiah.

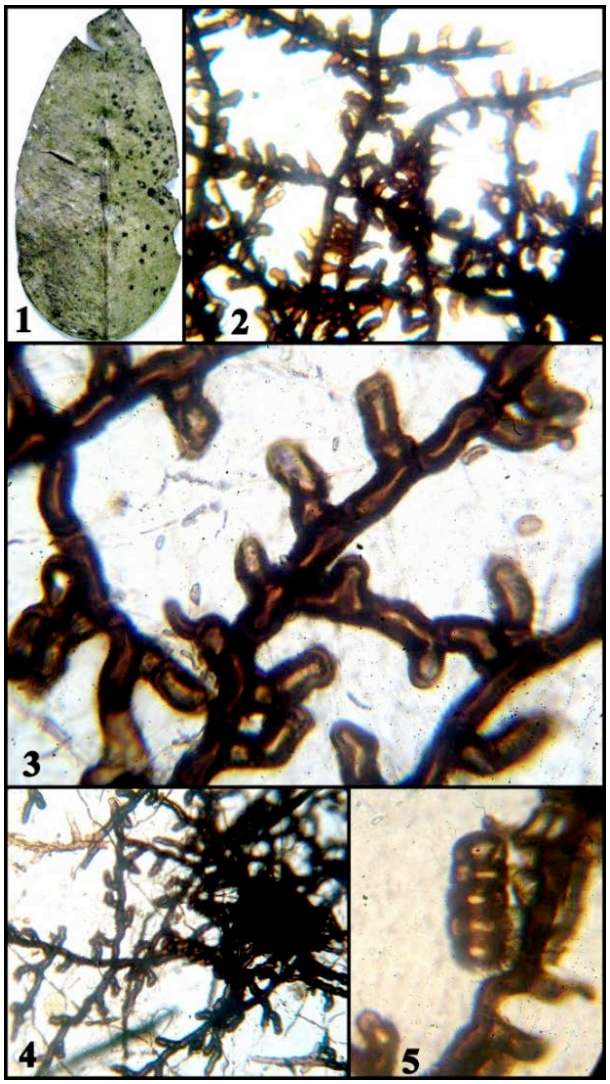


Image 51. *Meliola butleri*
1 - Infected leaf; 2 - Mycelium with appressoria & Phialides; 4 - Colony showing perithecium; 5 - Ascospore

Colonies amphigenous, thin to velvety, up to 4mm in diameter. Hyhae flexuous to straight, branching mostly opposite to subopposite at wide angles, loosely reticulate, cells 30–45x5–8µm. Appressoria alternate, few unilateral, straight, antrorse, 32–40 µm long; stalk cells cylindrical to cuneate 5–11µm long; head cells angular, few ovate, tapered, entire, 23–26x5–8 µm. Phialides mixed with appressoria, opposite to each other or alternating with appressoria, ampulliform, 15–24x5–7µm. Mycelial setae few, simple, straight, acute to obtuse at the tip, up to 950µm long. Perithecia scattered, globose, up to 130µm in diameter; ascospores 4-septate, constricted at the septa, obovoidal to cylindrical, 40–44x16–18 µm.

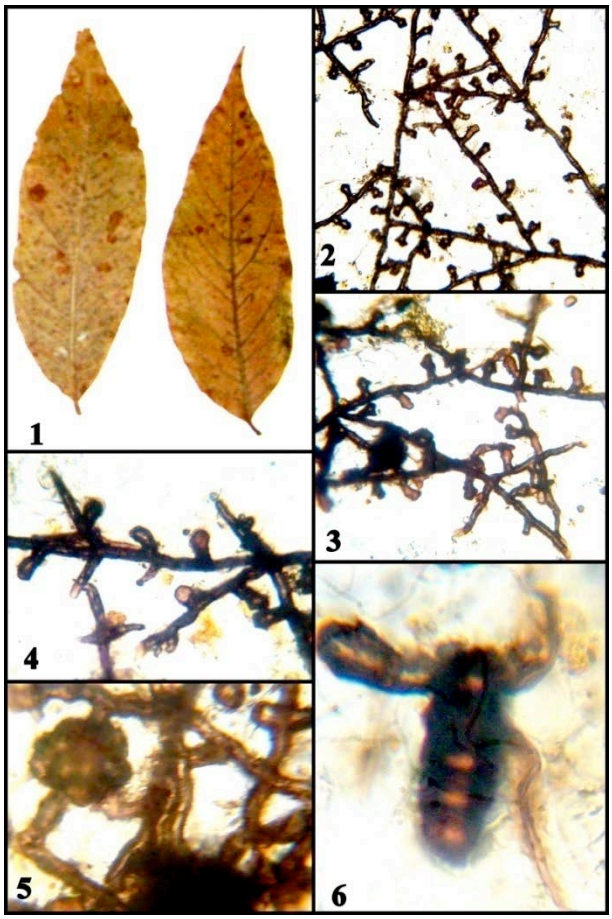


Image 52. *Meliola canarii*
1 - Infected leaves; 2-3 - mycelium with appressoria & Phialides; 5 - Young perithecium; 6 - Germinating ascospore

Meliola canthii Hansf., Proc. Linn. Soc. London 157: 22, 1945; Sydowia Beih. 2: 604, 1961; Kapoor, Indian Phytopath. 20: 152, 1967; Hosag., Meliolales of India, p. 153, 1996. (Image 53)

Materials examined: HCIO 45733, TBGT 1482, 13.xi.2003, on leaves of *Canthium* sp. (Rubiaceae), MPCA, Brahmagiri, Talacauvery, V.B. Hosagoudar et al;TBGT 5381, FMKMCC 52, 25.xi.2008, *C. dicoccum* (Garertn) Teijsm. & Binn., Galibeedu, C. Jagath Thimmaiah.

Colonies amphigenous, dense up to 5mm in diameter. Hyphae straight to substraight, branching opposite to alternate or irregular at acute angles, loosely reticulate, cells 19–29x6–9 µm. Appressoria alternate, straight to curved, antrorse, 22–33 µm long; stalk cells cylindrical to cuneate, 2–11 µm long; head cells cylindrical to clavate, entire to angulose,15–19x12–17 µm. Phialides mixed with appressoria, ampulliform, 21–27x7–11 µm. Mycelial setae scattered to grouped around perithecia, simple straight, acute, up to 410µm long. Perithecia scattered up to 70µm in diameter; ascospores oblong,

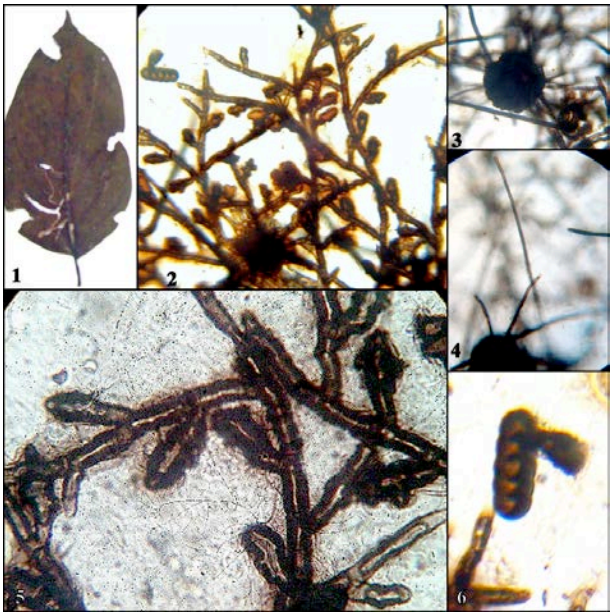


Image 53. *Meliola canthii*
1 - Infected leaf; 2 - Branched mycelium; 3&4 - Perithecium & mycelial setae; 5 - Appressoria; 6 - Germinating ascospore.

4-septate, constricted, 40–47x13–17 µm.

Meliola canthii-angustifolii Hosag., Meliolales of India, P. 153, 1996. (Image 54).

Materials examined: FMKMCC 53, 16.xi.2010, on leaves of *Canthium coromandelicum* (Burm. f.), (Rubiaceae), Mandalpatti, November 16, 2010, C. Jagath Thimmaiah.

Colonies amphigenous, dark carbonaceous, up to 5mm in diameter. Hyphae straight to substraight or slightly flexuous, branching mostly opposite, few alternate at acute to wide angles, closely reticulate, cells 19–35x5–8 µm. Appressoria alternately arranged, few unilateral, antrorse, retrorse, 27–30 µm long ; stalk cells cylindrical to cuneate 8–11 µm long; head cells ovate, oblong, few slightly reflexed,18–23x14–17 µm. Phialides borne on separate mycelial branches alternate to opposite, few unilateral, ampulliform, 15–19x6–8 µm. Mycelial setae numerous, simple, straight, slightly curved, acute or obtuse at the tip, up to 600µm long. Perithecia scattered to grouped, globose, and surrounded by mycelial setae, up to 250µm in diameter; ascospores obovoidal 4-septate, constricted at the septa, brown, 44–52x17–20 µm.

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. (Image 55)

Materials examined: HCIO 45628, TBGT 1371, 11.xi.2003, on leaves of *Nephelium longan* (Lam.) Camb. (Sapindaceae), Abbe Falls, V.B. Hosagoudar et al.; HCIO 45781, TBGT 1530, 11.xi.2003, *Nephelium* sp., Abbe Falls, V.B. Hosagoudar et al.; TBGT 5351, FMKMCC 54, 25.xi.2008, *Dimocarpus longan* Lour. (*Sapindaceae*), Cherambane, C. Jagath Thimmaiah; TBGT 5365, FMKMCC 55, 25.xi.2008, Bhagamandala, Jagath Thimmaiah.

Colonies epiphyllous, dense, up to 4mm in diameter. Hyphae straight to substraight, branching opposite at subacute angles, loosely to closely reticulate, cells 13–20x5-7 µm. Appressoria opposite, antrorse, straight, 15–20 µm long; stalk cells cuneate, 2–4 µm long; head cells ovate, entire, attenuated at the apex, 11–15x5–8 µm. Phialides many, mixed with appressoria, opposite, few unilateral, ampulliform, 18–23x5–7.5 µm. Mycelial setae many, grouped around perithecia, simple, straight, few curved, acute to obtuse at the tip, up to 900µm long.

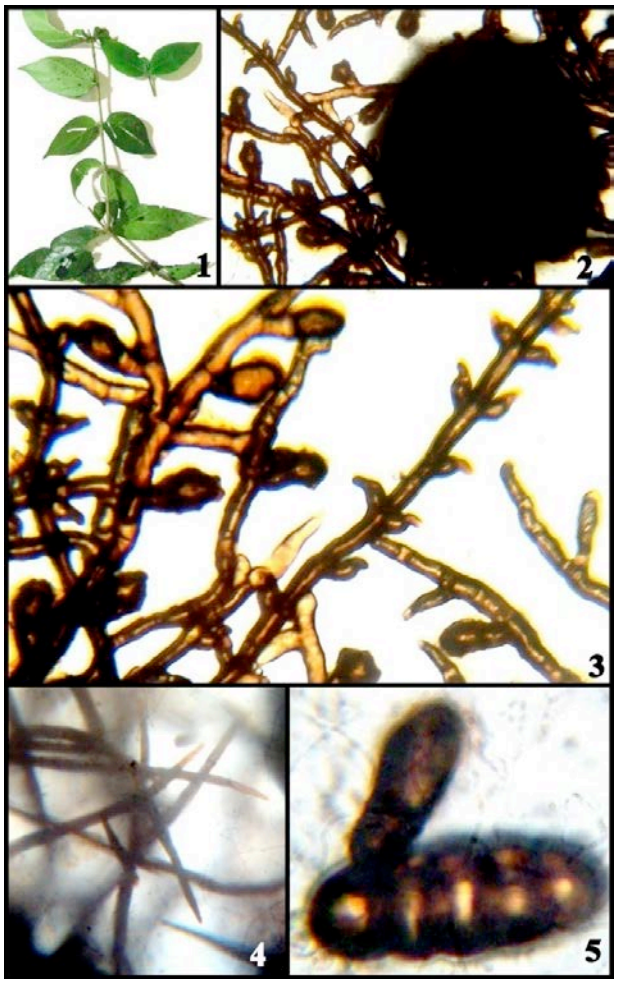


Image 54. Meliola canthii- angustifolii
1. Infected leaves; 2. Branched mycelium with perithecium; 3. Appressoria & Phialide; 4. Mycelial setae; 5. Germinating ascospore

Perithecia scattered to grouped, globose, up to 240µm in diameter; ascospores cylindrical, constricted at the septa, 4-septate, 30–36x10–15 µm.

The *Meliola* species recorded on the members of Sapindaceae with cylindrical-clavate or more or less conoid head cells have been treated as the varieties of *Meliola capensis* (Kalch & Cooke.) Theiss. Hansford (1961) stated that each variety of this species is limited in its occurrence to a single host species or genus.

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. (Image 56)

Materials examined: FMKMCC 56, 14.i.2010, on leaves of *Schleichera oleosa* (Lour.) Oken (Sapindaceae), Payashwini River bank, Sampaje Ghat, C. Jagath Thimmaiah.

Colonies amphigenous, subdense, velvety, up to 9 mm in diameter. Hyphae substraight, branching mostly opposite to few unilateral at wide angles, loosely to closely reticulate, cells 9–20x6 µm. Appressoria opposite, few alternate, straight, antrorse, few retrorse, 10–16 µm long; stalk cells short, cylindrical to cuneate, 1.5–3 µm long; head cells obovate, slightly recurved, few attenuating towards apex, rarely sublobate, entire 8–10x5–6 µm. Phialides many, ampulliform, mixed with appressoria, opposite to unilateral, 15–17x6–7 µm. Mycelial setae many, straight, few curved, acute to obtuse at the tip, up to 630µm long. Perihelia scattered, globose, margin crenate, up to 170µm in diameter; ascospores 4-septate, constricted, oblong to elliptic, brown, 29–32x11–14 µm.

Meliola careyae (Stev.) Hosag. var. ***indica*** Hosag., Persoonia 18: 3, 2003; Hosag., Meliolales of India. vol. 2:

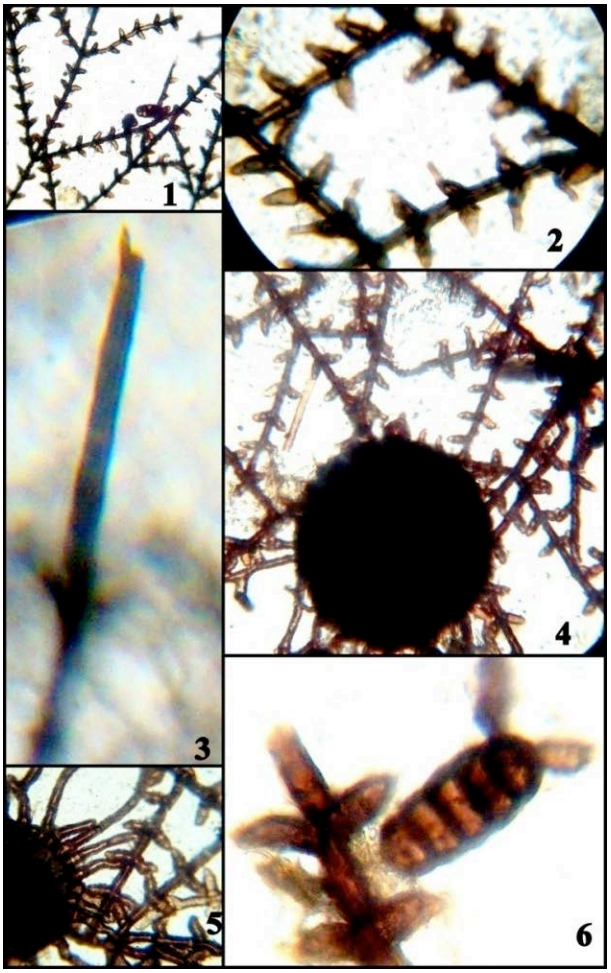


Image 55. *Meliola capensis* var. *malayensis*
1 - Colony; 2 - Appressoria & Phialides; 3 - Mycelial setae; 4&5 - Perithecia; 6 - Germinating ascospore

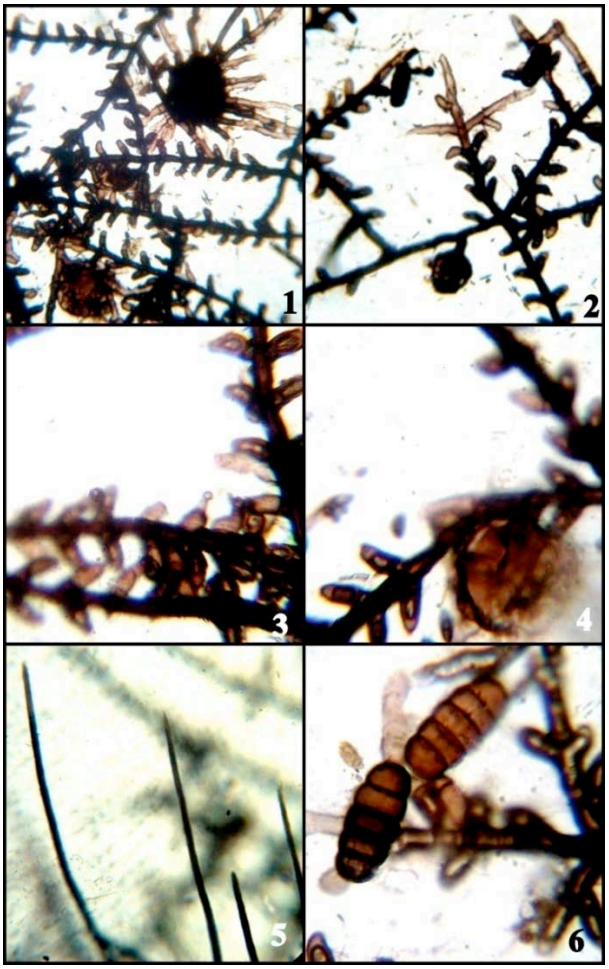


Image 56. *Meliola capensis* var. *schleicherae*
1 - Colony; 2 - Branched hyphae; 3 - Appressoria & phialides; 4 - Young Perithecium; 5 - Mycelial setae; 6 - Ascospores.

211, 2008; Hosag. & Agarwal, Taxonomic Studies of Meliolales. Identification Manual, p. 152, 2008. (Image 57).

Materials examined: FMKMCC 57, 31.i.2010, on leaves of *Careya arborea* Roxb. (Lecythidaceae), Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, dense, up to 6mm in diameter. Hyphae flexuous branched opposite at wide angles, closely reticulate, cells 15–25x6–7 µm. Appressoria mostly opposite, few unilateral and alternate, straight, antrorse 11–15x7–19 µm; head cells globose few slightly angulose, cylindrical, entire 12–14x7–10 µm; stalk cells cylindrical to cuneate, 3–5 µm long. Phialides few usually on separate branches, few are seen mixed with appressoria, opposite to each other, ampulliform, 15–20x7–9 µm. Mycelial setae simple straight or slightly curved, acute, obtuse, up to 350µm long. Perithecia globose, surrounded by radiating mycelia, up to 75µm in diameter; ascospores brown, cylindrical, 4-septate, constricted at the septa 45–49x13–15 µm.

Meliola cariappae Hosag., Jagath. & Archana, J. Threatened Taxa 5: 4023, 2013. (Image 58)

Colonies amphigenous, subdense, up to 3mm in diameter. Hyphae substraight to flexuous, branching opposite, few unilateral at mostly wide angles, loosely to closely reticulate, cells 15–26x5–7 µm. Appressoria closely packed, mostly alternate, straight, recurved, antrorse, retrorse, 25–33 µm long; stalk cells cylindrical to cuneate, 5-12 µm long; head cells sublobate, clavate, oblong, crooked, 15–21x8–20 µm. Phialides mixed with appressoria, opposite to unilateral, ampulliform to conoid, 25–30x5.5–6 µm. Mycelial setae simple, carbonaceous, slightly curved, acute to obtuse, up to 540µm long. Perithecia few, scattered, globose, up to 230µm in diameter; ascospores 4-septate, cylindrical to elliptical, brown, constricted, 40–44x15–17 µm.

Materials examined: TBGT 5824 (holotype), FMKMCC 58 (isotype), 13.ii.2010, on leaves of *Michelia champaca* L. (Magnoliaceae), Sampaje Ghat, C. Jagath Thimmaiah.

Meliola carissae Doidge var. ***indica*** Hansf., Sydowia 10: 67, 1957; Sydowia Beih. 2: 558, 1961; Hosag. Nova Hedwigia 47: 539, 1988; Hosag., Meliolales of India, p.159, 1996. (Image 59).

Materials examined: FMKMCC 59, 11.i.2011, on leaves of *Carissa carandas* L. (Apocyanaceae), Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, up to 2mm in diameter, confluent, dense. Hyphae substraight to straight, branching opposite at subacute angles, closely reticulate, cells

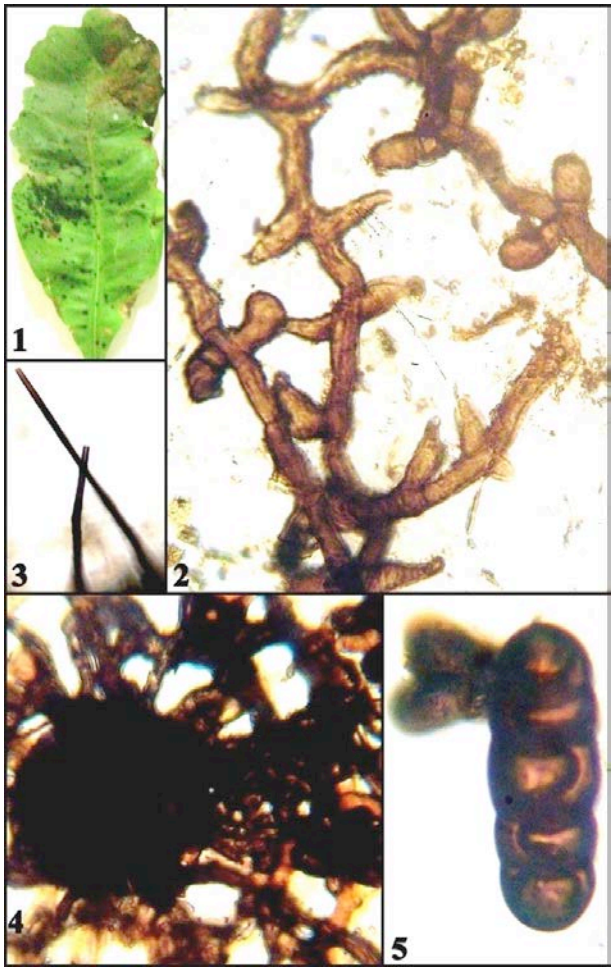


Image 57. *Meliola careyae* var. *indica*
1 - Infected leaf; 2 - Mycelium with appressoria. & phialides; 3 - Mycelial setae; 4 - Perithecium; 5 - Germinating ascospore

15–20x10–12 µm. Appressoria alternate, straight, antrorse, 22–25 µm long; stalk cells cylindrical to cuneate, 5–10 µm long; head cells oblong, angular, lobed, 15–17 x10–12 µm. Phialides on separate mycelial branches, alternate, few unilateral, ampulliform, 15–20x5–7 µm. Mycelial setae numerous, simple acute to obtuse, found around perithecia, up to 340µm long. Perithecia globose, dark, up to 110µm in diameter; ascospores 4-septate, oblong to elliptical, constricted at the septum, 36–40x15–17 µm.

***Meliola cauveriana* sp. nov.**

V.B. Hosagoudar, B. Divya & C. Jagath Thimmaiah. (Fig. 13) (urn:lsid:indexfungorum.org:names:807143)

Materials examined: TBGT 6562 (holotype), 16.xi.2010, on leaves of *Syzygium mundagam* (Myrtaceae), Medikeri, C.Jagath Thimmiah.

Colonies amphigenous, thin, scattered, spreading, up

to 4mm in diameter, confluent. Hyphae straight, branching alternate to opposite at acute to wide angles, loosely reticulate, cells 25–35x6–7 µm. Appressoria alternate, antrorse to subantrorse, 20–27 µm long; stalk cells cylindrical to cuneate, 7–10 µm long; head cells ovate, entire, 12–17x10–12 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 20–27x3–5 µm. Mycelial setae simple, straight, acute to obtuse at the tip, up to 760µm long. Perithecia scattered, up to 120µm in diameter; ascospores obovoidal to cylindrical, 4-septate, slightly constricted at the septa, 40–50x15–20 µm.

Based on the digital formula, this species is similar to *Meliola rangamothi* Hansf. known on *Eugenia* sp. from Karnataka. However, differs from it in having longer appressoria with ovate head cells in contrast to oblong

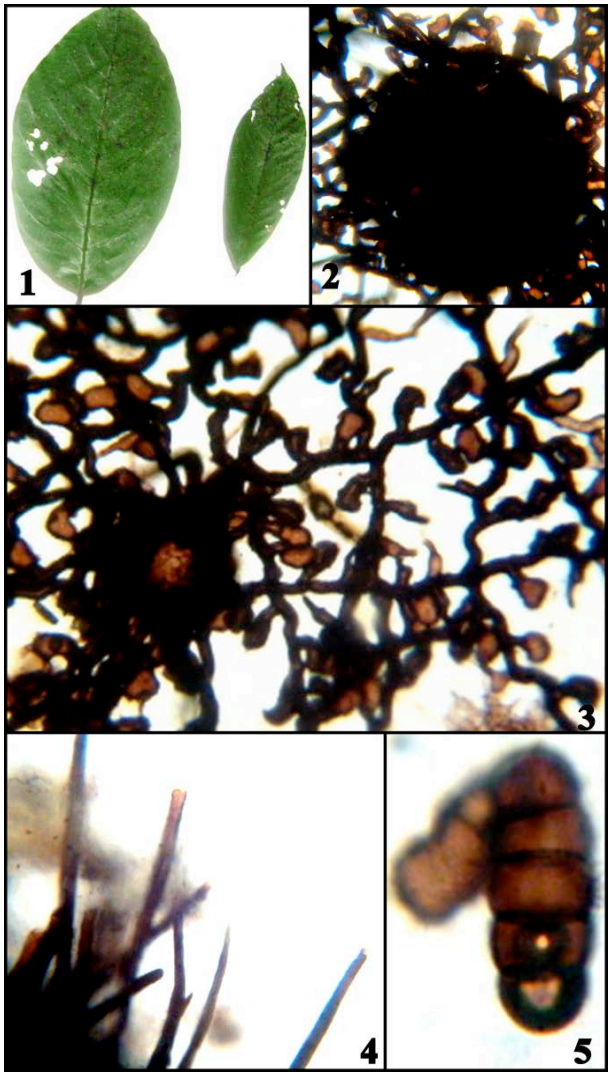


Image 58. *Meliola cariappae*
1 - Infected leaves, 2 - Mycelium with Perithecium, 3 - Mycelium with appressoria & phialides, 4 - Mycelial setae, 5 - Germinating ascospore

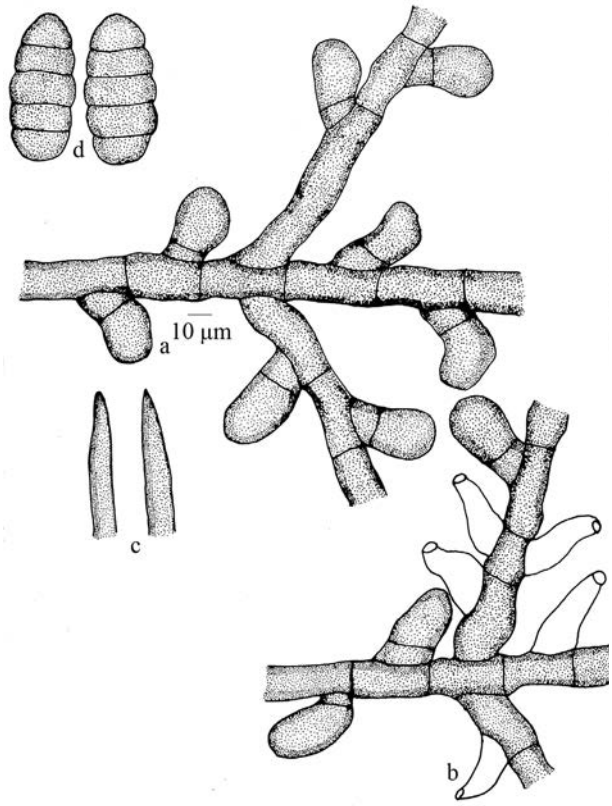


Figure 13. *Meliola cauveriana* sp. nov.
a - Appressorium, b - Phialide, c - Apical portion of mycelial setae, d - Ascospores

(Hansford, 1961).

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

1991, Hosag., Meliolales of India, p. 164, 1996. (Image 60).

Materials examined: HCIO 45725, TBGT 1474; HCIO 45726, TBGT 1475, 13.xi.2003, on leaves of *Nothopodytes nimmoniana* (Graham) Mabberley (Icacinaceae), MPCA, Brahmagiri, Talacauvery, V.B. Hosagoudar et al.; TBGT 5324, FMKMCC 60, 23.xi.2008, Vanachalu; TBGT 5325, FMKMCC 61, 23.xi.2008, FMC Compound; TBGT 5345, FMKMCC 62, 24.xi.2008, Talacauvery, C. Jagath Thimmaiah; HCIO 45635, TBGT 1379; HCIO 45809, TBGT 1559, 12.xi.2003, *Apodytes* sp. (Icacinaceae), Abbe Falls, V.B. Hosagoudar et al.; HCIO 45641, TBGT 1387, 13.xi.2003, MPCA, Talacauvery, V.B. Hosagoudar et al.; HCIO 45791, TBGT 1540, 11.xi.2003, Nishane motta, V.B. Hosagoudar et al.; HCIO 45792, TBGT 1541, 11.xi.2003, Abbe Falls, V.B. Hosagoudar et al.

Colonies hypophyllous, subdense up to 5mm in diameter. Hyphae substraight, flexuous, branching opposite at wide angles, loosely reticulate, cells 25–35x5–7

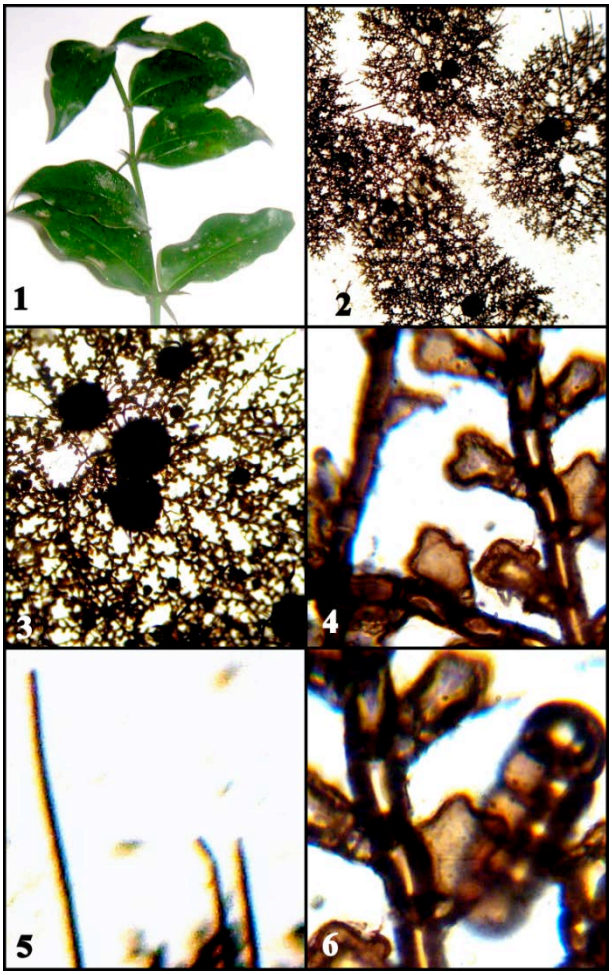


Image 59 *Meliola carissae* var. *indica*
1 - Infected leaves, 2-3 - Colony with Perithecia, 4 - Mycelium with appressoria & phialides, 5 - Mycelial setae, 6 - Ascospore

µm. Appressoria alternate, opposite, (few unilateral), antrorse, straight to curved 20–24 µm long; stalk cells cuneate, 3–5 µm long; head cells globose, ovate, sublobate, rarely entire, 10–12x12–14 µm. Phialides borne on separate branches, few mixed with appressoria opposite 10–17x4–6 µm. Mycelial setae numerous, straight, acute, up to 350µm long. Perithecia loosely scattered, up to 200µm in diameter; ascospores ellipsoidal to oblong, 4-septate, constricted at the septa, 35–42x10–12 µm.

Meliola chukrasiae Hosag., Meliolales of India, p. 166,1996. (Image 61)

Colonies amphigenous, well scattered, up to 7mm in diameter. Hyphae substraight, flexuous, branching opposite to alternate at acute to subacute angles, loosely reticulate, cells 28–35x6–8 µm. Appressoria alternate to unilateral, antrorse to retrorse, straight to curved, 14–24 µm long; stalk cells cylindrical to cuneate, 4–7µm long; head cells ovate, few cylindrical, rarely angulose, entire, 9–12x7–10 µm. Phialides many, mixed with appressoria, opposite to unilateral, ampulliform, neck elongated, 18–25x6–7.5 µm. Mycelial setae numerous, grouped on mycelia, simple, straight, obtuse to dentate at the tip, up to 280µm long. Perithecia scattered, verrucose, up to 180µm in diameter; ascospores oblong to cylindrical, 4-septate, constricted at the septa, 42–46x14–16 µm.

Materials examined: TBGT 5430, FMKMCC 63, 17.x.2009, on leaves of *Chukrasia tabularis* A. Juss. (Meliaceae), Akare, Hoddur, C. Jagath Thimmaiah; TBGT 5469, FMKMCC 64, 4.xii.2009, Devarakadu, Hoddur, C. Jagath Thimmaiah

This species is close to *Meliola nairii* Hosag. & *Meliola togonensis* Hughes var. *angulata* but differs from both in having entire, rounded head cells and straight to

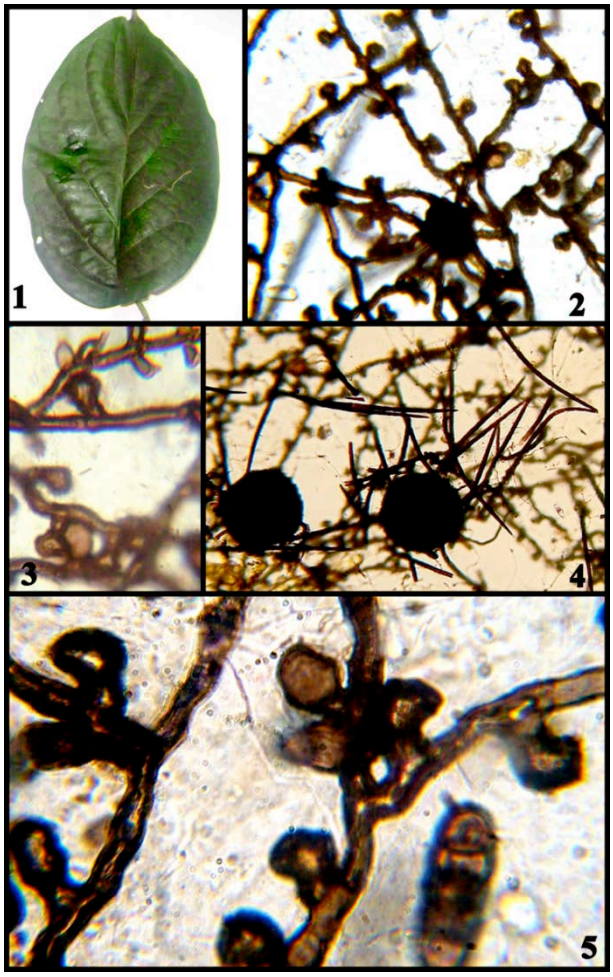


Image 60. *Meliola chandrashekaranii*
1 - Infected leaf, 2 - Colony with Perithecium , 3 - Mycelium with appressoria & phialides, 4 - Mycelial setae grouped around the Perithecium, 5 - Ascospore

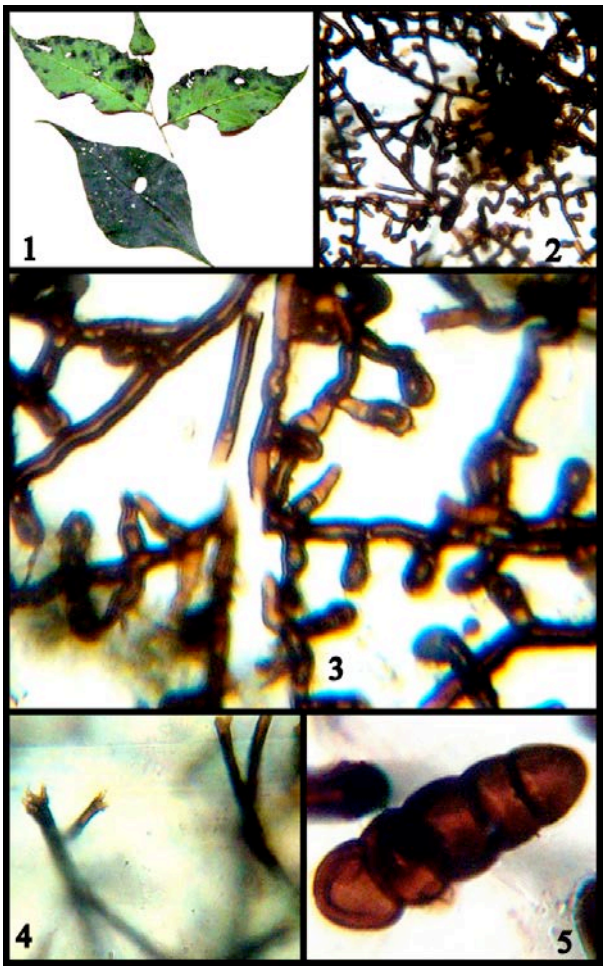


Image 61. *Meliola chukrasiae*
1 - Infected leaves; 2 - Colony with Perithecium; 3 - Mycelium with appressoria & phialides; 4 - Mycelial setae; 5 - Ascospore

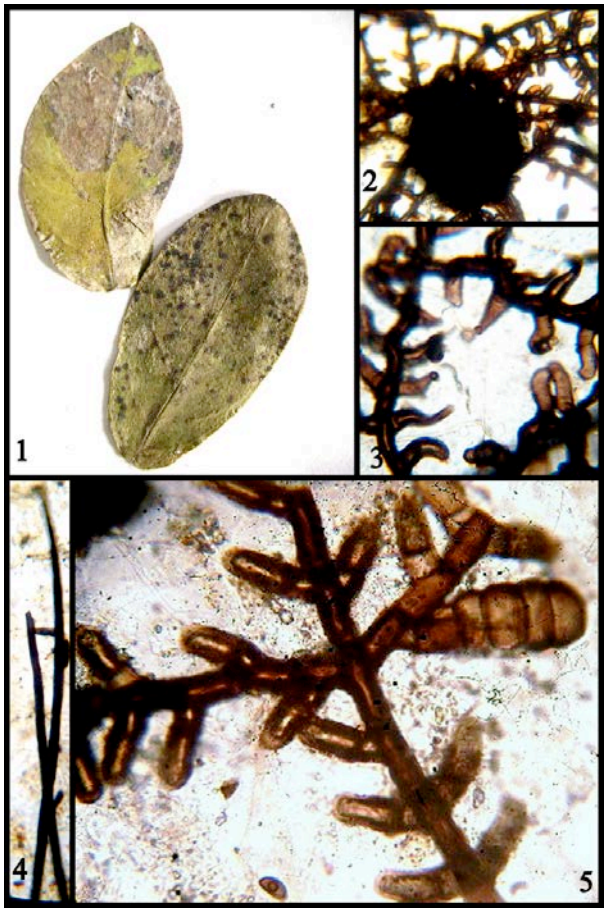


Image 62. *Meliola citricola*
1 - Infected leaves; 2 - Colony with perithecium; 3 - Appressoria & Phialides; 4 - Mycelial setae; 5 - Ascospore & branched hyphae

curved mycelial setae.

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: 246, 1990; 42: 133, 1991; Hosag., Meliolales of India, p. 167, 1996. (Image 62)

Colonies amphigenous, dense, up to 7mm in diameter. Hyphae straight to substraight, branching opposite to subopposite, few alternate at subacute to wide angles, loosely to closely reticulate, cells 20–25x6.5–8 µm. Appressoria alternate to unilateral, antrorse, straight to curved, few reflexed, 15–24 µm long; stalk cells cuneate to cylindrical, 3–8 µm long; head cells ovate, angulose, curved inwards, entire, 13-17x7-10 µm. Phialides many, mixed with appressoria, opposite to unilateral, ampulliform to cylindrical, 12–22x5–8.5 µm. Mycelial setae numerous, grouped to scattered, straight to slightly curved, simple, acute to obtuse, forked at the tip, up to 670µm long. Perithecia grouped, globose, surrounded by mycelial setae, up to 70µm in diameter; ascospores 4-septate, oblong, constricted at the septa, brown, 33–35x16–17 µm.

Materials examined: HCIO 45667, TBGT 1414, 12.xi.2003, on leaves of *Citrus* sp. (Rutaceae), Jodupal, V.B. Hosagoudar et al; TBGT 5371, FMKMCC 65, 26.xi.2008, *C. maxima* (Burm.f.) Merr., Madikeri, C. Jagath Thimmaiah; TBGT 5404, FMKMCC 66, 29.viii.2009, Hoddur, C. Jagath Thimmaiah; TBGT 5410, FMKMCC 67, 12.ix.2009, FMC Campus, Madikeri, C. Jagath Thimmaiah; TBGT 5456, FMKMCC 68, 2.xii.2009, Hoddur, C. Jagath Thimmaiah.

This species was associated with *Meliola butleri*.

Meliola clavulata Wint., Hedwigia 25: 98, 1886; Hansf., Sydowia Beih. 2: 650, 1961; Hosag. & Goos, Mycotaxon 37: 226, 1990; Hosag., Meliolales of India, p. 168–69, 1996. (Image 63)

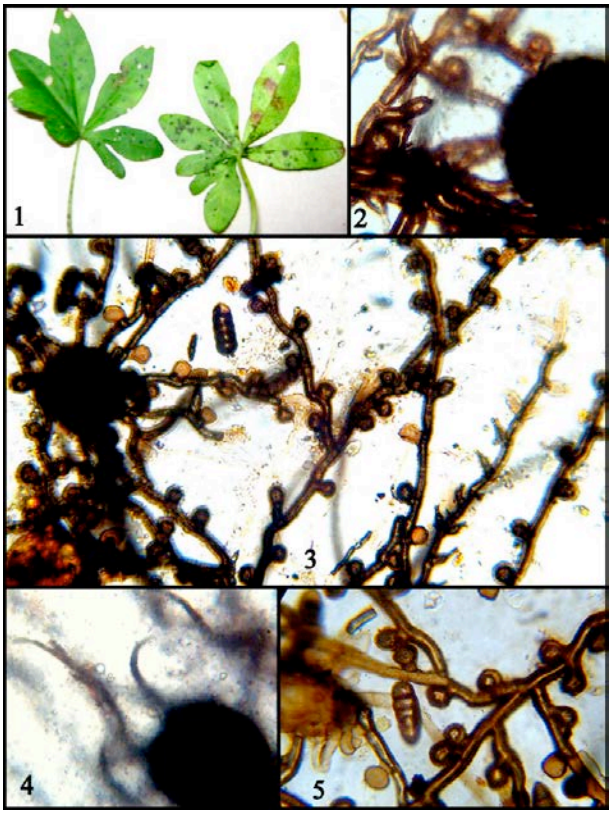


Image 63. *Meliola clavulata*
1 - Infected leaves; 2 - Colony with Perithecium; 3 - Appressoria & Phialides; 4 - Mycelial setae around perithecium; 5 - An ascospore & branched hyphae

Materials examined: TBGT 5400, FMKMCC 69, 9.i.2010, on leaves of *Ipomea palmata* Forsk. (Convolvulaceae), Hoddur, C. Jagath Thimmaiah; TBGT 5428, FMKMCC 70, 11.x.2009, *Ipomea* sp., Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, dense up to 3mm in diameter. Hyphae flexuous, branching alternate at subacute angles, loosely reticulate, cells 18–30x5–7 µm. Appressoria alternate to unilateral (50%), antrorse to subantrorse, straight, up to 11–22 µm long; stalk cells cylindrical to cuneate, up to 1–7 µm long; head cells globose, mostly entire, few angulose, truncate, up to 11–16x10–14 µm. Phialides many, borne on separate mycelial branch, mostly unilateral to opposite, rarely alternate, ampulliform, neck elongate, up to 16–20x4–7.5 µm. Mycelial setae many, few grouped around perithecia, remaining present on mycelia, simple, uncinate, acute to obtuse tip, up to 300µm. Perithecia scattered, globose, verrucose, up to 150µm in diameter; ascospores ellipsoidal, 4-septate, constricted at the septa, 30–38x12–15 µm.

Meliola clerodendricola Henn., Hedwigia 37:288, 1895; Hansf., Sydowia Beih. 2: 694, 1991; Hosag. & Goos, Mycotaxon 37: 226. 1990; Hosag., Kaveriappa, Raghu & Goos, Mycotaxon 51: 111. 1994; Hosag., Meliolales of India, p. 169, 1996. (Image 64).

Materials examined: HCIO 45652, TBGT 1398, 11.xi.2003, on leaves of *Clerodendrun viscosum* Vent (Verbenaceae), Abbe falls, V.B. Hosagoudar et al; TBGT 5342, FMKMCC 71, 24.xi.2008, Vanachalu, C. Jagath Thimmaiah; TBGT 5427, FMKMCC 72, 11.x.2009 Hoddur, Jagath Thimmaiah.

Colonies amphigenous, dense up to 4mm in diameter. Hyphae substraight, flexuous, branching opposite at wide angles, loosely to closely reticulate, cells 10–12x1.5–3µm. Appressoria alternate, straight, antrorse, 5–7 µm long; stalk cells cuneate, 1–3 µm long; head cells ovate to globose, entire, 8–10x10–12 µm.

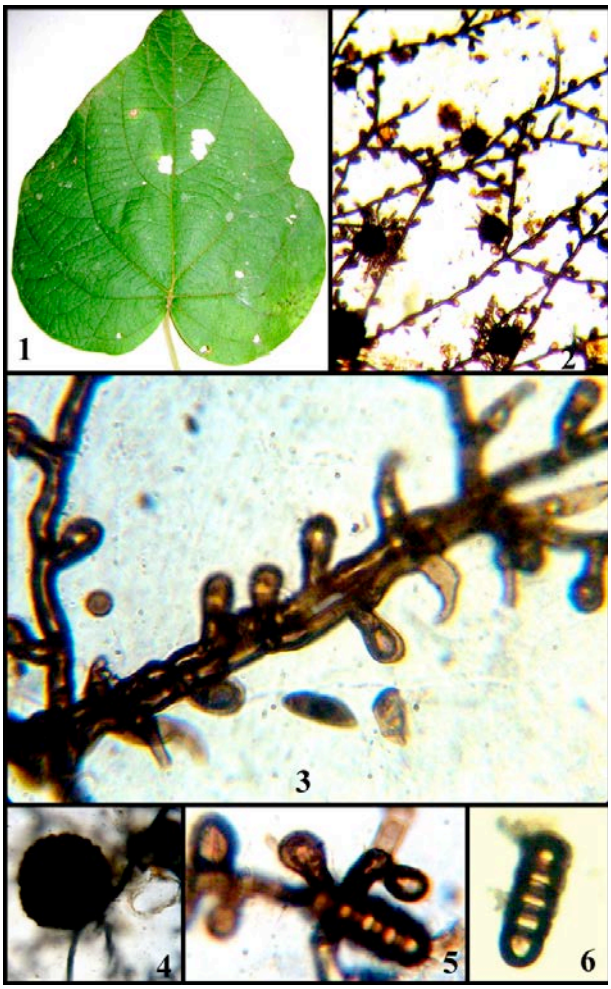


Image 64. *Meliola clerodendricola*
1 - Infected leaf; 2. Colony with Perithecia; 3. Appressoria & Phialides; 4. Mycelial setae around perithecium; 5. Germinating ascospore; 6. Ascospore

Phialides many mixed with appressoria opposite to unilateral, ampulliform, 15–17x6–8µm. Mycelial setae numerous, simple, straight, acute at the tip, up to 270µm long. Perithecia grouped to scattered, globose, up to 175µm in diameter; ascospores 4-septate, cylindrical, constricted at the septa, 35–40x11–14 µm.

Meliola clerodendricola Henn. var. ***micromera*** (Sydow & Sydow) Hansf., Sydowia Beih. 2: 694, 1961; Hosag. & Goos, Mycotaxon 37: 227, 1990; Hosag., Meliolales of India, p. 170, 1996. (Image 65).

Materials examined: TBGT 5385, FMKMCC 73, 27.xii.2008, on leaves of *Gmelina aroborea* Roxb. (Verbenaceae), FMKMCC 74, 29.xii.2009, Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense, up to 4mm in diameter. Hyphae straight to substraight, branching opposite at subacute angles, loosely reticulate, cells 18–33x4–7µm. Appressoria mostly alternate to unilateral (10%), antrorse to subantrorse, straight, up to 13–21 µm long; stalk cells cuneate to cylindrical, up to 2.5–6.5 µm; head cells ovate to globose, entire, broadly rounded at the apex, few angulose, rarely sublobate, up to 11–13x7–13µm. Phialides numerous, mostly borne on separate mycelial branch, few mixed with appressoria, opposite to subopposite, few unilateral, ampulliform, neck elongated, 13–19x3–6 µm. Mycelial setae many, scattered, few setae grouped around perithecia, simple, straight to slightly curved, obtuse at the tip, up to 320µm long. Perithecia grouped to scattered, globose, up to 130µm diameter; ascospores cylindrical to oblong, 4-septate, constricted at the septa, 31–37x12–15 µm.

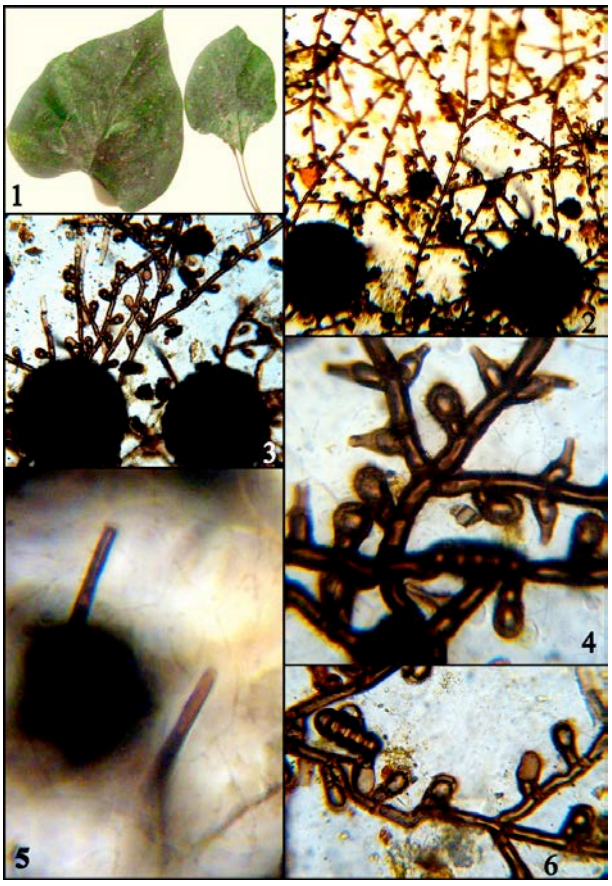


Image 65. *Meliola clerodendricola* var. *micromera*
1 - Infected leaves; 2&3 - Colony with Perithecia; 4 - Appressoria & Phialides; 5 - Mycelial setae around perithecium; 6 - Germinating ascospore

***Meliola coorgiana* sp. nov.**

Hosag. B. Divya & Jagath.

(Fig. 14) (urn:lsid:indexfungorum.org:names:807144)

Materials examined: TBGT 6558 (holotype), 11.xi.2010, on leaves of Rubiaceae member, Medikari, C.Jagath Thimmaiah.

Colonies amphigenous, subdense, scattered, spreading, up to 5mm in diameter. Hyphae straight to substraight, branching mostly opposite to rarely irregular at acute to wide angles, loosely reticulate, cells 25–32x5–6 µm. Appressoria alternate to opposite(10%), straight

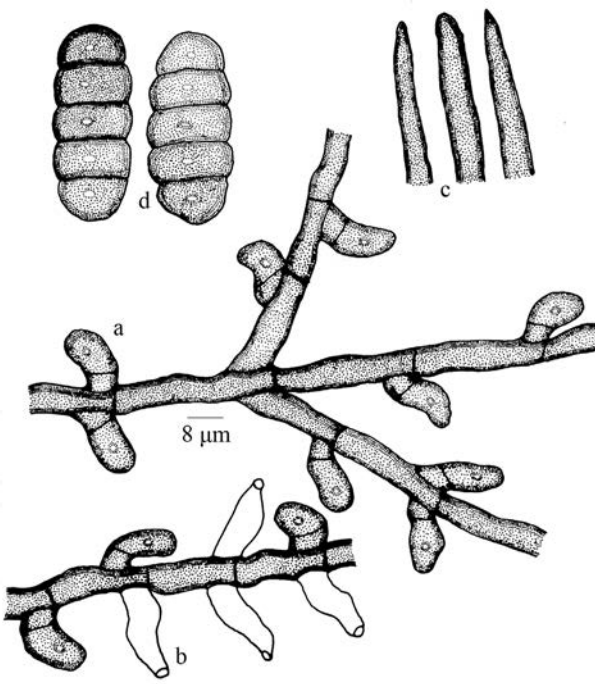


Figure 14. *Meliola coorgiana* sp. nov.
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

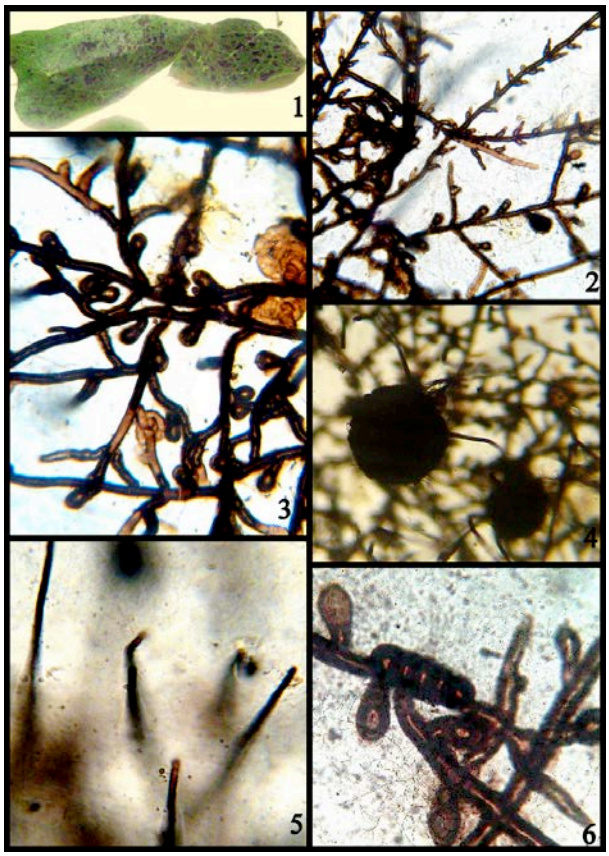


Image 66. *Meliola cycleae*
1 - Infected leaves; 2&3 - Appressoria & Phialides; 4 - Mycelial setae around perithecia; 5 - Mycelial setae; 6 - Germinating ascospore & branched hyphae

to curved, mostly antrorse, often closely subantrorse to retrose,15–20 µm long; stalk cells cylindrical to cuneate, 5–7 µm long; head cells ovate to oblong to cylindrical, straight to curved, entire, 10–12x5–7 µm. Phialides mixed with appressoria, opposite to unilateral, ampulliform, 22–27x5–7 µm. Mycelial setae numerous, simple, straight, acute to obtuse at the tip, up to 840µm long. Perithecia scattered, up to 150µm in diameter; ascospores obovoidal, 4-septate, slightly constricted at septa, 40–45x15–17µm.

Based on the digital formula 3113.4223, it is similar to Meliola mitragynes Sydow as Meliola aliberatiae Stev. but differs from both in having oval to oblong and straight to curved head cells of appressoria (Hansford, 1961).

Meliola cycleae Hosag. in Hosag. & Goos, Mycotaxon 37: 228, 1990; Hosag., Meliolales of India, p. 176, 1996. (Image 66)

Materials examined: TBGT 5426, FMKMCC 75, 27.xi.2009, on leaves of *Cyclea peltata* Cooke (Menispermaceae), Hoddur, C. Jagath Thimmaiah.

Colonies amphigenous, mostly epiphyllous, dense, up to 4 mm in diameter. Hyphae substraight, slightly flexuous, branching opposite to alternate at wide angles, loosely to closely reticulate, cells 27-33x6.5-8.5 µm. Appressoria alternate to unilateral, antrorse, straight, 18-31 µm long; stalk cells cuneate to cylindrical, 5-15 µm long; head cells ovate, globose, few cylindrical, few attenuated at the apex, rarely angulose, entire, 13-15x12-14 µm. Phialides many, borne on separate mycelial branch, mostly unilateral, few alternate, ampulliform, 16-21x4-6.5 µm. Mycelial setae numerous, grouped to scattered grouped around perithecia, simple, straight, obtuse to acute at the tip, up to 450 µm long. Perithecia grouped, globose, verrucose, up to 170 µm in diameter; ascospores cylindrical to oblong, 4-septate, constricted at the septa, 34-38x14-16 µm.

Meliola dichotoma Berk. & Curt. var. ***kusanoi***

var. ***kusanoi*** (Henn.) Hansf., Sydowia Beih. 2: 484, 1961; Hosag., Meliolales of India, p. 180, 1996. (Image 67)

Materials examined: TBGT 5337, FMKMCC 76,

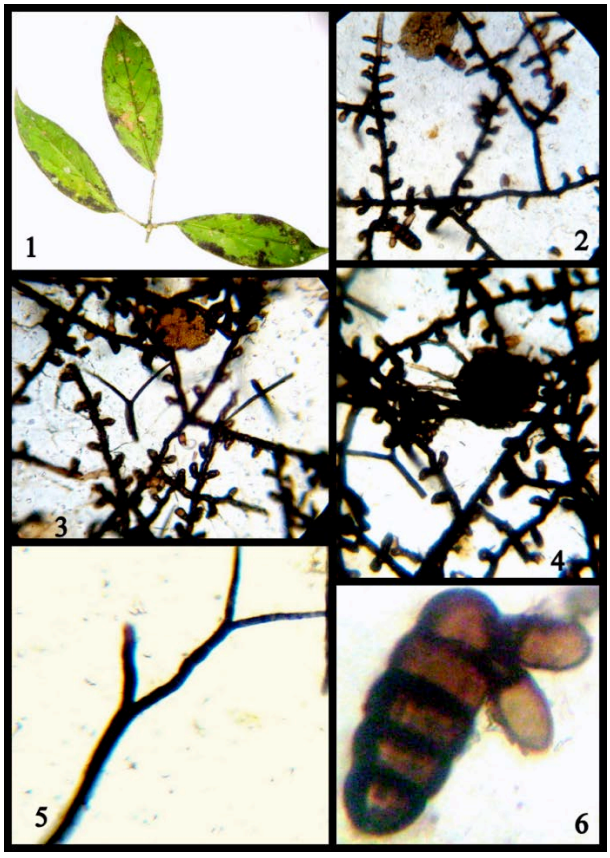


Image 67. *Meliola dichotoma* var. *kusanoi*
1 - Infected leaves; 2&3 - Mycelium with appressoria & phialides; 4 - Perithecia; 5 - Mycelial setae; 6 - Germinating ascospore.

24.xi.2008, on leaves of *Schefflera venulosa* (Wight &Arn.) Harms (Araliaceae), Vanachalu, C. Jagath Thimmaiah.

Colonies epiphyllous, dense, up to 7mm in diameter. Hyphae substraight, branching opposite at subacute angles, closely reticulates. Cells 18–20x5–7 µm. Appressoria opposite, alternate, few unilateral, antrorse, few curved, few retrorse, entire, 15–29 µm long; stalk cells cuneate 3–5 µm long; head cells ovate to globose, entire, 10–12x8–10 µm. Phialides few opposite, cylindrical 17–26x7–9 µm. Mycelial setae numerous, grouped around perithecia, branched dichotomously, few straight, 170µm long from base to 1st branch, up to 130µm long from 1st branch to 2nd branch & up to 40µm long 2nd final branch, tip acute, all branch lets spreading. Perithecia scattered, globose, up to 140µm in diameter; ascospores cylindrical, 4-septate, constricted at the septa, brown, 38–45x13–18 µm.

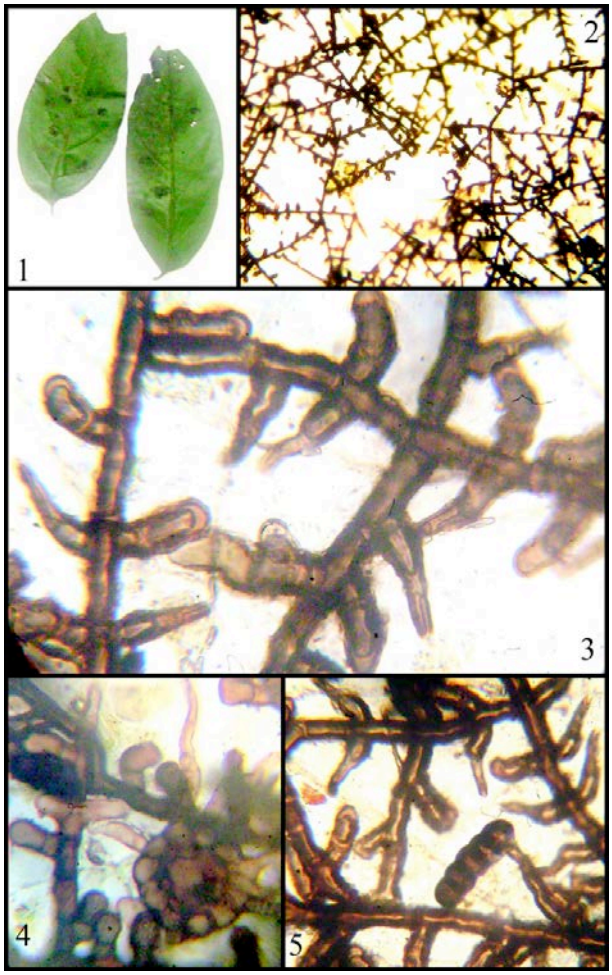


Image 68. *Meliola diospyri*
1 - Infected leaves; 2 - Colony; 3 - Appressoria & Phialides; 4 - Young Perithecium; 5 - Ascospore & branched hyphae

Meliola diospyri Sydow & Sydow in Sydow & Butler, Ann. Mycol. 9: 281, 1991; Hansf., Sydowia Beih. 2: 498, 1961; Thite & Kulakarni, j. Shivaji Univ. (Sci.) 6:162, 1973; Srinivasulu, Nova Hedwigia Beih. 47: 426, 1974; Maity, Indian J. Mycol. Res. 16: 25, 1975; Hosag. & Goos, Mycotaxon 37: 230, 1990; Hosag., Siddappa & Udaiyan, Nova Hedwigia 56: 197, 1993; Hosag., Raghu & Pillai, Nova Hedwigia 58:438, 1993; Hosag. Meliolales of India, p. 181, 1996. (Image 68)

Colonies amphigenous, mostly hypophyllous, subdense to dense, up to 5 mm in diameter, confluent. Hyphae straight to slightly undulate, branching opposite at wide to acute angles, loosely reticulate, cells 20-36x6-10 µm. Appressoria alternate, about 40% opposite, antrorse, spreading, 18-26 µm long; stalk cells cylindrical to cuneate, 4-8 µm long; head cells ovate, versiform, entire, rarely angular, 14-18x8-10 µm. Phialides numerous, mixed with appressoria, alternate to opposite, ampulliform, 20-28x8-10 µm. Mycelial setae scattered, straight, simple, acute to obtuse at the tip, up to 774 µm long. Perithecia scattered to grouped, up to 200 µm in diam.; ascospores obovoidal, 4-septate, constricted at the septa, 42-50x16-18 µm.

Materials examined: TBGT, FMKMCC 77, 14.i.2010, on leaves of *Diospyros bourdillonii* Brandis (Ebenaceae), Sampaje Ghat, C. Jagath Thimmaiah.

Meliola elaeagni Hansf. & Thirum., Farlowia 3: 292, 1948; Hansf., Sydowia Beih. 2: 369, 1961; Hosag., Meliolales of India, p. 187, 1996. (Image 69)

Materials examined: TBGT 5474, FMKMCC 78, 4.xii.2009, on leaves of *Elaeagnus latifolia* L. (*Elaeagnaceae*), Devarakadu, Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense to dense, up to 8mm in diameter. Hyphae substraight to flexuous, branching opposite at wide angles, loosely reticulate, cells 23–30x5–7 µm. Appressoria mostly alternate, few unilateral, antrorse, retrorse, straight to slightly curved 12–18x10–12 µm; head cells ovate globose, few clavate and oblong, entire, angular, 10–13 µm long; stalk cells cylindrical few cuneate, 4–5 µm long. Phialides few ampulliform, mixed with the appressoria 11–17x5–7 µm. Mycelial setae numerous, simple, slightly curved, scattered all over the colony, acute, up to 600 µm long. Perithecia globose surrounded by radiating hyphae, up to 150µm in diameter; ascospores 4-septate, cylindrical, constricted at the septa, 32–37x13–15 µm.

Meliola ervatamiae Hosag., Sydowia 40: 115, 1987; Hosag., Meliolales of India, p. 188, 1996. (Image 70)

Materials examined: TBGT 5355, FMKMCC 79,

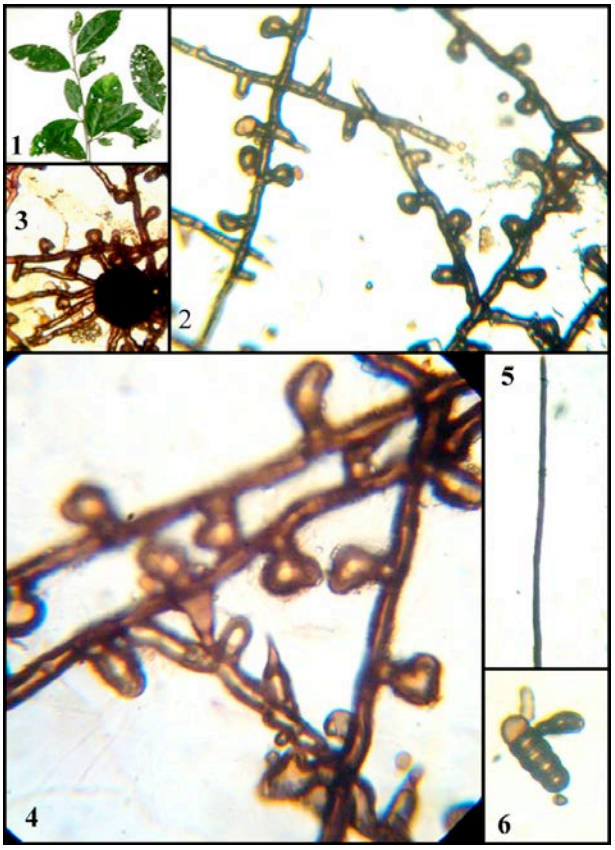


Image 69. *Meliola elaeagni*
1 - Infected leaves; 2 - Appressoria & Phialides; 3 - Young Perithecium; 4 - Mycelium with appressoria & Phialides; 5 - Mycelial setae; 6 - Germinating ascospore

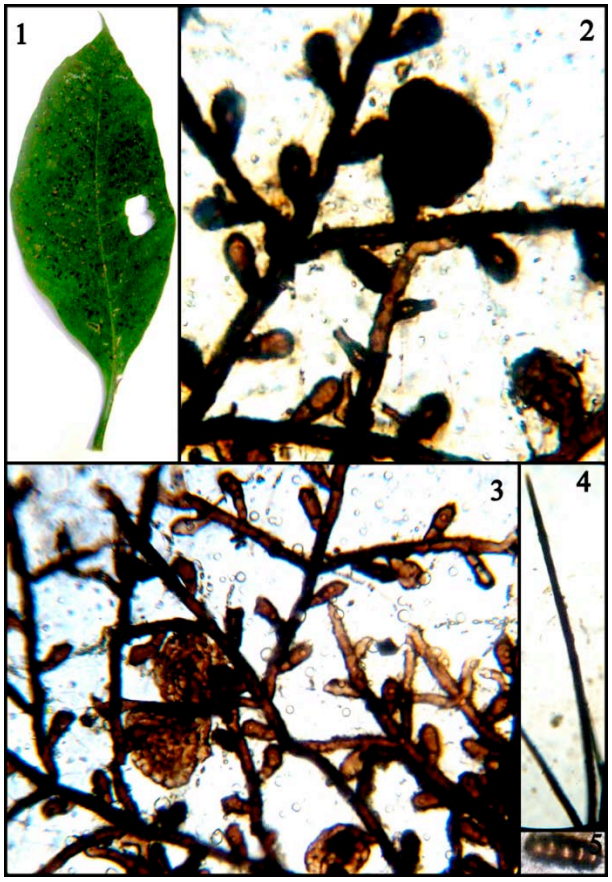


Image 70. *Meliola ervatamiae*
1 - Infected leaf; 2 - Appressoria & Phialides; 3 - Young Perithecia; 4 - Mycelial setae; 5 - Ascospore.

25.xi.2008, on leaves of *Tabernaemontana heyneana* Wall. (Apocyanaceae), Bhagamandala, C. Jagath Thimmaiah.

Colonies epiphyllous, dense, discrete up to 3mm in diameter. Hyphae substraight, branching opposite at subacute angles, loosely to closely reticulate, cells 17–20x12–14 µm. Appressoria alternate, few unilateral, antrorse, straight, few curved inwards, 22–35 µm long; stalk cells cylindrical to cuneate, 5–9 µm long; head cells ovate, entire, few lobate & angulose. Phialides many, mixed with appressoria opposite to unilateral, ampulliform, 15–17x3.5–6.5 µm. Mycelial setae few, straight, simple, acute to obtuse, up to 250µm long. Perithecia scattered, verrucose, globose, up to 195µm in diameter; ascospores 4-septate, slightly obovoidal to cylindrical, slightly constricted at the septa, 34–39x13–16 µm.

Meliola erythropali Hosag. in Hosag. & Goos, Mycotaxon 37: 323, 1990; Hosag., Meliolales of India, p. 190, 1996. (Image 71)

Materials examined: FMKMCC 80, 9.i.2010, on leaves of *Erythropalum populifolium* (Arn.) Mast. (Erythropalaceae), Tadiandamol, C. Jagath Thimmaiah.

Colonies amphigenous, dense, thick, up to 4mm in diameter. Hyphae flexuous, branching opposite to irregular at wide angles, closely reticulate, cells 27–35x5–8 µm. Appressoria alternate, about 20% unilateral, straight, antrorse and retrorse, 14–20 µm long; head cells cylindrical, obovate, few slightly curved, entire, 12–16x9–11 µm; stalk cells cylindrical to cuneate 5–7 µm long. Phialides few on separate branches, opposite, ampulliform 15–20x5–7 µm. Mycelial setae many simple, carboniferous, acute up to 250µm long. Perithecia globose, scattered, surrounded by radiating hyphae, up to 100µm in diameter; ascospores 4-septate, brown, cylindrical, constricted at the septa, 35–40x12–14 µm.

Meliola garciniae Yates, Philippine J. Sci. 13:369, 1918; Hansf., Sydowia Beih. 2: 167, 1961; Hosag., Meliolales of India, p. 201, 1996. (Image 72)

Materials examined: TBGT 5389, FMKMCC 81, 25.ii.2009, on leaves of *Garcinia gummigutta* (L.) Robs.

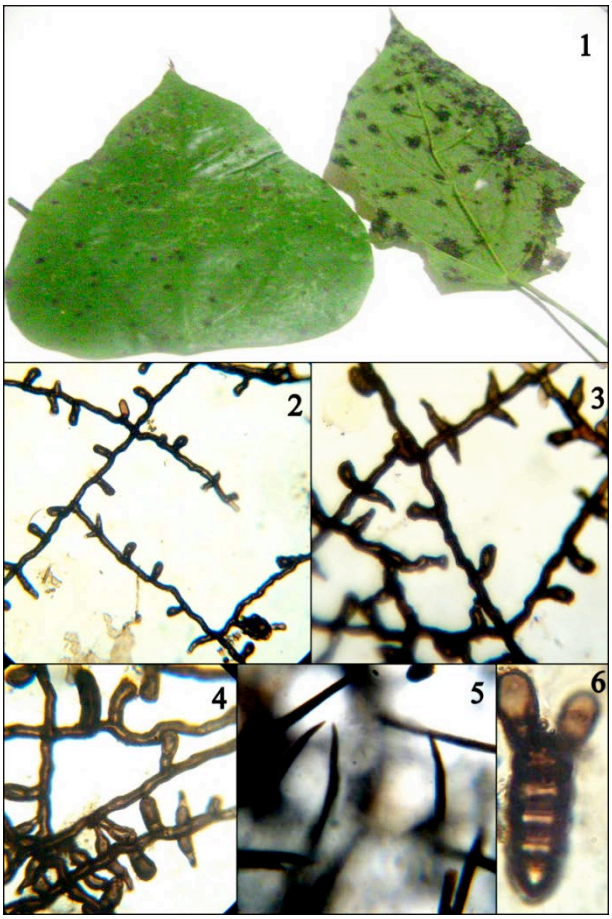


Image 71. ***Meliola erythropali***
1 - Infected leaves; 2 - Branched mycelium; 3&4 - Appressoria & Phialides; 5 - Mycelial setae; 6 - Germinating ascospore.

(Clusiaceae), Hoddur, C. Jagath Thimmaiah.

Colonies hypophyllous, dense, up to 7mm in diameter. Hyphae substraight, branching opposite at subacute to wide angles, loosely to closely reticulate, cells 23–30x6–9 µm. Appressoria alternate to unilateral (40%), antrorse, straight to slightly curved, up to 17–25µm long; stalk cells cuneate to cylindrical, up to 4–8 µm; head cells ovate, cylindrical, rarely globose, entire, angulose, up to 11–20x9–11 µm. Phialides many, mixed with appressoria, mostly opposite to alternate, few unilateral, ampulliform, neck elongated, 21–27x5–7 µm. Mycelial setae numerous, present on mycelia, simple, straight to slightly curved, acute to obtuse at the tip, up to 750µm long. Perithecia scattered, globose, up to 110µm diameter; ascospores cylindrical to oblong, 4-septate, constricted at the septa, 44–48x17–20 µm.

This species was found associated with Asterina clusiacearum and Lembosia garciniae.

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. (Image 73).

Materials examined: HCIO 45631, TBGT 1375; HCIO 45780, TBGT 1529; HCIO 45796, TBGT 1545; HCIO 45645, TBGT 1391, 11.xi.2003, on leaves of *Jasminum* sp. (Oleaceae), Nishane motta, Madikeri, V.B. Hosagoudar et al; TBGT 5333, FMKMCC 82; TBGT 5340, FMKMCC 83, 24.xi.2008, *J. malabaricum* Wight, Vanachalu, C. Jagath Thimmaiah; TBGT 5379, FMKMCC 84, 26.xi.2008, TBGT 5384, FMKMCC 85, 28.xii.2008, Hoddur, C. Jagath Thimmaiah.

Colonies amphigenous, mostly epiphyllous, dense, up to 3mm in diameter, confluent. Hyphae straight to slightly undulate, branching opposite at acute angles,

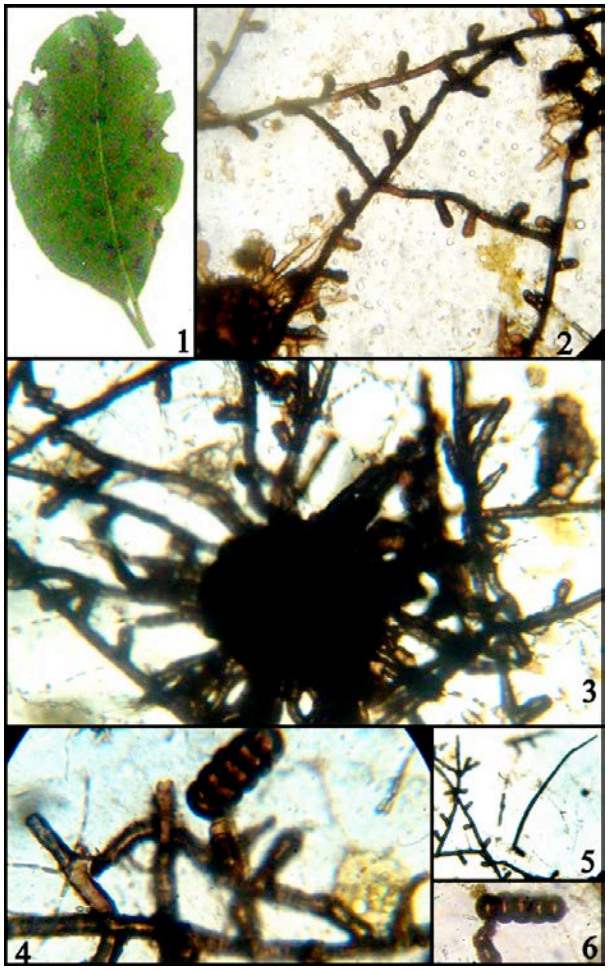


Image 72.. ***Meliola garciniae***
1 - Infected leaf; 2 - Branched hyphae; 3 - Perithecium; 4 - Mycelium with appressoria & phialides; 5 - Mycelial setae; 6 - Germinating ascospore

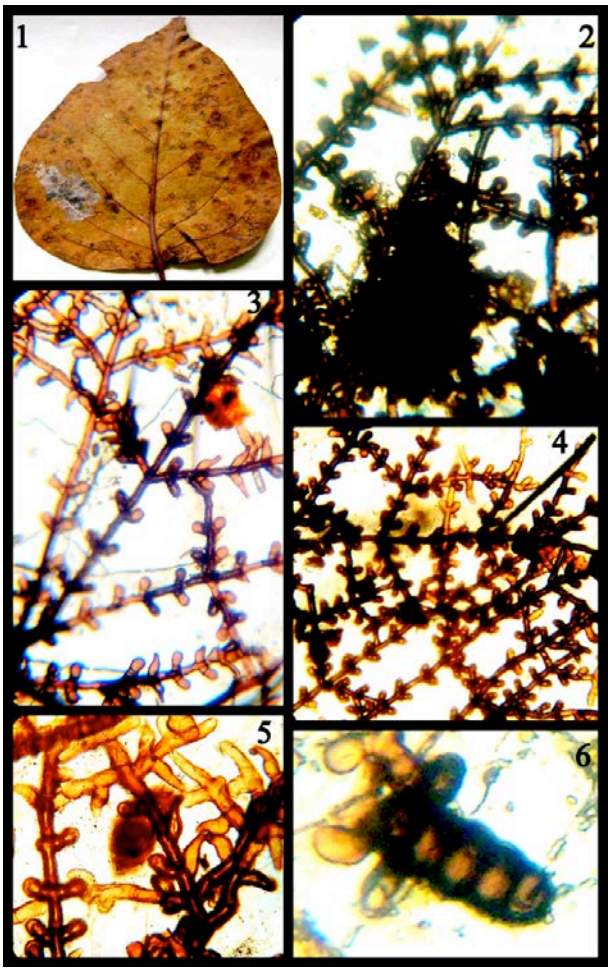


Image 73. ***Meliola gemellipoda***
1 - Infected leaf; 2 - Colony with Perithecia; 3 - Branched mycelium; 4 - Mycelial setae, 5 - Mycelium with appressoria & phialides, 6 - Germinating ascospore

loosely to closely reticulate, cells 9–20x5–7µm. Appressoria opposite, few unilateral, straight, antrorse, 15–21 µm long; stalk cells cuneate, few cylindrical, 4–8 µm long; head cells globose to ovate, entire, 10–13x7–9µm. Phialides few, mixed with appressoria, alternate to opposite, ampulliform, 20–28x7–9 µm. Mycelial setae scattered and grouped around perithecia, straight, simple, acute to obtuse at the tip, up to 570µm long. Perithecia scattered, up to 105µm in diameter; ascospores ovate to obovoidal, 4-septate, constricted at the septa, 40–48x13–19 µm.

This species was found associated with Asterina erysiphoides.

Meliola geniculata Sydow & Butler, Ann. Mycol. 9: 381, 1991; Hansf., Sydowia Beih. 2: 463, 1961; Hosag., Meliolales of India, p. 205, 1996. (Image 74)

Materials examined: FMKMC 86, 14.i.2010, on leaves of *Lannea coromandelica* (Houtt.) Merr. (Odina wodier Roxb.) (Anacardiaceae), Sampaje Ghat, C. Jagath Thimmaiah.

Colonies epiphyllous, dense, confluent. Hyphae substraight, branching opposite, few alternate at subacute to wide angles, loosely to closely reticulate, cells 19–27x6–8 µm. Appressoria distantly placed, alternate, about 10% unilateral, straight antrorse, 15–21 µm long; stalk cells cylindrical to cuneate, 4–6 µm long; head cells oblong, clavate, slightly curved, entire, 13–16x8–9 µm. Phialides numerous on separate mycelial branches, few mixed with appressoria, opposite, unilateral or subopposite, 18–24x5–7 µm. Mycelial setae numerous, simple, curved or straight, surrounding perihelia, forked, dentate up to five times, obtuse, up to 320µm long. Perihelia scattered to grouped, globose, up to 220µm in diameter; ascospores 4-septate, cylindrical, oblong, constricted, 40–42x13–16 µm.

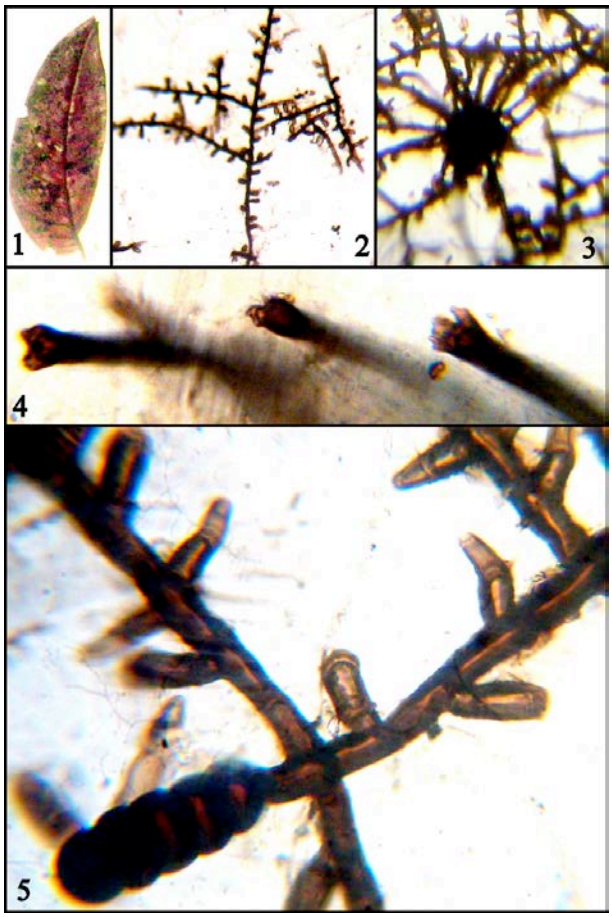


Image 74. ***Meliola geniculata***
1 - Infected leaf; 2 - Branched colony; 3 - Perithecium; 4 - Mycelial setae; 5 - Appressoria, Phialides & germinating ascospore.

Meliola gliricidiicola Hosag. & Agarwal, Indian Phytopath. 56: 103, 2003; Hosag. & Agarwal, Taxonomic Studies of Meliolales. Identification manual, p. 178, 2008. (Image 75)

Materials examined: TBGT 5431, FMKMCC 87, 17.x.2009, on leaves of *Gliricidia sepium* (Jacq.) Walp. (Fabaceae), Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense, up to 4mm in diameter. Hyphae substraight, branching opposite at wide angles, loosely reticulates, cells 21-30x6-7.5 µm. Appressoria alternate to unilateral, few opposite, antrorse to subantrorse, retrorse, 12-17 µm long; stalk cells cuneate, 2-4 µm long; head cells ovate, slightly curved, angulose, entire, 10-13x10-12 µm. Phialides many mixed with appressoria, mostly unilateral to opposite, ampulliform, neck elongated 16-20x8-9 µm. Mycelial setae numerous, grouped around perithecia, simple, straight to curved, acute to obtuse at the tip, up to 260 µm long. Perithecia scattered, verrucose, up to 160 µm in diameter; ascospores oblong, 4-septate, constricted, 35-38x13-16 µm.

Meliola gneti Hansf., Reinwardtia 3: 85, 1954; Sydowia Beih. 2: 751, 1961; Thite & Kulkarni, J.Shivaji Univ. (Sci.) 18: 211, 1978; Hosag. & Goos, Mycotaxon 36: 236, 1989; 42:126, 1991; Hosag., Dayal & Goos, Mycotaxon 37: 234, 1990; 42: 135, 1991; Hosag., Meliolales of India, p. 207, 1996. (Image 76)

Materials examined: HCIO 45688, TBGT 1435; HCIO 45737, TBGT 1486, 13.xi.2003, on leaves of *Gnetum ula* Brongn. (Gnetaceae), MPCA, Brahmagiri, Talacauvery, V.B. Hosagoudar et al; TBGT 5335, FMKMCC 88, 24.xi.2008, Vanachalu, C. Jagath Thimmaiah.

Colonies amphigenous, mostly epiphyllous, dense, rarely confluent, up to 4mm in diameter. Hyphae substraight, branching opposite at wide angles, closely reticulate, cells 20–24x5–7 µm. Appressoria alternate,

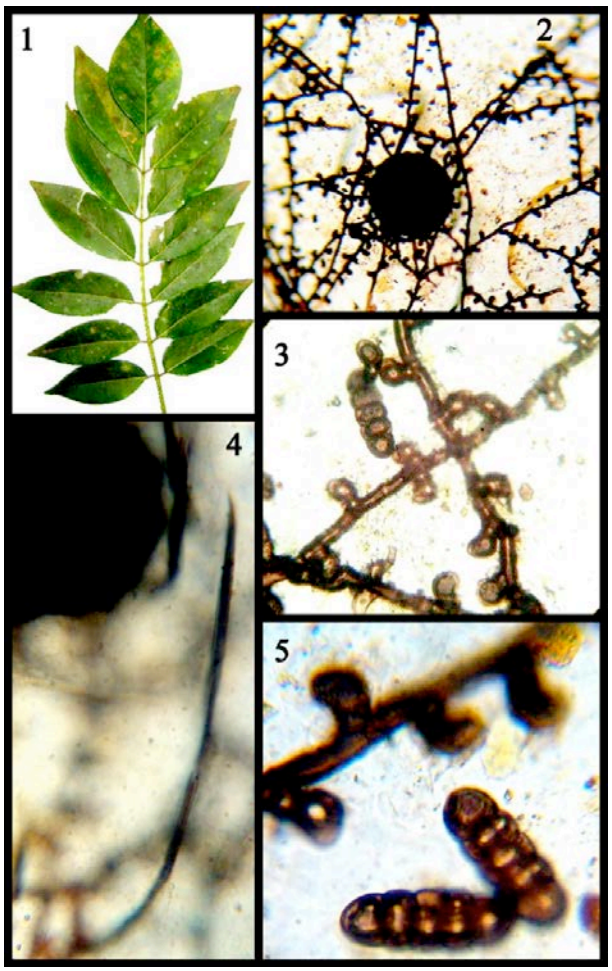


Image 75. *Meliola gliricidicola*
1 - Infected leaf lets; 2 - Branched colony; 3 - Appressoria & Phialides; 4 - Mycelial setae; 5 - Ascospores

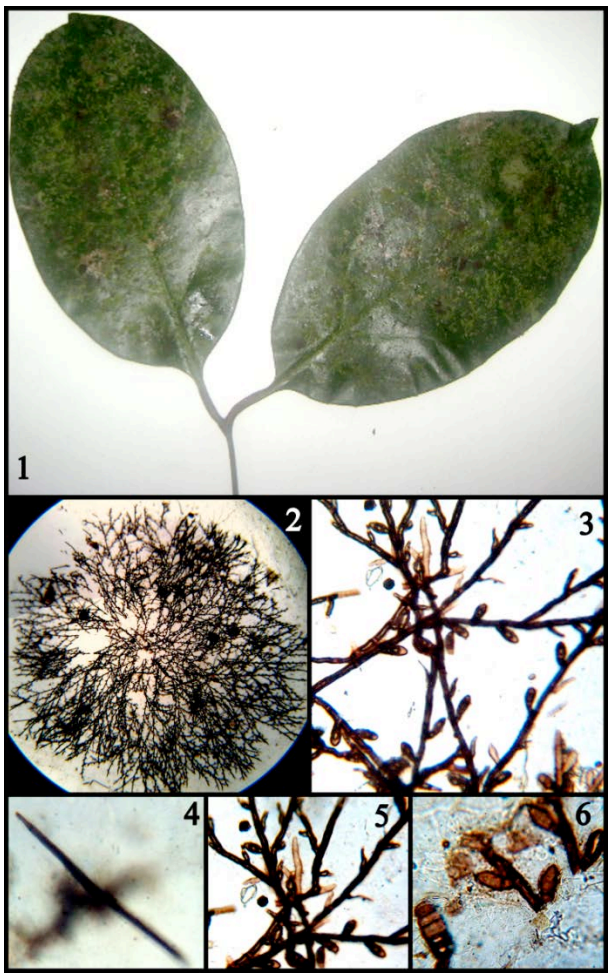


Image 76. *Meliola gneti*
1 - Infected leaves; 2 - Radially spreaded mycelium; 3 - Reticulate mycelium; 4 - Mycelial setae; 5 - Appressoria & phialides; 6 - Ascospore

antrorse, straight, 20–23µm long; stalk cells cylindrical to cuneate, 4–9 µm long; head cells ovate, globose, slightly angulose, entire, 19–23 µm long. Phialides many mixed with appressoria, opposite to alternate, ampulliform, 20–23x4–7 µm. Mycelial setae scattered, simple, straight, tip acute or bent to curved, up to 330µm long. Perithecia globose, few, surrounded by mycelial setae, up to 150µm in diameter; ascospores cylindrical, 4-septate, constricted at the septa, 39–49x14–22 µm.

Meliola goosii Hosag., Crypt. Bot. 2/ 3: 186, 1991; Hosag., Abraham & Pushpangadan, The Meliolineae-A Supplement, p. 122, 1997. (image 77)

Materials examined: FMKMCC 89, 26.i.2010, on leaves of *Viburnum punctatum* Buch.-Ham. (Caprifoliaceae), Mandrane, Hoddur, C. Jagath Thimmaiah.

Colonies amphigenous, thin, up to 4mm in diameter. Hyphae flexuous, branching alternate at wide angles, loosely reticulate, cells 25–28x7–9 µm. Appressoria alternate and unilateral, straight, antrorse, distantly placed 25–29 µm long; head cells ovate, clavate, irregularly lobed, 15–20x12–17 µm; stalk cells mostly cylindrical, few cuneate, 5–10 µm long. Phialides few borne on separate branch, unilateral, few alternate, ampulliform 20-–28x4–7 µm. Mycelial setae carboniferous, straight or slightly curved, acute, up to 700µm long. Perithecia globose scattered, up to 125µm in diameter; ascospores 4-septate, brown, cylindrical, constricted at the septa, 45–55x15–20 µm.

Meliola goniothalamigena Hosag. & Jagath., Plant Pathology & Quarantine 3: 6, 2013 (Fig. 15)

Materials examined: TBGT 6240 (holotype), 8.i.2010. On leaves of *Goniothalamus cardiopetalus* (Dalz.) Hook. f. & Thomson (Annonaceae), Medikari, C. Jagath Thimmaiah.

Colonies amphigenous, subdense, scattered, up to 1mm in diameter. Hyphae straight to substraight, branching mostly opposite, rarely alternate at acute to wide angles, loosely to closely reticulate, cells 20–27×5–8 µm. Appressoria alternate to unilateral, antrorse to subantrorse, straight to rarely curved, 22–27 µm long;

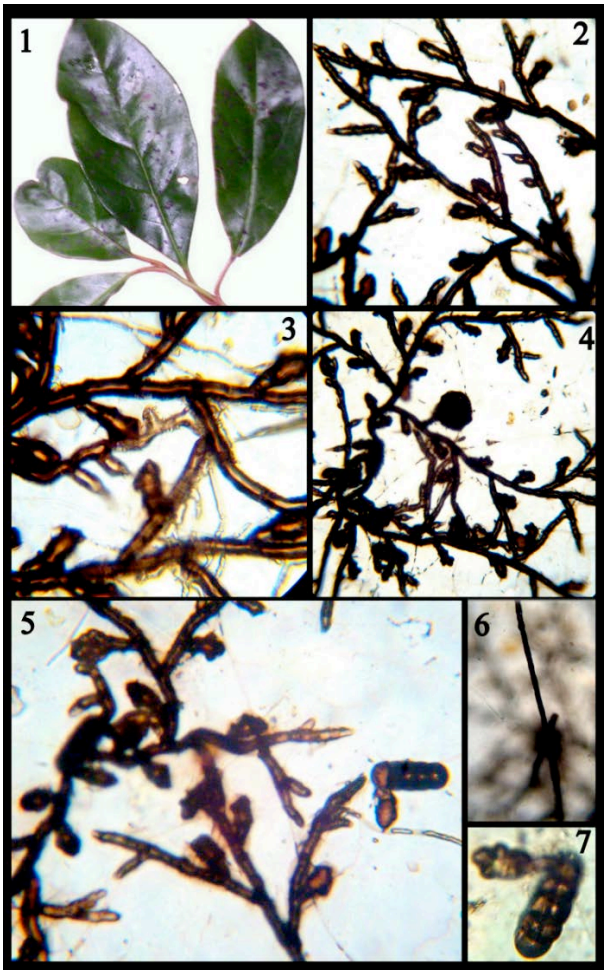


Image 77. *Meliola goosii*
1 - Infected leaves; 2 - Branched mycelium; 3 - Appressoria & Phialides; 4 - Young perithecia; 5 - Germinating spore forming colony; 6 - Mycelial setae; 7 - Ascospore

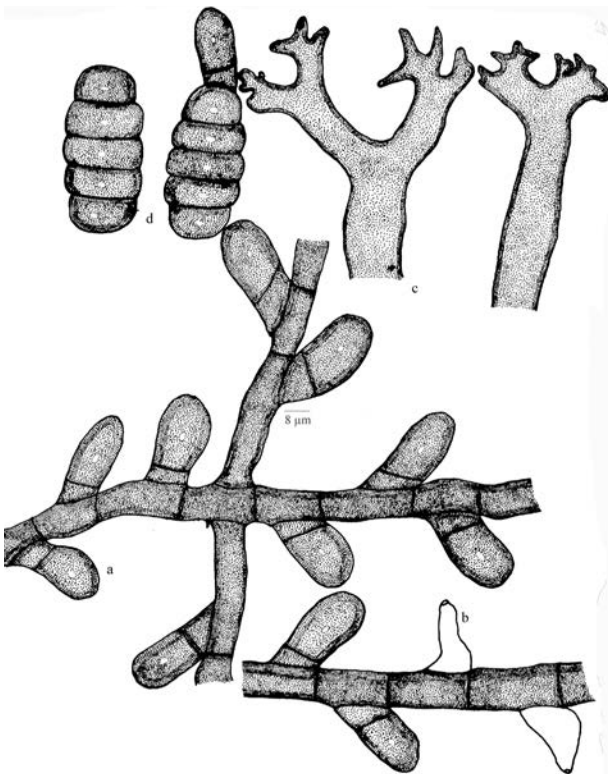


Figure 15. *Meliola goniothalamigena*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

stalk cells cylindrical to cuneate, 5–7 µm long; head cells ovate to oblong, often attenuated to truncate the tip, entire, 15–20×7–12 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 17–27×6–7 µm. Mycelial setae densely scattered, dichotomously and irregularly furcated, branchlets recurved, acute to dentate at the tip, up to 270µm long. Perithecia scattered, up to 160 µm in diameter; ascospores oblong to cylindrical, 4-septate, slightly constricted at septa, 40–45×17–20 µm.

Meliola gouaniicola Hosag. & Robin, Bioscience Discovery 2(2): 266, 2011. (Image 78)

Materials examined: TBGT 5327, FMKMCC 90, 24.xi.2008, on leaves of *Gouania microcarpa* DC. (Rhamnaceae), Vanachalu, November 24, 2008, C. Jagath Thimmaiah.

Colonies dense up to 6mm in diameter. Hyphae substraight, branching opposite at subacute to wide angles, loosely reticulate, cells 30–38x7–10 µm. Appressoria alternate to unilateral, antrorse to subantrorse, straight to curved, up to 14–26 µm long; stalk cells cuneate to cylindrical, up to 4–6.5 µm long; head cells ovate, angulose, entire, up to 13–18x11–13 µm. Phialides few, borne on separate mycelial branch, opposite to alternate, ampulliform, neck elongated, up to 15–22x5–8 µm. Mycelial setae many, scattered, straight to curved, simple, acute at the tip, up to 620µm long. Perithecia scattered, globose, up to 250µm diameter, surrounded by perithecial setae, straight to curved tip. Ascospores cylindrical, 4-septate, constricted at the septa, up to 42–45x11–15 µm.

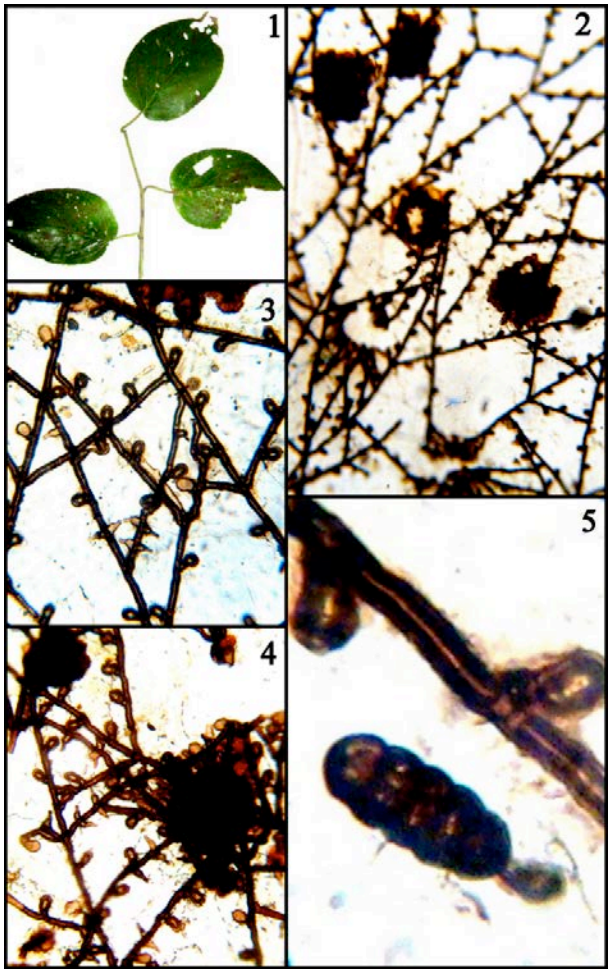


Image 78. *Meliola gouaniicola*
1 - Infected leaves; 2 - Branched mycelium; 3 - Appressoria & Phialides; 4 - Young perithecia; 5 - Germinating ascospore.

Meliola groteana Sydow & Sydow, Ann. Mycol. 11: 402, 1913; Hansf., Sydowia Beih. 2: 511, 1961; Thite & Patil, Kavaka 10: 30, 1982; Hosag. & Goos, Mycotaxon 37: 234, 1990; 42: 135, 1991; Hosag., Meliolales of India, p. 211, 1996.

Meliola maesae Rehm, Philippine J. Sci. 8: 392, 1913. (Fig. 16).

Material examined: HCIO 45730, 11.xi.2003, on leaves of *Maesa indica* (Roxb.) DC. (Myrsinaceae), Nishane motta, V.B. Hosagoudar et al; HCIO 45668, TBGT 1415, 14.xi.2003, V.B. Hosagoudar et al; HCIO 45739, TBGT 1488, 12.xi.2003 Jodupal, V.B. Hosagoudar et al.

Colonies hypophyllous, dense, velvety, up to 5mm in diameter, rarely confluent, corresponding upper surface of the leaf turned yellowish brown. Hyphae straight to slightly crooked, branching opposite at wide angles, loosely to closely reticulate, cells 10–28x6–8 µm. Appressoria alternate, about 10% opposite, antrorse, spreading, 10–15 µm long; stalk cells cylindrical to cu-

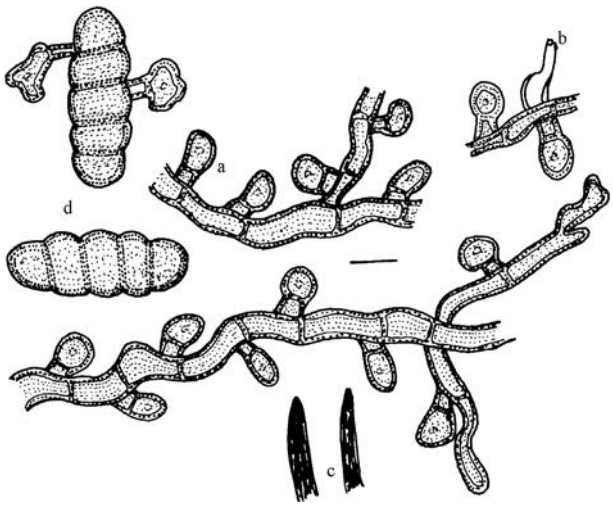


Figure 16. *Meliola groteana*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

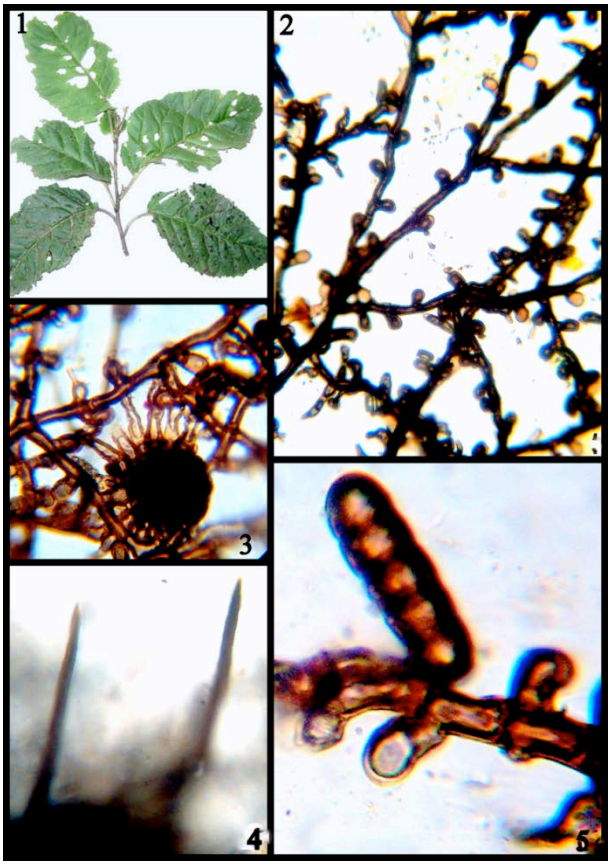


Image 79. *Meliola groteana* var. *maesae*
1 - Infected leaves; 2 - Branched colony showing appressoria & Phialides; 3 - Young perithecium; 4 - Mycelial setae; 5 - Germinating ascospore

neate, 2–5 µm long; head cells globose, slightly angular, entire, 8–10x8–12 µm. Phialides mixed with appressoria, opposite to alternate, ampulliform, 10–16x8–10 µm. Mycelial setae fairly numerous, straight, simple, acute at the tip, up to 302µm long. Perithecia scattered, verrucose, up to 200µm in diam.; ascospores oblong, 4-septate, constricted, 40–44x12–16 µm.

Meliola groteana Sydow var. ***maesae*** Hosag., C.K. Biju & Abraham, Nova Hedwigia 80: 486, 2005; Hosag., Meliolales of India 2: 257, 2008. (Image 79)

Materials examined: TBGT5476, FMKMCC 91, 4.xii.2009, on leaves of *Maesa indica* (Roxb.) (Myrsinaceae), Devara kadu, Hoddur, C. Jagath Thimmaiah; TBGT 5459, FMKMCC 92 , 22.xi.2009, Mallamatti, C. Jagath Thimmaiah.

Colonies hypophyllous, dense, up to 5mm in diameter, rarely confluent. Hyphae straight to slightly crooked, branching opposite at wide angles, loosely to closely reticulate, cells 10–28x6–8 µm. Appressoria alternate, few branches opposite, antrorse, 10–15 µm long; stalk cells cylindrical to cuneate, 2–5 µm long; head cells globose, slightly angular, entire, 8–10x8–12 µm. Phialides mixed with appressoria, opposite to alternate, ampulliform, 10–16x8–10 µm. Mycelial setae numerous, straight, simple, acute at the apex, up to 300 µm long. Perithecia scattered, verrucose, up to 200µm in diameter; ascospores oblong, 4-sptate, constricted at the septa, 40–44x12–16 µm.

Meliola gymnemae Jana, Ghosh & Das, Indian Phytopath. 58: 444, 2005; Hosag., Meliolales of India 2: 259, 2008. (Image 80).

Materials examined: TBGT 5405, FMKMCC 93, 22.viii.2009, on leaves of *Gymnema sylvestre* (Retz.) R.Br. ex Schult. (Asclepiadaceae), Hoddur, C. Jagath Thimmaiah.

Colonies, dense up to 4mm in diameter. Hyphae

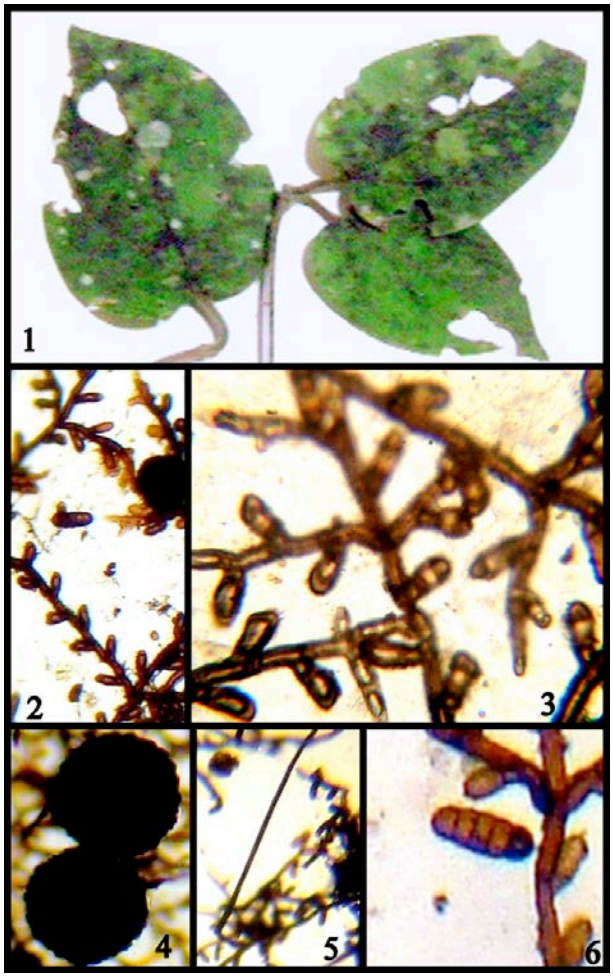


Image 80. *Meliola gymnemae*
1 - Infected leaves; 2&3 - Branched mycelium with appressoria & phialides; 4 - Perithecia; 5 - Mycelial setae; 6 - Ascospore

substraight, flexuous, branching opposite at subacute to wide angles, loosely to closely reticulate, cells 17–23X7–10 µm. Appressoria alternate to unilateral (few), antrorse, straight to curved, up to 16–32 µm long; stalk cells cuneate to cylindrical, up to 4–10 µm long; head cells ovate, entire, angulose, up to 14–18x7–10 µm. Phialides many, borne on a separate mycelial branch, mostly opposite, few unilateral, ampulliform, 15–19x7–9 µm. Mycelial setae numerous, scattered, simple, straight, acute at the tip, up to 300µm long. Perithecia grouped to scattered, globose, up to 150µm diameter; ascospores cylindrical to oblong, 4-septate, constricted at the septa, 30–35x14–17 µm.

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. 17; Images 80a,b).

Material examined: HCIO 45623, TBGT 1366, 12.xi.2003, on leaves of *Holigarna* sp. (Anacardiaceae), Nishane motta, November 12, 2003, V.B. Hosagoudar et al.; HCIO 45712, TBGT 1461, 12.xi.2003, Jodupal, V.B. Hosagoudar et al.

Colonies hypophyllous, dense, velvety, up to 10mm in diam., confluent. Hyphae strongly appressed to the host surface, crooked, branching alternate to irregular at acute to wide angles, closely reticulate and forming almost solid mycelial mat, cells 38–56x6–8 µm. Appressoria scattered, alternate to unilateral, antrorse to

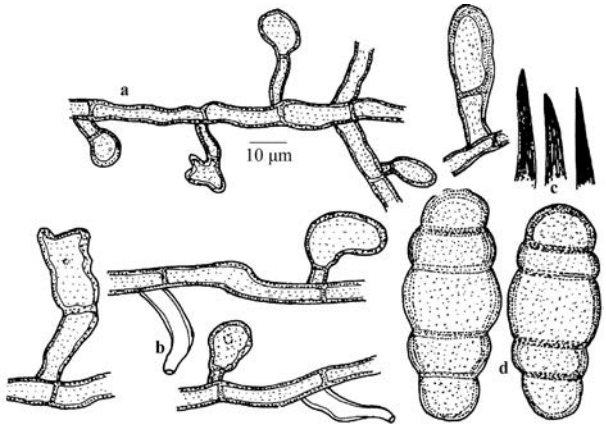


Figure 17. *Meliola holigarnae*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Image 80a. *Meliola holigarnae* - infected leaves

Image 80b. *Meliola holigarnae* - infected leaves

reflexed, curved variously, 26–50 µm long; stalk cells cylindrical, flexuous, usually elongated, usually 8–22 µm long; head cells ovate, versiform, angulose, entire to lobate, straight to curved, 18–22x14–18 µm. Phialides few, mixed with appressoria, conoid to ampulliform, 12–26x4–8 µm. Mycelial setae numerous, straight, flexuous, simple, acute to obtuse at the tip, up to 810µm long. Perithecia scattered, verrucose, up to 270µm in diam.; ascospores ellipsoidal, 4-septate, constricted, middle cell largest, 64–74x24–30 µm.

Meliola jasmini Hansf. & Stev., J. Linn. Soc. London 51: 273, 1937; Hansf., Sydowia Beih. 2: 535, 1961; Hosag., Indian J. Bot. 11: 185, 1988; Hosag. & Raghu, New Botanist 20: 70, 1993; Hosag., Meliolales of India, p. 226, 1996. (Image 81)

Materials examined: HCIO 45645, TBGT 1391; HCIO 45660, TBGT 1406; MPCA, 11.xi.2003, on leaves of *Jasminum* sp. (Oleaceae), Nishane motta, V.B. Hosagoudar et al.; Brahmagiri, Talacauvery, HCIO 45674, TBGT 1421, 11.xi.2003, V.B. Hosagoudar et al; TBGT 5382, FMKMCC 94, 20.xii.2008, Mandrane, Hoddur, C. Jagath Thimmaiah; TBGT 5421, FMKMCC 95 18.xi.2009, Hoddur, C. Jagath Thimmaiah.

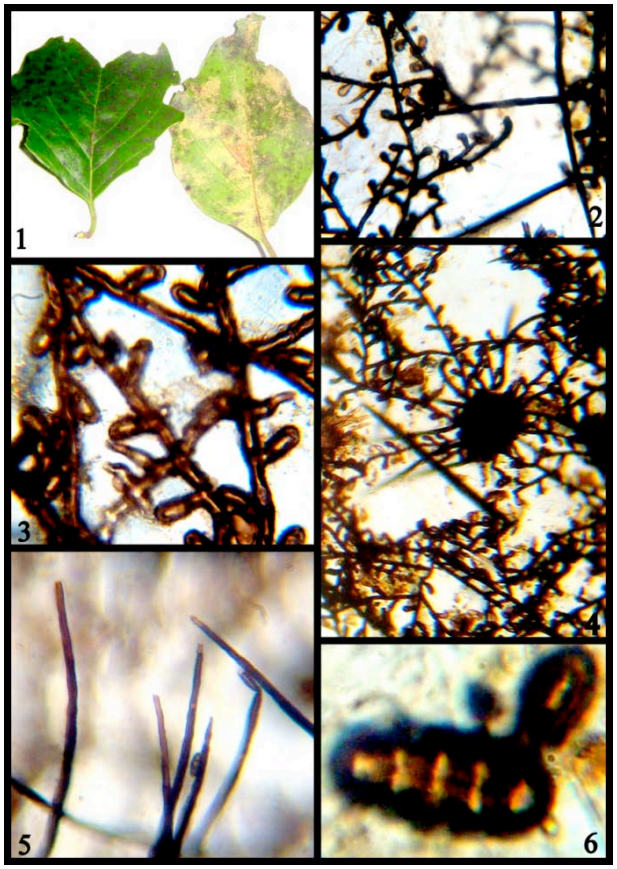


Image 81. *Meliola jasmini*
1 - Infected leaves; 2&3 - Colonies showing appressoria & Phialides; 4 - Perithecia; 5 - Mycelial setae; 6 - Germinating ascospore

Colonies amphigenous, subdense, up to 5mm in diameter. Hyphae straight to substraight, branching opposite at subacute angles, loosely reticulate, cells 25–30x5–7 µm. Appressoria alternate to unilateral, antrorse, few retrorse, straight to curved, 18–25 µm long; head cells ovate, globose, oblong, broadly rounded at the apex, entire, few curved inwards, angulose, rarely sublobate, 15–18x8–10 µm. Phialides many borne on separate mycelial branch, opposite to subopposite, unilateral, ampulliform, 19–25x4–5.5 µm. Mycelial setae many, scattered, simple, straight, slightly curved, mostly acute, few obtuse, up to 380µm long. Perithecia scattered, globose, up to 90µm in diameter, margin verrucose. Ascospores oblong to cylindrical, 4-septate, constricted at the septa, 34–40x13–15 µm.

Colonies were associated with M. gemellipoda Doidge, Asterina erysiphoides Kalch. & Cooke

Meliola jasminicola Henn. var. ***indica*** Kapoor, Indian Phytopathol. 20: 156, 1967; Hosag. & Goos, Mycotaxon 37: 236, 1990; Hosag., Meliolales of India, p. 226, 1996. (Image 82).

Materials examined: BGT 5448, FMKMCC 96, 23.xi.2009, 31.i.2010, on leaves of *Jasminum angustifloium* (L.) Willd. var. *angustifolium* Hook. (Oleaceae), Field Marshal Cariappa College Campus, Hoddur, C. Jagath Thimmaiah T; FMKMCC 97, 14.i.2010 *J. auriculatum* Vahl, Sampaje Ghat, C. Jagath Thimmaiah.

Colonies epiphyllous, dense, up to 3mm in diameter. Hyphae substraight, branching opposite at subacute to wide angles, loosely to closely reticulate, cells 22–30x5–8.5µm. Appressoria alternate, antrorse to subantrorse, few retrorse, 15–24 µm long; stalk cells cuneate to cylindrical, 3–6µm long; head cells ovate few cylindrical, angulose, entire, 11–19x8–11µm. Phialides few mixed with appressoria, opposite to unilateral, ampulliform,18–26x5–8µm. Mycelial setae numerous, simple straight to curved, acute to obtuse, up to 310µm long. Perithecia grouped to scattered, globose, up to 120µm in diameter; ascospores 4-septate, cylindrical to oblong, constricted at the septa, 40–45x18–22 µm.

Meliola kanniyakumariana Hosag. var. ***brahmagiriense*** Hosag., Agarwal, H. Biju & Archana, Indian Phytopath. 59: 347, 2006; Hosag., Meliolaes of India 2: 274, 2008. (Image 83).

Materials examined: FMKMCC 98, 16.x.2010 on leaves of *Knoxia sumatrensis* (Retz.) DC. (Rubiaceae),

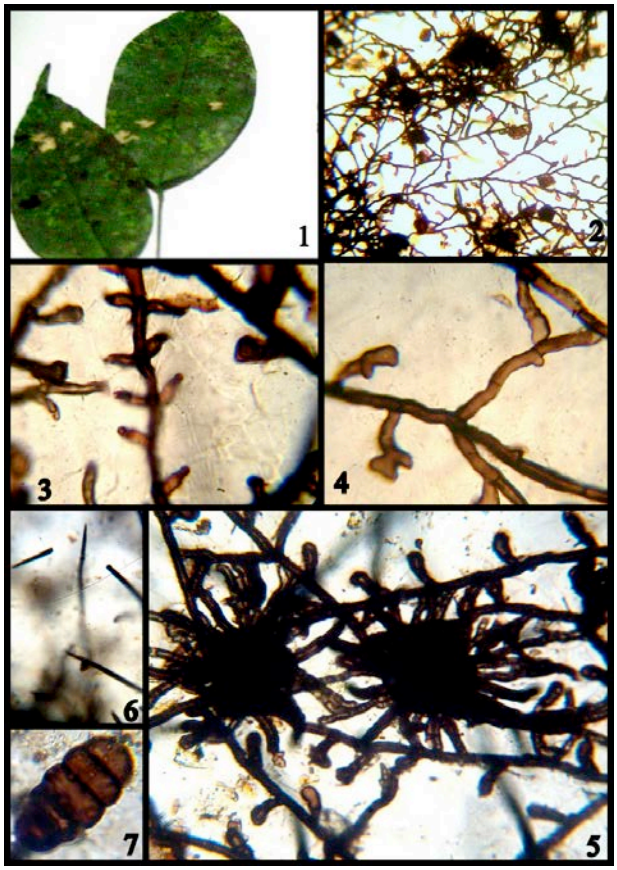


Image 82. ***Meliola jasminicola*** **. var.** ***indica***
1 - Infected leaves; 2 - Colony; 3 - Phialides; 4 - Appressoria; 5 - Perithecia; 6 - Mycelial setae; 7 - Ascospore.

Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, dense, up to 4mm in diameter. Hyphae substraight to flexuous, branching opposite at wide angles, loosely to closely reticulate, cells 21–31x5–6 µm. Appressoria mostly alternate few unilateral, antrorse; stalk cells cuneate, 5–9 µm long; head cells globose, slightly lobed, rhomboid, entire, 11–15x10–12 µm. Phialides few, mixed with appressoria, opposite, ampulliform, 15–18x6–7 µm. Mycelial setae numerous, simple, uncinate, obtuse at the tip, up to 250µm long. Perithecia scattered to grouped, globose, dark, surrounded by mycelial setae, margin crenulate, up to 150µm in diameter; ascospores cylindrical, 4-septate, constricted at the septa, brown, 33–37x13–15 µm.

Meliola kapoorii Hosag. & Raghu in Hosag., Meliolales of India, p. 229, 1996.

Meliola pandani Sawada & Yamamoto in Sawada, Spec. Publ. coll.Agric. Nat. Taiwan univ. 8:35, 1959 (non, Sydow, 1928).

M. juttingi sensu Nair, Curr. Sci.19:527, 1971 (non, Hansf., 1954). (Image 84)

Materials examined: TBGT 5342, FMKMCC 99, 24.xi.2008, on leaves of *Pandanus thwaitesii* Bull. (Pandanaceae), K. Nidugane, Kodagu, C. Jagath Thimmaiah.

Colonies hypophyllous, dense, up to 8mm in diameter. Hyphae substraight, branching subopposite at subacute angles, loosely reticulate, cells 15–20x3–5 µm. Appressoria mostly alternate, few unilateral, antrorse, straight, few curved, 13–15 µm long; stalk cells cylindrical to cuneate, 4–6 µm long; head cells globose, ovate, sublobate, angulose, curved inwards, 7–9x10–15 µm. Phialides few mixed with appressoria, alternate, ampulliform, 12–14x4–7 µm. Mycelial setae few, straight, simple, acute at the tip, up to 350µm long. Perithecia scattered, globose, up to 150µm in diameter; ascospores obovoidal to ellipsoidal, 4-septate, constricted at the septa, 48–53x19–21 µm.

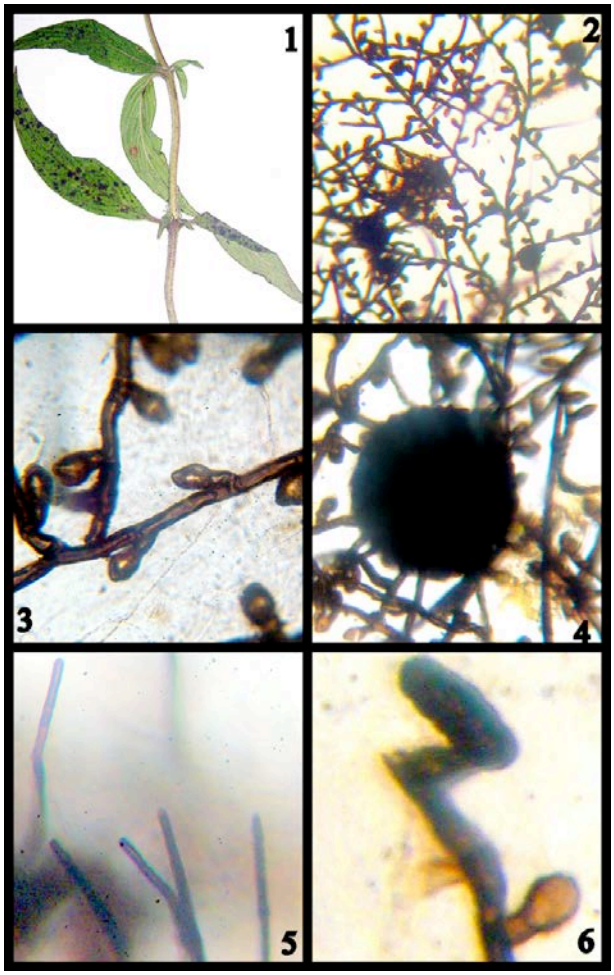


Image 83. ***Meliola kanyakumariensis*** **var.** ***brahmagiriensis***
1 - Infected leaves; 2 - Colony; 3 - Appressoria; 4 - Perithecium; 5 - Mycelial setae; 6 - Germinating ascospore

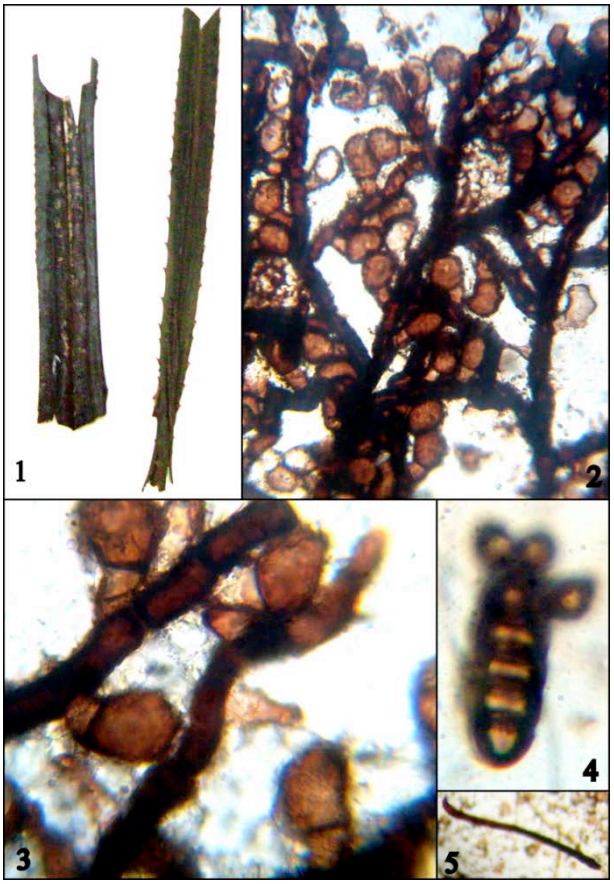


Image 84. *Meliola kapoorii*
1 - Infected leaves; 2 - Colony; 3 - Appressoria & Phialides; 4 - Germinating ascospore; 5 - Mycelial setae

Meliola kingiodendri Hosag., Dayal & Goos, Mycotaxon 46: 205, 1993; Hosag., Meliolales of India, p. 234, 1996; Hosag., Abraham & Pushpangadan, The Meliolinae - A Supplement, p. 133, 1997. (Image 85)

Materials examined: FMKMCC 100, 14.i.2010, on leaves of *Kingiodendron pinnatum* (Roxb. ex DC.) Harms (Fabaceae), Sampaje Ghat, Kodagu, C. Jagath Thimmaiah.

Colonies epiphyllous, thin, up to 3mm in diameter. Hyphae straight to substraight, branching opposite few branches are unilateral at wide angles, loosely reticulate forming a thick mycelial mat, cells 20–24x5–7 µm. Appressoria straight, antrorse, few retrorse, opposite, densely arranged, 15–19 µm long; stalk cells cylindrical to cuneate 2–4 µm long; head cells 13–17x7–8 µm. Phialides mixed with appressoria, opposite, ampulliform to conoid, few curved 15–17x7–8 µm. Mycelial setae many, short, stout, uncinate to straight, simple, acute, obtuse, up to 340µm long. Perithecia globose scattered, up to 160µm in diameter; ascospores 4-septate, constricted at the septa, brown, elliptical, middle cells broad, 35–37x18–20 µm.

Meliola knowltoniae Doidge, Bothalia 1: 308, 1924; Hansf., Sydowia Beih. 2: 62, 1961.(Image 86)

Colonies amphigenous, dense, up to 10mm in diameter. Hyphae substraight, branching opposite at wide to subacute angles, loosely reticulate, cells 35–40x6–8 µm. Appressoria alternate, antrorse, 15–35 µm long; stalk cells cylindrical to cuneate, 6–15 µm long; head cells lobate, 13–20x15–17 µm. Phialides mostly opposite to unilateral, on separate branches, few mixed with appressoria, 20–22x7–9 µm. Mycelial setae numerous, simple, straight or substraight, slightly uncinate, acute to obtuse, up to 550µm long. Perithecia orbicular, grouped, up to 150µm in diameter; ascospores 4-septate, oblong to cylindrical or elliptic constricted at the septa, 38–40x13–15 µm.

Materials examined: FMKMCC 101, 1.i.2010, on

Image 85. *Meliola kingiodendri*
1. Infected leaves; 2. Colony; 3. Appressoria; Phialides & mycelial setae; 4. Opposite branches; 5. Perithecium; 6.Germinating ascospore

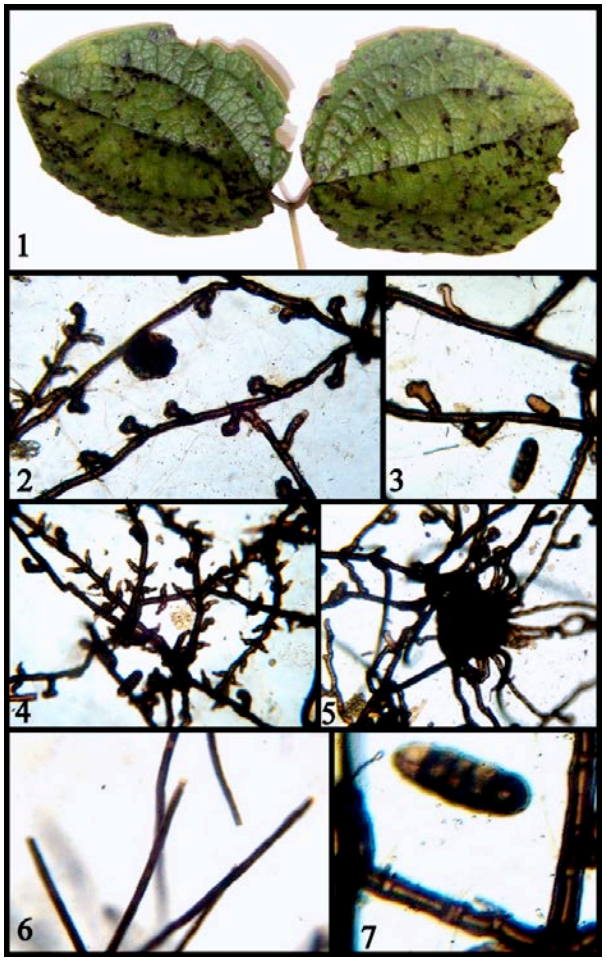


Image 86. *Meliola knowltoniae*
1 - Infected leaves; 2 - Thin colony; 3 - Appressoria; 4 - Phialides; 5 - Perithecium; 6 - Mycelial setae; 7 - Ascospore

leaves of *Clematis gouriana* Roxb. ex DC. (Ranunculaceae), Igguthappa Temple, January 9, 2010, C. Jagath Thimmaiah.

This species was known on *Knowltonia vesicatoria* from S. Africa and on *Clematis gouriana* and *Clematis floribunda* from Formosa and on *Clematis glycinoides* from New South Wales. This is the only species known on members of *Ranunculaceae* (Hansford, 1961).

***Meliola kodaguensis* sp. nov.**

Hosag. B. Divya & Jagath.

(Fig. 20) (urn:lsid:indexfungorum.org:names:807145)

Materials examined: TBGT 6559 (holotype), 23.xii.2010, on leaves of *Strychnos colubrina* L. (Loganiaceae), Medikare, December 23, 2010, C.Jagath Thimmaiah.

Colonies epiphyllous, subdense, spreading, up to 5mm in diameter. Hyphae straight, substraight to flexuous, branching mostly opposite, rarely irregular at acute to wide angles, loosely to closely reticulate, cells 20–25x5–7 µm. Appressoria alternate to unilateral, straight to curved, antrorse, subantrorse to retrorse, 22–27 µm long; stalk cells cylindrical, 5–7 µm long; head cells oblong to cylindrical, entire, angular, straight to curved,17–20x5–7 µm. Phialides mixed with appressoria, opposite to unilateral, ampulliform,15–22x5–6 µm. Mycelial setae few, simple, straight, acute to obtuse at the tip, up to 360µm long. Perithecia scattered, up to 160µm in diameter; ascospores obovoidal, 4-septate, constricted at septa, 30–40x12–15µm.

Based on the typically straight to curved and oblong to cylindrical head cells of appressoria, this species is closer to *Meliola evanida* Gaill. but differs from it in having shorter setae (up to 300µm vs 1100µm) in contrast to 2-3-dentate setae and having smaller ascospores (30–40x12–15 µm vs. 38–45x14–17 µm). (Hansford, 1996).

Meliola ligustri Hosag., Mycotaxon 37: 236,1990; Hosag. & Goos, Hosag., Meliolales of India, p. 232, 1996. (Image 87).

Colonies epiphyllous, dense, up to 2mm in diameter. Hyphae sub stright, branching opposite to alternate at wide to subacute angles. Cells 10–13x6–8 µm. Appres-

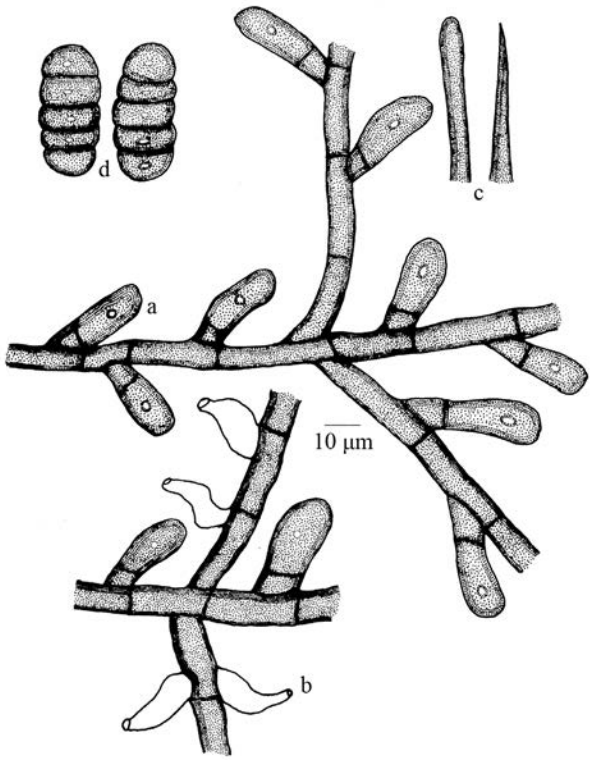


Figure 20. *Meliola kodaguensis* sp. nov.
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

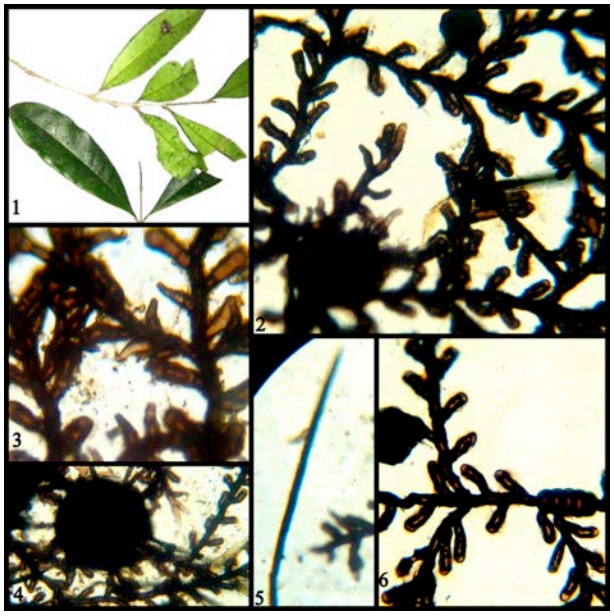


Image 87. *Meliola ligustri*
1 - Infected leaves; 2 - Colony; 3 - Appressoria & Phialides; 4 - Perithecium; 5 - Mycelial setae; 6 - Germinated ascospore

soria alternate, antrorse, straight, few curved, 15–22 µm long; stalk cells cylindrical to cuneate, 2.5–6 µm long; head cells ovate, cylindrical, few lobate, 11–15x6–10 µm. Phialides many, mixed with appressoria, opposite to unilateral, few alternate, ampulliform, 15–22x4–6 µm. Mycelial setae numerous, grouped around perithecia, few scattered, simple, straight to slightly curved, acute to obtuse at the tip, up to 500µm long. Perithecia scattered, globose, up to 100 µm in diameter; ascospores 4-septate, cylindrical, constricted at the septa, 30–40x14–16 µm.

Materials examined: On leaves of *Ligustrum* sp. (Oleaceae), Nishane motta, November 11, 2003, V.B. Hosagoudar et al. HCIO 45655, TBGT 1401; HCIO 45643, TBGT 1389; November 12, 2003, HCIO 45799, TBGT 1548; November 13, 2003, V.B. Hosagoudar et al. HCIO 45808, TBGT 1557; MPCA, Brahmagiri, Talacauvery, Madikeri, November 13, 2003, V.B. Hosagoudar et al. HCIO 45678, TBGT 1425; HCIO 45702, TBGT 1450; HCIO 45741, TBGT 1490; HCIO 45810, TBGT 1560; *Chionanthus mala-elengi* (Dennst.) (Oleaceae), Madikeri, November 26, 2008, C. JagathThimmaiah TBGT 5360, FMKMCC 102; Hoddur, Janaury 11, 2010, Jagath Thimmaiah TBGT 5392, FMKMCC 103, Hoddur, December 2, 2009, Jagath Thimmaiah TBGT 5453, FMKMCC 104.

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

Materials examined: TBGT 5321, FMKMCC 105, 24.xi.2008, on leaves of *Litsea* sp. (Lauraceae), Vanachalu, Kodagu, C. Jagath Thimmaiah.

Colonies epiphyllous, dense, up to 4mm in diameter, confluent. Hyphae substraight, branching opposite at wide angles, loosely reticulate, cells 30–32x8–9 µm. Appressoria alternate, straight to curved, antrorse to retrorse, 20–23 µm long; stalk cells cylindrical 4–5 µm long; head cells versiform, obovate, entire, 14–16x10–13 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 18–22x6–9 µm. Mycelial setae few, straight, simple, acute to obtuse, up to 600µm long. Perithecia scattered, globose, up to 180µm in diameter; ascospores 4-septate obovate to ellipsoidal, constricted at the septa, 45–63x17–20 µm.

***Meliola madhucae* sp. nov.**

Hosag., B. Divya & Jagath.

(Fig.21) (urn:lsid:indexfungorum.org:names:807146)

Colonies amphigenous, dense, up to 5mm in diameter, confluent. Hyphae substraight to flexuous, branching opposite acute to wide angles, loosely reticulate, cells 20–32x6–8 µm. Appressoria alternate to unilateral, antrorse to subantrorse, straight to curved, 22–30 µm long; stalk cells cylindrical to cuneate, 5–6 µm long; head

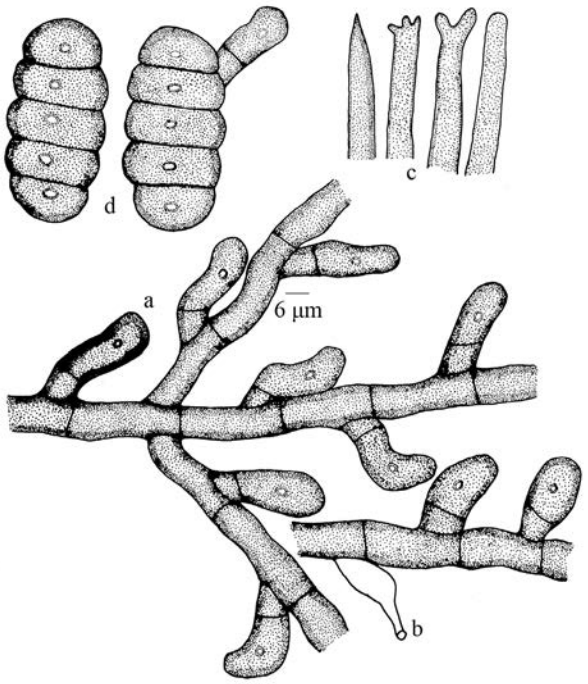


Fig 21. *Meliola madhucae* sp. nov.
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

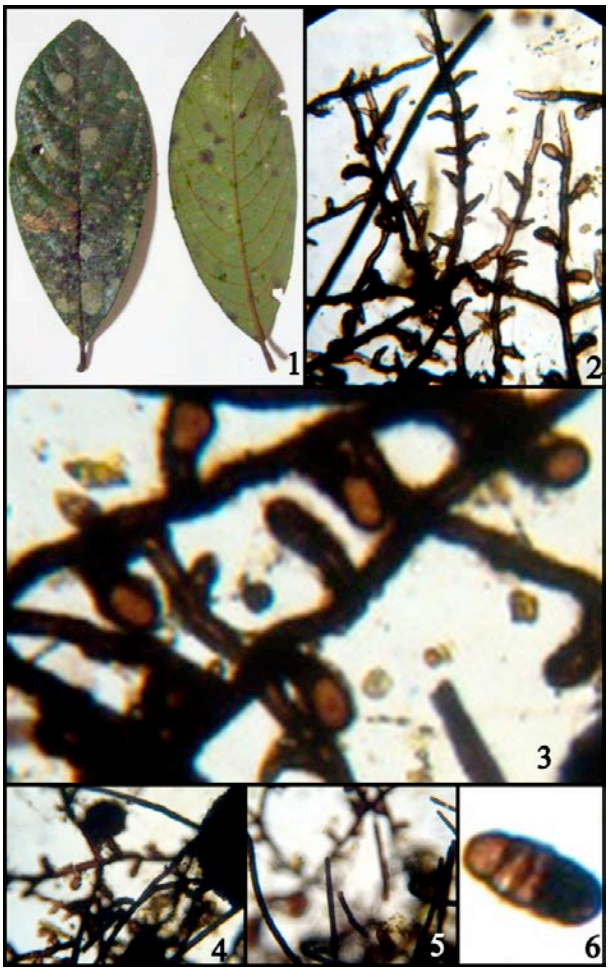


Image 88. *Meliola litseae* var. *rotundipoda*
1 - Infected leaves; 2 - Colony; 3 - Appressoria & Phialides; 4 - Perithecium; 5 - Mycelial setae; 6 - Ascospore

cells ovate, oblong to cylindrical, mostly entire, angular, often attenuated at the apex, 17–25x6–7 µm. Phialides mixed appressoria, scattered, alternate, ampulliform, 20–27x5–7 µm. Mycelial setae few to many, scattered, simple, straight, acute, obtuse to 1–3 dentate at the tip, up to 700µm long. Perithecia scattered, up to 190µm diameter; ascospores cylindrical to oblong, 4-septate, constricted at the septa, 37–42x15–17 µm.

Materials examined: TBGT 6561 (holotype), 18.ix.2009, on leaves of *Madhuca nerifolia* (Sapotaceae), Medikeri, C. Jagath Thimmaih

Based on the digital formula, this species can be compared with *Meliola lucurnae* Stev. and *Meliola palaquiicola* Hansf. However, differs from both in having straight mycelium, only alternate appressoria and simple to dentate mycelial setae (Hansford, 1961).

Meliola malabarensis Hansf. & Thirum., Proc. Linn. Soc. London 157: 182, 1946; Sydowia Beih.2:531, 1961; Thite & Kulakarni, 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. (Image 89).

Materials examined: TBGT 5330, FMKMCC 106, 24.xi.2008, on leaves of *Olea dioica* Roxb. (Oleaceae), Galibeedu, TBGT 5362, FMKMCC 107, 25.xi.2008, C. Jagath Thimmaiah, Bhagamandala, C. Jagath Thimmaiah.

Colonies epiphyllous, thin to dense, up to 4mm in diameter. Hyphae straight to slightly undulate, branching alternate to irregular at acute angles, closely reticulate, 12–16x2–4 µm. Appressoria distantly placed, alternate, straight to curved, antrorse to spreading, 16–24 µm long; stalk cells cylindrical to cuneate, 2–8 µm long; head cells ovate, linear, obtuse, entire,11–12x4–6µm. Phialides few mixed with appressoria, alternate to opposite, ampulliform to cylindrical, 11–18x4–6 µm. Mycelial setae grouped around perithecia, straight, simple, acute at the tip, up to 450µm long. Perithecia scattered, up

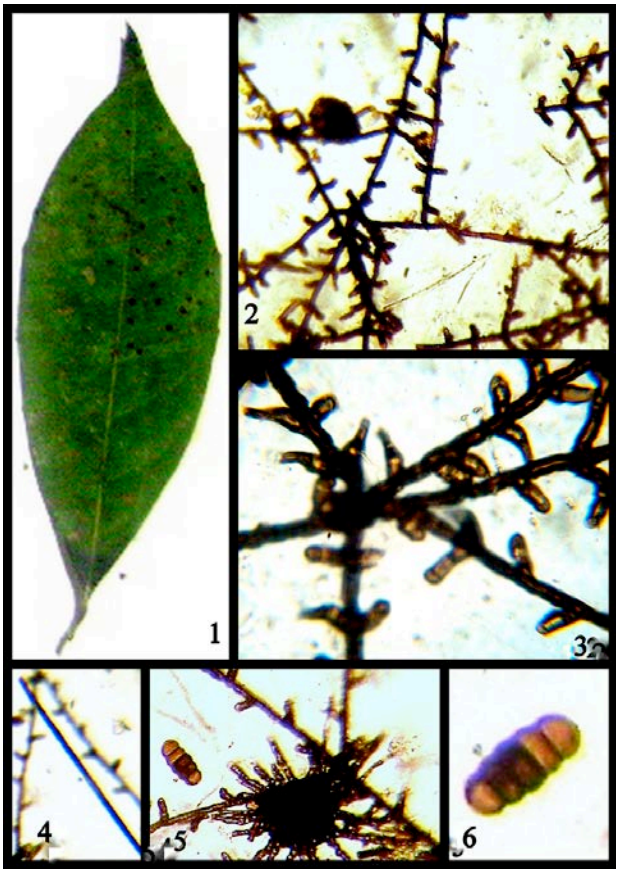


Image 89. *Meliola malabarensis*
1 - Infected leaf; 2 - Mycelium; 3 - Appressoria & Phialides; 4 - Mycelial setae; 5 - Perithecium; 6 - Ascospore

to 140µm in diameter; ascospores obovoidal, 4-septate, constricted at the septa, 32–38x10–14 µm.

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; Hosag., Crypt. Bot. 2/3: 186, 1991; Hosag., Raghu & Pillai, Nova Hedwigia 58: 540, 1994, Hosag., Meliolales of India, p. 249, 1996. (Image 90).

Colonies epiphyllous, dense, scattered, up to 1mm in diameter. Hyphae substraight, branching opposite at subacute angles, closely reticulate, forms a solid mycelial mat. Cells 15–26x6–8 µm. Appressoria regularly opposite, antrorse to subantrorse, straight, up to 10–16 µm long; stalk cells cuneate, up to 3–5 µm long; head cells ovate, globose, entire, up to 7–10x8–10 µm. Phialides few, mixed with appressoria, opposite, ampulliform, 15–19x5–8 µm. Mycelial setae numerous, simple, straight, curved, acute at the tip, up to 290µm long. Perithecia grouped to scattered, globose, up to 170µm in diameter; ascospores cylindrical to oblong, 4-septate, constricted at the septa, 32–43x12–15 µm. 3112.4221.

Materials examined: HCIO 45675, TBGT 1422, 11.xi.2003, on leaves of *Argyreia* sp. (Convolvulaceae), Abbe Falls, V.B. Hosagoudar et al.; HCIO 45697, TBGT 1444; HCIO 45728, TBGT 1477, 13.xi.2003, MPCA, Brahmagiri, Talacauvery, Madikeri, V.B. Hosagoudar et al.; HCIO 45699, TBGT 1446; HCIO 45806, TBGT 1555, 12.xi.2003, Jodupal, V.B. Hosagoudar et al.; TBGT 5407, FMKMCC 108, 23.viii.2009, Hoddur, C. Jagath Thimmaiah; TBGT 5437, FMKMCC 109, 31.x.2009, Hoddur, C. Jagath Thimmaia; TBGT 5432, FMKMCC 110, 17.x.2009, Hoddur, C. Jagath Thimmaiah; TBGT 5416, FMKMCC 111, 21.xi.2009, Hoddur, C. Jagath Thimmaiah; TBGT 5442, FMKMCC112, 16.xi.2009, Hoddur Bioreserve, C. Jagath Thimmaiah.

Meliola mangiferae Earle, Bull. New York Bot. Gard. 3: 307, 1905; Hansf., Sydowia Beih. 2: 464, 1961; Hansf. & Thirum., Farlowia 3: 296, 1948; 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. (Image 91)

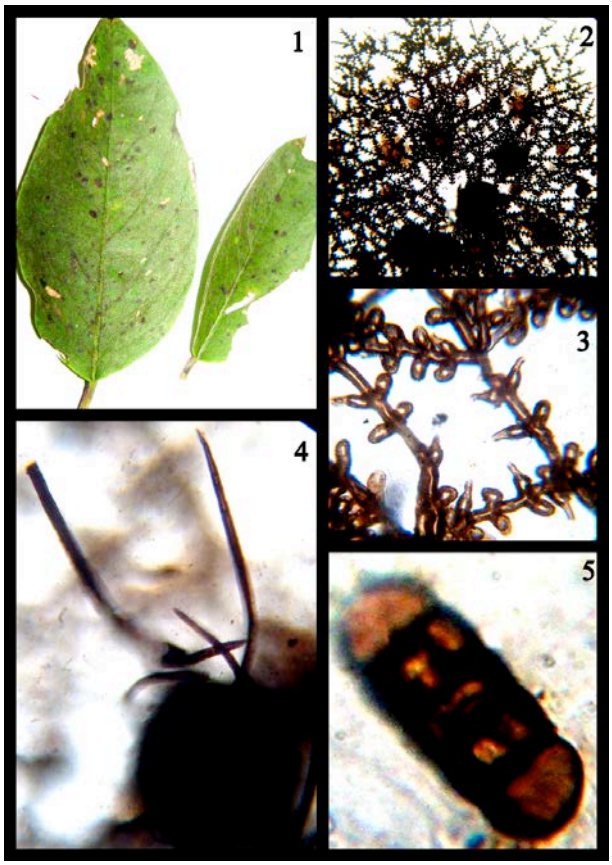


Image 90. *Meliola malacotricha* var. *major*
1 - Infected leaves; 2 - Mycelium; 3 - Appressoria & Phialides; 4 - Perithecium & Mycelial Setae; 5 - Ascospore

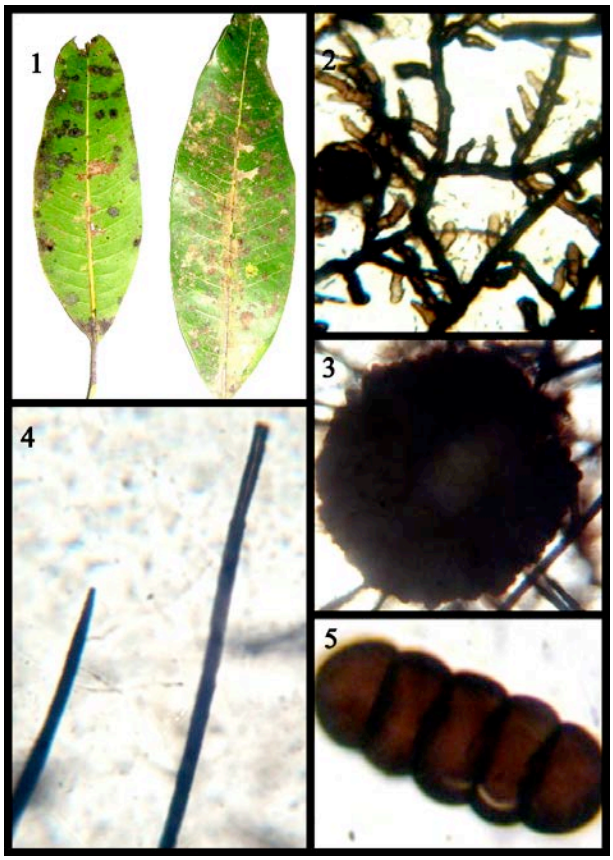


Image 91. *Meliola mangiferae*
1 - Infected leaves; 2 - Appressoria & Phialides; 3 - Perithecium; 4 - Mycelial setae; 5 - Ascospore

Colonies amphigenous, dense, velvety, up to 5mm in diameter. Hyphae straight to substraight, branching opposite at subacute angles, loosely to closely reticulate, cells 21–27x8.5–10.5 µm. Appressoria alternate, antrorse, straight to curved, rarely retrorse, up to 19–30 µm long; stalk cells cylindrical to cuneate, up to 3–7 µm cells; head cells cylindrical to ovate, entire to angulose rarely sublobate, up to 16–23x7.5–14 µm. Phialides few, mixed with appressoria, alternate, ampulliform to conoid, up to 23–26x7–9 µm. Mycelial setae numerous, grouped around Perithecia, few found on mycelia, simple, straight, acute to flattened tip, up to 600µm long. Perithecia scattered, globose, up to 110µm in diameter; ascospores cylindrical, 4-septate, constricted at the septa, up to 48–50x20–24 µm.

Materials examined: HCIO 45615, TBGT 1358, 11.xi.2003 on leaves of *Mangifera indica* L. (Anacardiaceae), Jodupal, V.B. Hosagoudar et al.; TBGT 5420, FMKMCC 113, 18.ix.2009, Hoddur, September 18, 2009, C. Jagath Thimmaiah; C. Jagath Thimmaiah 6.ii.2010, FMKMCC 114, TBGT 5419, FMKMCC 109; Hoddur, C. Jagath Thimmaiah.

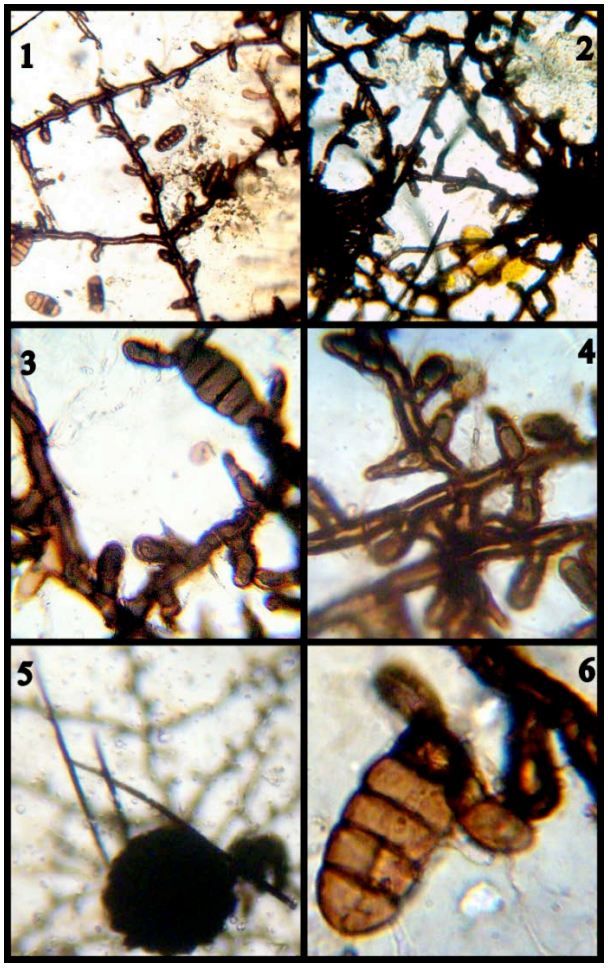


Image 92. ***Meliola mayapeae***
1&2 - Reticulate mycelium; 3&4 - Appressoria & Phialides; 5 - Perithecium & Mycelial setae; 6 - Germinating ascospore.

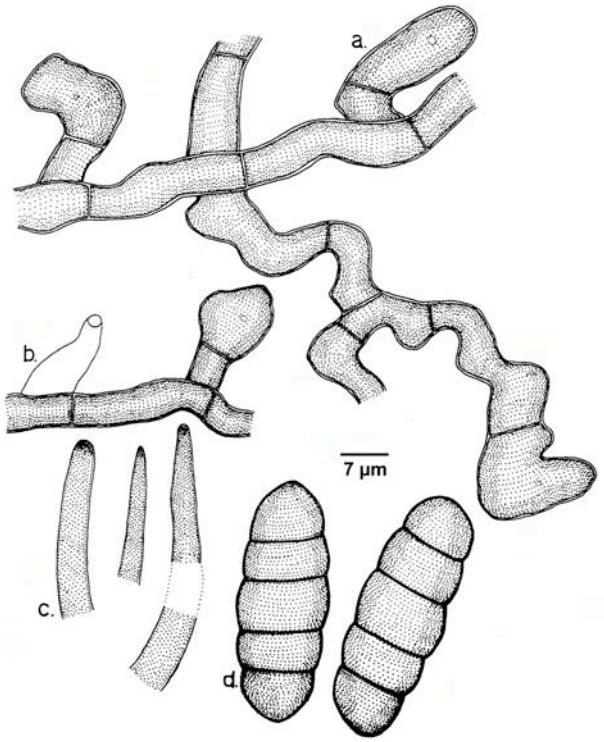


Figure 22. ***Meliola mannavanensis***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Meliola mannavanensis Hosag., C.K. Biju, Abraham & Crane, Mycotaxon 76: 302, 2000; Hosag., Meliolales of India 2: 285, 2008. (Fig. 22).

Material examined: 12.xi.2003, HCIO 45701, TBGT 1449, on leaves of *Litsea* sp. (Lauraceae), Jodupal, Madikeri, V.B. Hosagoudar et al.

Colonies hypophyllous, scattered, subdense to dense, up to 5mm in diameter, rarely confluent. Hyphae flexuous to crooked, branching opposite to irregular at acute angles, loosely to closely reticulate, cells 22–35x10–13 µm. Appressoria scattered, alternate, antrorse, spreading to irregularly curved, 15–33 µm long; stalk cells cylindrical to cuneate, 5–13 µm long; head cells ovate, globose, variously curved, entire to angular, 10–20x12–18 µm. Phialides many, mixed with appressoria, alternate to opposite, ampulliform, 15–35x7–10 µm. Mycelial setae scattered to mostly grouped around perithecia, simple, hamate, arcuate to irregularly curved, obtuse at the tip, up to 450µm long. Perithecia scattered to grouped, verrucose, up to 225µm in diameter; ascospores ellipsoidal, 4-septate, constricted at the septa, central cell

slightly larger, 50–53x15–18 µm.

Meliola mayapeae Stev., Illions 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. (Image 92).

Colonies epiphyllous, dense, up to 6mm in diameter. Hyphae substraight, branching opposite to subopposite at wide angles, loosely to closely reticulate, forms a loose mycelial net. Cells 20–25x5–7 µm. Appressoria alternate, antrorse to subantrorse, straight, few curved, 12–24 µm long; stalk cells cylindrical to cuneate, 4–7 µm; head cells ovate, cylindrical, entire, broadly rounded at the apex, rarely sublobate, slightly curved inwards, few attenuated at the apex, up to 10–15x8–14 µm. Phialides many, mostly mixed with appressoria, few borne on separate mycelial branch, ampulliform, few conoid, opposite to unilateral, 19–23x4–7 µm. Mycelial setae numerous, grouped around Perithecia, scattered, simple, straight to slightly curved, acute to obtuse at the tip, up to 230µm long. Perithecia scattered, globose, up to 160µm diameter; ascospores cylindrical to slightly ellipsoidal constricted at the septa, 4-septate, 34–40x13–17 µm.

Materials examined: TBGT 5389, FMKMCC 115, 9.i.2009 on leaves of *Ligusrtum perrottetti* DC. (Oleaceae), Field Marshal K.M. Cariappa College, Madikeri, C. Jagath Thimmaiah; TBGT 5338, FMKMCC 116, TBGT 5344, FMKMCC 117, 24.xi.2008. *Linociera intermedia* Wight (Oleaceae), Vanachalu, November 24, 2008, Jagath Thimmaiah.

Meliola mayapicola* Stev**. var. ***indica Hosag., Nova Hedwigia 47: 541, 1988; Hosag., Meliolales of India, p. 253, 1996. (Image 93)

Colonies epiphyllous, dense, up to 4mm in diameter. Hyphae substraight, slightly flexuous, branching opposite to subopposite at subacute to wide angles, loosely to closely reticulate, cells 18–30x5–8.5 µm. Appressoria mostly alternate to unilateral, antrorse to subantrorse, few retrorse,15–21 µm long; stalk cells cylindrical to cuneate, 3–5 µm long; head cells ovate, entire, few angulose, 12–16x6–9 µm. Phialides few, borne on separate mycelial branch, ampulliform, alternate to unilateral,19–25x4–6.5 µm. Mycelial setae many, simple, straight to slightly curved, acute, obtuse, few lobate at the apex, up to 380µm long. Perithecia grouped to scattered, globose, up to 140µm in diameter; ascospores 4-septate, oblong to cylindrical constricted at the septa, 38–42x15–17 µm.

Materials examined: HCIO 45812, 12.xi2003 on leaves of *Linoceira malabarica* (Oleaceae), Jodupal, V.B. Hosagoudar et al.; HCIO 45654, TBGT 1400, 12.xi.2003, Jodupal, V.B. Hosagoudar et al.; 23.xi.2009, TBGT 5446, FMKMCC 118, on leaves of *Ligustrum* sp. (Oleaceae), Field Marshal Cariappa college campus, Madikeri, C. Jagath Thimmaiah; TBGT 5462, FMKMCC 119, 21.xi.2009, Bharatiya Vidya Bhavan School, Madikeri, C. Jagath Thimmaiah.

Meliola melanoxylonis Hosag. & Pillai in Hosag., Raghu & Pillai, Nova Hedwigia 58: 540, 1994; Hosag., Meliolales of India, p.255,1996. (Image 94)

Colonies epiphyllous, dense up to 8mm in diameter, hyphae substraight, flexuous, branches opposite at subacute to wide angles, loosely to closely reticulate, cells 18–24x5.5–7.5 µm. Appressoria mostly opposite to unilateral, antrorse to retrorse, straight to bent like a hook, 10–23 µm long; stalk cells cylindrical to cuneate, 2–19

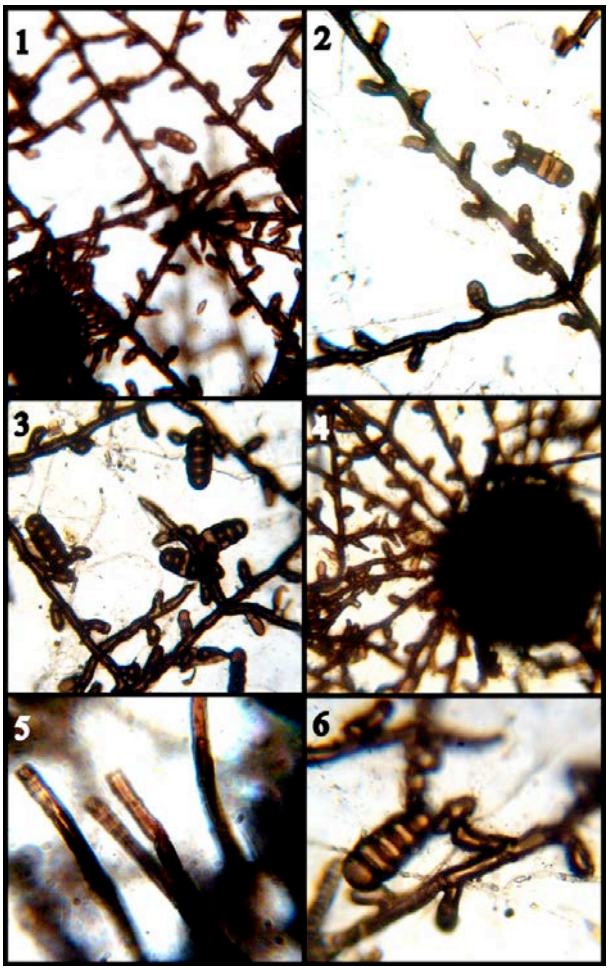


Image 93. *Meliola mayapicola* var. *indica*
1 - Mycelium; 2 - Branching at opposite & wide angles; 3 - Appressoria & Spores; 4 - Perithecium; 5 - Mycelial setae; 6 - Germinating ascospore

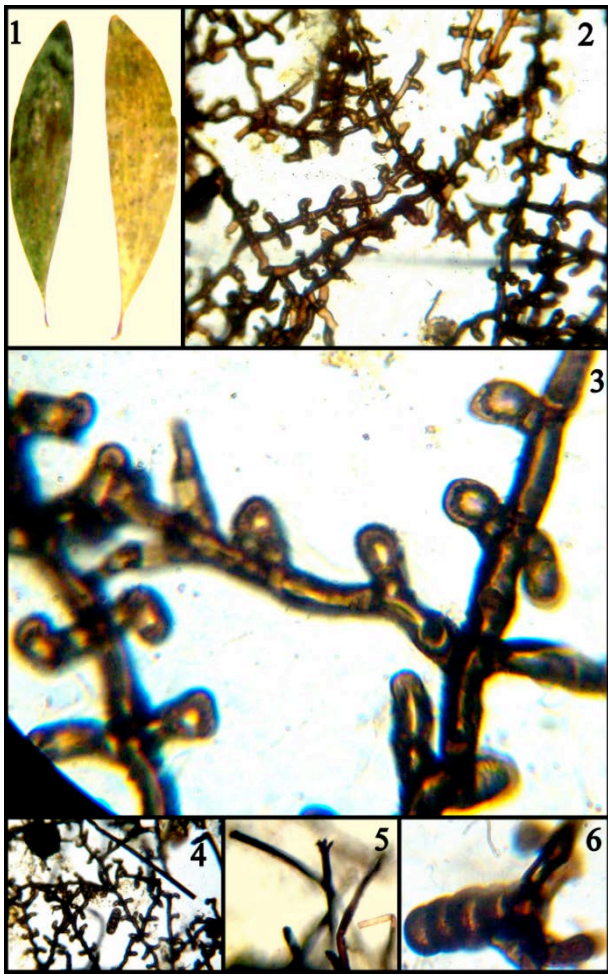


Image 94. ***Meliola melanoxylonis***
1 - Infected leaves; 2 - Mycelium; 3 - Appressoria & Phialides; 4 - Perithecium; 5 - Mycelial setae; 6 - Germinating ascospore

µm long; head cells ovate, angulose truncate, entire, 8–13x8–15 µm. Phialides many, mixed with appressoria, mostly opposite to unilateral, ampulliform, 14–17x5–9 µm. Mycelial setae numerous, simple, straight to slightly curved towards the apex, flat ended to dentate at the tip, up to 590µm long. Perithecia scattered to globose, up to 110µm in diameter; ascospores cylindrical 4-septatae, constricted at the septa, 32–41x13–17 µm.

Materials examined: HCIO 45651, TBGT 1397, 12.xi.2003, on leaves of *Acacia mangium* Willd. (Mimosaceae), Abbe Falls, V.B. Hosagoudar et al; MPCA, Brahmagiri, HCIO 45680, TBGT 1427, 13.xi.2003, Talacauvery, V.B. Hosagoudar et al.; FMKMCC 121, 20.iv.2011, Nishani Motte, Madikeri, Kodagu, C. Jagath Thimmaiah; HCIO 45696, TBGT 1443, 11.xi.2003, *A. auriculiformis* A. Cunn. ex Benth., Nishane motta, V.B. Hosagoudar et al.; TBGT 5447, FMKMCC 120, 23.xi.2009, Field Marshal Cariappa college campus, Madikeri, C. Jagath Thimmaiah.

Meliola memecyli Sydow & Sydow, Ann.Mycol.12:198, 1914; Hannf. & Thirum. Farlowia 3: 297, 1948; Hansf., Reinwardtia 3: 92, 1953; Sydowia Beih. 2: 155, 1961; Sreenivasulu, Nova Hedwigia Beih. 47: 431, 1974; Hosag. & Goos. Mycotaxon 37: 240, 1990, Hosag., Meliolales of India, p. 256, 1996. (Image 95).

Colonies epiphyllous, subdense, up to 3mm in diameter. Hyphae substraight, branching opposite at acute to wide angles. Cells 25–30x7–9 µm. Appressoria alternate, antrorse, straight, 17–19 µm long; stalk cells cuneate 3–5 µm long; head cells ovate, entire, 12–15x8–10 µm. Phialides mixed with appressoria unilateral, ampulliform, 20–25x6–8 µm. Mycelial setae scattered, simple, mostly curved acute at the tip, up to 400µm long. Perithecia scattered, globose, up tp 160µm in diameter; ascospores 4-septate, brown, cylindrical, constricted at the septa, 40–42x15–17 µm.

Materials examined: TBGT 5347, FMKMCC 122,

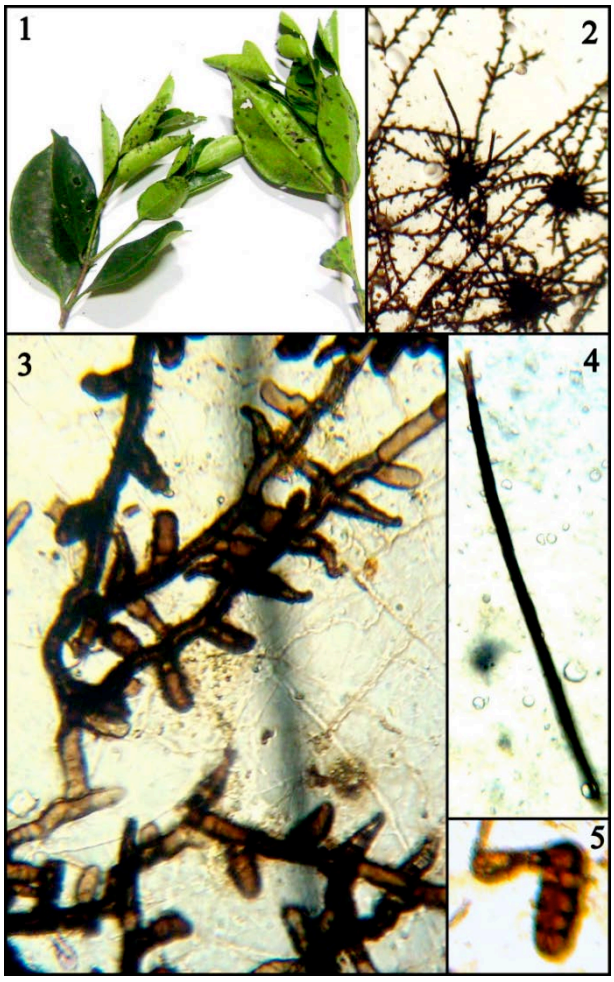


Image 95. ***Meliola memecyli***
1 - Infected leaves; 2 - Mycelium with Perithecia & mycelial setae; 3 - Appressoria & Phialides; 4 - Mycelial setae; 5 - Germinating ascospore

25.xi.2008, on leaves of *Memecylon gracile* Bedd. (Melastomataceae), Bhagamandala, C. Jagath Thimmaiah

Meliola memecyli Sydow var. ***microspora*** Hansf., Sydowia 10: 68, 1957; Hansf., Sydowia Beih. 2: 156, 1961; Hosag., C.K. Biju & Abraham, Nova Hedwigia 80: 491, 2005; Hosag., Meliolales of India 2: 285, 2008. (Fig. 23).

Colonies epiphyllous, dense, crustose, up to 2mm in diam., confluent. Hyphae straight, branching opposite at wide angles, loosely to closely reticulate, cells 22–24x6–7 µm. Appressoria alternate, about 2% opposite, antrorse to subantrorse, 16–18 µm long; stalk cells cylindrical to cuneate, 3–4 µm long; head cells ovate, entire, 12–14x9–11 µm in diameter. Phialides mixed with appressoria, alternate to opposite, ampulliform, 20–24x8–10 µm. Mycelial setae mostly grouped around perithecia, simple, straight, acute, obtuse to dentate at the tip, up to 800µm long. Perithecia scattered, globose, up to 190µm in diameter; ascospores oblong, 4-septate, strongly constricted at the septa, 36–40x16–18 µm.

Material examined: HCIO 45740, TBGT 1489, 14.xi.2003, on leaves of *Memecylon* sp. (Melastomataceae), Nishane motta, V.B. Hosagoudar et al.

Meliola salleana **Hansf., var. *smilacis*** Hosag. in Hosag. & Goos, Mycotaxon 37: 245, 1990; Hosag., Meliolales of India, p. 305,1996. (Image 96).

Colonies epiphyllous, up to 4mm in diameter. Hyphae substraight to flexuous, branching opposite at wide angles, loosely to closely reticulate, cells 21–25x6–7 µm. Appressoria alternate, antrorse, straight, few slightly curved, 19–22 µm long; stalk cells cuneate to cylindrical, 4–5 µm long; head cells ovate to clavate, slightly angular, entire, 15–17x7–9 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 18–28x8–12 µm. Mycelial setae simple, straight to slightly curved or obtuse at the apex, up to 210µm long. Perithecia scattered to grouped, globose, and verrucose, up to 170µm in diameter; ascospores 4-septate, obovoidal to cylindrical,

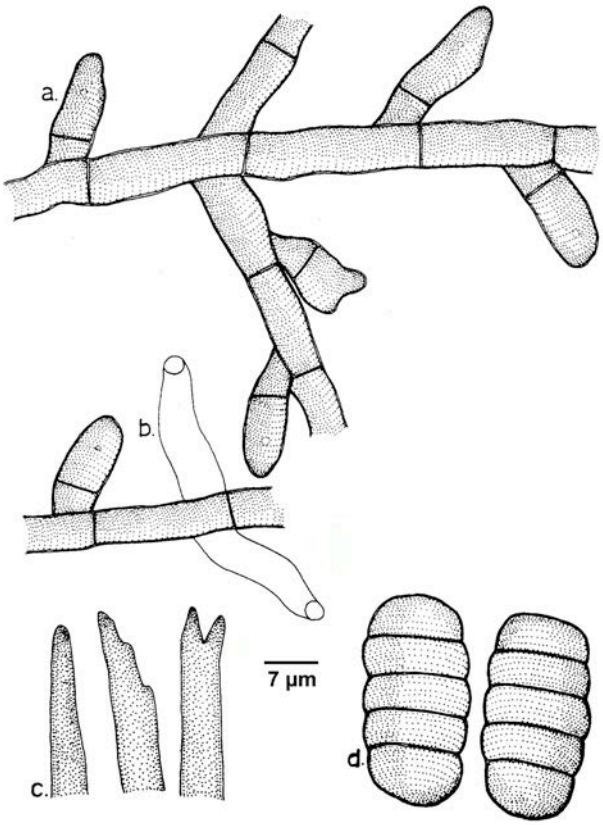


Figure 23. ***Meliola memecyli*** **var.** ***microspora***
a - Appressorium; b - Phialide; c - Apical portion of mycelia setae; d - Ascospores

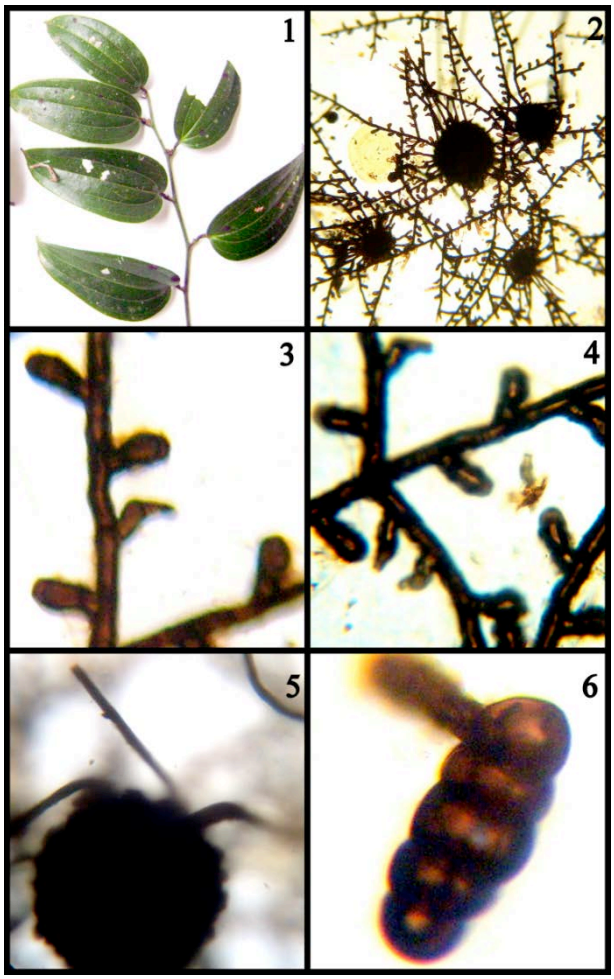


Image 96. ***Meliola salleana*** **Hansf. var.** ***smilacis*** **Hosag.**
1 - Infected leaves; 2 - Branched Mycelium; 3&4 - Phialides & Appressoria; 5 - Perithecium & mycelial setae; 6 - Germinating ascospore

constricted, 38–44x13–15 µm.

Materials examined: TBGT5472, FMKMCC 134, 4.xii.2009, on leaves of *Smilax zeylanica* L. (Smilacaceae), Devarakadu, Hoddur, December 4, 2009, C. Jagath Thimmaiah.

Meliola scleropyri Hosag. in Hosag. & Goos, Mycotaxon 37: 247, 1990; Hosag., Meliolales of India, p. 307, 1996. (Image 97).

Materials examined: TBGT 5367, FMKMCC135, 26.xi.2008, on leaves of *Scleropyrum pentandrum* (Dennst.) Mabb. (Santalaceae), Hoddur, C. Jagath Thimmaiah

Colonies amphigenous, dense, up to 6mm in diameter. Hyphae substraight, branching opposite to alternate at subacute angles, loosely to closely reticulate, cells 27–30x5.5–7.5 µm. Appressoria alternate to unilateral, antrorse, straight to curved, 19–26 µm long; stalk cells cuneate to cylindrical 4–11 µm long; head cells ovate globose, few curved, entire, 13–17x7–10 µm. Phialides few mixed with appressoria, alternate to opposite, ampulliform, 16–19x7–10 µm. Mycelial setae numerous, grouped around perithecia, simple, straight, acute to obtuse at the tip, up to 200µm long. Perithecia scattered, globose, verrucose, up to 80µm in diameter; ascospores obovate, 4-septate, constricted at the septa, 40–42x8–11 µm.

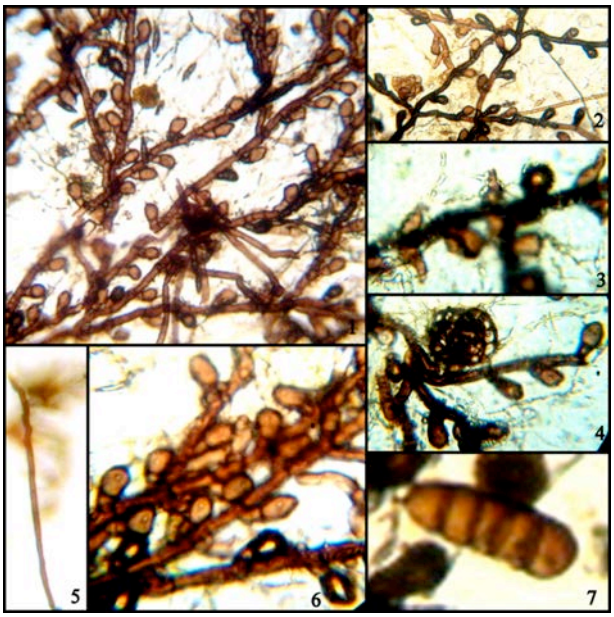


Image 97. *Meliola scleropyri* Hosag.
1&2 - Branched mycelium; 3 - Appressoria & Phialides; 4 - Young Perithecium; 5 - Mycelial setae; 6 - Enlarged mycelium; 7 - Ascospore

Meliola nothopegiae Hansf., Sydowia 10: 80, 1957; Sydowia Beih. 2: 469, 1961; Thite & Kulakarni, J. Shivaji Univ. 6: 163, 1973; Hosag., Lakshmanan & Vishwanathan, 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. (Image 98).

Colonies amphigenous, mostly epiphyllous, subdense, up to 5mm in diameter. Hyphae straight to crooked, branching regularly opposite to irregular at acute angles to wide angles, loosely reticulate, cells 17–26x6–8 µm. Appressoria alternate, antrorse to subantrorse, 23–34 µm long; stalk cells cuneate, 6–14 µm long; head cells cylindrical or of various forms, slightly angulose, entire, 16–22x12–14 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 10–20x08–10 µm. Mycelial setae scattered to grouped, straight, simple acute at the tip up to 680µm long. Perithecia scattered to aggregated verrucose, up to 160µm in diameter; ascospores obovoidal, 4-septate, constricted, 43–50x18–20 µm.

Materials examined: TBGT 5464, FMKMCC 123,

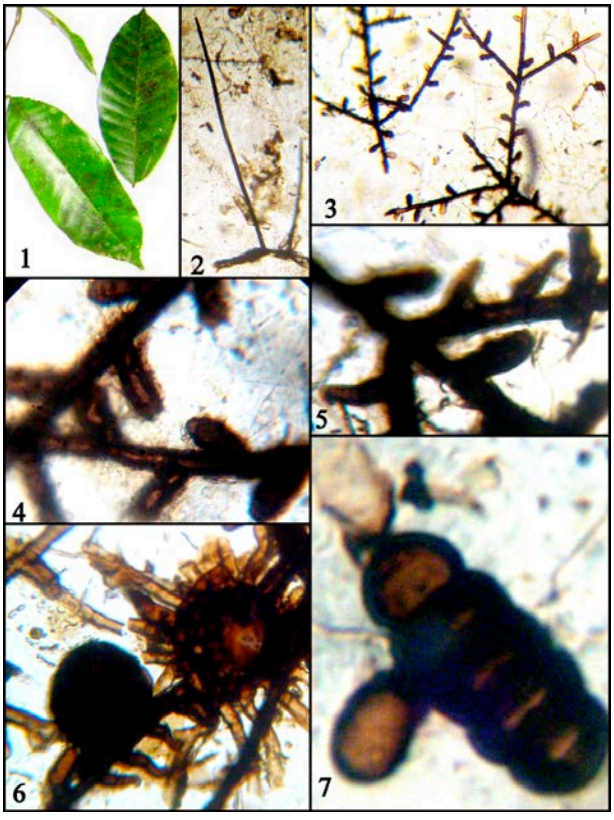


Image 98. *Meliola nothopegiae*
1 - Infected leaves; 2 - Mycelial setae; 3 - Thinly branched mycelium; 4 - Appressoria; 5 - Phialides; 6 - Perithecium; 7 - Germinating ascospore

2.xii.2009 on leaves of *Nothopegia racemosa* (Dalz.) Ramam. (Anacardiaceae), Devarakadu, Hoddur, Karnataka, C. Jagath Thimmaiah.

Meliola oleacearum Hosag., Sydowia 54: 55, 2002; Hosag., Meliolales of India 2: 293, 2008. (Fig. 24)

Material examined: on HCIO 45605, TBGT 1348, 12.xi.2003, leaves of *Olea dioica* Roxb. (Oleaceae), Jodupal,V.B. Hosagoudar et al.

Colonies hypophyllous, dense, scattered, up to 10mm in diameter, confluent. Hyphae flexuous to crooked, branching opposite to irregular at acute angles, loosely to closely reticulate, cells 20–26x4–6 µm. Appressoria alternate, antrorse, retrorse, spreading, curved towards hyphae, 14–24 µm long; stalk cells cylindrical to cuneate, 3–6 µm long; head cells ovate, oblong, narrowly oblong, cylindrical, entire, rarely angular to sublobate, straight, curved to uncinate, 11–18x6–10 µm. Phialides many, mixed with appressoria, alternate, ampulliform, neck elongated, 20–26x4–6 µm. Mycelial setae numerous, scattered, simple, straight, flexuous, sigmoid, curved, uncinate, up to 400µm long, subobtuse to obtuse at the tip. Perithecia scattered, up to 120µm in diameter; ascospores oblong to slightly ellipsoidal, 4-sepatet, constricted at the septa, 35–40x14–16 µm.

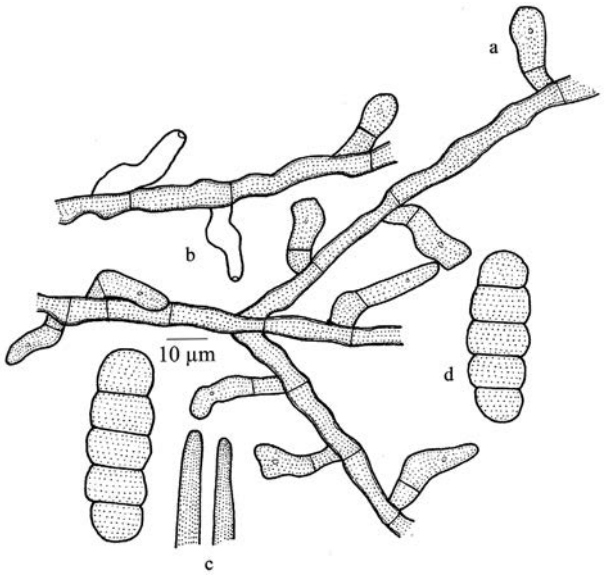


Figure 24. *Meliola oleacearum*
a - Appressorium; b - Phialide; c - Apical portion of mycelia setae; d - Ascospores

Meliola otophorae* Yates var. *indica Hosag. & Ravikumar in Hosag., Meliolales of India, p. 274, 1996. (Image 99)

Materials examined: FMKMCC 124, 29.xii.2010, on leaves of *Sapindus emarginatus* Vahl (Sapindaceae), C. Jagath Thimmaiah.

Colonies hypophyllous, velvety, up to 4mm in diameter. Hyphae straight, branching opposite at wide angles to subacute angles, loosely reticulate, cells 16–25x4–5 µm. Appressoria alternate, few unilateral, antrorse, 16–22 µm long; stalk cells cylindrical to cuneate, 3–5 µm long; head cells angular, slightly lobed, clavate, margin entire, 13–17x9–10 µm. Phialides on separate mycelial branch, opposite, unilateral, alternate, ampulliform, 15–20x5–7 µm. Mycelial setae numerous, straight, acute, up to 450µm long. Perithecia scattered, globose, dark black, up to 160µm in diameter; ascospores cylindrical, brown, 4-septate, constricted, 40–43x12–15 µm.

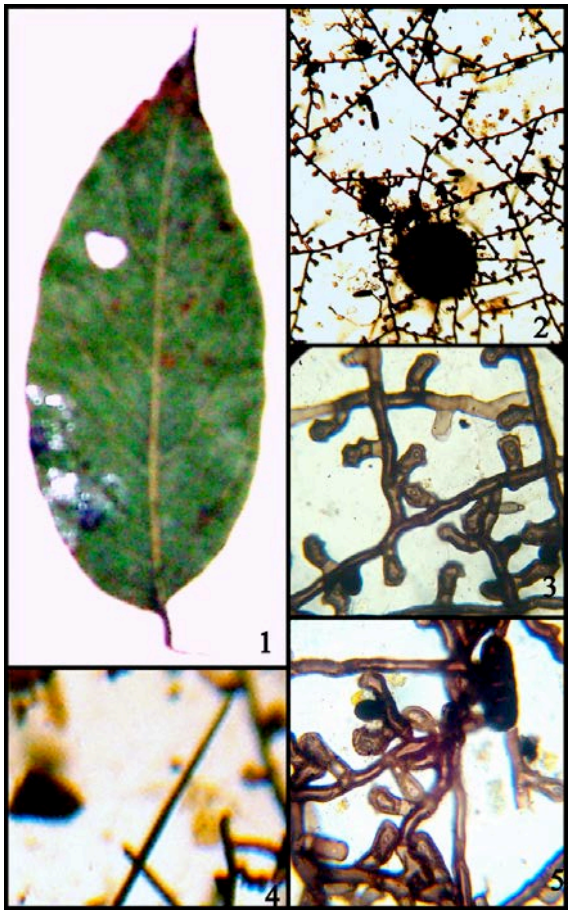


Image 99. *Meliola otophorae* var. *indica*
1 - Infected leaf; 2 - Reticulate mycelium; 3 - Appressoria; 4 - Mycelial setae; 5 - Germinating ascospore

Meliola parsonsiicola Hosag., J. Mycopathol. Res. 44: 17, 2006. (Fig. 25).

Material examined: HCIO 45657(holotype), TBGT 1403 (isotype) 13.xi.2003, on leaves of *Parsonia alboflavescens* (Dennst.) Mabberley (Apocynaceae), Medicinal Plant Conservation Area, Brahmagiri, Talacauvery, Ma-

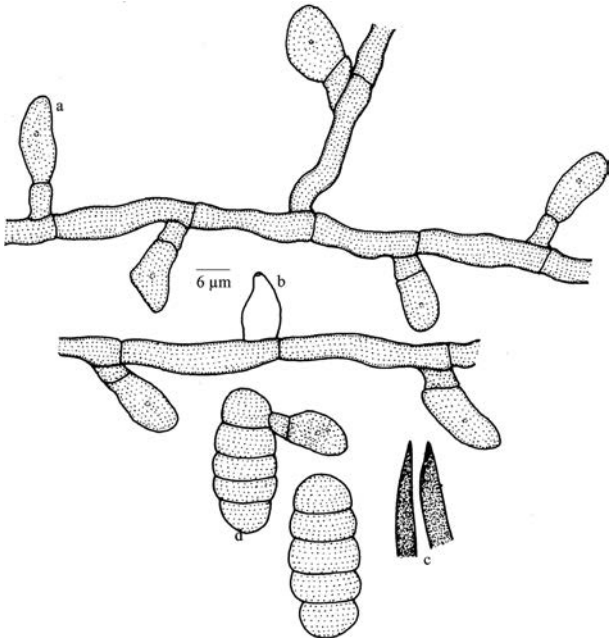


Figure 25. *Meliola parsonsiicola*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

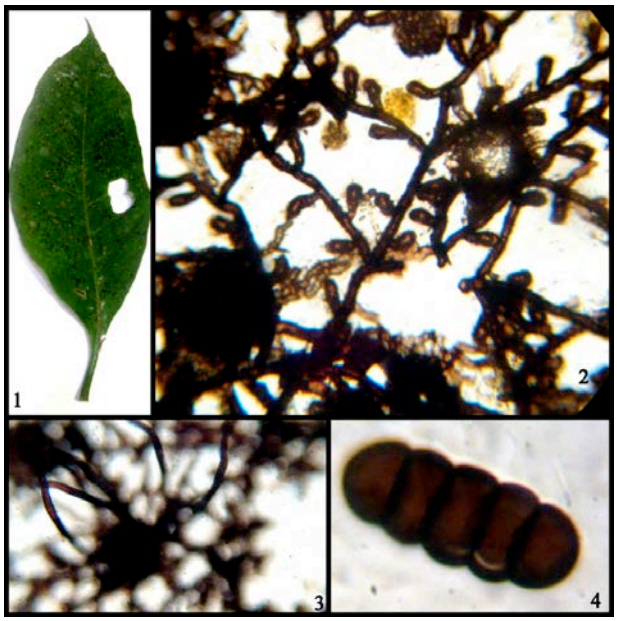


Image 100. *Meliola pepparaensis*
1 - Infected Leaf; 2 - Colony with appressoria; phialides & Perithecia; 3 - Mycelial setae around perithecium; 4 - Ascospore

dikeri, Coorg, Karnataka, V.B. Hosagoudar.

Colonies amphigenous, mostly hypophyllous, caulicolous, subdense to dense, confluent. Hyphae straight to substraight, branching irregular at acute to wide angles, loosely to closely reticulate, cells 28–32x6–8 µm. Appressoria alternate, antrorse, closely antrorse to rarely retrorse, 17–24 µm long; stalk cells cylindrical to cuneate, 4–8 µm long; head cells ovate, entire, rarely angular to slightly lobate, attenuated and broadly rounded to truncate at the apex, 12–16x11–13 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 16–20x6–8 µm. Mycelial setae scattered, simple, straight to curved, not constantly uncinate, acute at the tip, up to 600µm long. Perithecia scattered, globose, up to 140µm in diameter; ascospores oblong to cylindrical, 4-septate, constricted at the septa, 27–32x12–13 µm.

Meliola carissae Doidge var. *parsonsiae* Hansf. is reported on *Parsonsia straminea* from Queensland (Hansford, 1961). *Meliola parsonsiicola* differs from it in having mostly antrorse and shorter appressoria with mostly entire head cells and smaller ascospores.

Meliola pepparaensis Hosag. & Abraham, Sydowia 50: 18, 1998; Hosag., Meliolales of India 2: 301, 2008. (Image 100).

Materials examined: TBGT 5363, FMKMCC 125, 25.xi.2008, on leaves of *Tabernaemontana heyneana* Wall. (Apocynaceae), Bhagamandala, November 25, 2008, C. Jagath Thimmaiah.

Colonies epiphyllous, dense, up to 4mm in diameter. Hyphae straight to substraight, branching opposite at subacute angles, closely reticulate, cells 18–22x7–10 µm. Appressoria alternate, few unilateral, antrorse, straight, up 18–27 µm long; stalk cells cylindrical to cuneate, 3–10 µm long; head cells ovate, globose, entire, 12–15x10–14 µm. Phialides many, borne on separate branches, unilateral, few alternate to opposite, ampulliform,17–20x4.5–6.5 µm. Mycelial setae few, simple, curved, forked & curved at the tip, up to 370µm long. Perithecia grouped to scattered, globose, up to 200µm in diameter; ascospores cylindrical to ellipsoidal, 4-septate, constricted at the septa, 33–37x12–15 µm.

Found associated with *Meliola ervatamiae*.

Meliola phaseoli Thite ex Hosag. in Hosag. Meliolales of India, p. 283, 1996; Hosag., Abraham & Pushpangadan, The Meliolineae – A Suppliment, p. 156, 1997. (Image 101)

Materials examined: FMKMCC 126, 9.i.2010, on leaves of *Vigna* sp. (Fabaceae), Igguthappa Temple, C. Jagath Thimmaiah.

Colonies epiphyllous, discrete, up to 4mm in diameter. Hyphae substraight, branching opposite to alternate at acute angles, closely reticulate forming thick mycelial mat, cells 20–29x5–7 µm. Appressoria mostly unilateral few alternate & opposite, straight, retrorse, few antrorse; stalk cells cylindrical to cuneate 4–7 µm long;

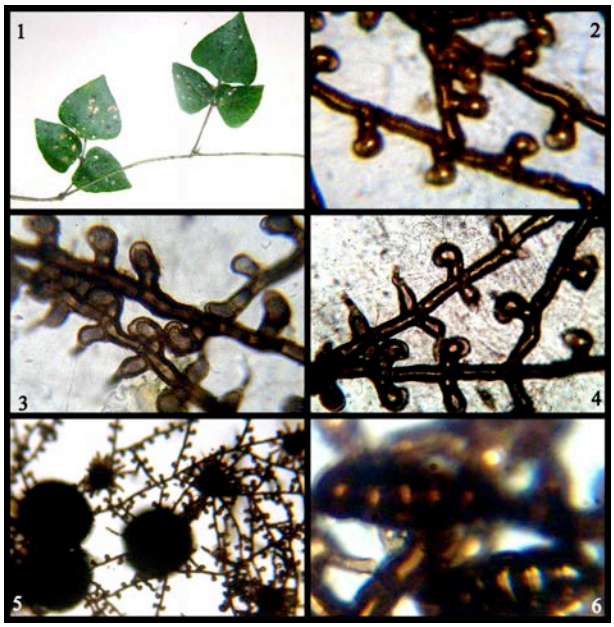


Image 101. *Meliola phaseoli*
1 - Infected leaves; 2, 3&4 - Appressoria & Phialides; 5 - Colony with Perithecia & mycelial Setae; 6 - Germinating ascospores

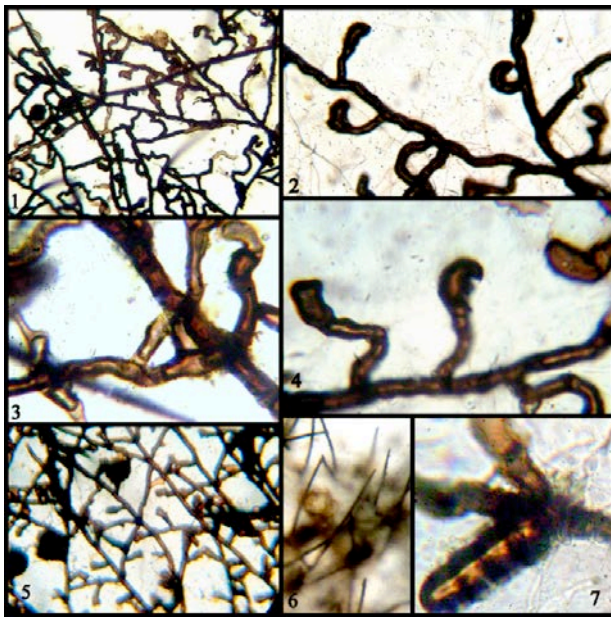


Image 102. *Meliola plectroniae*
1 - Reticulate colony; 2 - Branched hyphae; 3&4 - Phialides & appressoria; 5 - Young perithecia; 6 - Mycelial setae; 7 - Germinating ascospore

head cells 10–14x9–10 µm, globose, slightly curved or crooked, entire. Phialides mixed with appressoria, few ampulliform.15–24x7–9 µm. Mycelial setae numerous, simple, straight to slightly curved, acute to obtuse, up to 350µm long. Perithecia globose, scattered, up to 200µm in diameter; ascospores 4-septate, oblong to cylindrical, elliptical, constricted at the septa, brown, 42–45x13–15 µm.

Meliola plectroniae Hansf., Sydowia 9: 72, 1955; Beih. 2: 702, 1961; Hoasg., Meliolales of India, p. 284, 1996. *Meliola coilicosa* Nair & Kaul, Sydowia 36: 204, 1983; Hosag. & Goos, Mycotaxon 37: 228, 1990. (Image 102).

Materials examined: HCIO 45687, TBGT 1434, 13.xi.2003, on leaves of *Canthium dicoccum* (Gaertn.) Teijsm. & Binn. (Rubiaceae), MPCA, Brahmagiri, Talacauvery, V.B. Hosagoudar et al; HCIO 45762, TBGT 1511, 11.xi.2003, Nishane motta, Madikeri, V.B. Hosagoudar et al; HCIO 45687, TBGT 1434, 13.xi.2003, *C. dicoccum* (Gaertn) Merr. var. *umbellatum* (Rubiaceae), MPCA, Bramhagiri, Talacauvery, V.B. Hosagoudar et al; 11.xi.2003, HCIO 45762, TBGT 1511, Nishane Motta, V.B. Hosagoudar et al; TBGT 5353, FMKMCC 127, 25.xi.2008, Bhagamandala, C. Jagath Thimmaiah; TBGT 5461, FMKMCC 128, 21.xi.2009, Madikeri, JagathThimmaiah.

Colonies hypophyllous, dense, up to 7mm in diameter. Hyphae substraight to flexuous, branching opposite to subopposite at subacute to wide angles or irregular, loosely to closely reticulate, cells 20–30x4–6 µm. Appressoria alternate to unilateral, variously curved, flexuous, 27–30 µm; stalk cells cylindrical one too many septate, tortuous, 8–11 µm long, septate ones are up to 80µm long; head cells angelus, mostly curved, crooked, few straight, 18–22x11–14 µm long. Phial ides few mixed with appressoria, alternate to opposite, ampulliform to cylindrical, 19–22x6–8 µm. Mycelial setae numerous, simple, straight to curved, tip acute, up to 350µm long. Perithecia globose, scattered, surrounded by few mycelial setae, 200µm in diameter; ascospores cylindrical, 4-septate, constricted at the septa, 43–45x13–17 µm.

Meliola pogostemonis Hansf., Sydowia 10: 83, 1957; Sydowia Beih. 2: 701, 1961; Hosag. & Goos, Mycotaxon 37: 243, 1990; Hosag., Meliolales of India, p. 285, 1996. (Fig. 26).

Materials examined: TBGT 6641, 16.xi.2010, on leaves of *Pogostemon* sp. (Lamiaceae), Madikeri, C. Jagath Thimmaiah.

Colonies amphigenous, mostly epiphyllous, dense, up to 5mm in diameter, confluent. Hyphae straight to undulate, branching opposite at acute angles, loosely reticulate, cells 16–32x6–8 µm. Appressoria alternate, often closely antrorse, straight, 10-22 µm long; stalk cells cuneate, 4-8 µm long; head cells ovate, bluntly pointed at the apex, entire, 10-16x8-10 µm. Phialides mixed

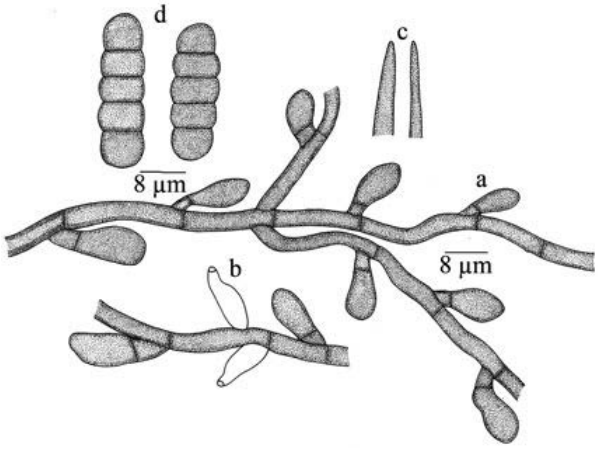


Figure 26. ***Meliola pogostemonis***
a - Appressorium; b - Phialide; c - Apical portion of the mycelial setae; d - Ascospores

with appressoria, opposite to alternate, 10–18x6–8 µm. Mycelial setae few, grouped around perithecia, simple, septate, acute at the tip, up to 243µm long. Perithecia scattered to grouped, verrucose, upto 146µm in diameter; ascospores obovoidal, 4-septate, constricted at the septa, 28–38x10–12 µm.

Meliola prataprajii Hosag. & Abraham, Seminar on Rec. Adv. Bot. Satara, P.15,1996; Hosag., Meliolalaes of Inda 2: 308, 2008; Hosag. & Agarwal, Meliolales – Identification Manual, p. 214, 2008. (Image 103).

Materials examined: TBGT 5388, FMKMCC 129, 22.ii.2009, on leaves of *Dendrophthoe falcata* (L. f.) Etting. (Loranthaceae), Hoddur, February 22, 2009, C. Jagath Thimmaiah.

Colonies epiphyllous, dense, up to 7]mm in diameter. Hyphae substraight slightly flexuous, branching opposite to alternate at subacute angles, loosely to closely reticulate, cells 20–25x5–8 µm. Appressoria mostly alternate to unilateral, antrorse, straight to curved, up to 9–18 µm long; stalk cells cuneate, 2–4 µm; head cells ovate, globose, entire, angulose, 7–13x7–12 µm. Phialides few, mixed with appressoria, alternate, cylindrical, 10–20x5–7 µm. Mycelial setae simple, straight, obtuse to 2-4fid at the apex, up to 300µm long. Perithecia grouped, globose to ovoid, up to 120µm in diameter; ascospores cylindrical to oblong, 4-septate, constricted at the septa, 45–60x12–22 µm.

This species can be compared with *Meliola suisyaensis* Yamam. reported on *Loranthus lonicerifolius* from Taiwan (Hansford, 1961). However, this species differs from it in having phialides born on a separate mycelial branch; having straight, obtuse to 2-4- fid mycelial setae.

Meliola premnicola Hosag. & Goos, Mycotaon 37: 243, 1990; Hosag., Meliolales of India, p. 288, 1996. (Image 104)

Materials examined: TBGT 5441, FMKMCC 130, 15.xi.2009 on leaves of *Premna* sp. (Verbenaceae), Hoddur, C. Jagath Thimmaiah.

Colonies amphigenous, dense, up to 4mm in diame-

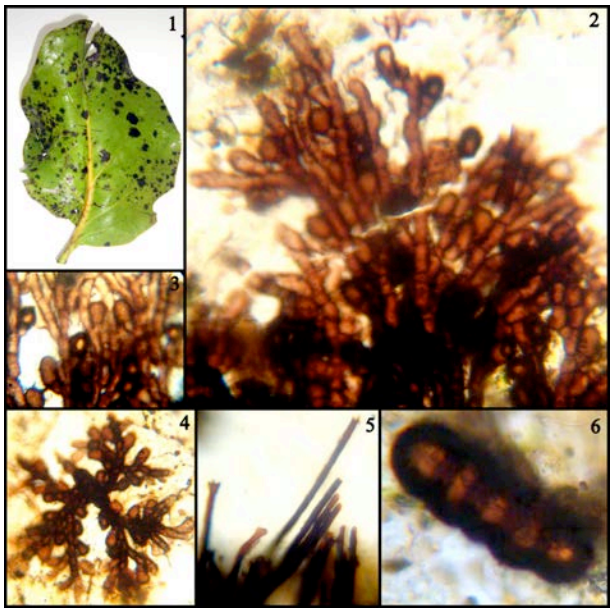


Image 103. ***Meliola prataprajii***
1 - Infected leaf; 2 - Colony; 3 - Appressoria & Phialides; 4 - Germinating ascospore; 5 - Mycelial setae; 6 - Ascospore

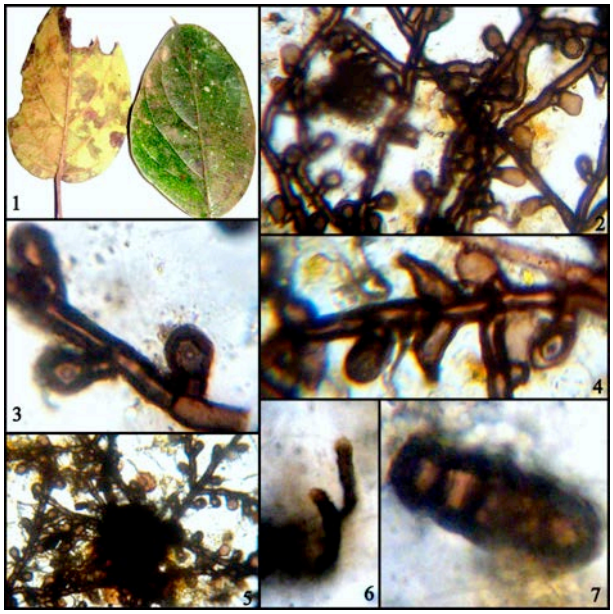


Image 104. ***Meliola premnicola***
1 - Infected leaves; 2 - Colony; 3 - Appressoria; 4 - Phialides; 5 - Perithecium; 6 - Mycelial setae; 7 - Ascospore

ter. Hyphae substraight, branching opposite at subacute angles, loosely to closely reticulate, cells 12–18x6–7 µm. Appressoria alternate to unilateral, antrorse, 9–15 µm long; stalk cells cuneate, 3–6 µm long; head cells ovate, few angulose, entire, 7–10x7–8.5 µm. Phialides few mixed with appressoria, unilateral, conoid, neck elongated, 12–23x5–8 µm. Mycelial setae many, simple, straight to curved, tip acute to obtuse, up to 410µm long. Perithecia globose, scattered, verrucose, up to 150µm in diameter; ascospores cylindrical, 4-septate, constricted at the septa, brown, 37–40x17–20 µm.

Meliola pterocarpi Yates, Philippine J. Sci. 13: 235, 1918; Hansf., Sydowia Beih. 2: 299, 1961; Hosag., Dayal & Goos, Mycotaxon 46: 208, 1993; Hosag., Meliolales of India, p. 290, 1996. (Image 105)

Materials examined: FMKMCC 131,1.ii.2011, on leaves of *Pterocarpus marsupium* Roxb. (Fabaceae), Hoddur, C. Jagath Thimmaiah.

Colonies amphigenous, dense on epiphyllous region, up to 2mm in diameter. Hyphae substraight to flexuous, branching opposite at acute angles, loosely to closely reticulate, cells 15–32x6–9 µm. Appressoria alternate, straight to curved, antrorse to reflexed, 15–19 µm long; stalk cells cylindrical to cuneate, 5–9 µm; head cells globose to obovoid, entire to rarely slightly angulose, 11–16x12-15 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 15–23x7–9 µm. Mycelial setae grouped around perithecia, simple straight, acute to obtuse at the apex, up to 350µm long. Perithecia scattered, globose, up to 140µm in diameter; ascospores obovoidal, 4- septate, constricted at the septa, 38–43x15–18 µm.

Meliola pterospermi **Stev. var.** ***microcarpa*** Hosag. & Raghu, New Botanist 20: 70, 1993; Hosag., Meliolales of India, p. 291, 1996. (Image 106)

Materials examined: FMKMCC 132, 14.i.2010, on leaves of *Pterospermum acerifolium* (L.) Willd. (Sterculiaceae), Sampaje Ghat, C. Jagath Thimmaiah.

Colonies amphigenous, dense, crustose, up to 3mm in diameter. Hyphae substraight, branching mostly opposite, few alternate at wide angles, closely reticulate to

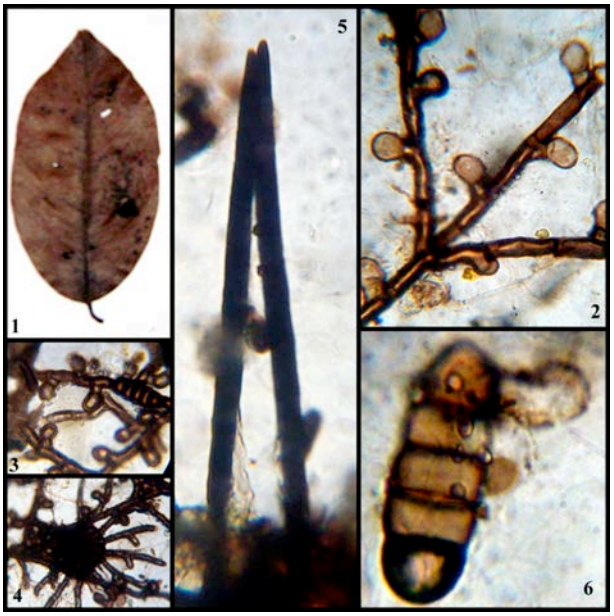


Image 105. ***Meliola pterocarpi***
1 - Infected leaf; 2 - Branching mycelium; 3 - Appressoria & Phialides; 4 - Perithecium; 5 - Mycelial setae; 6 - Germinating ascospore

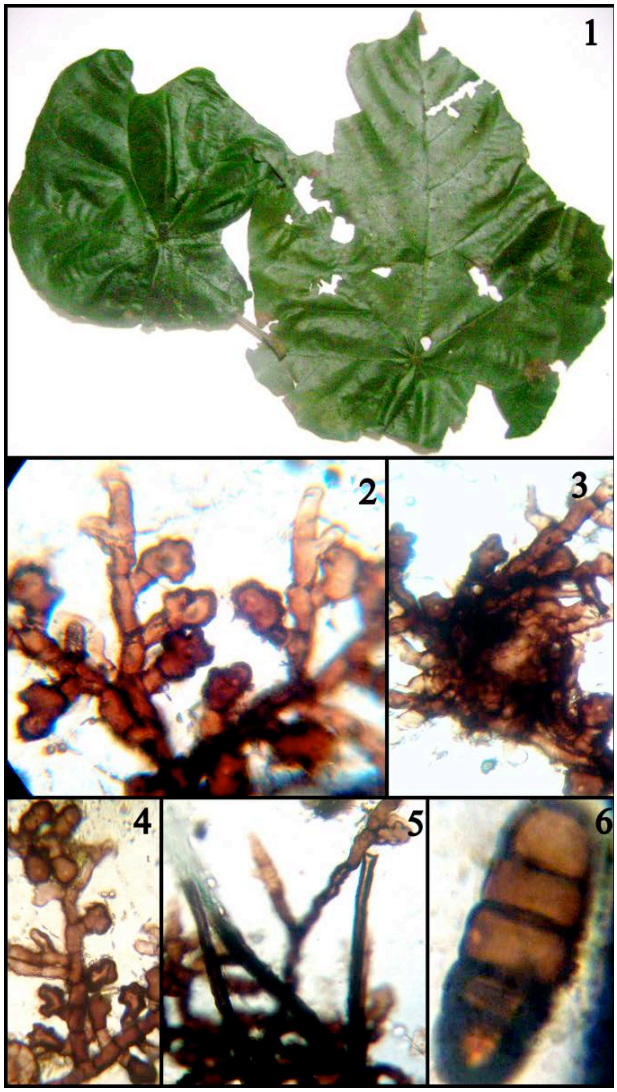


Image 106. ***Meliola pterospermi*** **var.** ***microcarpa***
1 - Infected leaves; 2 - Branched Hyphae; 3&4 - Appressoria & Phialides; 5 - Mycelial setae; 6 - Ascospore

form compact mass of mycelia. Cells 12–17x6–7 µm. Appressoria densely arranged, mostly opposite, few unilateral, margin lobate to entire, 18–25 µm long; stalk cells cylindrical to cuneate 3–6 µm long; head cells globose, obovate, lobed, angulose, 15–19x11–12 µm. Phialides few, on separate mycelial branch, opposite to unilateral, ampulliform, 21–24x4–7 µm. Mycelial setae many, simple, straight to slightly curved, acute to obtuse at the apex, up to 500µm long. Perithecia globose, scattered, dehisced at the center, up to 200µm in diameter; ascospores oblong to elliptic, brown, constricted, 38–40x13–16 µm.

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. 27)

Material examined: HCIO 45617, TBGT 1360, 14.xi.2003, on leaves of *Argyreia* sp. (Convolvulaceae), Nishane motta, V.B. Hosagoudar et al; HCIO 45710, TBGT 1459, 14.xi.2003, *Merremia* sp. (Convolvulaceae), Nishane motta, V.B. Hosagoudar et al.

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, the first branching up to 162µm, from first to second branching up to 24 µm long and the final branchlets up to 136µm long, obtuse to acute at the tip. Perithecia mostly grouped, verrucose, up to 261µm in diam; ascospores broadly obovoidal, 4-septate, constricted, 40–50x14–22 µm.

The colonies were associated with the colonies of Meliola malacotricha Speg. var. major Beeli

Meliola ramosii Sydow & Sydow, Ann. Mycol. 12: 552, 1914; Ann. Mycol. 15: 191, 1917; Hansf., Sydowia Beih. 2: 226, 1961; Hosag. & Goos, Mycotaxon 37: 244, 1990; Hosag., Meliolales of India, p. 295, 1996. (Image 107)

Materials examined: TBGT 5401, FMKMCC 133, 11.i.2009, on leaves of *Homonoia riparia* Lour. (Euphorbiaceae), Hoddur, July 11, 2009, C. Jagath Thimmaiah.

Colonies epiphyllous, dense up to 4mm in diameter.

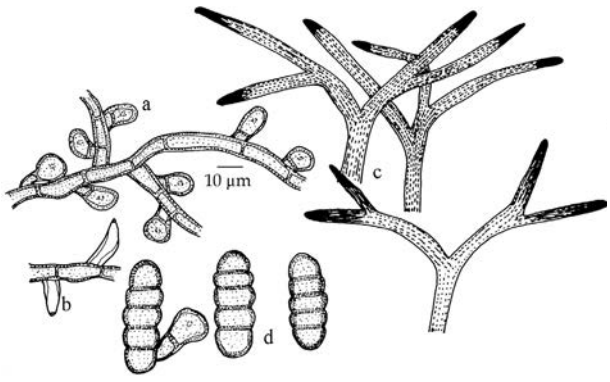


Figure 27. *Meliola quadrispina*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

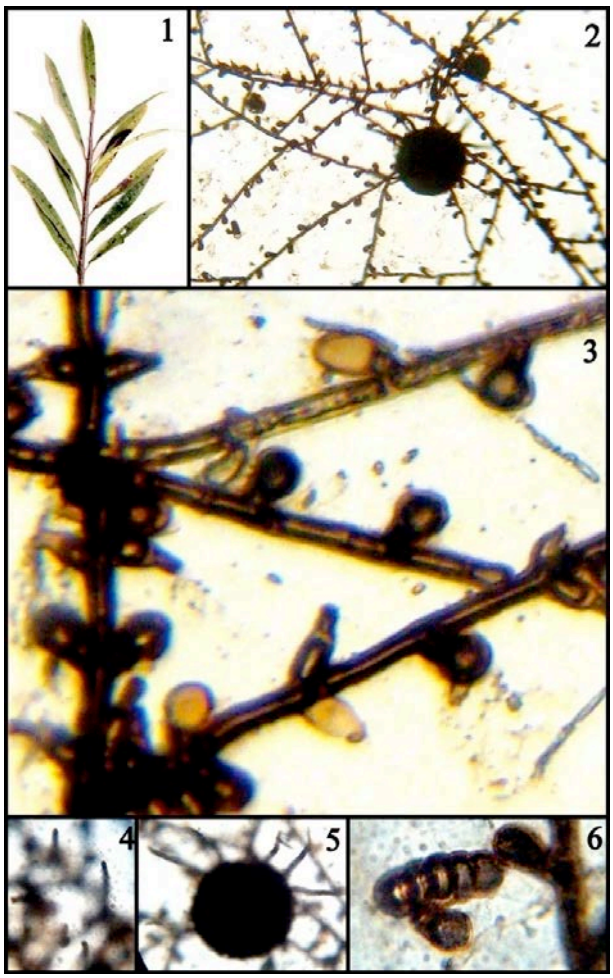


Image 107. *Meliola ramosii*
1 - Infected leaves; 2 - Branched Colony; 3 - Phialides & appressoria; 4 - Mycelial setae; 5 - Perithecium; 6. Ascospore

Hyphae straight to substraight, branching opposite at acute to subacute angles, loosely to closely reticulate, form a loose mycelial mat. Cells 17–41x5–8 µm. Appressoria mostly alternate to unilateral, antrorse, straight to slightly curved, up to 13–25 µm long; stalk cells cuneate, up to 4–6 µm long; head cells globose, mostly entire, few angulose, rarely sublobate, hamate up to 9–13x8–15 µm. Phialides numerous, mostly borne on separate mycelial branch, but few mixed with appressoria, mostly opposite to subopposite, few unilateral, ampulliform, 14–16x4–7 µm. Mycelial setae many, scattered, simple, short, curved, acute to obtuse at the tip, up to 120µm long. Perithecia scattered, globose, up to 160µm in diameter; ascospores cylindrical to slightly ellipsoidal 4-septate, constricted at the septa, 30–32x11–13 µm.

Meliola reinwartiodendricola Hosag. & Divya, Int. J. Biol. Pharm. Allied Sci. 2: 432, 2013. (Fig. 28).

Materials Examined: TBGT 6253 (holotype). 14.i.2010, on leaves of *Reinwartiodendron* sp. (Linaceae), Madikeri, C.JagathThimmaiah.

Colonies epiphyllous, thin, spreading, up to 1mm in diameter, confluent. Hyphae straight to substraight, branching opposite to unilateral at acute to wide angles, loosely reticulate, cells 25–30x5–6 µm. Appressoria alternate to unilateral, straight to slightly curved, antrorse, 15–22 µm long; stalk cells cylindrical to cuneate, 5–7µm long; head cells ovate, entire to angular, straight to curved, 10–15x5–7 µm. Phialides mixed with appressoria, alternate, ampulliform, 15–25x5–6 µm. Mycelial setae very few, simple, straight, obtuse, acute to dentate at the tip, up to 280µm long. Perithecia scattered, up to190 µm in diameter; ascospores cylindrical, 4-septate, constricted at septum, 32–42x12–17 µm.

Meliola salleana **Hansf. var.** ***smilacis*** Hosag. in Hosag. & Goos, Mycotaxon 37: 245, 1990; Hosag., Meliolales of India, p.305, 1996. (Fig. 29)

Materials examined: TBGT 5472, 4.xii.2004, on leaves of *Smilax* sp. (Smilacaceae), Devarakadu, Hoddur, C.Jagath Thimmaiah.

Colonies amphigenous, mostly epiphyllous, subdense, up to 4mm in diameter, rarely confluent. Hyphae straight, branching opposite at acute angles, loosely to closely reticulate, cells 10–30x6–9 µm. Appressoria alternate, straight, antrorse, 18–32 µm long; stalk cells cuneate, 5–14 µm long; head cells ovate, bluntly pointed, entire, 12–16x8–12 µm. Phialides mixed with appressoria, alternate to opposite, ampulliform, 18–28x8–12 µm. Mycelial setae mostly grouped around perithecia, straight, simple, acute at the apex, up to 855µm long. Perithecia scattered, verrucose, up to 198µm in diam.; ascospores obovoidal, 4-septate, constricted, 42–50x18–20 µm.

Meliola scleropyri Hosag. in Hosag. & Goos, Mycotaxon 37: 247, 1990; Hosag., Meliolales of India, p. 307, 1996. (Fig. 30).

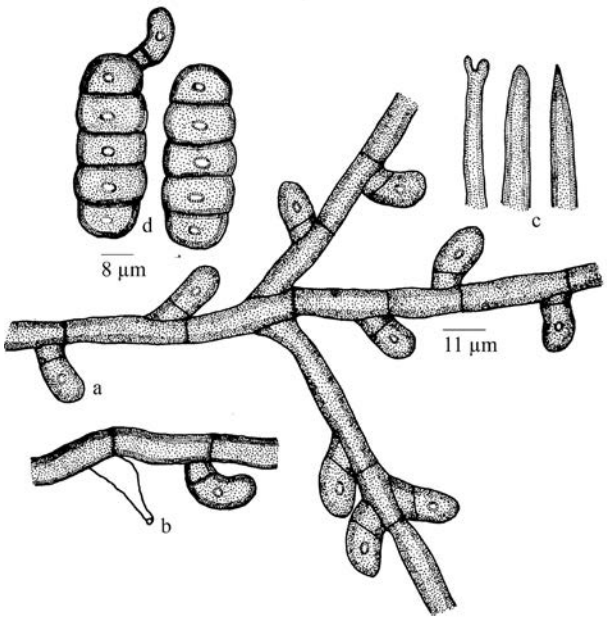


Figure 28. ***Meliola reinwartiodendricola***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

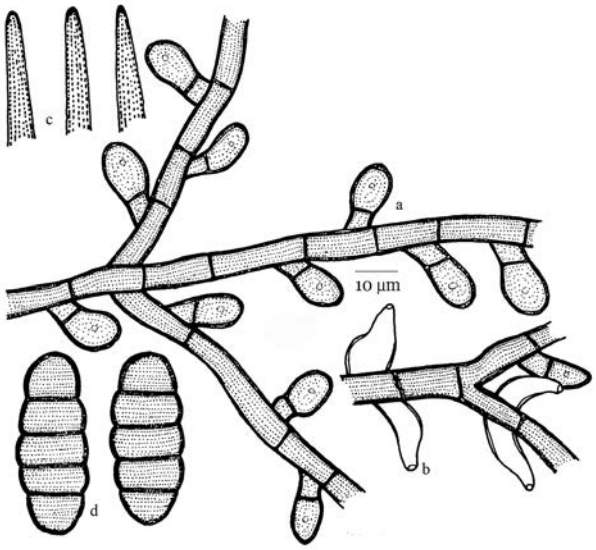


Figure 29. ***Meliola salleana*** **var.** ***smilacis***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Materials examined: TBGT 3410, HCIO 49155, 26.xi.2008, on leaves of *Scleropyrum pentandrum* (Dennst.) Mabberley (Santalaceae), Coorg, V.B.Hosagoudar et al; TBGT 5367, 26.xi.2008 Hoddur, C.Jagath Thimmaiah.

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.

Meliola scolopiae Doidge var. ***indica*** Hosag., Meliolales of India, p. 307, 1996. (Image 108).

Materials examined: HCIO 45813, TBGT 1563, 13.xi.2003, on leaves of *Scolopia* sp. (Flacourtiaceae), Nishane motta, V.B. Hosagoudar et al; TBGT 5357, FMKMCC 136, 25.xi.2008, *S.crenata* (Wight & Arn.) D. Clox. (Flacourtiaceae), Talacauveri, November 25, 2008, C. Jagath Thimmaiah .

Colonies epiphyllous, dense, up to 5mm in diameter. Hyphae substraight, Branching irregular at acute angles closely reticulate, forms thick mat of mycelia. Cells 12–21x9–12 µm. Appressoria alternate, antrorse, straight to curved, 30–55 µm long; stalk cells cylindrical, 12–25 µm long; head cells globose, oblong, irregularly and deeply stellately lobate, 15–22x18–25 µm. Phialides mixed with appressoria, unilateral, cylindrical, 18–21x5–7 µm. Mycelial setae scattered, grouped to scattered, few grouped around perithecia, simple, straight to curved, mostly acute, few obtuse at the tip, up to 580µm long. Perithecia scattered, globose, up to 170µm in diameter; ascospores oblong to fusiform, 4-septate, constricted at the septa, 35–38x14–17 µm.

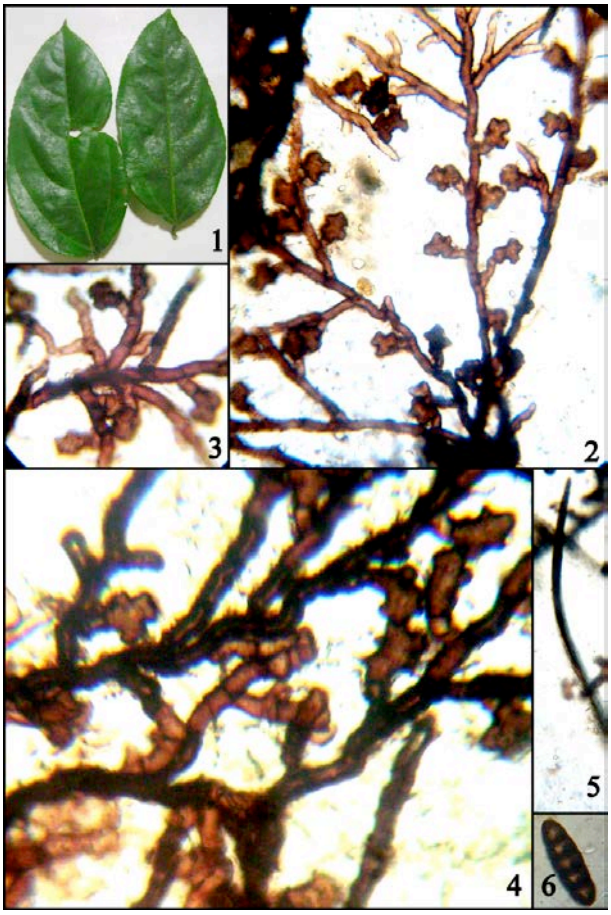


Image 108. *Meliola scolopiae* var. *indica*
1 - Infected leaves; 2 - Branched Colony; 3&4 - Phialides & appressoria; 5 - Mycelial setae; 6 - Ascospore

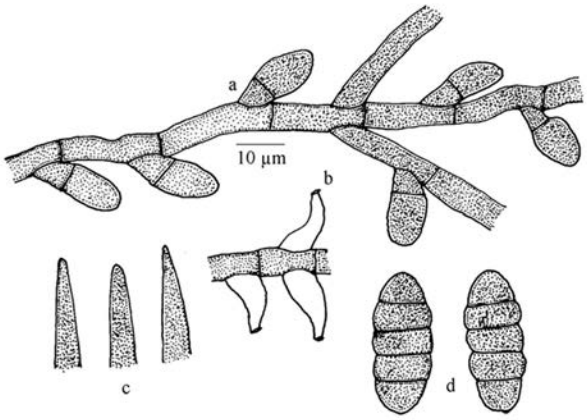


Figure 30. *Meliola scleropyri*
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Meliola serjaniae* Stev. var. *major Hansf., Sydowia 9: 49, 1955; Beih. 2: 444, 1961; Hosag., Kaveriappa, Raghu & Goos., Mycotaxon 51: 114, 1994., Hosag., Meliolales of India, p.309, 1996. (Image 109).

Materials examined: FMKMCC 137, 12.xii.2009, on leaves of *Sapindus emarginatus* Vahl. (Sapindaceae), Hoddur, Kodagu, C. Jagath Thimmaiah.

Colonies epiphyllous, up to 5mm in diameter. Hyphae flexuous, branching opposite at acute angles, loosely to closely reticulate, cells 34–40x7–9 µm. Appressoria mostly alternate, few unilateral, antrorse, few retrorse,

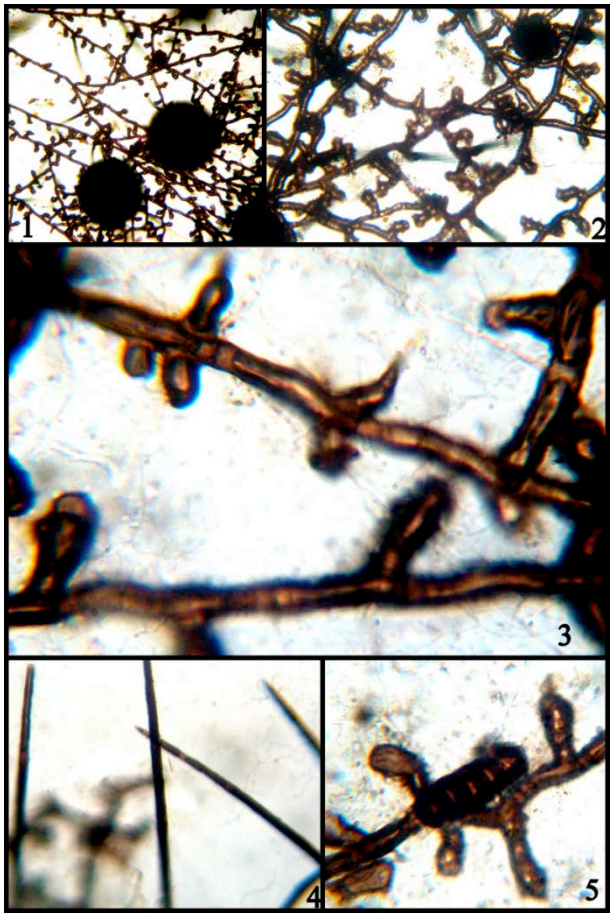


Image 109. *Meliola serjaniae* var. *major*
1 - Branched colony with perithecia; 2&3 - Phialides & appressoria; 4 - Mycelial setae; 5 - Germinating ascospore

16–22x7–11 µm; head cells ovate, lobate, few globular, entire, 15–17x8–10 µm; stalk cells cylindrical to cuneate, 3–5 µm long. Phialides few mixed with appressoria, ampulliform 17–20x6–8 µm. Mycelial setae many slightly curved, acute, up to 325µm long. Perithecia globose, up to 75µm in diameter; ascospores 4-septate, constricted at the septa, brown, cylindrical, 34–40x12–14 µm.

Meliola spigeliae Hansf., Sydowia 9: 49, 1955; Sydowia Beih. 2:527, 1961; Hosag., Siddappa & Udaiyan, Nova Hedwigia 56:200, 1993; Hosag., Meliolales of India, p. 312, 1996. (Image 110).

Materials examined: TBGT 5350, FMKMCC 138, 25.xi.2008, on leaves of *Strychnos nuxvomica* L. (Loganiaceae), Karike, Kodagu, November 25, 2008, C. Jagath Thimmaiah .

Colonies hypophyllous, dense, up to 4mm in diameter. Hyphae substraight, branching opposite at subacute angles, loosely to closely reticulate, cells 25–30x8–10 µm. Appressoria alternate, few unilateral, antrorse to retrorse, straight, few curved, 22–30 µm long; stalk cells cylindrical to cuneate, 3–10 µm long; head cells ovate, slightly angulose, few truncate, few curved inwards, lobate to crooked, 20–25x9–13 µm. Phialides few, mixed with appressoria, alternate, 15–20x3.5–5 µm. Mycelial setae numerous, simple, straight, few bent, acute at the tip, up to 1000µm long. Perithecia globose, up to 120µm in diameter; ascospores obovoidal to cylindrical, 4-septate, constricted at the septa, 31–35x12–16 µm.

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. (Image 111).

Materials examined: HCIO 45685, TBGT 1432, 12.xi.2003, on leaves of *Piper* sp. (Piperaceae), Jodu-

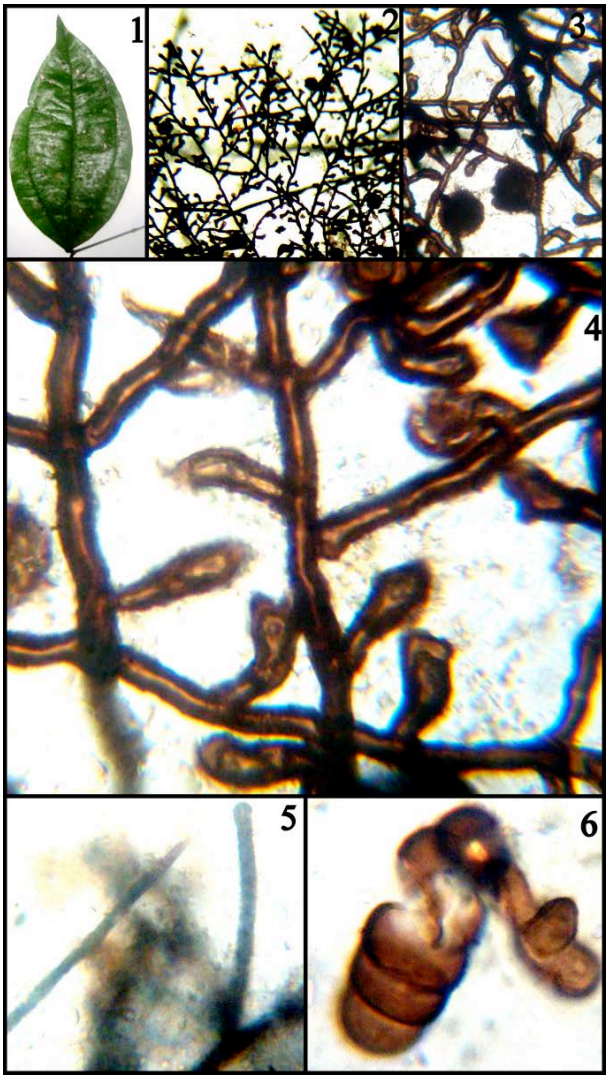


Image 110. *Meliola spigeliae*
1 - I nfected leaf; 2 - Branched Colony; 3 - Young Perithecia; 4 - Appressoria & Phialides; 5 - Mycelial setae; 6 - Germinating ascospore

pal, Madikeri, V.B. Hosagoudar et al; FMKMCC 139, 11.iv.2011, *P. nigrum* L., Abbey falls, C. Jagath Thimmaiah.

Colonies hypophyllous, dense, up to 5mm in diameter, confluent. Hyphae substraight to undulate, branching opposite to irregular at wide angles, loosely to closely reticulate, cells 19–25x7–10 µm. Appressoria alternate, few unilateral, spreading to antrorse, straight to curved,17–24 µm long; stalk cells cuneate to cylindrical, 3–9 µm long; head cells subglobose with crenate to lobate margin, 12–17x6–9 µm. Mycelial setae numerous, simple, straight, acute to obtuse at the tip, up to 550µm long. Perithecia scattered to loosely grouped, verrucose, up to 130µm in diameter; ascospores oblong, 4-septate, slightly constricted, 38–45x13–18µm.

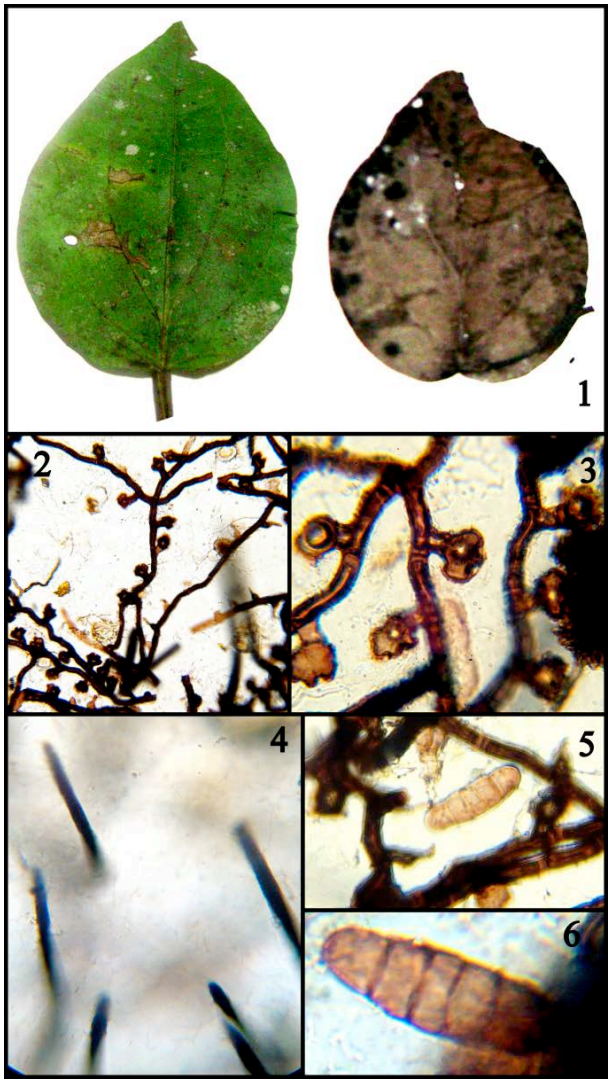


Image 111. ***Meliola stenospora***
1 - Infected leaves; 2 - Branched mycelium; 3 - Appressoria; 4 - Mycelial setae; 5 - Phialides; 6 - Ascospore

Meliola tecleae* Hansf. var. *toddaliae-asiaticae Hansf., Proc. Linn. Soc. London 153:11, 1941; Hansf. & Thirum., Farlowia 3: 298, 1948; Hansf., Sydowia Beih. 2:392, 1961; Hosag. & Goos, Mycotaxon 37:249, 1990; Hosag., Meliolales of India, p. 323, 1996. (Image 112)

Materials examined: TBGT 5336, FMKMCC 140, 24.xi.2008, on leaves of *Toddalia asiatica* (L)., (Rutaceae), Vanachalu, C. Jagath Thimmaiah; TBGT 5425, FMKMCC 141, 29.ix.2009 Hoddur, C. Jagath Thimmaia; TBGT 5366, FMKMCC 142, 25.xi.2008, Bhagamandala, C. Jagath Thimmaiah.

Colonies hypophyllous, dense to subdense, up to 3mm in diameter, confluent. Hyphae substraight, branching opposite at wide angles to subacute angles, sparsely reticulates to non reticulate, cells 15–25x6–8 µm. Appressoria mostly alternate, few opposite to unilateral, introrsely, straight, 15–17 µm long; stalk cells cineaste 3–4 µm long; head cells ovate to curved, entire,10–14x7–9 µm. Phialides few, alternate, ampulliform, 11–13x3–6 µm. Mycelial setae numerous, scattered to grouped, straight, simple, acute at the tip, up

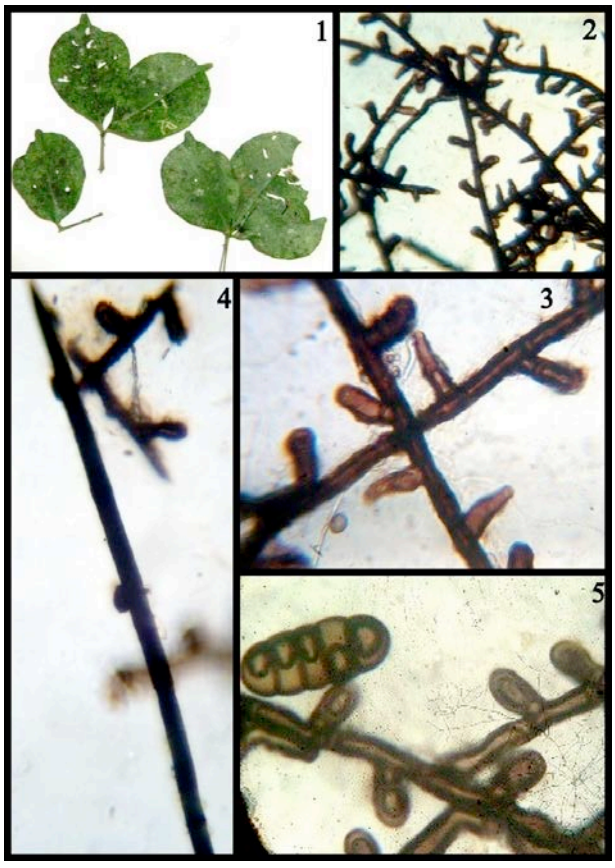


Image 112. ***Meliola tecleae* var. *toddaliae-asiaticae***
1 - Infected leaves; 2 - Branched Colony; 3 - Appressoria & Phialides; 4 - Mycelial setae; 5 - Ascospore

to 500µm long. Perihelia few, globose, scattered, up to 120µm in diameter; ascospores 4-septate, constricted at the septa, brown, 35–44x13–16 µm.

Meliola tenella Pat., Rev. Mycol. 10: 140, 1888; Hansf., Sydowia Beih. 2: 381, 1961; Hosag., Meliolales of India, p. 324, 1996. (Image 113)

Materials examined: TBGT 5411, FMKMCC 143, 11.i.2009, on leaves of *Murayya paniculata* (L.) Jack. (Rutaceae), Hoddur, C. Jagath Thimmaiah; TBGT 5443, FMKMCC 144, 16.viii.2009, Hoddur, Bio reserve, C. Jagath Thimmaiah.

Colonies mostly epiphyllous, dense up to 5mm in diameter. Hyphae substraight, branching opposite at subacute to wide angles, loosely to closely reticulate, cells 21_25x8–10 µm. Appressoria alternate, antrorse, straight, up to 21–30 µm long; stalk cells cuneate to cylindrical, up to 6–8 µm long; head cells cylindrical, entire, up to 14–20x9–11 µm. Phialides many, mixed with appressoria, alternate to unilateral, ampulliform, up to 24–28x5–7 µm. Mycelial setae, scattered, dichotomously branched, branches reflexed, up to 550µm long. Perithecia scattered, verrucose, globose, up to 230µm in diameter; ascospores 4-septate, cylindrical, constricted at the septa, up to 35–41x12–15 µm.

Meliola toonae Hosag. & Sabu in Hosag., C.K. Biju & Abraham, J. Econ. Taxon. Bot. 25: 72, 2001; Hosag., Meliolales of India 2: 345, 2008. (Image 114)

Materials examined: TBGT 5454, FMKMCC 145, 29.xi.2009, on leaves of *Toona ciliata* Roem. (Meliaceae), Hoddur, C. Jagath Thimmaiah

Colonies epiphyllous, dense, up to 3mm in diameter.

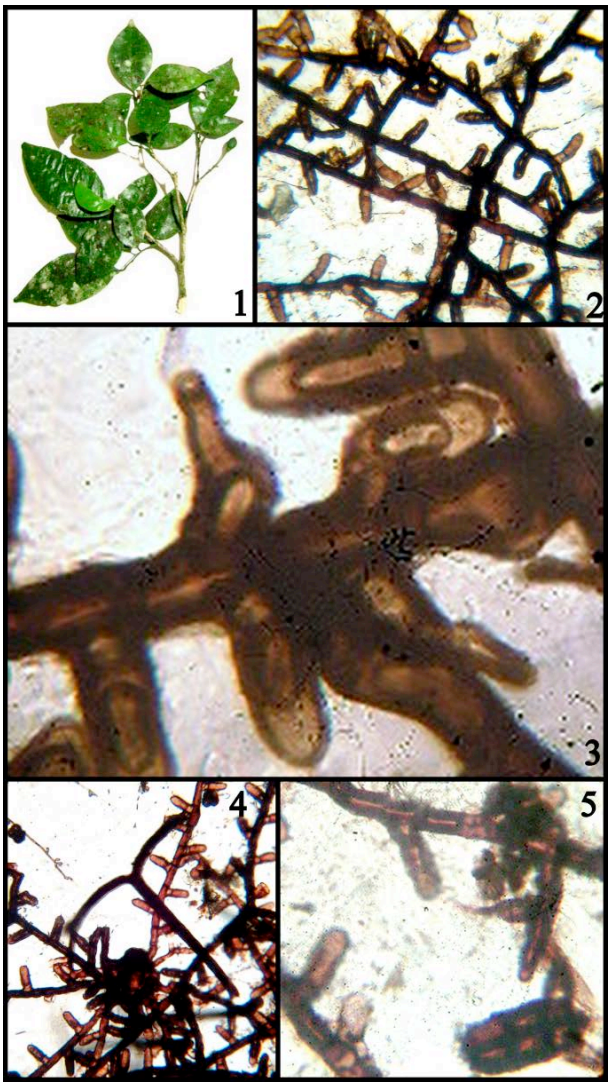


Image 113. *Meliola tenella*
1 - Infected leaves; 2 - Branched Colony; 3 - Appressoria & Phialides; 4 - Mycelial setae & young perithecium; 5 - Ascospore

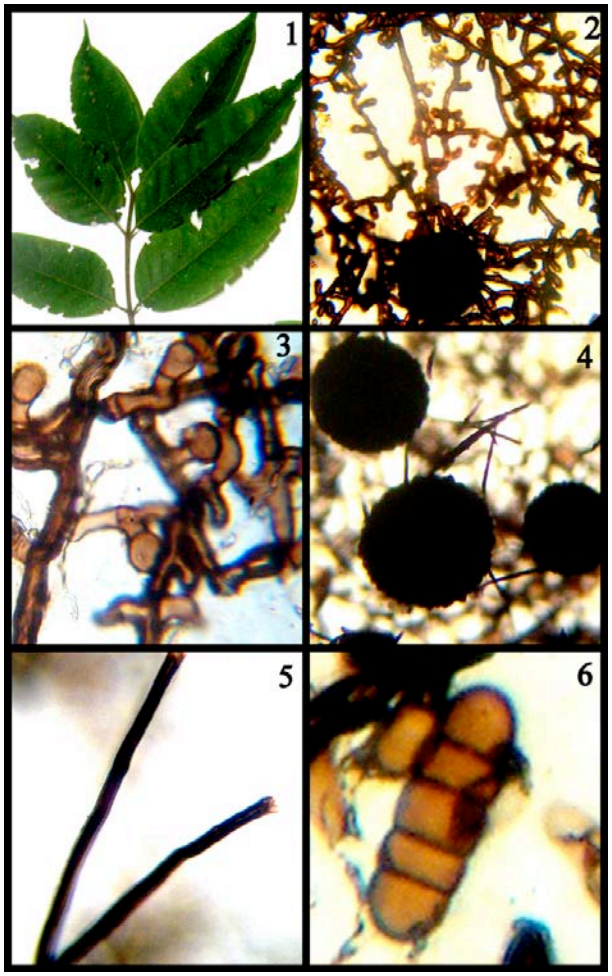


Image 114. *Meliola toonae*
1 - Infected leaves; 2 - Branched Colony; 3 - Appressoria & Phialides; 4 - Mycelial setae & Perithecia; 5 - Dentate mycelial setae; 6 - Ascospore

Hyphae substraight, flexuous, branching opposite to subopposite, alternate at acute to subacute angles, loosely to closely reticulate, cells 24–35x5.5–8 µm. Appressoria alternate, unilateral, few opposite to subopposite, antrorse to subantrorse, few retrorse, up to 14–20 µm long; stalk cells cylindrical to cuneate, 4–6 µm long; head cells ovate, angulose, entire,10–15x7–9.5 µm. Phialides few, mixed with appressoria, opposite, ampulliform, 17–23x4–9 µm. Mycelial setae numerous, simple, straight to curved, dentate to obtuse at the apex, up to 230µm long. Perithecia grouped, globose, up to 240µm in diameter; ascospores oblong, 4-septate, constricted at the septa, 41–45x13–15 µm.

Meliola toxocarpi Hosag. & Antony, J. Swamy Bot. Club 5: 75, 1988; Hosag., Meliolales of India, p. 333, 1996. (Fig. 31).

Material examined: HCIO 45735, TBGT 1484, 11.xi.2003, on leaves of *Toxocarpus* sp. (Asclepiadaceae), Nishane motta, V.B. Hosagoudar et al.

Colonies amphigenous, mostly epiphyllous, dense, up to 2mm in diameter confluent. Hyphae straight substraight, branching alternate, opposite to irregular at acute angles, loosely to closely reticulate, cells 21–28x6–8 µm. Appressoria alternate, mostly antrorse, 21–31 µm long; stalk cells cylindrical to cuneate, 6–9 µm long; head cells ovate, globose, entire to angular, rarely slightly ;sublobate, 18–25x12–15.5 µm. Phialides mixed with appressoria, opposite to alternate, ampulliform, 18–25x6–9 µm. Mycelial setae scattered to grouped around perithecia, straight to curved, simple, acute, up to 544µm long. Perithecia scattered, verrucose, up to 117µm in diam; ascospores obovoidal, 4-septate, constricted, 43–46.5x15–22 µm.

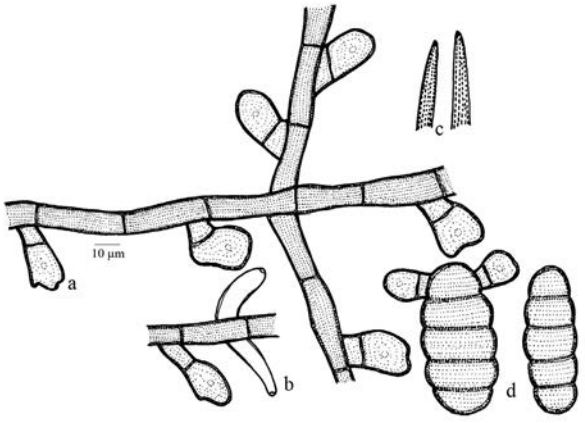


Figure 31. ***Meliola toxocarpi***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

Meliola tragiae Hosag. & Jagath., Plant Pathology & Quarantine 3: 8, 2013. (Fig. 32).

Materials examined: TBGT 6238b (holotype), 1.i.2010, on leaves of *Tragia* sp. (Euphorbiaceae), Medikari, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense, up to 2mm in diameter, confluent. Hyphae straight, substraight to flexuous, branching opposite to irregular at wide angles, loosely reticulate, cells 22–27×5–6 µm. Appressoria alternate, about 1% opposite, straight to slightly curved, antrorse to subantrose,12–20 µm long; stalk cells cylindrical to cuneate, 2–7 µm long; head cells ovate, globose, entire, straight to curved, rarely truncate at the apex, 10–15×7–10 µm. Phialides mixed with appressoria, alternate to opposite, conoid to ampulliform, 12–20×5–7 µm. Mycelial setae numerous, simple, straight, obtuse, 2–3-times variously and irregularly dentate, often furcate at the tip, about 10% uncinate, up to 470µm long. Perithecia scattered, up to 110 µm in diameter; ascospores oblong, cylindrical, 4-septate, constricted at septa, 35–40×12–15 µm.

Meliola tylophorae-indicae Hosag. & Manoj., Indian Phytopath. 57: 466, 2004; Hosag. Meliolales of India 2: 347, 2008. (Image 115)

Materials examined: TBGT 5383, FMKMCC 146, 27.vi.2009,Hoddur, on leaves of *Tylophora* sp. (Asclepiadaceae), Mandrane, Hoddur, C. Jagath Thimmaiah; TBGT 5399, FMKMCC 147, 28.xii.2008 , C. Jagath Thimmaiah

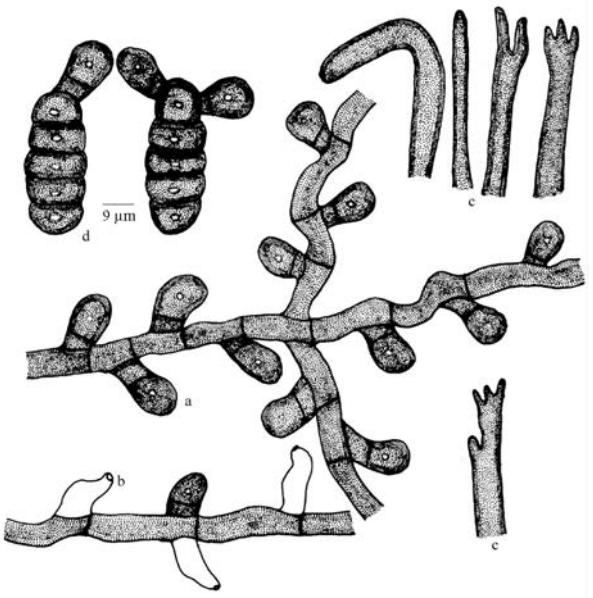


Figure 32. ***Meliola tragiae***
a - Appressorium; b - Phialide; c - Apical portion of mycelial setae; d - Ascospores

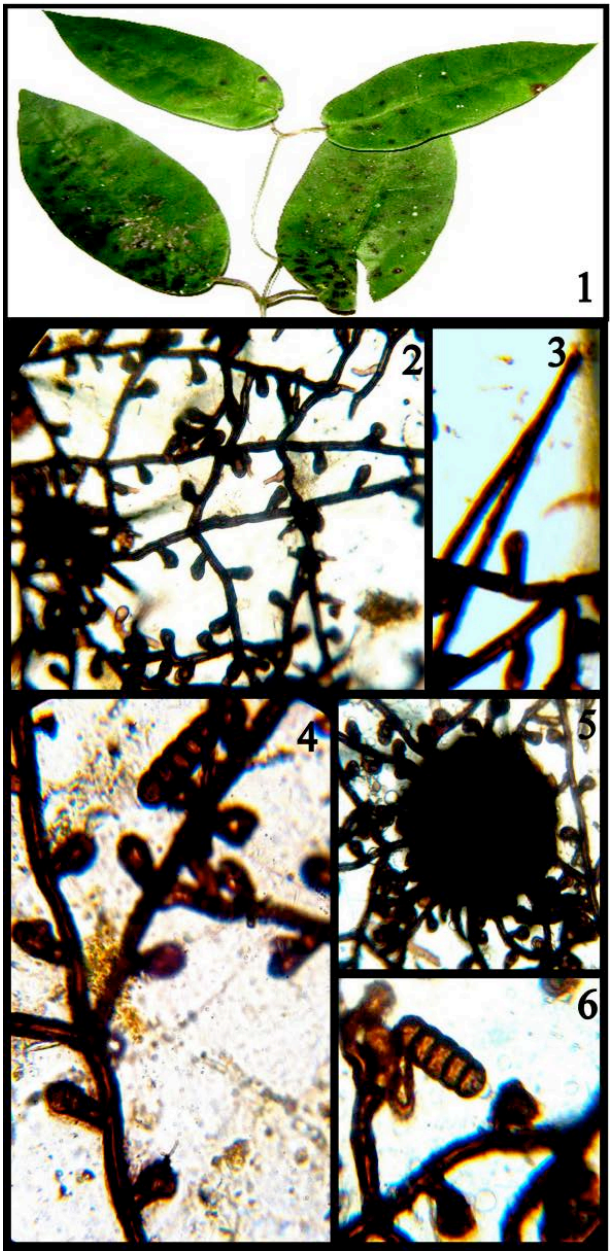


Image 115 - *Meliola tylophorae-indicae*
1 - Infected leaves; 2 - Branched Colony showing Appressoria & Phialides; 3 - Mycelial setae; 4 - Enlarged Hyphae; 5 - Perithecia; 6 - Germinating ascospore

TBGT 5414, FMKMCC 148, 7.v.2009, C. Jagath Thimmaiah.

Colonies amphigenous, dense, up to 4mm in diameter. Hyphae substraight, flexuous, branching opposite at subacute angles, loosely to closely reticulate, cells 27–30x4–6 µm. Appressoria alternate to opposite (2%), antrorse, straight, up to 14–24 µm long; stalk cells cuneate to cylindrical, up to 4–12 µm; head cells ovate to globose, entire, angulose, sublobate to lobate, attenuated and broadly rounded at the apex, 13–16x8–12 µm. Phialides many, mixed with appressoria, also borne on separate branch, mostly opposite, alternate to unilateral, ampulliform, neck elongated 16–22x3–7 µm. Mycelial setae many, scattered, simple, straight to slightly curved, acute to obtuse at the tip, few dentate at the tip, up to 300µm long. Perithecia scattered, globose, up to 110µm diameter; ascospores 4-septate, cylindrical, constricted at the septa, 33–36x10–15 µm.

Meliola wendlandiae Hosag. in Hosag. & Goos., Mycotaxon 37: 251, 1990., Hoasg., Meliolales of India, p. 340, 1996. (Image 116).

Materials examined: HCIO 45612, TBGT 1355, 13.xi.2003, on leaves of *Wendlandia thyrsoidea* (Schult.) Steud. (Rubiaceae), Bramhagiri, Talacauvery, V. B. Hosagoudar et al; HCIO 45624, TBGT 1367; MPCA, 11.xi.2003, Nishane Motta, V. B. Hosagoudar et al; HCIO 45811, TBGT 1561, 13.xi.2003, Talacauvery, V. B. Hosagoudar et al; TBGT 5331, FMKMCC 149, 24.xi.2008, Vanachalu, Kodagu, C. Jagath Thimmaiah; FMKMCC 150, 9.i.2010, Tadiandamol, C. J. Thimmaiah.

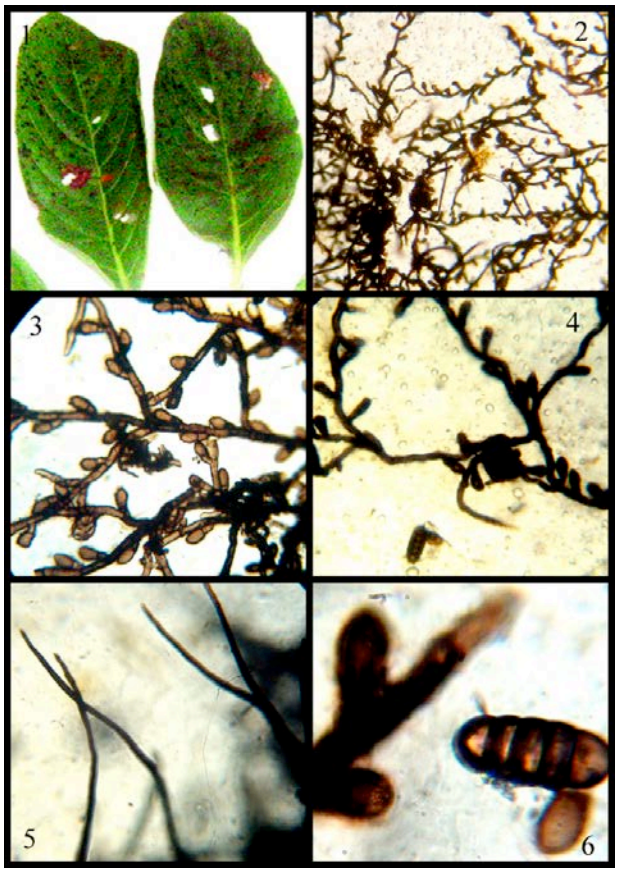


Image 116. *Meliola wendlandiae*
1 - Infected leaves; 2 - Branched Colony; 3&4 - Appressoria & Phialides; 5 - Mycelial setae; 6 - Germinating ascospore

Colonies hypophyllous, thin to subdense, 1–2 mm in diameter. Hyphae substraight to flexuous, branching opposite to alternate at subacute to wide angles, loosely reticulate, cells 25–30x5–7µm. Appressoria alternate, antrorse, 22–24x8–10 µm; stalk cells cylindrical to cuneate, 6–11 µm long; head cells ovate, obovate, entire, few angulose, attenuated at the apex,15–20x9–11 µm. Phialides few, borne on separate branches, unilalateral to opposite, ampulliform,12–16x5–7µm. Mycelial setae numerous, simple, straight, uncinate, tip acute, up to 200µm long. Perithecia scattered, globose, up to 150µm in diameter, few mycelial setae arranged around the perithecia. Ascospores obovoidal, 4-septate, constricted at the septa, oblong, 30–35x15–17 µm.

Meliola zanthoxyli Hansf., Proc. Linn. Soc.London 158: 37, 1946; Sydowia Beih. 2: 386, 1961; Kapoor, Indian Phytopathol. 20: 160, 1961; Hosag. & Goos, Mycotaxon 42: 139, 1991, Hosag., Meliolales of India, p. 341, 1996. (Image 117).

Materials examined: TBGT 5356, FMKMCC 151, 25.xi.2008, on leaves of *Zanthoxylum* sp. (Rutaceae), Bhagamandala, November 25, 2008, C. Jagath Thimmaiah.

Colonies epiphyllous, scattered, up to 4mm in diameter, dense. Hyphae substraight to straight, branching opposite at subacute angles, loosely to closely reticulate, cells 20–20x8–10 µm. Appressoria alternate, antrorse, straight, 20–30 µm long; stalk cells cylindrical, 8–10 µm long; head cells globose, stellately lobate, few ovate, 8–20x12–17 µm. Phialides many, on separate branches to mixed with appressoria, opposite to subopposite, ampulliform, 15–22x10–12 µm. Mycelial setae numerous, grouped, simple, uncinate, tip obtuse, up to 400µm long. Perithecia scattered, globose, up to 250µm in diameter; ascospores 4-septate, cylindrical, constricted at the septa, 35–50x16–22 µm.

Meliola ziziphi Hansf. & Thirum., Farlowia 3: 299, 1948; Hansf., Sydowia Beih. 2: 368, 1961; Thite & Kulakarni, 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. (Image 118)

Materials examined: HCIO 45650, TBGT 1396,

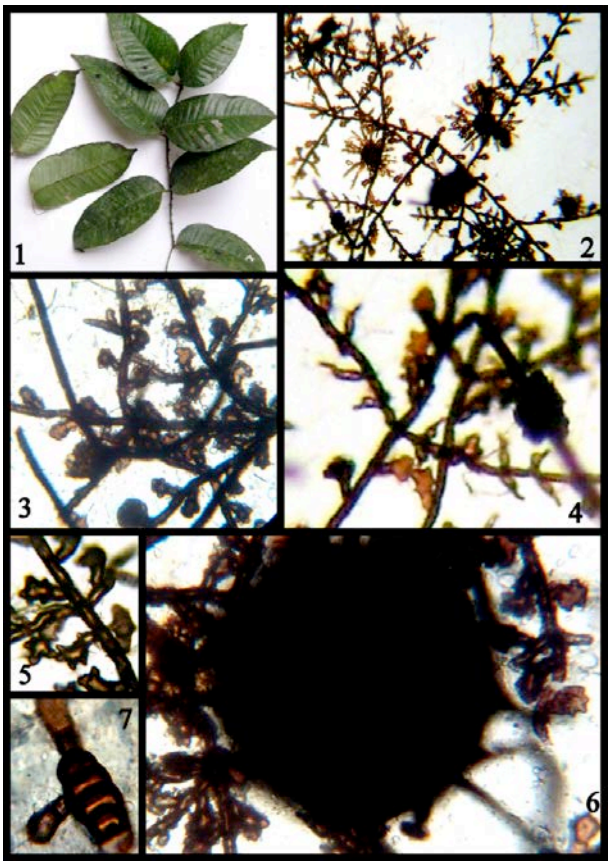


Image 117. *Meliola zanthoxyli*
1 - Infected leaves; 2 - Branched Colony; 3&4 - Appressoria; Phialides & mycelial setae; 5 - Enlarged appressoria; 6 - Perithecium; 7 - Germinating ascospore

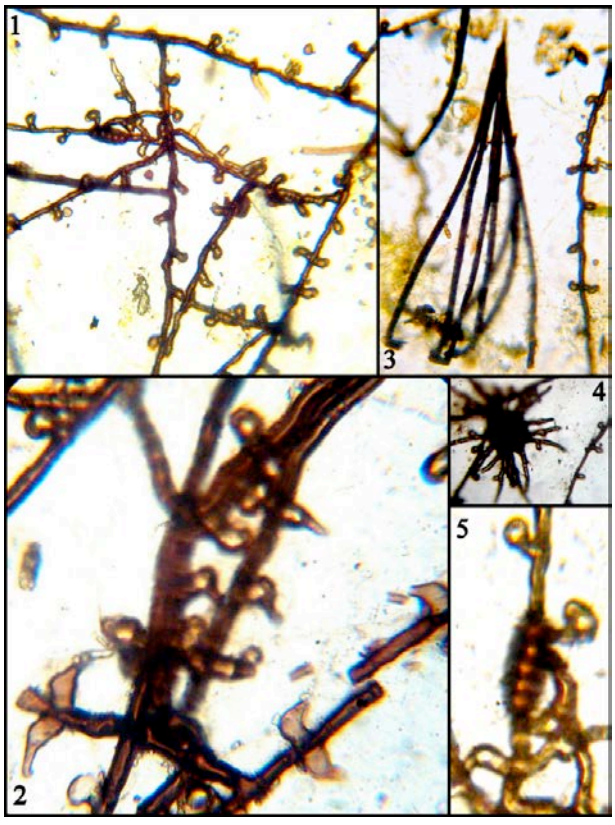


Image 118. *Meliola ziziphi*
1 - Loosely reticulate mycelium; 2 - Appressoria & phialides; 3 - Mycelial setae; 4 - Perithecium; 5 - Germinating ascospore

12.xi.2003, on leaves of *Ziziphus* sp. (Rhamnaceae), Abbe falls, V.B. Hosagoudar et al; 25.xi.2008, TBGT 5364, FMKMCC 152, *Z. rugosa* Lam., Bhagamandala, C. Jagath Thimmaiah; TBGT 5393, FMKMCC 153; TBGT 5452, FMKMCC 154, 11.i.2010, *Z. oenoplia* (L.) Mill. Hoddur, C. Jagath Thimmaiah.

Colonies hypophyllous, thin, along the midrib, 1–2 mm in diameter. Hyphae substraight, flexuous, branching opposite at subacute to wide angles, loosely reticulate, cells 20–23x4.5–6 µm. Appressoria alternate, antrorse, straight, few curved, 9–14 µm long; stalk cells cuneate,1.5–3 µm long; head cells ovate, entire, 8–11x6–7 µm. Phialides many mixed with appressoria, mostly opposite, ampulliform, neck elongated, 15–20x5–6.5 µm. Mycelial setae numerous, simple, slightly curved, acute, up to 370µm long. Perithecia globose, scattered, surrounded by mycelial setae, up to 80µm in diameter; ascospores 4-septate, oblong to cylindrical constricted at the septa, 25–35x10–12 µm.

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., Chandra. & 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 stellatelly at the center; asci globose, octosporous, bitunicate; ascospores conglobate, uniseptate, brown.

Type sp: *A. melastomatis* Lev.

In addition to the anamorphs, Asterotomella and Clasterosporium, Mahanteshamyces were assigned to this genus (Hofmann & Piepenbring, 2008).

DESCRIPTIONS TO SPECIES

Asterina acronychiae

Hosag. & Goos, Mycotaxon 59: 150, 1996; Hosag. & Abraham, J. Econ. Taxon. Bot. 4: 581, 2000; Hosag., Zoos' Print J. 18: 1284, 2003; 21: 2325, 2006; 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. (Image 120)

Materials examined: FMKMCC 156, 24.x.2010, on leaves of *Acronychia pedunculata* (L.) Miq. (Rutaceae), Hoddur, C. Jagath Thimmaiah; FMKMCC 157, 19.i 2011, Vanachalu, C. Jagath Thimmaiah; HCIO 45729, TBGT

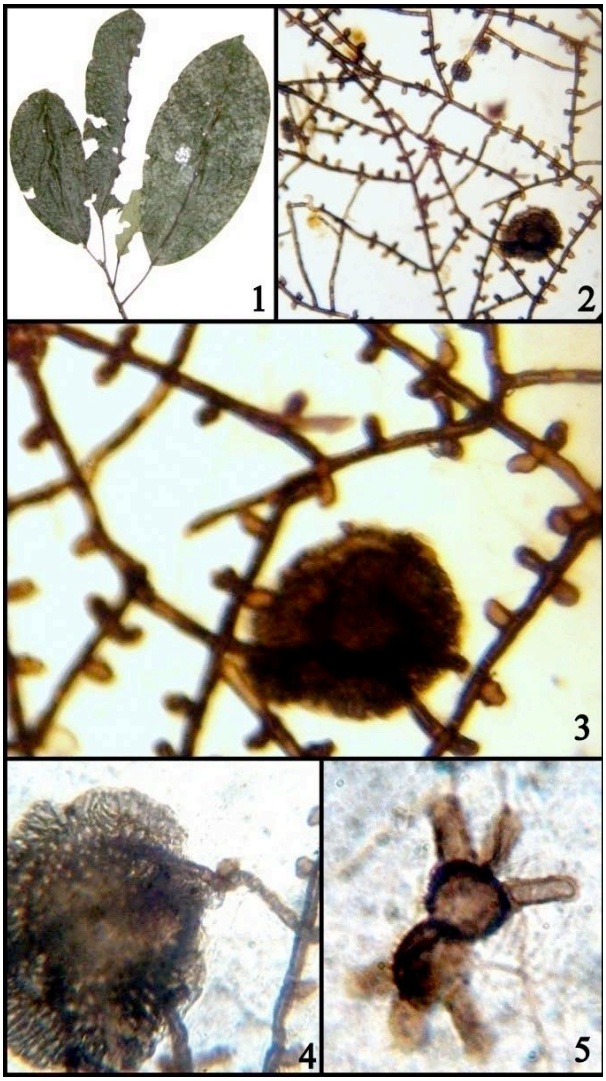


Image 120. *Asterina acronychiae*
1 - Infected leaves; 2 - Branched colony; 3 - Appressoria & thyriothecium; 4 - Thyriothecium with crenate margin; 5 - Septate echinulate ascospore

Asterinales: Asterinaceae
Key to the genera

1. Appressoria absent.....*Prillieuxina*
1. Appressoria present 2
2. Appressoria intercalary.....*Asterolibertia*
2. Appressoria lateral.....3
3. Appressoria in clusters.....*Ishwaramyces*
3. Appressoria not so.....4
4. Ascospore uniseptate.....*Asterina*
4. Ascospore biseptate and one cell tapers .....*Meliolaster*

Key to the species of Asterinaceae

Acanthaceae
Asterina
Single species.....*Asterina tertia*

Anacardiacae
Asterina
Single species .....*Asterina nothopegiae*

Asterolibertia
Single species .....*Asterolibertia mangiferae*

Apocynaceae
Asterina
1.On wrightia.....*Asterina wrightiae*
1.On other host.....*Asterina parsonsiae*

Aristolochiaceae
Asterina
Single species.....*Asterina thotteae*

Asclepidaceae
Asterina
Single species.....*Asterina gymnemae*

Caesalpinaceae
Asterina
Single species.....*Asterina mezonevronis*

Celastraceae
Asterina
Single species.....*Asterina cassinecola*

Clusiaceae
Asterina
Single species.....*Asterina clusiacearum*

Combretaceae
Asterina
Single species.....*Asterina escharoides*

Convolvulaceae
Asterina
Single species.....*Asterina argyreiae*

Dipterocarpaceae
Asterolibertia
Single species.....*Asterolibertia vateriae*

Elaeagnaceae
Prillieuxina
Single species.....*Prillieuxina elaeagni*

Elaeocarpaceae
Asterina
1.Appressoria uncinate.....*Asterina elaeocarpicola*
1.Appressoria not uncinate...*Asterina elaeocarpi* var. *ovalis*

Erythropalaceae
Asterina
Single species.....*Asterina erythropalicola*

Euphorbiaceae
Asterina
1.Appressoria unicellular.....2
1.Appressoria bicellular.....4
2. Appressoria alternate only.....*Asterina agrostistichydis*
2. Appressoria alternate and opposite.....3
3. On antidesma.....*Asterina antidesmatis*
3. On aporusa.....*Asterina aporusae*
4. Head cells globose.....*Asterina lobulifera* var. *indica*
4. Head cells ovate to oblong.....*Asterina ushae*

Meliolaster
Single species .....*Meliolaster aporusae*

Flacourtiaceae
Asterina
1. Head cells ovate, ampulliform to cylindrical.....
.....*Asterina homaligena*
1. Not so.....2
2. Head cells globose.....*Asterina talacauveriana*
2. Head cells ovate.....*Asterina hydnocarpi*

Ishwaramyces
Single species.....*Ishwaramyces flacourtiae*

Lamiaceae
Asterina
Single species.....*asterina hyptidicola*

Lauraceae
Asterina
Single species.....*asterina cryptocariicola*

Loranthaceae
Asterina
1.Appressoria globose .....*Asterina deightonii*
2.Appressoria ovate to oblong.....*Asterina loranthigena*

Lythraceae
Asterina
Single species.....*Asterina lawsoniae*

Malvaceae
Asterina
Single species.....*Asterina hibisci*

Melastomataceae
Asterina
Single species.....*Asterina memecylonis*

Asterina madikeriensis

Meliaceae
Asterina
1.On cipadessa.....*Asterina cipadessae*
1. On other hosts.....2
2.On trichilia.....*Asterina trichiliae*
2. On other hosts.....3
3. On aglaia.....*Asterina aglaiae*
3. On chukrasia.....*Asterina chukrasiae*

Meniseprmaceae
Asterina
Single species .....*Asterina lepianthis*

Asterina piperina
Myrtaceae
Asterina
1.Appressoria unicellular.....*Asterina claviflori*
1,Appressoria two celled.....*Asterina jambolana*

Oleaceae
Asterina
1.Appressoria unicellular.....*Asterina jasmini* var. *indica*
1.Appressoria 2- celled .....*Asterina erysiphoides*

Periplocaceae
Asterina
Single species.....*Asterina hemidesmii*

Piperaceae
Asterina
Single species.....*Asterina piperina*

Ranunculaceae
Asterina
Single species.....*Asterina naraveliae*

Rubiaceae
Asterina
1.On Canthium.....*Asterina canthii-dicocci*
1.On Glycosmis.....*Asterina glycosmidigena*

Asterina canthiigena

Rutaceae
Asterina
1.Appressoria two celled.....*Asterina toddaliicola*
1.Appressoria unicellular.....2
2.Appressoria entire.....*Asterina acronychiae*
2.Appressoria angular to lobatwe.....3
3. On zanthoxylum.....*Asterina zanthoxyli*
3. On melicope.....*Asterina melicopecola*

Sabiaceae
Asterina
Single species.....*Asterina meliosmae-simplicifoliae*

Santalaceae
Asterina
Single species.....*Asterina congesta*

Sapotaceae
Asterina
Single species.....*Asterina chrysophylligena*

Symplocaceae
Asterina
Single species.....*Asterina indica*

Tiliaceae
Asterina
1. On Triumfetta.....*Asterina triumfetticola*
1. On Grewia.....*Asterina wingfieldii*

Urticaceae
Asterina
Single species.....*Asterina tragiae*

Verbenaceae
Asterina
Single species.....*Asterina pusilla*

Vitaceae
Asterina
1.On Cissus.....*Asterina vitacearum*
1. On Vitis .....*Asterina viticola*

1478, 11.xi.2003, *Acronychia* sp., Nishane motta, V.B. Hosagoudar et al.

Colonies amphigenous, dense on epiphyllous region, crutose, up to 4mm in diameter, confluent. Hyphae straight to substraight, branching mostly opposite at acute angles, loosely reticulate, cells 10–21x4–6 µm. Appressoria alternate to opposite, unicellular, ovate, entire, 6–9x4–6 µm, few solitary. Thyriothecia scattered, orbicular, up to 120µm in diameter, dehisced stellately at the center, margin crenate; asci globose, octosporous, 32–37 µm in diameter; ascospores brown, conglobate, 1- septate, deeply constricted at the septum, 20–23x9–11µm, wall echinulate.

This species is similar to *Asterina vepridis* Doidge, but differs in having larger and echinulate ascospores.

Asterina aglaiae Hosag., J. Mycopathol. Res. 44: 5, 2006; Hosag., Chandra. & Agarwal, Asterinales of Kerala, p.36, 2011; Hosag., Mycosphere 2(5): 634, 2012. (Fig. 33)

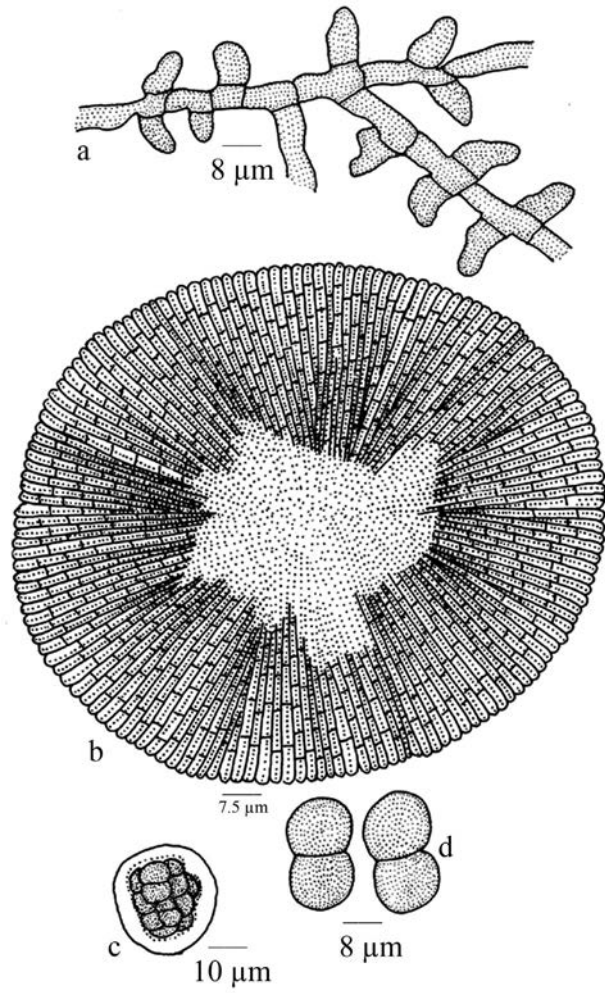


Figure 33. ***Asterina aglaiae***
a - Appressoriate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores

Material examined: HCIO 45756, TBGT 1505, 12.xi.2003, on leaves of *Aglaia* sp. (Meliaceae), Jodupal, Madikeri, V.B. Hosagoudar et al.

Colonies epiphyllous, thin to subdense, up to 3mm in diameter, rarefly confluent. Hyphae straight to slightly crooked, branching irregular at acute to wide angles, loosely to closely reticulate, cells 16–23x4–6 µm. Appressoria alternate, opposite to subopposite, unicellular, ovate, conoid, ampulliform, antrorse, subantrorse to retrorse, straight to curved, entire to rarely angular to sublobate, 8–13x5–15 µm. Thyriothecia scattered, orbicular, up to 120µm in diam., stellately dehisced at the centre, margin crenate to fimbriate, fringed hyphae few, crooked; asci globose, octosporous, up to 30µm in diam; ascospores conglobate, oblong, brown, uniseptate, deeply constricted at the septum, 20–28x11–13 µm, wall smooth.

This is the type locality of this species

***Asterina agrostistichydis* sp. nov.**

Hosag. & Jagath. (Image 121)

(urn:lsid:indexfungorum.org:names:807147)

Materials examined: FMKMCC 158, 9.i.2010, on leaves of *Agrostistachys indica* Dalz. (Euphorbiaceae), Tadiandamol, C. Jagath Thimmaiah.

Colonies amphigenous, dense, up to 3mm in diameter. Hyphae straight to substraight, branching irregular at acute to wide angles, loosely reticulate, cells 10–30x3–6 µm. Appressoria unicellular, alternate to unilateral, ovate to oblong, mostly lobate, 8–12x3–6 µm. Thyriothecia scattered, orbicular, up to 80µm in diameter, dehisced stellately at the center, margin crenate; asci globose, octosporous, 30–35 µm in diameter; ascospores brown, conglobate, 1- septate, deeply constricted at the septum, 18–20x5–6 µm, wall echinulate.

This is the first record of the genus *Asterina* on this host genus.

Etymology: Named after the host genus.

Asterina antidesmatis Petrak, Sydowia 12:472, 1959; Hosag., Jagath, Jayashankara & Sabeena, J. Threatened Taxa 5(2): 3661, 2013. (Image. 122).

Materials examined: TBGT 5423, FMKMCC 159, 9.i.2010, on leaves of *Antidesma montanum* Blume (Euphorbiaceae), Tadiandamol, C. Jagath Thimmaiah; FMKMCC 160, FMKMCC 161, 23.ix.2010, Hoddur, C. Jagath Thimmaiah.

Colonies amphigenous, thin, velvety, up to 4mm in diameter, confluent. Hyphae flexuous, branching oppo-

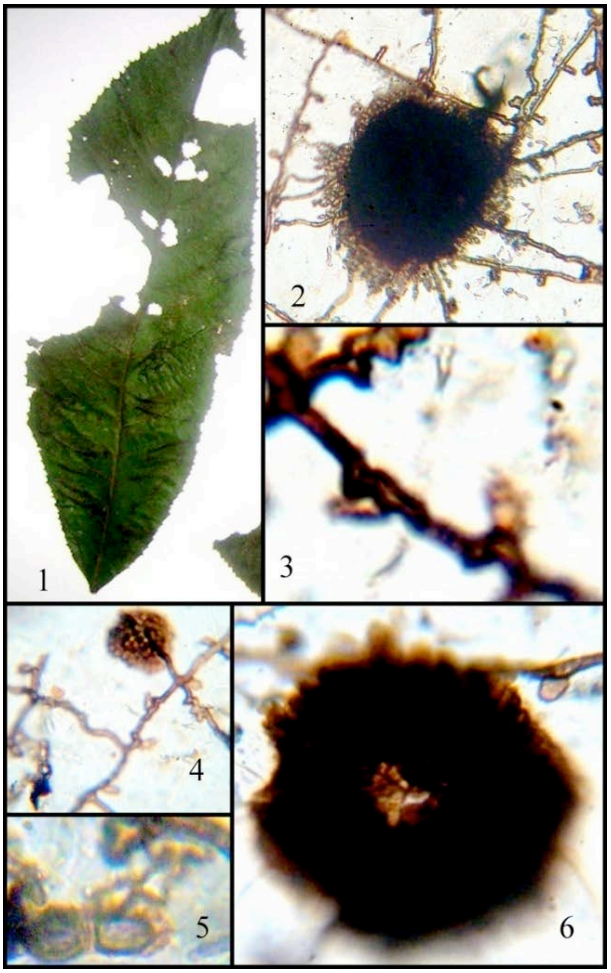


Image 121. *Asterina agrostistachydes* 1 - Infected leaf; 2 - Branched colony; 3 - Appressoria; 4 - Thyriothecium; 5 - 1-septate echinulate ascospore; 6 - Dehisced thyriothecium.

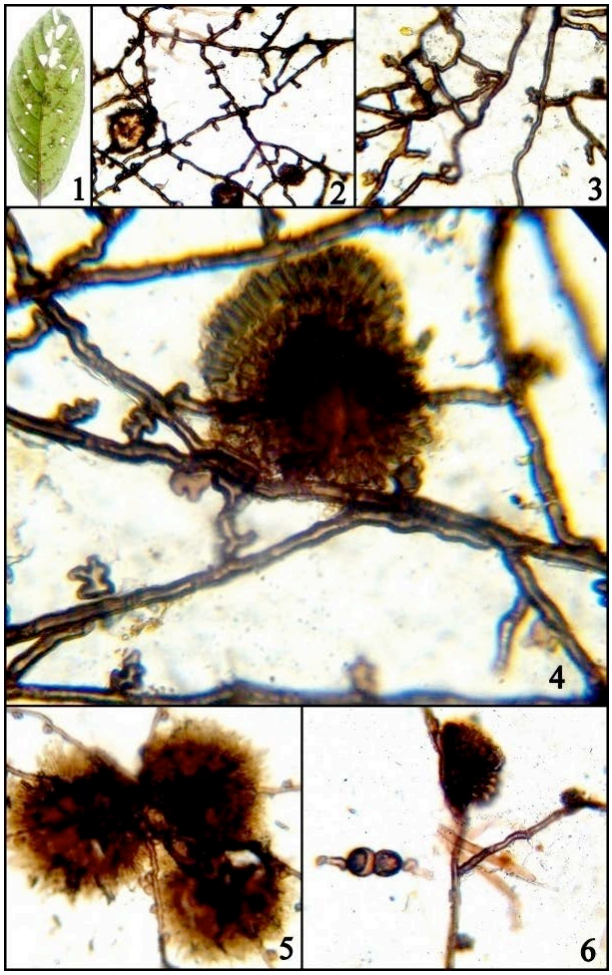


Image 122. *Asterina antidesmatis* 1 - Infected leaf; 2&3 - Branched colonies; 4 - Appressoria & Thyriothecium; 5 - Dehisced thyriothecia; 6 - 1- septate germinating ascospore

site, few unilateral at sub acute to wide angles, loosely reticulate. Cells 20–25x3–4 µm. Appressoria distantly placed, unicellular, alternate, unilateral, opposite and sub opposite, straight, oblong, slightly lobed, angulose, few curved, entire, 5–9x4–6 µm. Thyriothecia orbicular, up to 100µm in diameter, dehisces stellately at the centre, margin fringed, fringed hyphae up to 20µm long; asci globose, octosporous up to 30µm in diameter. Ascospores 1-septate, conglobate, 12–18x6–10 µm, wall smooth. Pycnothyria orbicular, smaller than thyriothecia, up to 25µm in diameter; pycnothyriospores unicellular, elliptical or oval, brown, 10–12x4–6 µm.

Asterina aporusae Hansf., Reinwardtia 3: 129, 1954; Hosag. &Abraham, J. Econ.Taxon. Bot. 4:567, 2000; Hosag. & Agarwal, Indian Phytopath. 56: 98, 2003; Hosag., Zoos' Print J.18:1282, 2003; Hosag. & Appaiah, J Mycopathol. Res.43: 168, 2005; Hosag., Zoos' Print J. 21: 2325, 2006; Hosag., Chandra. & Agarwal, Asterinales of Kerala, p. 37, 2011; Hosag., Mycosphere 2(5): 636, 2012. (Image 123).

Materials examined: TBGT 5423, FMKMCC 162, TBGT 5402, FMKMCC 163, 12.vii.2009, 21.ix.2009, on leaves of *Aporusa bourdillonii* Stapf. (Euphorbiaceae), Riverside, Hoddur, C. Jagath Thimmaiah; TBGT 5402; 5434,5. xi.2009, Mandrane, Hoddur, 5 November 2009, C. Jagath Thimmaiah.

Colonies hypophyllous, subdense, well scattered, up to 3mm in diameter. Hyphae thin, straight, slightly flexuous, branching opposite to alternate at subacute to wide angles, loosely reticulate. Cells 15–18x2–4.5 µm. Appressoria unicellular, opposite to unilateral, few alternate, straight to slightly curved, ovate, cylindrical, oblong, elongated, entire, up to 5–12x2.5–4 µm. Thyriothecia scattered to grouped, orbicular, ovate, stellately dehisced at the center, crenate to fimbriate at the mar-

gin, up to 170µm in diameter; asci ovate, few to many, octosporous, 22–30 µm diameter. Ascospores oblong, conglobate, brown, 1-septate, constricted at the septum, wall smooth, 20–23x5–7 µm.

This species was associated with *Meliolaster aporusae.*

Asterina argyreiae Hansf., Reinwardtia 3:130, 1954; Hosag., Mycosphere 2(5): 640, 2012. (Image 124).

Material examined: TBGT 5705, 25.xi.2008, on leaves of *Argyreia* sp. (Merremia sp.) (Convolvulaceae), Tank Estate, Hoddur, C. Jagath Thimmaiah.

Colonies amphigenous, mostly epiphyllous, subdense, up to 1mm in diameter. Hyphae substraight, flexuous to crooked, branching irregular at acute to wide angles, loosely reticulate to form a net, cells 18–27×3–5 µm. Appressoria alternate to unilateral, scattered, mostly perpendicular to the hyphae, globose, ovate, clavate, stipitate to broad based, lobate to deeply lobate, 5–7×5–8 µm. Thyriothecia scattered to connate, orbicular, irregularly dehisced at the centre, up to 140µm in diameter, margin crenate to fimbriate, fringed hyphae small; asci many, globose, 8-spored, 20–28 µm in diameter; ascospores conglobate, oblong to cylindrical, brown, uniseptate, constricted at the septum, 16–18×6–8 µm.

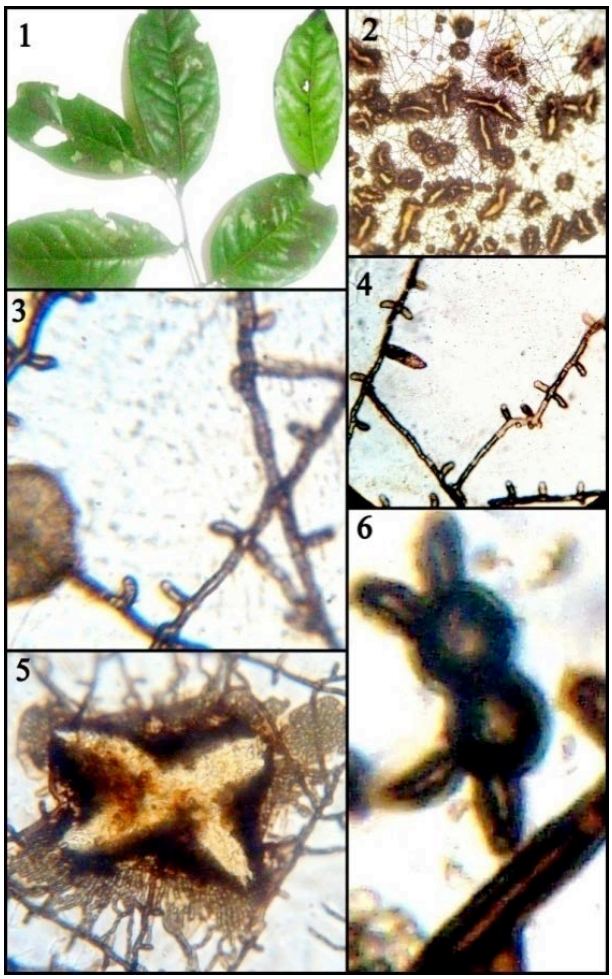


Image 123. ***Asterina aporusae***
1 - Infected leaves; 2 - Colony; 3 - Appressoria & thyriothecium; 4 - Hyphae enlarged; 5 - Dehisced thyriothecia; 6 - 1- septate germinating ascospore

Asterina canthii-dicocci Hosag., J. Mycopathol. Res. 44: 6, 2006; Mycosphere 2 (5): 649, 2012. (Image 125)

Material examined: HCIO 45762, TBGT 1511, 11.xi.2003, on leaves of *Canthium dicoccum* (Gaertn.) Teijsm. & Binn. (Rubiaceae), Nishanemotta, Madikeri, Kodagu (Coorg), Karnataka, V.B. Hosagoudar et al; TBGT 5408, FMKMCC 165, 23.viii.2009, Hoddur, 23 Aug 2009, Jagath Thimmaiah.

Colonies epiphyllous, dense, up to 5mm in diameter. Hyphae straight to substraight, branching opposite to irregular at wide angles, loosely to closely reticulate. Cells 27–30x6–8 µm. Appressoria mostly unilateral, rarely alternate, antrorse to subantrorse, straight, unicellular, cells ovoid, entire, angulose to sublobate, up to 10–15x8–12 µm. Thyriothecia scattered, orbicular, dehiscing stellately at the center, 240µm diameter; asci not seen. Ascospores 2-celled, conglobate, oblong, 23–25x6–7 µm, wall smooth.

Asterina canthii-dicocci differs from *A. canthii* in absence of apposite appressoria and having larger ascospores. It differs from *A. knysnae* Doidge known on *Canthium* sp. from South Africa in having smaller ascospores against (30–35x16–20 µm). Hence, it is proposed here as a new species (Stevens & Ryan, 1939; Doidge,1942).

This is the type locality of this this speices.

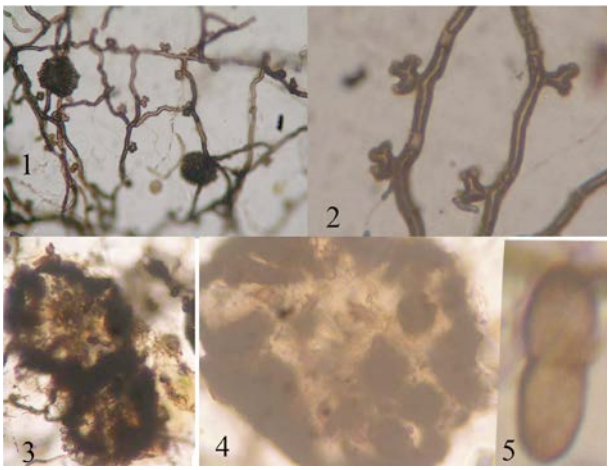


Image 124. ***Asterina argyreiae*** **1 - Colony; 2 - Depply lobate appressoria; 3 - Dehisced thyriothecia; 4 - Thyriothecium with exposed asci; 5 - Ascospore**

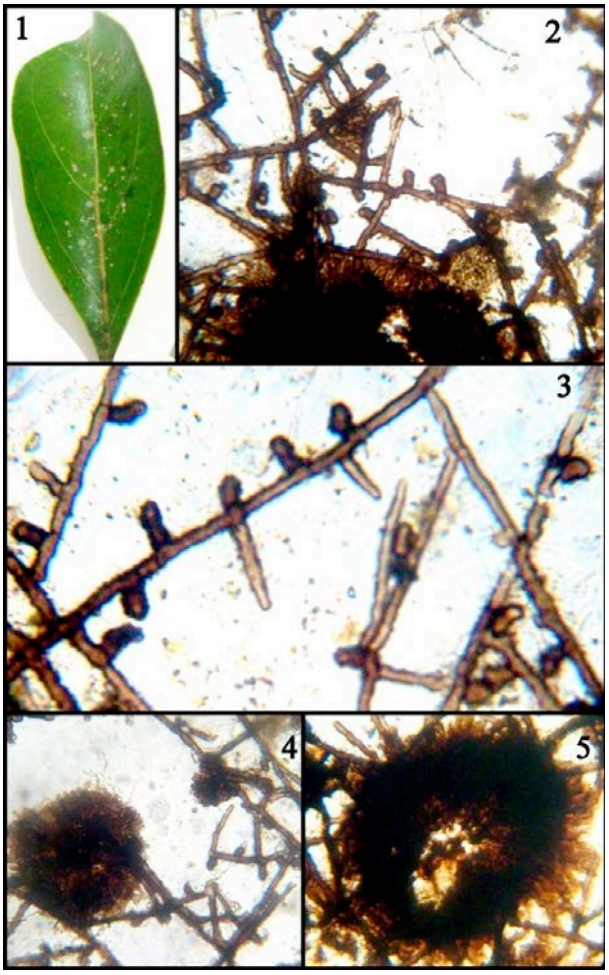


Image 125. ***Asterina canthi-dicocci***
1 - Infected leaf; 2 - Branched colony; 3 - Appressoria; 4 - Thyriothecium; 5 - Dehisced thyriothecium showing ascospores.

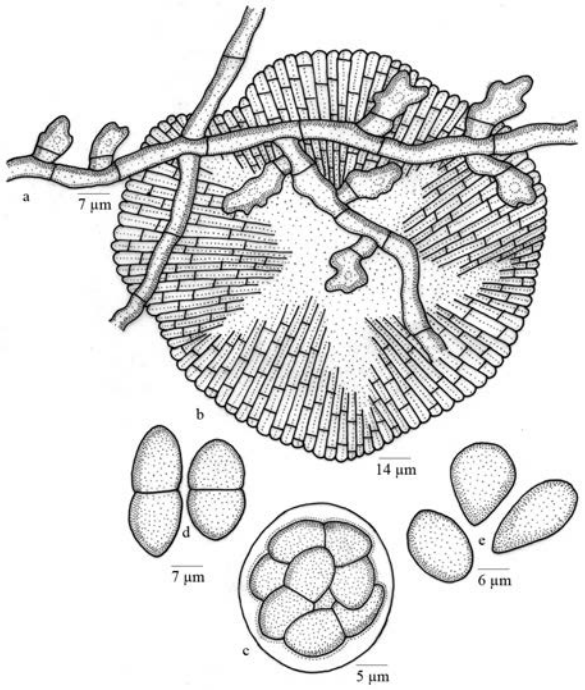


Figure 34. ***Asterina canthiigena***
a - Appressoriate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores; e - Pycnothyriospores

Asterina canthiigena Hosag., Archana & Agarwal, Indian Phytopath. 60: 345, 2007. (Fig. 34).

Materials examined: HCIO 47319 (holotype), TBGT 2357 (isotype), 11.xi.2003, on leaves of *Canthium* sp. (Rubiaceae), Nishanemotta, Madikeri, November 11, 2003, V.B. Hosagoudar et al.

Colonies amphigenous, thin, up to 2mm in diameter, confluent. Hyphae substraight to flexuous, branching alternate, opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 8–29x3–5 µm. Appressoria two celled, mostly alternate, often opposite to unilateral, antrorse to subantrorse, straight to curved, 9–19 µm long; stalk cells cuneate, 3–8µm long; head cells oblong, ovate, angular to sublobate, 6–13x6–8 µm. Thyriothecia scattered to grouped, orbicular, up to 176µm in diameter, stellately dehisced at the centre, margin crenate to fringed, fringed Hyphae small; asci globose to slightly ovate, octosporous, up to 25µm in diameter; ascospores conglobate, uniseptate, constricted at the septum, 16–27x8–11 µm, wall smooth; pycnothyria similar to thyriothecia, smaller; pycnothyriospores pyriform, ovate, globose, 12–19x8–11 µm.

Asterina canthii Yates is known on *Canthium* sp. from Philippines (Yates, 1918a,b; Hosagoudar & Abraham, 2000). However, A. canthiigena differs from it in having two celled in contrast to the unicellular appressoria.

Asterina cassiigena Hosag., C. Jagath Thimmaiah & A. Sabeena, J. Threatened Taxa 5(2): 3662, 2013. (Fig. 35)

Materials examined: TBGT 5838 (holotype), 8.i.2010, on leaves of *Cassia glauca* Lam. (Caesalpiniaceae), Hoddur, C. Jagath Thimmiah.

Colonies epiphyllous, subdense to dense, up to 3mm in diameter, confluent. Hyphae straight to substraight, branching opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 15–27x2–5 µm. Appressoria alternate, unicellular, distantly placed, antrorse to subantrorse, globose, oblong, entire, 5–7x5–10 µm. Thyriothecia, scattered, orbicular, up to 240 µm in diameter, stellately dehisced at the centre, margin crenate to fimbriate; asci globose, octosporous, up to 25µm in diameter; ascospores brown, conglobate, uniseptate, constricted at the septum, 20–22x7–10 µm, wall

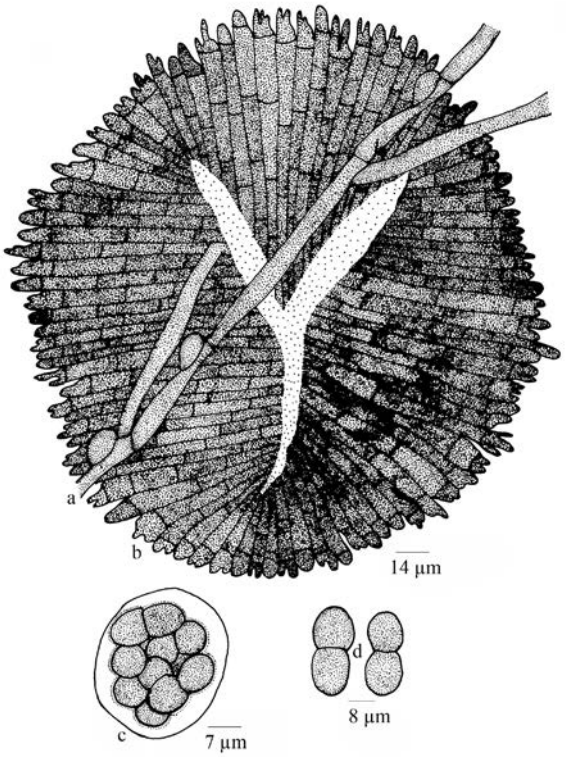


Figure 35. ***Asterina cassiigena***
a - Appressoriate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores

smooth.

Asterina cifferiana Petrak, A. contigua Sydow are known on the members of family Caesalpiniaceae (Hosagoudar & Abraham, 2000). However, *Asterina cassiigena* differs from both in having distantly appressoria.

***Asterina cassinecola* sp. nov.**

V.B. Hosagoudar & C. Jagath Thimmaiah. (Image 126)
(urn:lsid:indexfungorum.org:names:807148)

Etymology: Named after the host genus

Materials examined: FMKMCC 164, 9.i.2010, on leaves of *Cassine paniculata* (Wight. & Arn.) Lobr. (Celastraceae), Igguthappa Temple, C. Jagath Thimmaiah.

Colonies amphigenous, dense. Hyphae substraight to flexuous, branching irregular, loosely reticulate at the edges, forms a thick mycelial mat at the centre. Cells 15–25x3–4 µm. Appressoria few knob like 9–10x4–5 µm. Thyriothecia grouped to scattered, globular, dark brown, margin conoid to mammiform, dehisces stellately at the centre, up to 220µm in diameter. Ascospores 1-septate, constricted, conglobate, brown, 10–12x4–5 µm.

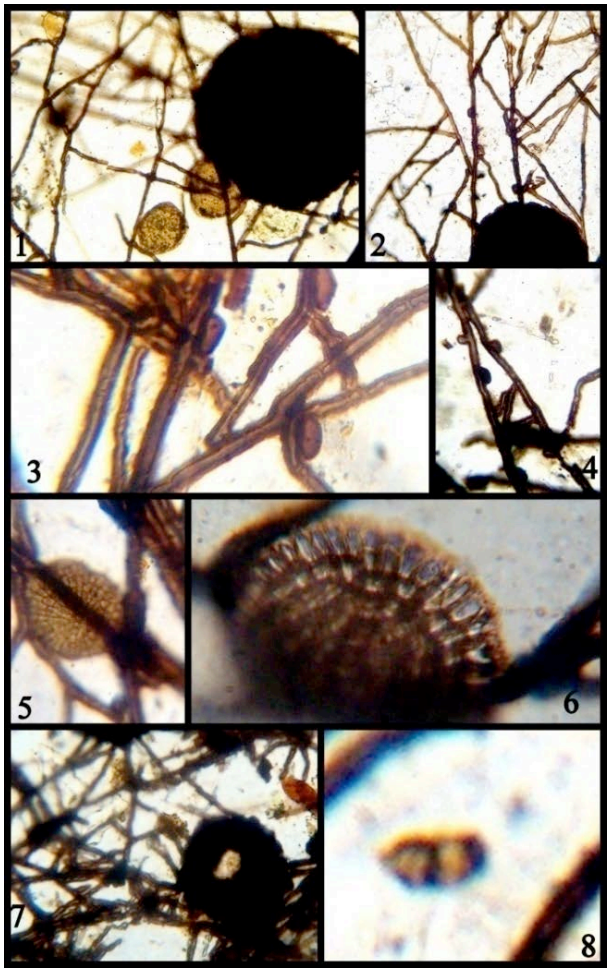


Image 126. ***Asterina cassinecola*** **sp. nov.**
1.&2 - Colonies; 3&4 - Hyphae & appressoria; 5&6 - Young & mature thyriothecia; 7 - Dehisced thyriothecium; 8 - 1- septate ascospore.

Asterina chukrasiae Hosag. in Hosag., H. Biju & Appaiah, J. Mycopathol. Res. 44: 40, 2006; Hosag., Chandra. & Agarwal, Asterinales of Kerala, p.47, 2011; Hosag., Mycosphere 2(5): 653, 2012. (Fig. 36).

Material examined: TBGT 5430, 17.x.2009, on leaves of *Chukrasia tabularis* A. Juss. (Meliaceae), Akane, Hoddur, Jagath Thimmaiah; TBGT 5469, 4.xii.2009, Devarakadu, 4 December 2009, Jagat Thimmaiah.

Colonies epiphyllous, thin to subdense, up to 2mm in diameter, rarely confluent. Hyphae substraight, branching irregular at acute to wide angles, loosely reticulate, cells 19–23×3–5 µm. Appressoria alternate to unilateral, minutely stipitate to mostly broad based, globose, 2–3 times sublobate to lobate, 4–6×6–7 µm. Thyriothecia loosely aggregated to closely aggregated, orbicular, up to 100µm in diameter, margin crenate, stellately dehisced at the centre; asci globose, octosporous, up to 30µm in diameter; ascospores oblong, conglobate, uniseptate,

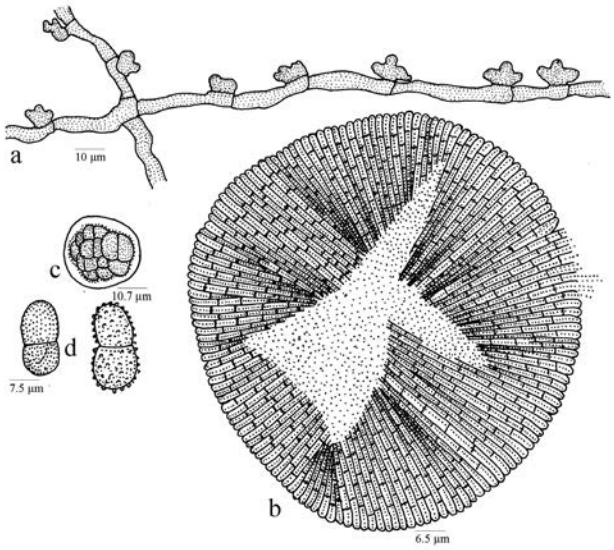


Figure 36. ***Asterina chukrasiae***
a - Appressoriate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores

constricted at the septum, brown, 20–24×11–13 µm, wall smooth to tubercled.

Asterina chrysophylligena Hosag., C. Jagath Thimmaiah & A. Sabeena, J. Threatened Taxa 5(2): 3662, 2013. (Image 127)

Materials examined: FMKMCC 166, 26.i.2011, on leaves of *Chrysophyllum roxburghii* G. Don, Gen. (Sapotaceae), 26 January 2011, C. Jagath Thimmaiah.

Colonies epiphyllous, velvety, confluent, up to 5mm in diameter. Hyphae sub straight, branching opposite, alternate, unilateral & irregular, loosely reticulate. Cells 20–30x5–7 µm. Appressoria unicellular, mostly unilateral, few alternate, reniform, entire, 9–10x5–8 µm. Thyriothecia orbicular, scattered to aggregated, margin crenate to fimbricate, up to 200µm in diameter, dehisces stellately at the center. Ascospores 1-septate, conglobate, constricted at the septum, brown, 28–33x13–16 µm, wall smooth.

Asterina cipadessae Yates, Philppine J. Sci.12:371, 1917; Hosag., Balkar. & Goos, Mycotaxon 59: 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., Chandra. & Agarwal, Asterinales of Kerala, p. 51, 2011; Hosag., Mycosphere 2(5): 654, 2012.

Parasterina cipadessae (Yates) Mendoza, Philippine J. Sci. 49: 446, 1932. (Image 128).

Materials examined: HCIO 45649, TBGT 1395,

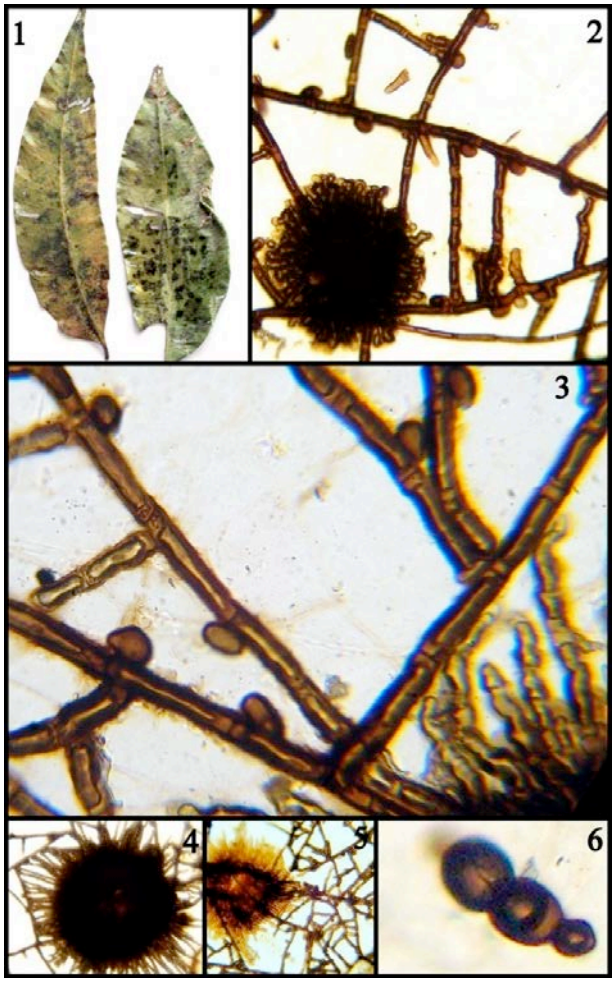


Image 127. ***Asterina chrysophylligena***
1 - Infected leaves; 2 - Branched colony; 3 - Appressoria; 4 - Thyriothecium; 5 - Dehisced thyriothecium; 6 - Ascospore.

11.xi.2003, on leaves of *Cipadessa baccifera* (Roth.) Miq. (Meliaceae), Nishane motta, V.B. Hosagoudar et al; TBGT 5274, 5374, FMKMCC 167, 26.xi.2008, Hakathur, C. Jagath Thimmaiah; HCIO 49226, TBGT 3465, 26.xi.2008, Coorg, Muddarmudi, Hakathur, V.B. Hosagoudar et al.

Colonies epiphyllous, subdense, up to 4mm in diameter. Hyphae flexuous, branching opposite to irregular at wide angles, loosely reticulate. Cells 20–27x2.5–3.5 µm. Appressoria unicellular, mostly opposite, alternate to unilateral, antrorse, straight to curved, ovate, lobate, crenate, 8–12x3–5 µm. Thyriothecia scattered, orbicular, dehiscing stellately at the center, margin crenate to fimbriate, up to 250µm in diameter; asci few, ovate to globose, octosporous, 28µm in diameter. Ascospores 1-septate, conglobate, constricted at the septa, 20–14x9–13 µm, wall smooth.

This is the only species known on this host genus.

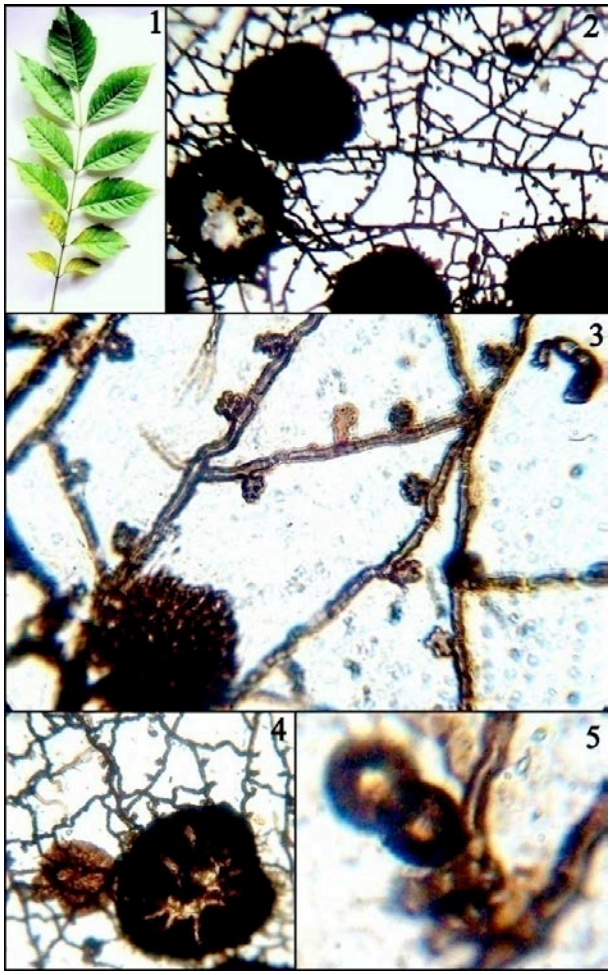


Image 128. ***Asterina cipadessae***
1 - Infected leaves; 2 - Colony; 3 - Appressoria & thyriothecium; 4 - Dehisced thyriothecium with ascus; 5 - 1- septate ascospore.

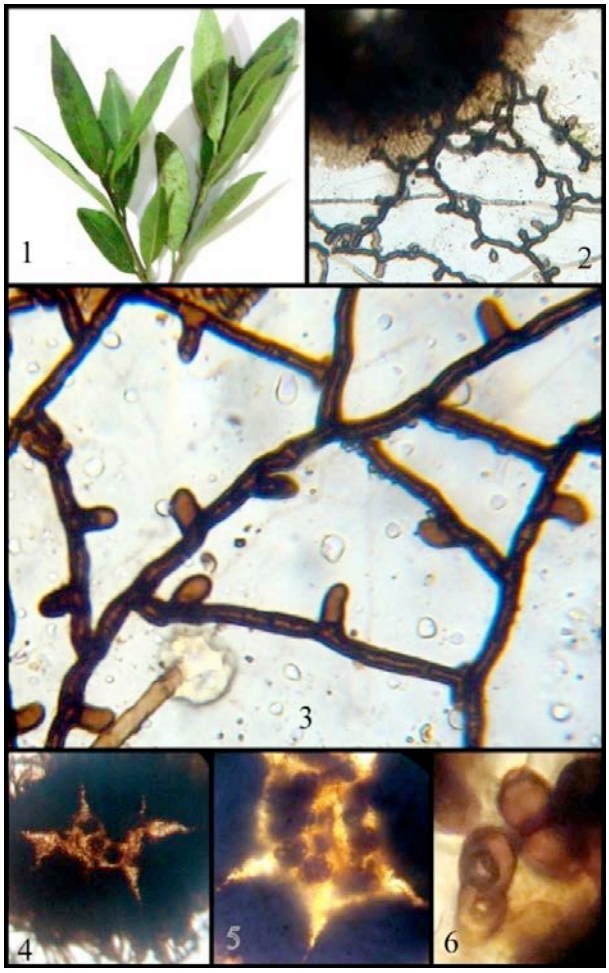


Image 129. ***Asterina claviflori***
1 - Infected leaves; 2 - Branched colony; 3 - Hyphae & appressoria; 4 - Thyriothecium dehisced; 5 - Asci; 6 - 1- septate ascospores

Asterina claviflori Kar & Maity. Trans.Brit. Mycol. Soc. 54:441, 1970; Hosag. & Abraham, J.Econ.Taxon. Bot. 4: 574, 2000; Hosag., Zoos' Print J.18:1283, 2003: 2326, 2006; Hosag. et al. Asterinales Of Kerala, p. 54, 2011; Hosag., Mycosphere 2(5): 657, 2012. (Image 129)

Materials examined: TBGT 5322, FMKMCC 168, 4.xi.2008, on leaves of *Syzygium* sp. (Myrtaceae), Vanachalu, Jagath Thimmaiah; TBGT 5373, FMKMCC 169, 26.xi.2008, *S. zeylanicum* (L.) DC., FMC Campus, Madikeri, C. Jagath Thimmaiah; TBGT 5396, 15.i.2009, Madikeri, C. Jagath Thimmaiah; TBGT 5322, 24.xi.2008, Vanachalu, C. Jagath Thimmaiah; TBGT 5373, 26.xi.2008, FMC Campus, Madikeri, November 26, 2008, C. Jagath Thimmaiah; HCIO 49149, TBGT 3404, 25.xi.2008, Madikari, November 25, 2008, V.B. Hosagoudar et al; HCIO 49157, TBGT 3412; HCIO 49161, TBGT 3416, 24.xi.2008, V.B. Hosagoudar et al; HCIO 49160, TBGT 3415, 26.xi.2008, Madikari, FMC College, V.B. Hosagoudar et al; TBGT 5332, C. Jagath Thimmaiah.

Colonies epiphyllous, dense up to 2mm in diameter. Hyphae substraight to flexuous, branching opposite to alternate at subacute angles, loosely to closely reticulate. Cells 18–26x7–9 µm. Appressoria alternate to unilateral, rarely opposite, unicellular, ovate, oblong, cylindrical, straight to slightly curved, entire, 9–14x7–9 µm. Thyriothecia scattered, orbicular up to 170µm in diameter, stellately dehisced at the center, margin fimbriate, fringed hyhae flexuous; asci few, globose, octosporous, up to 44µm in diameter. Ascospores oblong, conglobate, 1- septate, constricted at the septum, 18–33x14–16 µm, wall smooth.

Asterina clusiacearum Hosag. & Jagath., Mycosphere 2(5): 659, 2012. (Image 130).

Materials examined: TBGT 5702 (holotype), FMKMCC 169, TBGT 5702, 22.ii.2009, on leaves of *Garcinia*

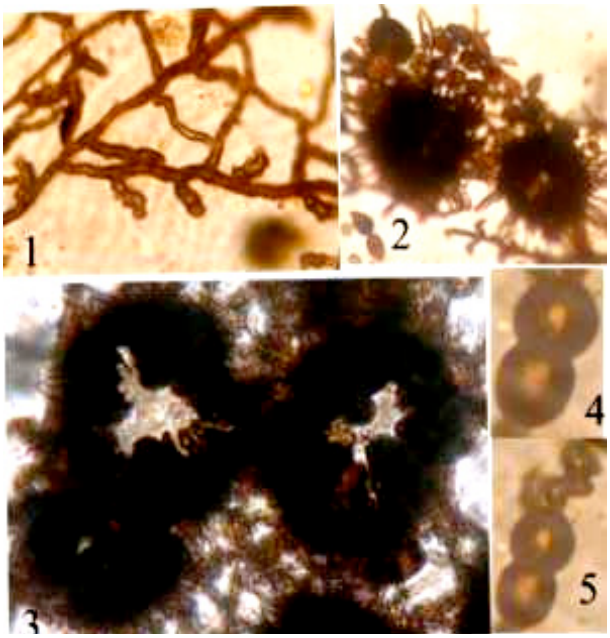


Image 130. ***Asterina clusiacearum***
1 - Branched colony with hyphae & appressoria; 2 - Thyriothecia; 3 - Dehisced thyriothecia; 4 - Ascospore; 5 - Germinating ascospore.

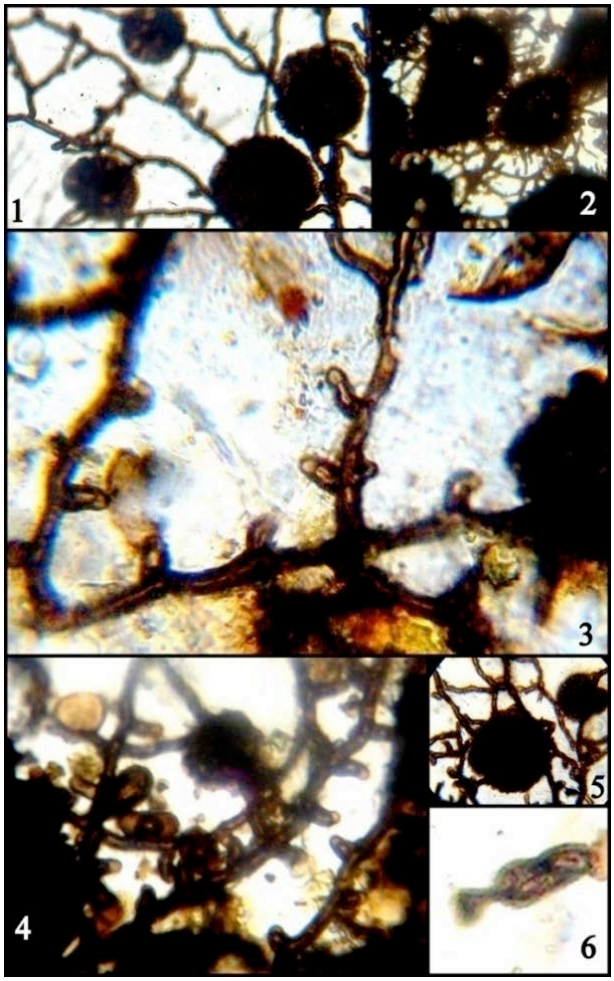


Image 131. ***Asterina congesta***
1&2 - Colony exhibiting branches & Thyriothecia; 3 - Enlarged portion of the Colony; 4&5 - Pycnothyrium & pycnothyriospores; 6 - An ascospore;

gummigutta (L.) Robs. (Clusiaceae), Mandrane, Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, thin to dense, upto 3mm in diameter, confluent. Hyphae straight to substraight, branching irregular at acute angles, loosely reticulate, cells 11–15×3–4 µm. Appressoria alternate, about 20% opposite, antrorse, subantrorse, straight to curved, 12–16 µm long; stalk cells cylindrical to cuneate, 5–6 µm long; head cells ovate, oblong to cylindrical, sinuately lobate to irregularly sublobate, 7–10×3–6 µm. Thyriothecia few, scattered to connate, orbicular, stellately dehisced at the centre, up to 100µm in diameter, margin mostly fimbriate, fringed hyphae solitary, substraight to flexuous; asci few, globose, up to 20µm in diameter; ascospores conglobate, brown, uniseptate, deeply constricted at the septum, 19–25×10–12 µm, wall smooth. Pycnothyria numerous, similar to thyriothecia, smaller; pycnothyriospores brown, globose, oval, pyriform, 15–18×8–10 µm.

This species was associated with *Meliola garciniae* and *Lembosia garciniae.*

Asterina congesta Cooke, Grevillea 8: 95, 1879; Hansf. & Thirum., Farlowia 3: 305, 1948; Hosag., Balkar. & Goos, Mycotaxon 59: 172, 1996; Hosag., Krishnan & Abraham, New Bot. 24: 28, 1997; Hosag. & Abraham, J. Econ. Taxon. Bot. 4: 582, 2000; Hosag., Zoos' Print J. 18: 1284, 2003; 21: 2326,2006; Hosag., Chandra. & Agarwal, Asterinales of Kerala, p. 57, 2011; Hosag., Mycosphere 2(5): 661, 2012. (Image 131)

Materials examined: TBGT 5397, FMKMCC 170, TBGT 5397, 29.xii.2008, on leaves of *Santalum album* L. (Santalaceae), Hoddur, C. Jagath Thimmaiah.

Colonies initially epiphyllous, later on both surfaces of the leaves, caulicolous, often on tender stems, from a coating of black colonies and are confluent. Hyphae straight to crooked, cells 10–15x4–6 urn. Appressoria alternate to unilateral, unicellular, ovate to cylindrical, straight to curved, entire to sinuately lobate, 5–10x4–8 µm. Pycnidia scattered to connate, orbicular, up to 100 µm in diameter, crenate to fimbriate at the margin, stellately dehisce at the centre; Pycnidiospores pyriform to obpyriform, cinnamon brown, 17–20x8–10 µm, wall smooth, often with a single hyaline band at the middle.

Thyrothecia similar to pycnidia, up to 130µm in diam.; asci many, aparaphysate, globose, octosporous, bitunicate, 35–45x28–40 µm, wall smooth.

Asterina cryptocariicola Hosag., C.K. Biju & Abraham, Indian Phytopath. 54: 137, 2001; J. Mycopathol. Res. 40: 195, 2002; Hosag. Zoos' Print J. 21: 2326, 2006. Hosag., Chandra. & Agarwal, Asterinales of Kerala, p. 59, 2011; Hosag., Mycosphere 2(5): 663, 2012. (Image 132)

Materials examined: TBGT FMKMCC 171, 29.xii.2008, on leaves of *Litsea* sp. (Lauraceae), Hoddur, C. Jagath Thimmaiah.

Colonies amphigenous, thin, up to 2mm in diameter. Hyphae substraight to undulate, branching alternate at wide angles, loosely reticulate. Cells 18–20x2–3 µm. Appressoria sparse, unicellular, alternate to unilateral, globose to ovoid, entire, 5–6x3–4 µm. Thyriothecia orbicular, scattered, stellately dehisced at the center, margin crenate, up to 100µm in diameter; asci not seen. Ascospores conglobate, light brown 1-septate, constricted at the septum, 13–17x6–7 µm, wall smooth.

This species is different from Asterina woodiana (Doidge, 1942) in having unicellular appressoria and smaller ascospores.

Asterina deightonii Sydow, Ann. Mycol. 36: 172, 1983; Hosag. & Abraham, J. Econ. Taxon. Bot. 4: 571, 2000; Hosag., C.K. Biju, Abraham & Agarwal, Indian Phytopath. 55: 497, 2002; Hosag., Zoos' Print J. 21: 2326, 2006; Hosag., Chandra. & Agarwal, Asterinales of Kerala, p. 62, 2011; Hosag., Mycosphere 2(5): 665, 2012. (Image 133).

Materials examined: TBGT 5388, FMKMCC 172, TBGT 5388, 22.ii.2009, on leaves of *Dendrophthoe falcata* (L. f.) Etting., Denkschr. (Loranthaceae) Hoddur, February 22, 2009, C. Jagath Thimmaiah.

Colonies amphigenous, mostly epiphyllous, thin to subdense, up to 3mm in diameter, rarely confluent. Hyphae flexuous, branching irregular at acute to wide angles, loosely reticulate. Cells 12–21x4–8 µm. Ap-

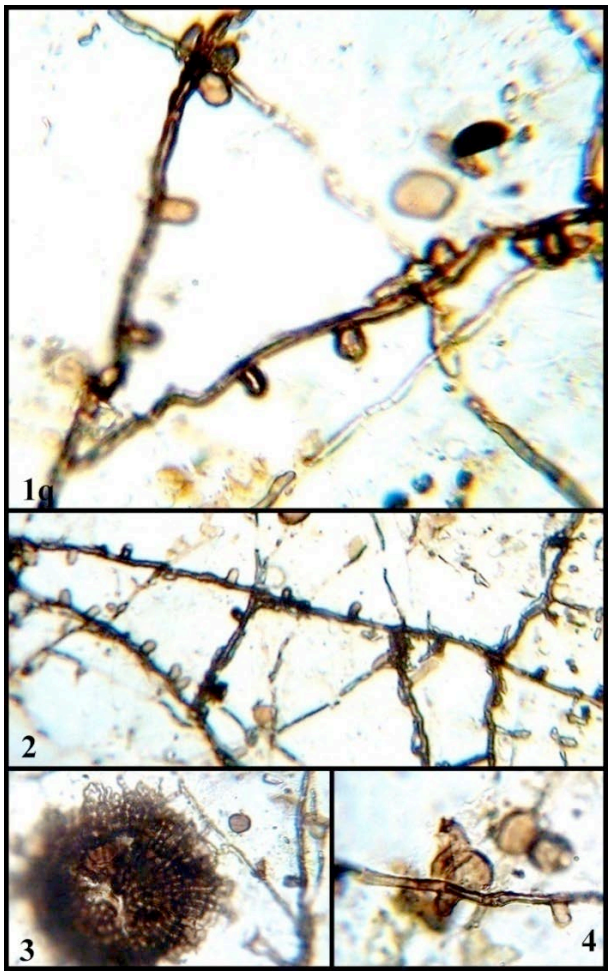


Image 132. ***Asterina cryptocariicola***
1 - Branched hyphae; 2 - Loose reticulum of the mycelium; 3 - Dehisced Thyriothecium; 4 - An ascospore

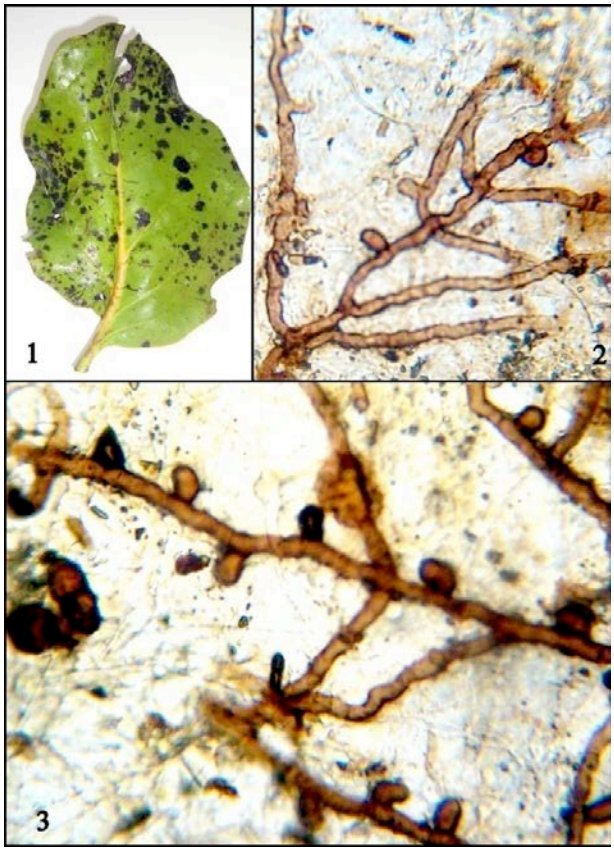


Image 133. ***Asterina deightonii***
1 - Infected leaf; 2 - Branched hyphae; 3 - Appressoriate hyphae with young thyriothecium & ascospore

pressoria unicellular, alternate, globose, ovate, entire, 7–12x7–9 µm. Thyriothecia scattered, often loosely grouped, orbicular, up to 140µm in diameter, stellately dehisced at the center, margin crenate to fimbriate; asci few to many, globose, octosporous, up to 40µm in diameter. Ascospores 1-septate, brown, oblong, conglobate, constricted at the septum, 20–23x10–13 µm, wall minutely echinulate. Pycnothyria similar to thyriothecia, smaller; pycnothyriospores few, globose, pyriform, brown, 15–19x11–15 µm, wall smooth.

Asterina elaeocarpicola Hansf., Reinwardtia 3:131, 1954; Hosag. & Goos, Mycotaxon 59:154, 1996; Hosag. & Abraham, J. Econ. Taxon. Bot. 4:566, 2000; Hosag. C.K.Biju & Abraham, J. Econ. Taxon. Bot. 25: 305, 2001; Hosag., Zoos' Print J. 18:1282, 2003: 21: 2327, 2006; Hosag., H. Biju & Appaiah, J. Mycopathol. Res. 44: 7, 2006; Hosag. & H.Biju, J. Mycopathol. Res. 44: 41, 2006; Hosag., J. Appl. Nat. Sci. 1:29, 2009; Hosag., Chandra. & Agarwal, Asterinales of Kerala, p. 67, 2011; Hosag., Mycosphere 2(5): 673, 2012. (Image 134).

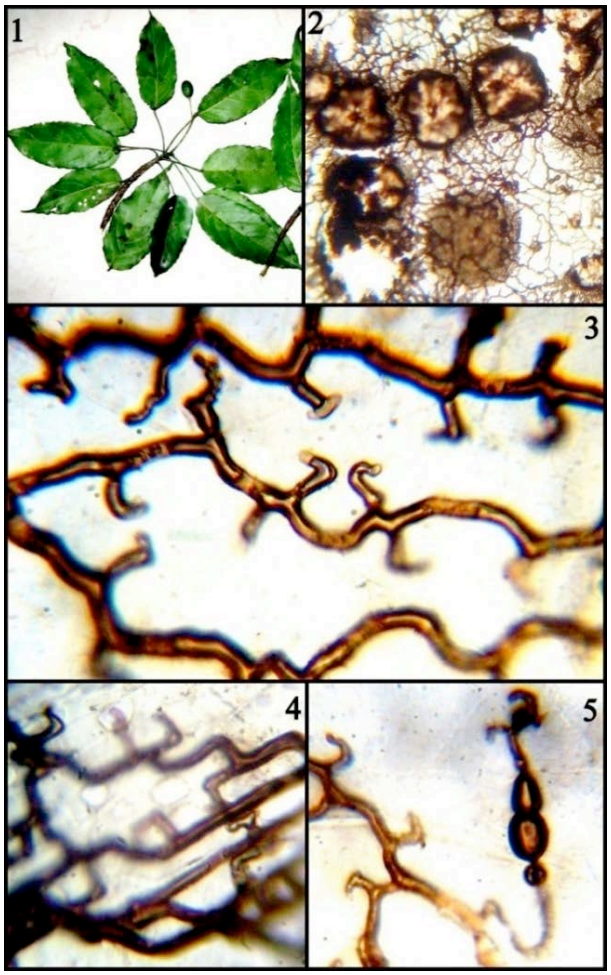


Image 134. ***Asterina elaeocarpicola***
1 - Infected leaves; 2 - Colony with dehisced thyriothecia & asci; 3 - Appressoriate hyphae; 4 - Mycelial reticulum; 5 - Germinating ascospore

Materials examined: HCIO 45614, TBGT 1357, 13.xi.2003, on leaves of *Elaeocarpus* sp. (Elaeocarpaceae), MPCA, Brahmagiri, Talacauveri, V.B. Hosagoudar et al; HCIO 45679, TBGT 1426, 12.xi.2003, Jodupal, V.B. Hosagoudar et al; HCIO 49147, TBGT 3402, 24.xi.2008, Madikeri, V.B. Hosagoudar et al; TBGT 5339, FMKMCC 173, 24.xi.2008, *E. munronii* (Wight) Masters (Elaeocarpaceae), Vanachalu, C. Jagath Thimmaiah.

Colonies hypophyllous, dense, up to 7mm in diameter. Hyphae flexuous to crooked, branching irregular at subacute angles, closely reticulate. Cells 15–17x3–5 µm. Appressoria unicellular, alternate, few opposite, cylindrical flexuous, curved, forked, 12–14x2–4 µm. Thyriothecia scattered to grouped, orbicular, up to 180µm in diameter, stellately dehisced at the center; asci octosporous, globose, up to 40µm in diameter. Ascospores uniseptate, oblong, conglobate, brown, constricted at the septum,one cell bigger than the other, 25–27x8–10 µm, wall smooth.

Asterina elaeocarpi Sydow var. **ovalis** Kar. & Ghosh., Indian Phytopath. 39:218, 1986; Hosag., Balkar. & Goos, Mycotaxon 60: 175, 1996; Hosag. & Abraham, J.Econ. Taxon. Bot. 4: 566, 2000; Hosag., C.K. Biju & Abraham, J.Econ.Taxon. Bot. 25: 305, 2001; Hosag., Zoos' Print J. 18:1282, 2003: 2326, 2006; Hosag ., H. Biju & Appaiah, J. Mycopathol. Res. 44:7, 2006; Hosag. & H.Biju, J. Mycopathol. Res. 44: 41, 2006; Hosag., J. Appl. Nat. Sci.1:29, 2009; Hosag., Chandra. & Agarwal, Asterinales of Kerala, p. 31, 2011; Hosag., Mycosphere 2(5): 674, 2012. (image. 135)

Materials examined: HCIO 45750, TBGT 1499; HCIO 45670, TBGT 1417; HCIO 45779, TBGT 1528; HCIO 45750, TBGT 1499, 12.xi.2003, on leaves of *Elaeocarpus tuberculatus* Roxb. (Elaeocarpaceae), Jodupal, V.B. Hosagoudar et al; TBGT 5329, FMKMCC 174, 24.xi.2008, Galibeedu, C. Jagath Thimmaiah; HCIO 45750, TBGT 1499; HCIO 45670, TBGT 1417, 12.xi.2003, Jodupal, V. B. Hosagoudar et al; HCIO 45750, TBGT 499, 12.xi.2003, V. B. Hosagoudar et al.

Colonies epiphyllous, subdense up to 9mm in diameter. Hyphae straight to substraight, branching opposite to alternate, at wide to subacute angles, closely reticulate, forms loose mycelial net. Cells 23–25x3–5 µm. Appressoria unicellular, alternate, opposite, few unilateral, antrorse, few retrorse, straight 8–15x3–5µm, and oblong, entire. Thyriothecia scattered, orbicular, stellately

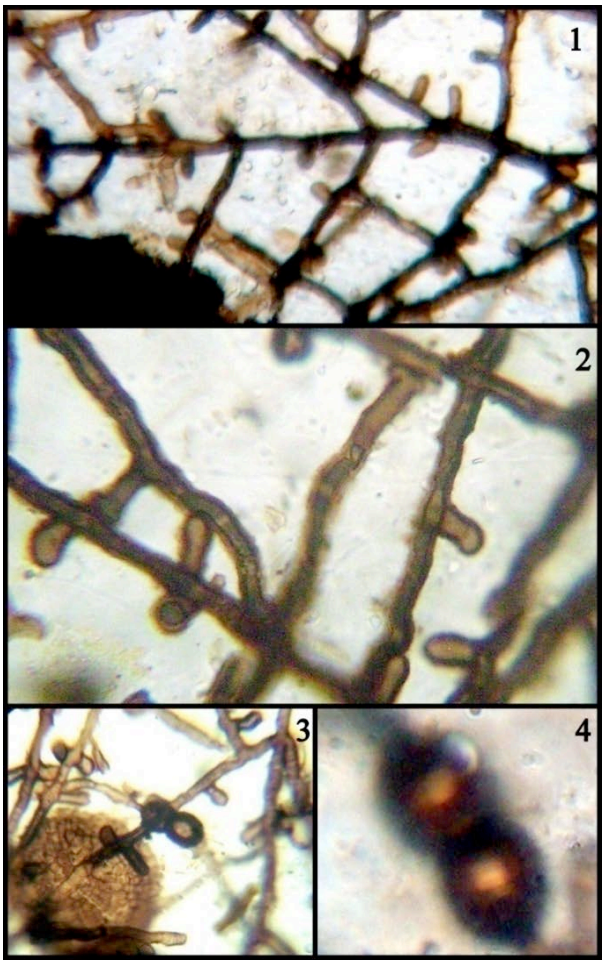


Image 135. *Asterina elaeocarpi* var. *ovalis*
1 - Branched colony; 2 - Enlarged hyphae; 3 - Thyriothecium & spore; 4 - Echinulate ascospore

dehisced at the center, margin crenate to fimbriate, up to 270µm in diameter. Ascospores uniseptate, conglobate, constricted at the septum, 20–28x12–14 µm, wall echinulate.

This fungus is common throughout the southern Western Ghats.

Asterina erysiphoides Kalch & Cooke., Grevillea 9:32, 1880; Hansf. &Thirum., Farlowia 3: 306, 1948; Hosag., Balkar. & Goos. Mycotaxon 59: 175, 1996; Hosag. & Abraham, J. Econ.Taxon. Bot. 4: 577, 2000; Hosag., Zoos' Print J. 18:1284, 2003; 21: 2327, 2006; Hosag., H.Biju & Appaiah, J Mycopathol. Res. 44: 7, 2006; Hosag., Chandra. & Agarwal, Asterinales of Kerala, p. 72, 2011; Hosag., Mycosphere 2(5): 677, 2012. (Image. 136).

Materials examined: HCIO 45630, TBGT 1373; HCIO 45780, TBGT 1529; HCIO 45645, TBGT 1391; HCIO 45795, TBGT 1544; HCIO 45796, TBGT 1545; HCIO 45797, TBGT 1546; HCIO 45631, TBGT 1375; HCIO 45634, TBGT 1378, 12.xi.2003, on leaves of *Jasminum* sp. (Oleaceae), Nishane motta, V.B. Hosagoudar et al; HCIO 45630, TBGT 1373; HCIO 45780, TBGT 1529; HCIO 45796, TBGT 1545; HCIO 45645, TBGT 1391; HCIO 45795, TBGT 1544; HCIO 45796, TBGT 1545; HCIO 45797, TBGT 1546, 11.xi.2003, V.B. Hosagoudar et al; TBGT 5326, FMKMCC 175, 24.xi.2008, *Jasminum* sp. (Oleaceae), Vanachalu, Kodagu C. Jagath Thimmaiah; TBGT 5361, FMKMCC 176, 25.xi.2008, Karike, C. Jagath Thimmaiah; TBGT 5376, FMKMCC 177, 26.xi.2008, Mutharmudi, November 26, 2008, C. Jagath Thimmaiah; TBGT 5369, FMKMCC 178, 26.xi.2008, Hoddur, C. Jagath Thimmaiah; HCIO 46354, TBGT 2000, 11.xi.2003, V.B. Hosagoudar et al; HCIO 47066, TBGT 2283, 14.xi.2003, V.B. Hosagoudar et al; HCIO 49146, TBGT 3401, 24.xi.2008, Kodagu, Vanachalu, V.B. Hosagoudar et al; HCIO 49165, TBGT 3420, 24.xi.2008, V.B. Hosagoudar et al; HCIO 49152, TBGT 3407, 26.xi.2008, Madikari, V.B. Hosagoudar et al; 24.xi.2008, Galibeedu, V.B. Hosagoudar et al. HCIO 49154, TBGT 3409; HCIO 49168, TBGT 3423, 25.xi.2008,

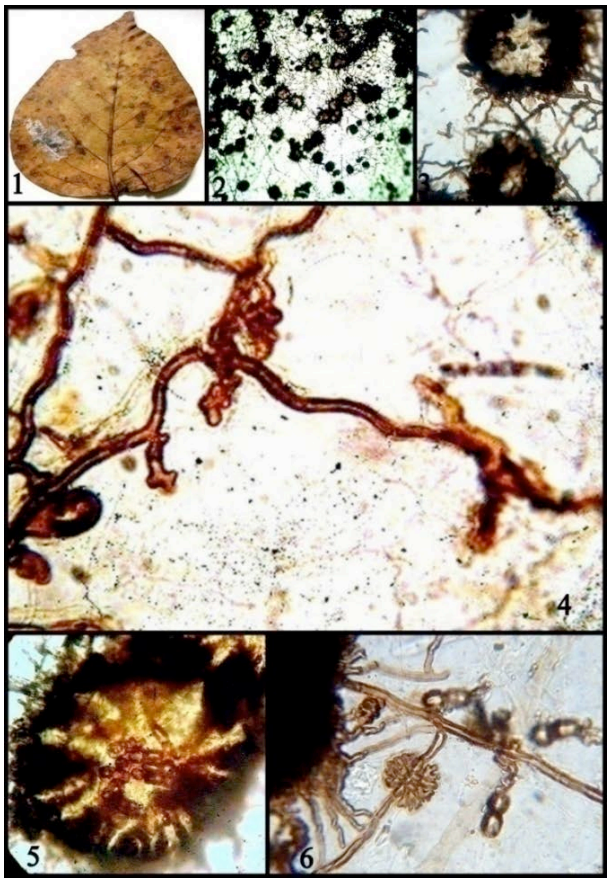


Image 136. *Asterina erysiphoides*
1 - Infected leaf; 2 - Colony with thyriothecia; 3 - Thyriothecia dehisced; 4 - Appressoriate hyphae; 5 - Stellately dehisced thyriothecium with asci; 6 - Germinating ascospores.

Madikari, V.B. Hosagoudar et al.

Colonies hypophyllous, scattered, up to 2mm in diameter. Hyphae substraight to flexuous, branching opposite to irregular at wide angles, loosely reticulate. Cells 18–22x2–4 µm. Appressoria mostly opposite, few alternate, few unilateral, straight to curved, 10–13µm long; stalk cells cylindrical to cuneate, 3–4 µm long; head cells angulose, reflexed, few deeply to shallowly lobate, 10–12x4–6 µm. Thyriothecia many, orbicular grouped, stellately dehisced at the centrer, margin crenate to fimbriate, up to 114µm in diameter. Ascospores 1- septate conglobate, constricted at the septum, 18–21x8–10 µm. Pycnothyria similar to thyriothecia, pycnothyriospores numerous brown, scattered, pyriform, unicellular, 17–19x8–11µm.

These colonies were associated with the colonies of *Meliola gemellipoda* Doidge and *Meliola jasminii* Hansf. & Stev.

Asterina erythropalicola Hosag. & Goos, Mycotaxon 59: 156, 1996; Hosag. & Abraham, J.Econ. Taxon. Bot. 4: 566, 2000; Hosag., Zoos' Print J.18:1282, 2003; 18: 2327, 2006; Hosag., Chandra. & Agarwal, Asterinales of Kerala, p.73, 2011; Hosag., Mycosphere 2(5): 679, 2012. (Image 137)

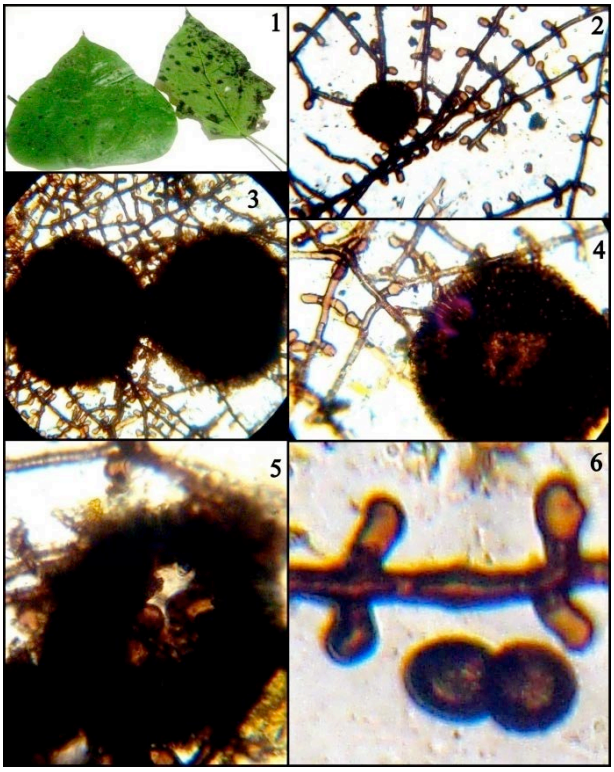


Image 137. ***Asterina erythropalicola***
1 - Infected leaves; 2 - Colony; 3 - Thyriothecia; 4 & 5 - Dehisced thyriothecia; 6 - An ascospore

Materials examined: TBGT 5412, FMKMCC 179, 17.v.2009, on leaves of *Erythropalum populifolium* (Arn.), (Erythropalaceae), Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense up to 4mm in diameter. Hyphae straight, branching alternate to unilateral at subacute angles, loosely to closely reticulate. Cells 27–31x4.5–6 µm. Appressoria regularly opposite, straight, 10–16 µm long; stalk cells cylindrical, up to 3–4.5 µm cells; head cells ovate, few cylindrical, entire, angulose, 7–11x6–8.5 µm. Thyriothecia grouped to scattered, orbicular, stellately dehisced at the center, up to 220µm in diameter, margin crenate to fimbriate; asci many globose, octosporous, up to 40µm in diameter. Ascospores uniseptate, conglobate, constricted at the septum, 27–29x12–14 µm, wall smooth.

It differs from *Asterina erythropali* Hansf. By the presence of entire head cells of the appressoria (Hansford, 1954).

Asterina escharoides Sydow, Abh. K.K. Zool. Bot. Ges. 7: 101, 1913; Hosag., Indian J. Forestry 18: 274, 1995; Hosag. & Abraham, J. Econ. Taxon. Bot. 4: 564, 2000; Hosag., Zoos' Print J. 18: 1282, 2003; 21: 2326, 2006; Hosag., H. Biju & Appaiah, J. Mycopathol. Res. 44: 7, 2006; Hosag., Chandra. & Agarwal, Asterinales of Kerala, p. 74, 2011; Hosag., Mycosphere 2(5): 680, 2012. (Image 138)

Materials examined: HCIO 45648, TBGT 1394; HCIO 45648, TBGT 1394; HCIO 45669, TBGT 1416, 12.xi.2003, on leaves of *Quisqualis indica* L. (Combretaceae), Jodupal, V.B. Hosagoudar et al; HCIO 45669, TBGT 1416, 12.xi.2003, Jodupal, V. B. Hosagoudar et al; FMKMCC 180, 1.v.2010, Backyard of Chowrira House, Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, dense, up to 2mm in diameter, confluent. Hyphae substraight to crooked, branching mostly irregular, few alternate at wide angles, loosely reticulate to form honey comb like structure. Cells 14–25x3–4 µm. Appressoria 2-celled, alternate, distantly placed, straight to curved, 9–15 µm long; stalk cells cylindrical, 3–6 µm long; head cells curved like hook, clavate, wedge shaped, sublobate to variously lobed, 6–9x4–9 µm. Thyriothecia scattered to grouped, orbicular, stellately dehisced at the center, margin crenate to fringed, up to 130µm in diameter; asci globose, octosporous, up to 28µm in diameter. Ascospores brown, oblong, conglobate, deeply constricted at the septum, 1-septate, 18–21x8–9 µm, wall smooth to echinulate.

Asterina flacourtiacearum Hosag. & Ravikumar in Hosag., Balakr. & Goos, Mycotaxon 59: 176, 1996; Ho-

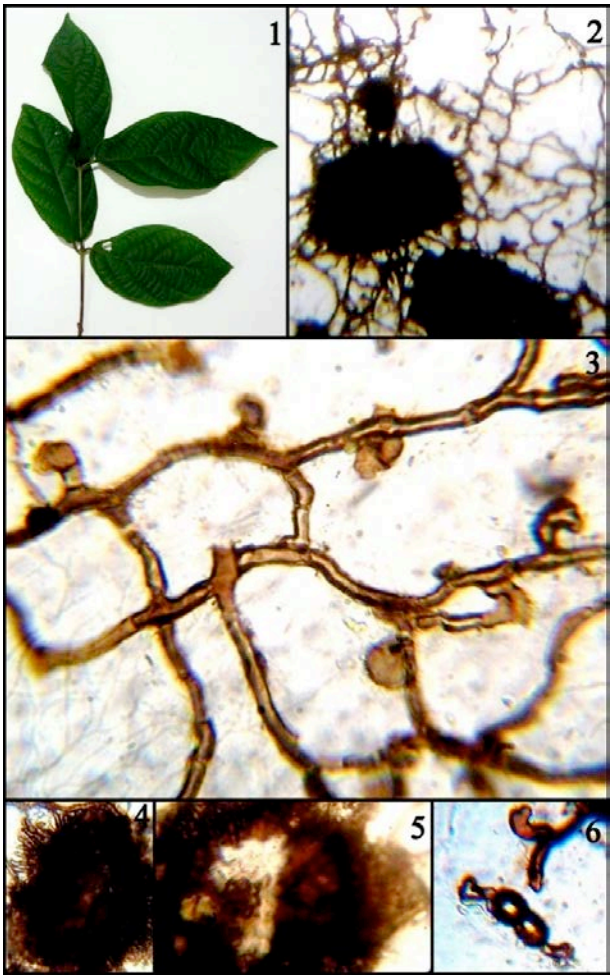


Image 138. ***Asterina escharoides***
1 - Infected leaves; 2 - Colony; 3 - Appressoriate hyphae; 4 - Thyriothecium; 5 - Dehisced thyriothecium with asci; 6 - Germinating ascospore

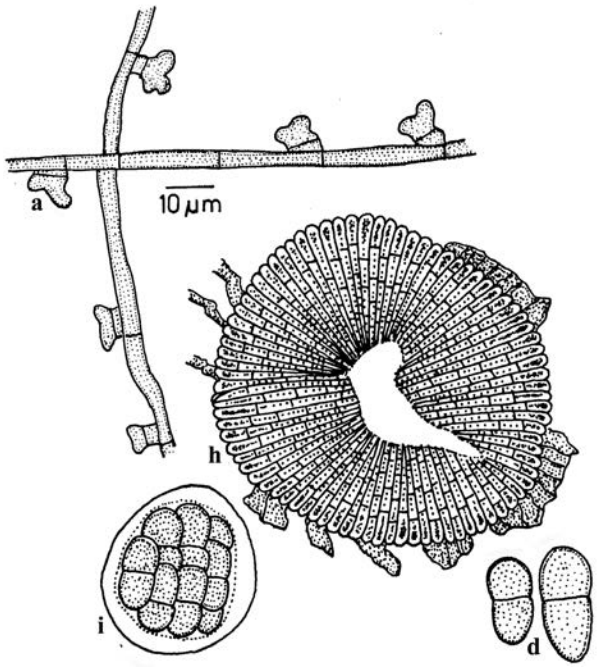


Figure 37. ***Asterina flacourtiacearum***
a - Appressoriate mycelium; d - Ascospores; h - Thyriothecium; i - Ascus

sag., Mycosphere 2(5): 682, 2012. (Fig. 37).

Materials examined: HCIO 49959, TBGT 4111, 26.xi.2008, on leaves of *Scolopia crenata* (Wgiht & Arn.) D. Clox. (Flacourtiaceae), Coorg, Madikari, member of Flacourtiaceae, V.B.Hosagoudar et al.

Colonies amphigenous, mostly epiphyllous, up to 2mm in diameter, frequently confluent. Hyphae straight, branching alternate to irregular at acute angles, loosely reticulate, cells 24–31x5–7 µm. Appressoria scattered, distantly placed, alternate, mostly two celled, occasionally several celled, 9–30 µm long; stalk cells mostly unicellular, rarely up to 3-celled, mostly cylindrical to cuneate, rarely irregularly curved, 3–22 µm long; head cells obpyriform, frequently 2–3 lobate, rarely entire to angular, 6–10x9–13 µm. Thyriothecia orbicular, carbonaceous black, closely grouped to scattered, up to 190µm in diameter, dehiscing stellately at the center, margin crenate to fimbriate, fringed hyphae tortuous; asci many, globose, eight spored, 31–41 µm in diameter; ascospores cinnamon brown, conglobate, 1-septate, deeply constricted at the septum, upper cell slightly larger, 24–28x12–16 µm, wall smooth. Pycnothyria similar to thyriothecia, up to 90µm in diameter; pycnothyriospores ovate to globose, slightly papillate at one end, cinnamon brown, 15–22x15–19 µm.

Asterina glycosmidigena Hosag. & Jacob., J.Applied Nat. Sci. 2(1): 102, 2010; Hosag., Mycosphere 2(5): 686, 2012. (Image 139)

Materials examined: FMKMCC 181, 4.xii.2009, on leaves of *Glycosmis pentaphylla* (Retz.) DC., Prod., (Rutaceae), Devarakadu, Hoddur, C. Jagath Thimmaiah TBGT 5477.

Colonies amphigenous, discrete, up to 2mm in diameter. Hyphae flexuous, branching irregular at subacute angles, loosely reticulate. Cells 11–19x3–4 µm. Appressoria alternate, unicellular, trilobed to irregularly lobate, 7–9x6–8 µm. Thyriothecia scattered, orbicular, stellately dehisced at the center, up to 100µm in diameter, margin crenate; asci octosporous, 25–45 µm in diameter. Ascospores 1- septate, conglobate, constricted at the septum, 18–20x10–12 µm, wall echinulate.

This species differs from *Asterina glycosmidigena* Hosag. & Jacob., in having echinulate spore wall. It is being reported for the first time from Karnataka.

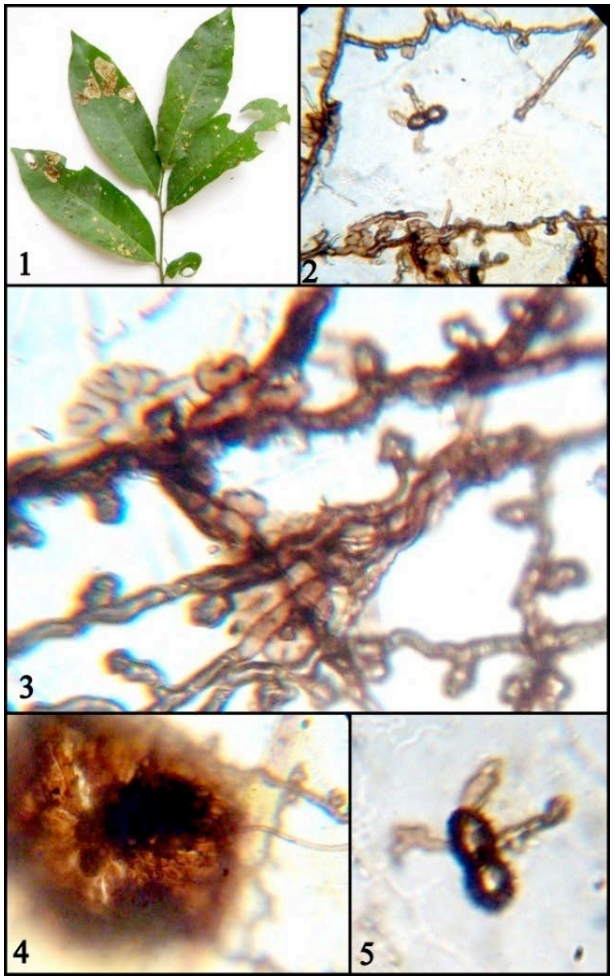


Image 139. *Asterina glycosmidigena*
1 - Infected leaves; 2 - Colony; 3 - Appressoriate hyphae; 4 - Thyriothecium dehisced with asci; 5 - Germinating ascospore

Asterina gymnemae Hosag. & Jacob., J. Appl. Nat. Sci. 2: 102, 2010; Hosag., Mycosphere 2(5): 690, 2012. (Fig. 38)

Material examined: TBGT 5405, 22.viii.2009, on leaves of *Gymnema* sp. (Asclepiadaceae), Hoddur, C.Jagath Thimmaiah.

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 19–34×2–5 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, 4–7×4–10 µm. Thyriothecia scattered, 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, 16–19×7–10 µm, wall smooth.

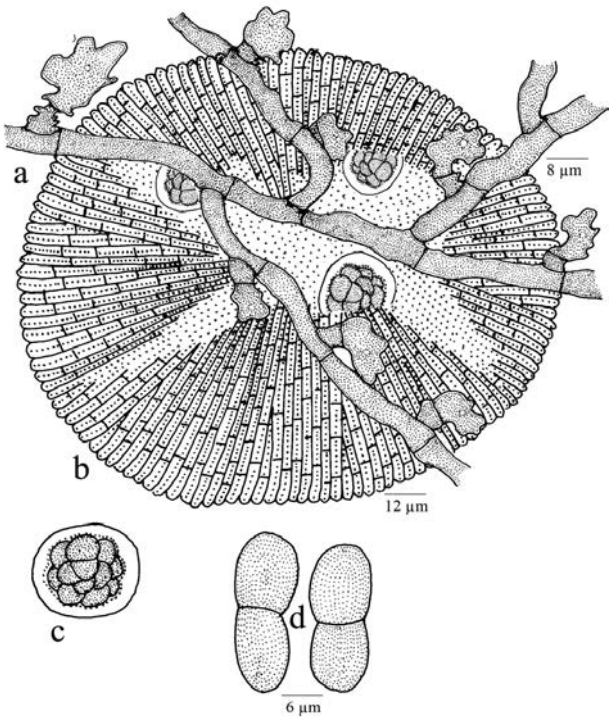


Figure 38. *Asterina gymnemae*
a - Appressoriate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores

Asterina hemidesmii Hosag., Jagath & A. Sabeena, J. Threatened Taxa 5(2): 3663, 2013. (Image 140)

Materials examined: FMKMCC 182, 13.i.2010, on leaves of *Hemidesmus indicus* (L) R.Br. (Periplocaceae), Riverside Hoddur, C. Jagath Thimmaiah.

Colonies hypophyllous, dense, confluent. Hyphae substraight, branching irregular, loosely reticulate. Cells 14–20x3–4 µm. Appressoria unicellular, alternate, unilateral, subopposite, irregularly lobed, 5–9x3–10 µm. Thyriothecia orbicular, stellately dehiscing at the center, margin with fringed hyphae, up to 130µm in diameter; asci octosporous, up to 30µm in diameter. Ascospores 1-septate, conglobate, constricted at the septum, 13–21x5–7 µm. Pycnothyria smaller than the thyriothecia, Pycnothyriospores pyriform, 15–17x8–10 µm.

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 et al., Asterinales Of Kerala, p. 88, 2011; Hosag., Mycosphere 2(5): 693, 2012. (Image 141).

Materials examined: TBGT 5409, FMKMCC183, 12.ix.2009, on leaves of *Hibiscus rosa-sinensis* L. var.

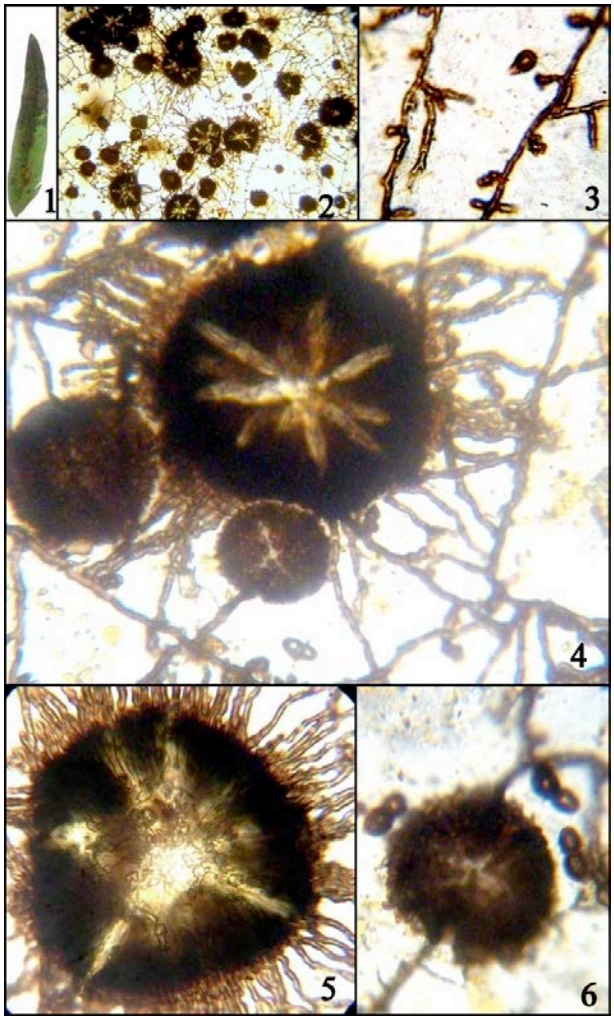


Image 140. ***Asterina hemidesmi***
1 - Infected leaf; 2 - Colony; 3 - Appressoriate hyphae with pycnothyriospores; 4 - Thyriothecia dehisced; 5 - Thyriothecia with asci; 6 - Ascospores

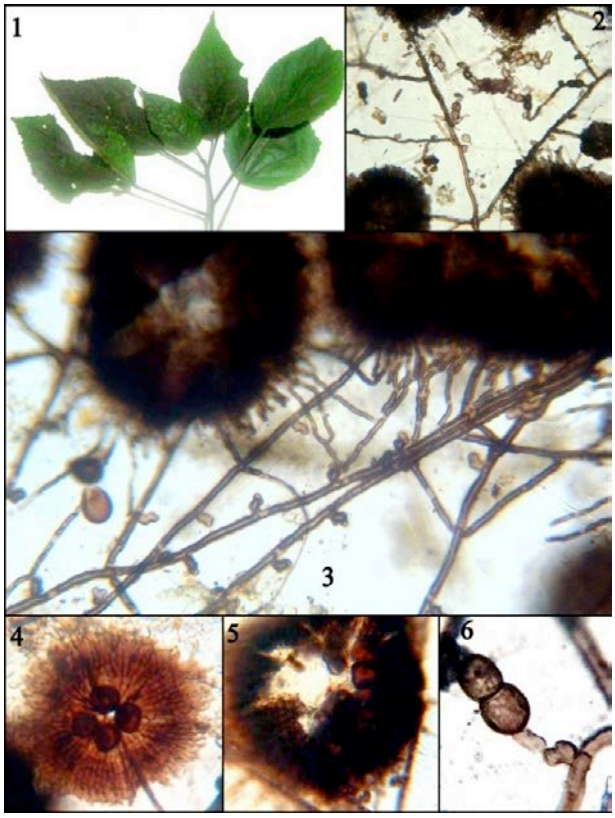


Image 141. ***Asterina hibisci***
1 - Infected leaves; 2 - Colony; 3 - Appressoriate hyphae with pycnothyriospores; 4 - Pycnothyriothecium dehisced with pycnothyriospores; 5 - Thyriothecium with asci; 6 - An ascospore

schizopetalus Dyer, Gard. (Malvaceae), Chowrira House Garden, Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense, confluent, up to 5mm in diameter, covers entire upper surface of the leaves. Hyphae thin, straight to substraight, branching opposite at acute angles, loosely reticulate. Cells 25–43x3–5.5 µm. Appressoria unicellular, mostly unilateral, few alternate, unicellular, ovate, sublobate to deeply lobate (2–3 times), 7–11x5–10 µm. Thyriothecia numerous, grouped to scattered, stellately to irregularly dehisced at the center, 200µm in diameter, fimbriate, margin crenate; asci many, globose, octosporous, up to 34µm in diameter. Ascospores 1- septate conglobate, constricted at the septum, 21–25x10–12 µm, and wall echinulate. Pycnothyria few, smaller than thyriothecia; pycnothyriospores few, pyriform, unicellular, 18–23x11–12 µm.

Asterina homaligena Hosag. & Jagath., Mycosphere 2(5): 695, 2012. (Image 142)

Materials examined: FMKMCC 184, 22.viii.2009, on leaves of *Homalium zeylanica* (Gardner) Benth. (Flacourtiaceae), Riverside, Hoddur, C. JagathThimmaih TBGT 5696 (holotype).

Colonies amphigenous, mostly epiphyllous, subdense, up to 4mm in diameter. Hyphae substraight to flexuous, branching irregular at wide angles, loosely reticulate, cells 16–31x4–7 µm. Appressoria alternate to opposite, few unilateral, antrorse to retrorse, straight to flexuous, two celled, 17–22 µm long; stalk cells cylindrical, 4–7 µm long; head cells ovate, ampulliform, cylindrical, flexuous, straight to curved, hamate, margin entire to flexuous, 10–12x5–9 µm. Thyriothecia scattered to loosely grouped, orbicular, up to 100 µm in diameter; stellately dehisced at the center, often the central portion dissolved to form wide opening by exposing the asci, margin crenate to fimbriate, fringed hyphae small;

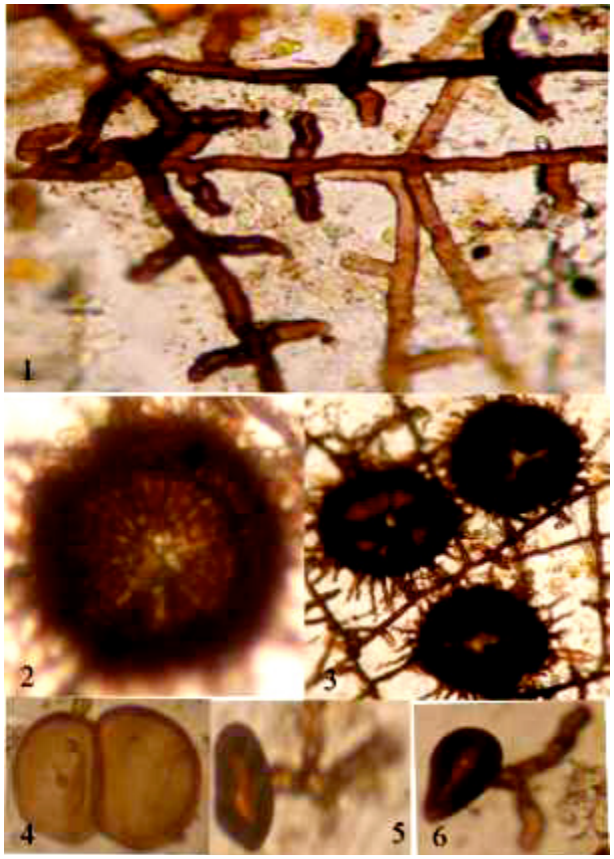


Image 142. *Asterina homaligena*
1 - Branched hyphae with appressoria; 2 - Thyriothecium; 3 - Dehisced Pycnothyria; 4 - An ascospore; 5&6 - Germinating pycnothyriospores

asci few, globose, 8-spored, up to 25µm in diameter; ascospores brown, conglobate, uniseptate, deeply constricted at the septum, 24–28x15–18 µm, wall smooth. Pycnothyria numerous, similar to thyriothecia, orbicular, smaller; pycnothyriospores numerous, ovate, oblong, pyriform, 18–27x14–18 µm.

Asterina homalii Sydow on Homalium alnifolium from *Sierra Leone* and *A. homaliicola* Hughes on *Homalium dolichophyllum* from Gold coast are known (Sydow & Sydow, 1939; Hughes, 1952). However, differs from both in having two celled appressoria.

Asterina hydnocarpi Hosag. & Abraham, Indian Phytopathol.51:389, 1998; Hosag., C. K. Biju & Abraham, J.Econ.Taxon.Bot.25: 305, 2001; Hosag., Zoos' Print J.18:1283, 2003, Hosag.et al. Asterinales of Kerala, p. 92, 2011; Hosag., Mycosphere 2(5): 698, 2012. (Image 143)

Materials examined: TBGT 5424, FMKMCC 185, 29.xi.2009, on leaves of *Hydnocarpus pentandra* (Buch.-Ham.) Oken, (Flacourtiaceae), Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense, up to 5mm in diameter. Hyphae straight to substraight, branching opposite at subacute to wide angles, loosely reticulate. Cells 28–32x5–6.5 µm. Appressoria unilateral to alternate, few opposite, straight, 12–18 µm long; stalk cells cylindrical, 4–7 µm long; head cells ovate, lobate broadly or acutely bifid, hammer shaped, 8–11x4–9 µm. Thyriothecia scattered, orbicular, stellately dehisced at the center, margin crenate to fimbriate, up to 150µm in diameter; asci globose, octosporous, up to 35µm in diameter. Ascospores uniseptate, conglobate, constricted at the septum, brown, 21–24x12–13 µm, wall tubercled.

Asterina hyptidicola Hosag. in Hosag., H. Biju & Appaiah, J. Mycopathol. Res. 44: 7, 2006; Hosag., Mycosphere 2(5): 699, 2012; Hosag., Mycosphere 2(5): 699, 2012. (Fig. 39).

Material examined: HCIO 45656 (type), TBGT 1402 (isotype), 11.xi.2003, on leaves of *Hyptis sauveolense* (L.) Poit. (Lamiaceae), Nishanemotta, Madikeri, Ko-

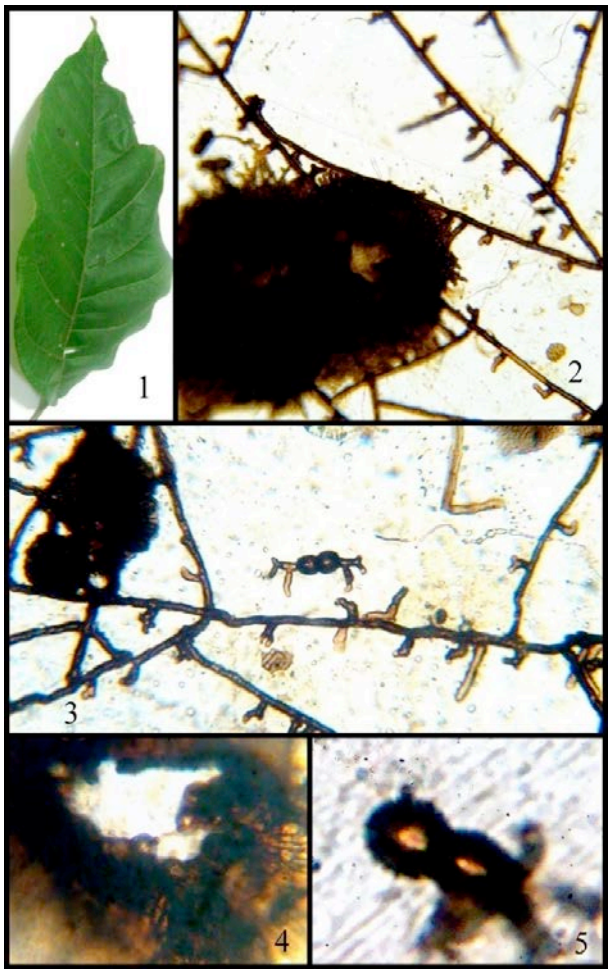


Image 143. *Asterina hydnocarpi*
1 - Infected leaf; 2 - Colony; 3 - Appressoriate hyphae; 4 - Thyriothecium dehisced with asci; 5 - Echinulate ascospore.

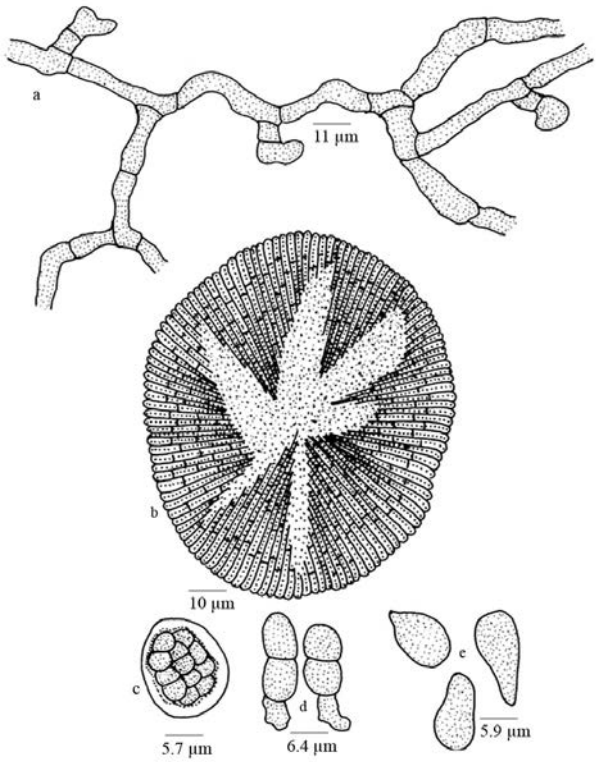


Figure 39. ***Asterina hyptidicola***
a - Appressoriate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores; e - Pycnothyriospores

dagu (Coorg), Karnataka, V.B. Hosagoudar et al. HCIO 45800, TBGT 1549, 12.xi.2003, Jodupal, *Hyptis* sp., V.B.Hosagoudar et al; {(as *Asterina hyptidis* (Rehm) Hosag. & Abraham)}.

Colonies epiphyllous, minute, dense, up to 1mm in diameter, confluent. Hyphae flexuous, branching irregular at acute to wide angles, loosely reticulate, form loose net, cells 19–43x3–5 µm. Appressoria very much distantly placed, bicellular, straight to curved, 9–16 µm long; stalk cells cylindrical to cuneate, 3–5 µm long; head cells ovate, globose, curved, entire, sublobate to deeply lobate, 6–12x8–10 µm. Thyriothecia scattered to connate, orbicular, up to 100µm in diameter, stellately dehisced at the centre, margin crenate; asci globose, octosporous, up to 30µm in diameter; ascospores conglobate, oblong, brown, uniseptate, 12–16x6–8 µm; pycnothyria mixed with thyriothecia, similar to thyriothecia but smaller; pycnothyriospores oval, pyriform, unicellular, brown, 13–16x7–9 µm.

Kodagu is the type locality of this species

Asterina indica Sydow., Sydow & Butler,Ann. Mycol. 9: 390, 1911; Patil & Thite, J.Shivaji Univ.17:152,1977; Hosag. & Abraham, J. Econ.Taxon. Bot.4: 584, 2000; Hosag., Zoos' Print J.18:1285, 2003: 21:2327, 2006; Hosag. & H.Biju & Appaiah, J. Mycopathol. Res. 44:8, 2006; Hosag; Hosag. et al., Asterinales of Kerala, p. 94, 2011; Hosag., Mycosphere 2(5): 700, 2012. (Fig. 40 & Image 144)

Materials examined: HCIO 45689, TBGT 1436; TBGT 1447; HCIO 45711, TBGT 1460; HCIO 45717, TBGT 1466; HCIO 45736, TBGT 1485; HCIO 45738, TBGT 1487, 13.xi.2003, on leaves of *Symplocos* sp. (Symplocaceae), MPCA, Brahmagiri, Talacauvery, V.B. Hosagoudar et al; HCIO 45662, TBGT 1408, 14.xi.2003, Nishane motta, V.B. Hosagoudar et al; TBGT 5334, FMKMCC 168, 24.xi.2008, Vanachalu, C. Jagath Thimmaiah; TBGT 5451, FMKMCC 186, 23.xi.2009, Field Marshal Cariappa College Campus, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense, up to 3 mm in diameter, hyphae straight, branching opposite to subopposite at subacute to wide angles, loosely reticulate. Cells 22–28x5–9 µm. Appressoria unicellular, mostly unilateral to alternate, ovate, globose, sublobate, broad based, 10–16x7–13 µm. Thyriothecia grouped to scattered, orbicular, stellately to circularly dehisced at the center, margin crenate to fimbriate, up to 250µm in diameter; asci few, globose, octosporous, up to 35µm in diameter. Ascospores oblong to ellipsoidal, 1-septate, conglobate, con-

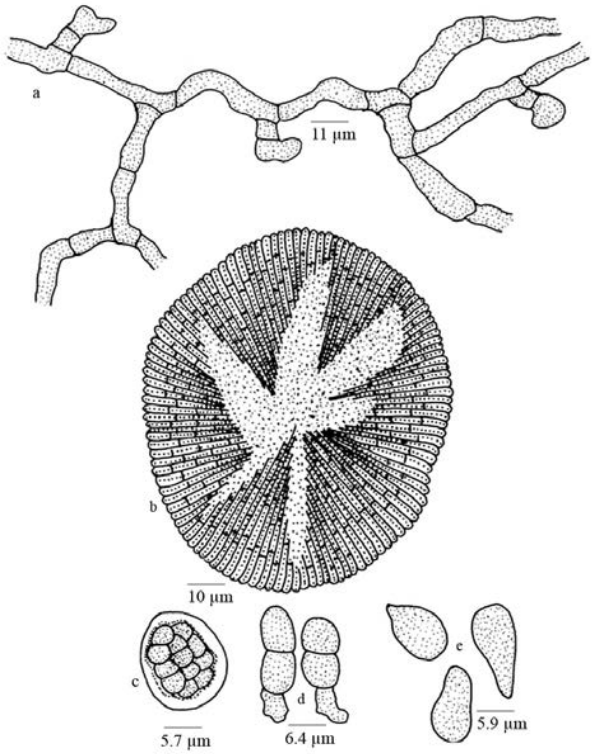


Figure 40. ***Asterina indica***
a - Appressoriate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores; e - Pycnothyriospores

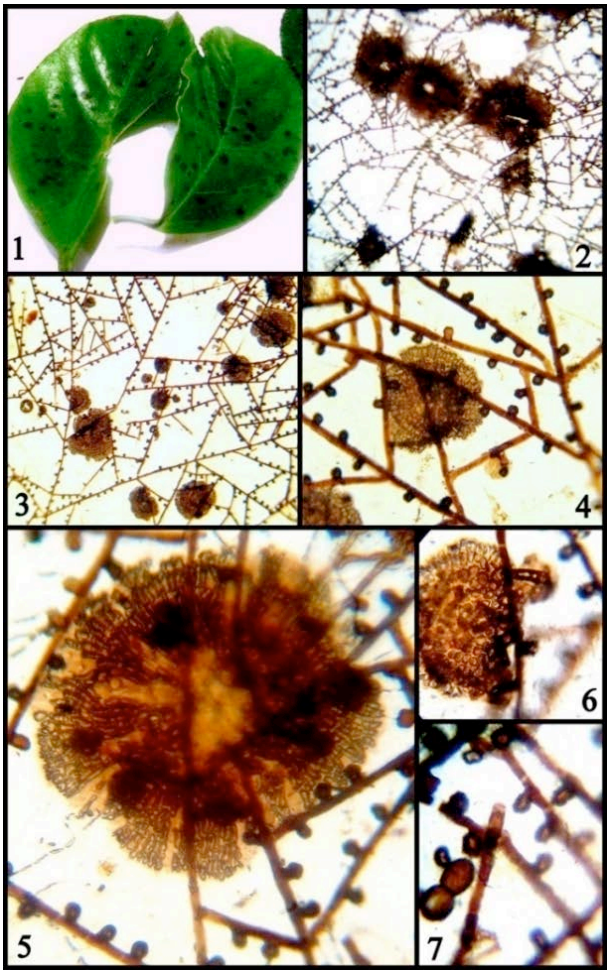


Image 144. ***Asterina indica***
1 - Infected leaves; 2 &3 - Colonies; 4 - Appressoriate hyphae with pycnothyriothecium; 5&6 - Thyriothecium with asci; 7 - Germinating ascospore.

stricted at the septum, 28–32x10–14 µm, wall smooth.

Asterina jambolana Kar & Maity, Trans.Brit. Mycol. Soc. 54:438, 1970; Hosag., Balkar. & Goose, Mycotaxon 59: 180, 1996; Hosag. & Abraham, J. Econ.Taxon. Bot. 4: 576, 2000; Hosag., J.Econ.Taxon. Bot. 25: 306, 2001; Hosag., J. Mycopathol. Res. 40:195, 2002; Hosag., Zoos' Print J. 18: 1283, 2003: 2327, 2006; Hosag. et al. Asterinales Of Kerala, p. 96, 2011; Hosag., Mycosphere 2(5): 701, 2012. (Image 145)

Materials examined: HCIO 49174, TBGT 3429, 25.xi.2008 on leaves of *Syzygium* sp. (Myrtaceae), Talacauveri, , V.B. Hosagoudar et al; TBGT 5322, FMK-MCC 187, 24.xi.2008, Vanachalu, Kodagu, Jagath Thimmaiah; TBGT 5359, 25.xi.2008, *Syzygium montanum* Gamble, (Myrtaceae), Talacauveri, C. Jagath Thimmaiah; BGT 5461; TBGT 5359, 29.xi.2009, Hoddur, C. Jagath Thimmaiah; 25.xi.2008, *Syzygium mundagam* (Bourd.) Chithra, Talacauveri, C. Jagath Thimmaiah.

Colonies epiphyllous, dense, up to 4mm in diameter. Hyphae substraight to flexuous, branching alternate at wide angles, closely reticulate. Cells 20–30x4–5 µm. Appressoria 2-celled, scattered, unilateral et alternate, antrorse, 19–23 µm long; stalk cells cylindrical to cuneate, 5–7 µm long; head cells ovate to globose, straight to slightly curved, entire, 8–13x6–9 µm. Thyriothecia grouped to scattered, often connate, up to 400µm in diameter, stellately dehisced at the center, margin crenate to fimbriate, fringed hyphae short; asci globose, octosporous, up to 50µm in diameter. Ascospores oblong, conglobate, brown, 1- septate, slightly constricted at the septum, 30–33x12–15 µm, wall smooth.

Asterina jasmini Hansf. var. ***indica*** Hosag., Indian Phytopath. 58: 199, 2005; Hosag., Zoos' print J. 21: 2327, 2006; Hosag et al, Asterinales of Kerala, p. 97, 2011; Hosag., Mycosphere 2(5): 702, 2012. (Image 146)

Materials examined: On leaves of *Jasminum* sp. (Oleaceae), Mandrane, Hoddur, Dec. 20, 2008, C. Jagath

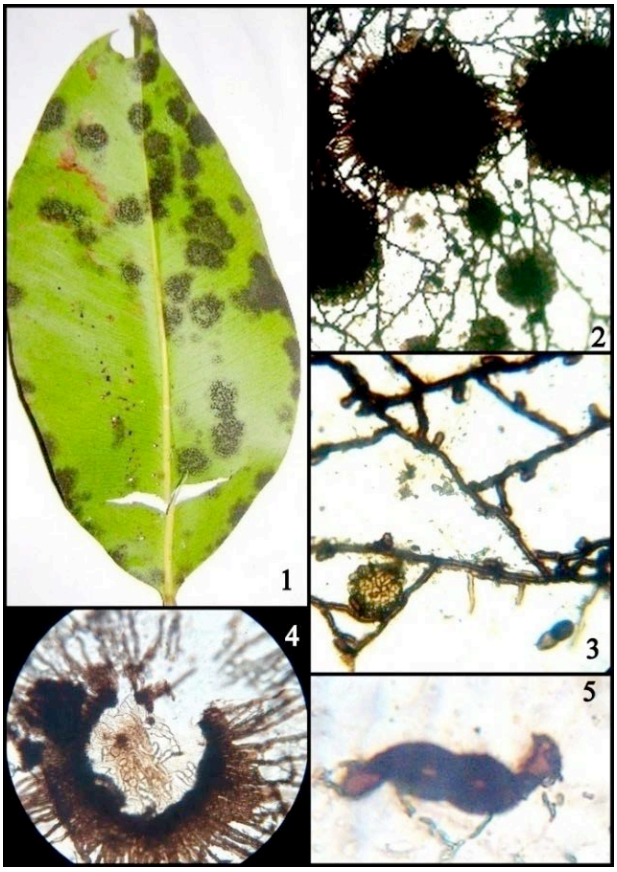


Image 145. ***Asterina jambolana***
1 - Infected leaf; 2 - Colony; 3 - Appressoriate hyphae; 4 - Dehisced thyriothecium; 5 - Germinating ascospore

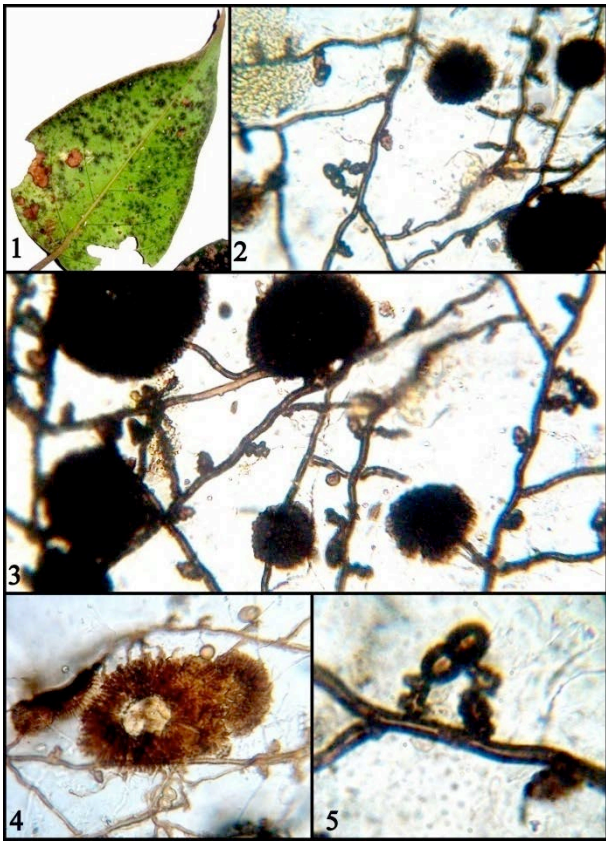


Image 146. *Asterina jasmini* var. *indica*
1 - Infected leaf; 2 - Colony; 3 - Appressoriate hyphae & thyriothecia; 4 - Pycnothyriospores; 5 - Germinating ascospore.

Thimmaiah FMKMCC 189.

Colonies amphigenous, dense, up to 4mm in diameter. Hyphae substraight to flexuous, branching irregular at subacute to wide angles, loosely reticulate. Cells 10-15x2.5-4 µm. Appressoria unilateral to alternate, unicellular, ovoid to globose, broad based slightly to deeply lobed, 5-15x6-9 µm.Thyriothecia grouped to scattered, orbicular, stellately dehisced at the center, up to 180 µm in diameter, margin crenate to fimbriate; asci few, globose, octosporous, up to 28 µm in diameter. Ascospores conglobate, brown, oblong, uniseptate, constricted at the septum, 19-24x8-10 µm, wall smooth. Pycnothyriothecia similar to thyriothecia, orbicular, margin crenate, up to 80 µm in diameter; pycnothyriospores brown, unseptate, pyriform, 14-16x7-9 µm, wall smooth.

Asterina lawsoniae Henn. & Nyn., Monsumia 1: 159, 1899; Hansf. Proc. Linn. Soc. London 160: 145, 1949; Patil & Thite, J. Shivaji Univ. 17: 152, 1977; Hosag. & Abraham, J. Econ. Taxon. Bot. 4: 572, 2000; Hosag., C.K. Biju & Abraham, J. Econ. Taxon. Bot. 25: 305, 2001; Hosag., Zoos' Print J. 18: 1283, 2003; 21: 2328, 2006; Hosag., H. Biju & Appaiah, J. Mycopathol. Res. 44: 8, 2006, Hosag. et al., Asterinales of Kerala, p. 102, 2011; Hosag., Mycosphere 2(5): 707, 2012. (Image 147)

Materials examined: HCIO 45807, TBGT 1556, 21.xi.2003, on leaves of *Lawsonia inermis* L. (Lythraceae), Jodupal, V.B. Hosagoudar et al; FMKMCC 190, 26.ii.2010, Ammathi, C. Jagath Thimmaiah.

Colonies amphigenous, dense, up to 3mm in diameter, confluent. Hyphae flexuous, branching irregular at subacute to wide angles, loosely to closely reticulate. Cells 12–20x4–5 µm. Appressoria unicellular, alternate, unilateral, sessile, mostly lobed, few ovate, 4–7x4–9 µm. Thyriothecia scattered to grouped, orbicular, up to 150µm in diameter, margin fimbriate, stellately dehisced at the center; asci few to many, octosporous, globose, up to 30µm in diameter. Ascospores 1-septate, conglobate, brown, constricted at the septum, 15–19x7–9 µm, wall smooth. Pycnothyriothecia similar to thyriothecia, orbicular, margin crenate, up to 70µm in diameter; pycnothyriospores brown, unseptate, pyriform, 15–17x7–10 µm, wall smooth.

Asterina lepianthis (Hosag., Balakr. & Goos) Hosag. in Hosag.,C.K. Biju, Abraham & Agarwal, Indian Phytopath. 55: 498, 2002 (lepianthedis); Hosag., Chandra. & Agarwal, Asterinales of Kerala, p. 103, 2011; Hosag., Mycosphere 2(5): 708, 2012.

Anamorph: *Asterostomella lepianthedis* Hosag., Balakr. & Goos, Mycotaxon 58:492, 1996. (Fig. 41)

Material examined: HCIO 45686, TBGT 1433, 12.xi.2003 on leaves of *Lepianthes umbellata* (L.) Raf. (Menispermaceae), Jodupal, V.B. Hosagoudar et al; HCIO 45802, TBGT 1551; 12.xi.2003, Jodupal, V.B. Hosagoudar et al; HCIO 45686, TBGT 1433, V.B. Hosagoudar et al. .

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 12–33×3–5 µm. Appressoria scattered, alternate to unilateral, straight to curved, two-celled, 9–13 µm long; basal cells cuneate to cylindrical, 3–7 µm. Pycnothyria scattered, orbicular, center, margin crenate; Pycnothyriospores unicellular, globose to ellipsoidal, brown, 9–15×6–10 µm.

Asterina leucadis Hosag. & Robin, Bioscience Discovery 2: 264, 2011; Hosag., Mycosphere 2(5): 709, 2012. (Fig. 42).

Materials examined: 4655 (holotype), HCIO, 27.xi.2007. on leaves of *Leucas* sp. (Lamiaceae), V.B. Hosagoudar & P.J. Robin.

Colonies epiphyllous, thin, up to 2mm in diameter,

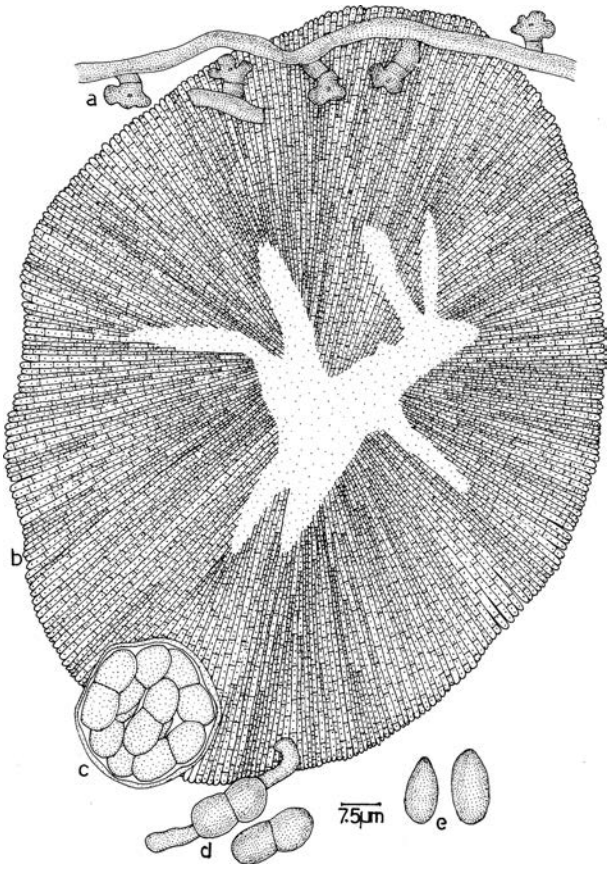


Figure 41. ***Asterina lepianthis***
a - Appressoriate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores

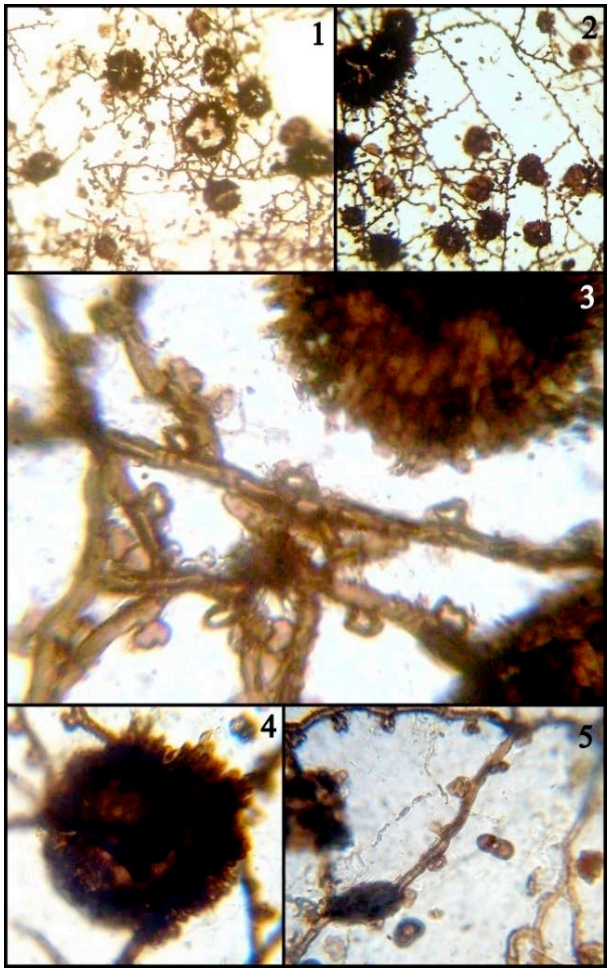


Image 147. ***Asterina lawsoniae***
1&2 - Colonies; 3 - Appressoriate hyphae; 4 - Thyriothecium; 5 - Ascospopre & pycnothyriospores

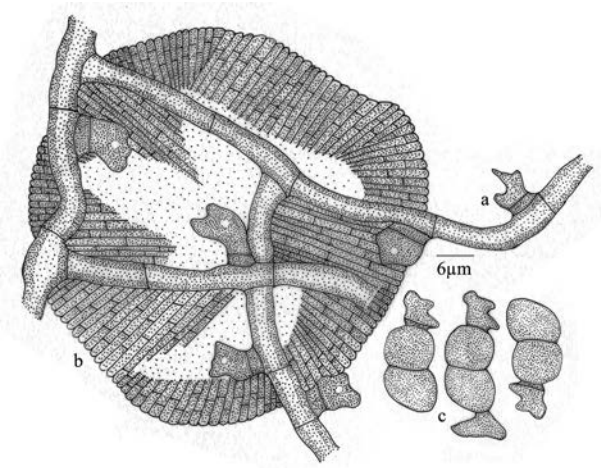


Figure 42. ***Asterina leucadis***
a - Appressoriate mycelium; b - Thyriothecia; c - Germinating ascospores

confluent. Hyphae substraight to undulate, branching alternate to opposite, irregular at acute to wide angles, loosely reticulate, form a net, cells 17–22x5–7µm. Appressoria two celled, alternate to unilateral, antrorse to subantrorse, 17–19 µm long; stalk cells cylindrical to cuneate, 5–7 µm long; head cells globose, ovate, clavate, irregularly sublobate to 2–4-times lobate, 10–12x7–10 µm. Thyriothecia scattered, orbicular, up to 144µm in diameter, stellately dehisced at the center, margin fimbriate, rarely crenate, fringed hyphae straight to flexuous; asci not seen; ascospores conglobate, brown, 1-septumte, constricted at the septum, 17–22x7–10 µm, wall smooth.

This is the only species on this host genus

Asterina lobulifera Sydow var. ***indica*** Hosag. & Chandra, Indian J. Sci. Techn. 2(6): 15, 2009; Hosag., Chandra. & Agarwal, Asterials of Kerala, p. 109, 2011; Hosag., Mycosphere 2(5): 712, 2012. (Image 148)

Materials examined: On leaves of *Glochidion zeylanicum* var. *tomentosum* Trim. (Euphorbiaceae), February

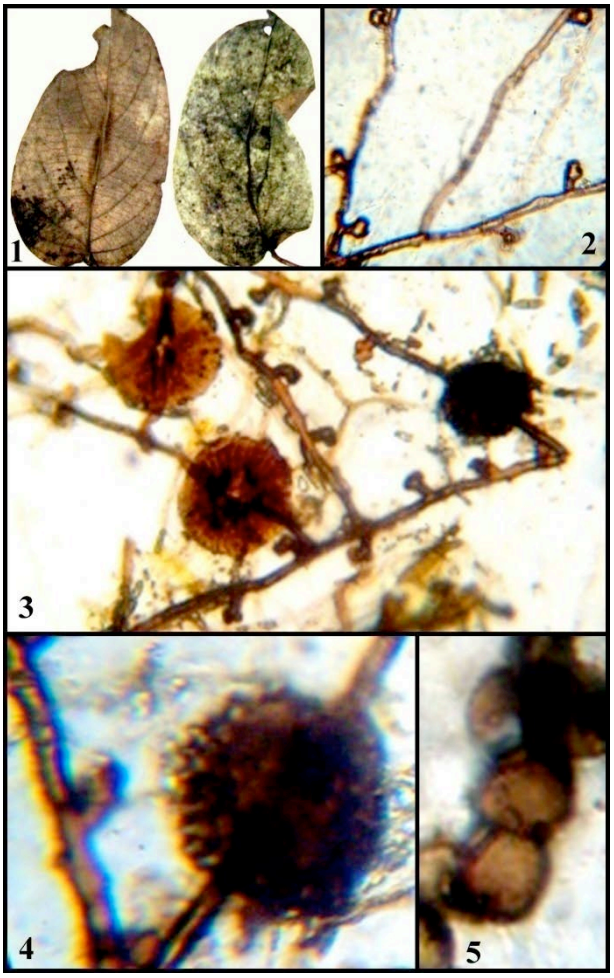


Image 148. *Asterina lobulifera* var. *indica*
1 - Infected leaves; 2 - Branched hyphae; 3 - Appressoriate hyphae & thyriothecia; 4 - Thyriothecium; 5 - An ascospore

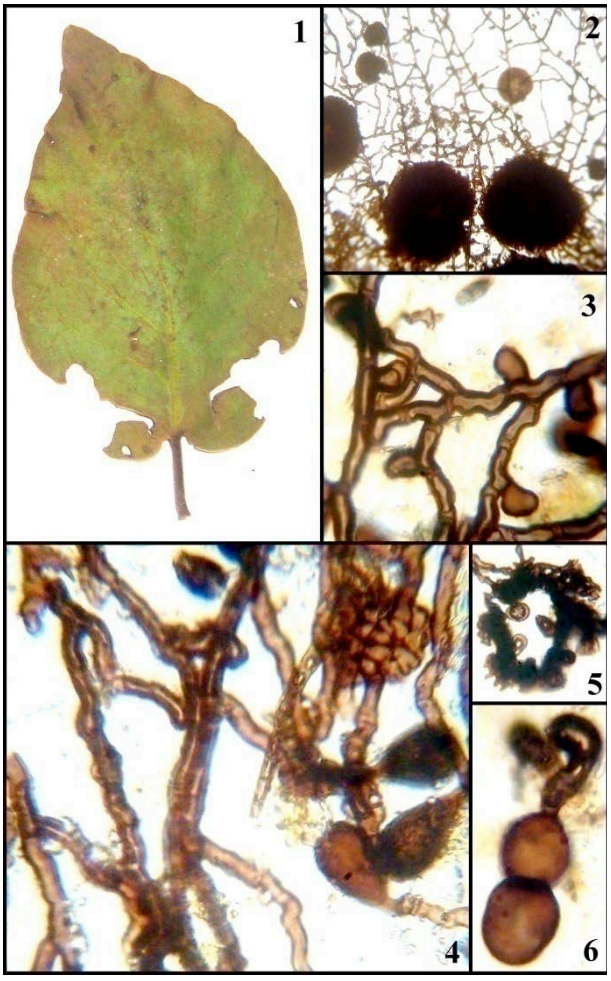


Image 149. *Asterina loranthigena*
1 - Infected leaf; 2 - Colony with thyriothecia; 3 - Appressoriate hyphae; 4 - Pycnothyriospores; 5 - Pycnothyriothecium; 6 - Germinating ascospore.

13, 2010, C. Jagath Thimmaiah FMKMCC 191; Madikeri, November 16, 2010, C. Jagasth Thimmaiah TBGT 6644.

Colonies amphigenous, dense, up to 2mm in diameter. Hyphae substraight to flexuous, branching irregular at acute to wide angles, loosely reticulate. Cells 15–20x4–6 µm. Appressoria 2- celled, alternate, unilateral, few opposite, subantrorse, straight to curved, 10–15 µm long; stalk cells cylindrical to cuneate, 4–7 µm long; head cells ovoid, lobate (2–3 times), 7–10x4–6 µm. Thyriothecia scattered to grouped, orbicular, up to 116µm in diameter, margin crenate to fimbriate, stellately dehisced at the center; asci not seen. Ascospores oblong, conglobate, 1-septate, constricted at the septum, 13–19x6–8 µm, wall smooth.

Asterina loranthigena Hosag., Agarwal, H. Biju & Archana, Indian Phytopath. 59: 525, 2006, Hosag. et al., Asterinales of Kerala, p.111, 2011; Hosag., Mycosphere 2(5): 714, 2012. (Image 149)

Materials examined: FMKMCC 192, 25.xii.2009 on leaves of *Dendrophthoe trigona* (Wight & Arn.) (Loranthaceae), Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, dense, up to 4mm in diameter, confluent. Hyphae flexuous to crooked, branching irregular at acute angles, closely reticulate. Cells 14–22x4–6 µm. Appressoria unicellular, alternate to unilateral, oblong, clavate, straight to curved, entire, 11–17x4–8 µm. Thyriothecia scattered to grouped and connate, orbicular, up to 180µm in diameter, margin crenate to fimbriate, stellately dehisced at the center; asci not seen. Ascospores 1-septate, conglobate, brown, constricted at the septum, 21x10–14 µm, wall echinulate. Pycnothyria similar to thyriothecia, smaller, orbicular, up to 80µm in diameter; pycnothyriospores numerous, brown, unicellular, pyriform, 15–19x7–10 µm, wall smooth.

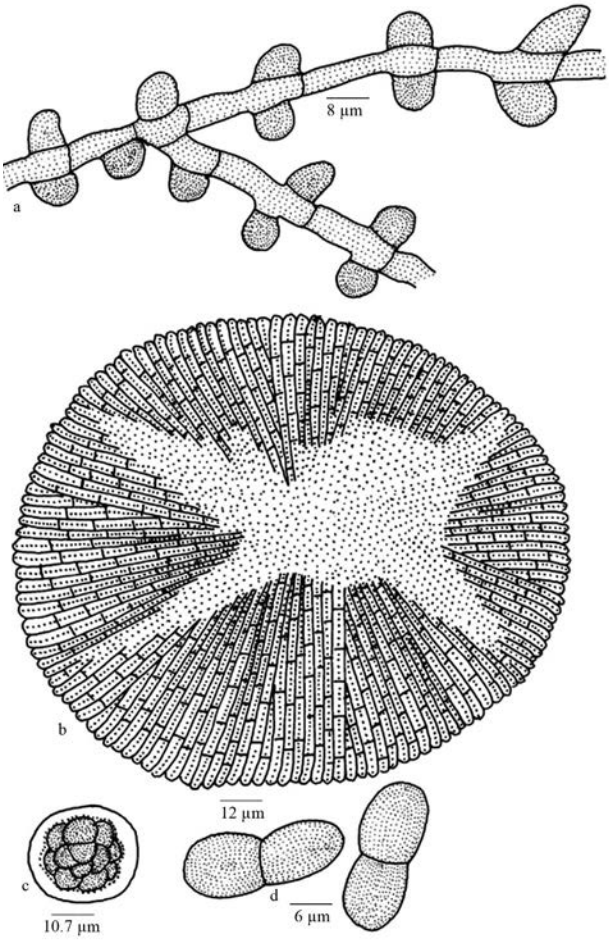


Figure 43. *Asterina madikeriensis*
a - Appressoriate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores

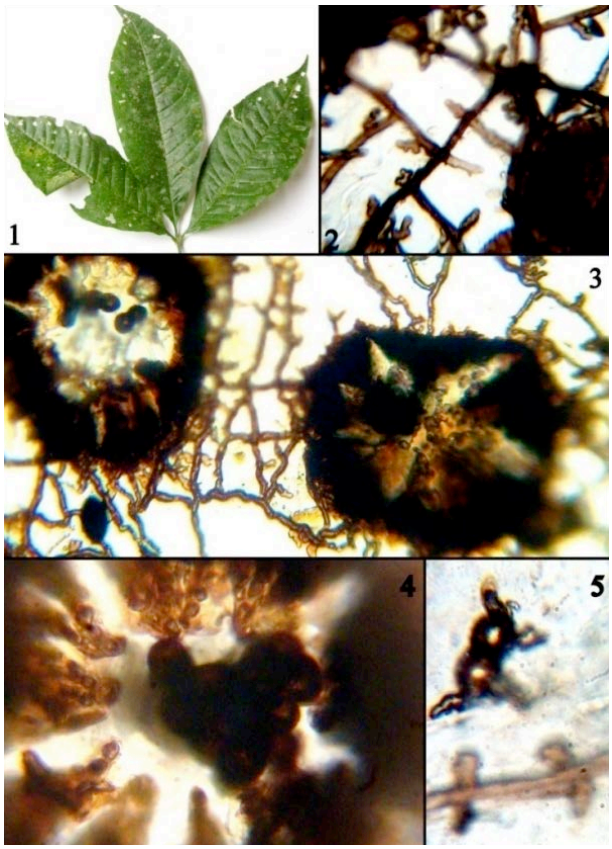


Image 150. *Asterina melicopecola*
1 - Infected leaf lets; 2 - A portion of the colony; 3 - Colony with dehisced thyriothecia; 4 - Ascus; 5 - Germinating ascospore

Asterina madikeriensis Hosag., J. Mycopathol.Res. 44: 9, 2006; Mycosphere 2(5): 716, 2012. (Fig. 43).

Material examined: TBGT 1455 (type), 12.xi.2003, on leaves of *Memecylon* sp. (Melastomataceae), Nishanemotta, Madikeri, Kodagu (Coorg), Karnataka, V.B. Hosagoudar et al. .

Colonies epiphyllous, dense, minute to 3mm in diameter, confluent. Hyphae straight, branching alternate to opposite at acute wide angles, loosely to closely reticulate, cells 17–24x4–6 µm. Appressoria opposite, rarely solitary or attenuate, ovate, entire, attenuated to broadly rounded at the apex, 8–10x6–8 µm. Thyriothecia orbicular, scattered, up to 170µm in diam., stellately dehisced at the centre, margin fimbriate to crenate, fringed hyphae straight to flexuous, compact; asci globose, octosporous, up to 30µm in diam.; ascospores oblong, conglobate, brown, uniseptate, constricted at the septum, 22–25x8–11 µm, wall tubercled.

Asterina memecylonis Ryan is the only species known on the genus Memecylon from Karwar, Karnataka (Ryan, 1928, Hosagoudar & Abraham, 2000). Recently, it was relocated from Kerala (Hosagoudar, 2003). However, *A. madikeriensis* differs from it in having regularly opposite and densely placed appressoria.

The colonies were associated with *Meliola memecyli* Syd. var. *microspor*a Hosag. et al.

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: 2412, 2006; Hosag., H.Biju & Appaiah, J.Mycopathol. Res. 44: 9, 2006; Hosag. et al. Asterinales of Kerala, p. 114, 2011; Hosag., Mycosphere 2(5): 718, 2012. (Image 150).

Materials examined: HCIO 45607, TBGT 1350, 11.xi.2003, on leaves of *Melicope lunuankenda* (Gaertn.) T.G. Hartley (Rutaceae), Nishane motta, V.B. Hosagoudar et al; TBGT 5377, FMKMCC 193, 26.xi.2008, Muthar-mudi, C. Jagath Thimmaiah; TBGT 5470, FMKMCC 194, 4.xii.2009, Devarakadu, Hoddur, Karnataka, C. Jagath Thimmaiah.

Colonies hypophyllous, subdense, up to 4mm in diameter. Hyphae substraight, branching opposite at subacute angles, loosely reticulate. Cells 17–24x3.5–5.5 µm. Appressoria unicellular, mostly opposite, few alternate (20%) to unilateral, straight, ovoid, deeply lobate to crenate, rarely entire, few angulose, 6–14x3–5 µm. Thyriothecia scattered, orbicular, stellately dehisced, up to 130µm in diameter, margin crenate to fimbriate; asci globose, octosporous, up to 35µm in diameter. Ascospores conglobate, 1-septate, brown, deeply constricted at the septum, 20–23x9–12 µm, wall smooth.

Asterina meliosmae-simplicifoliae Hosag., C.K. Biju & Abraham, J. Mycopathol. Res. 40: 195, 2002; Hosag. et al., Asterinales Of Kerala, P. 115, 2011; Hosag., Mycosphere 2(5): 719, 2012. (Image 151).

Materials examined: on leaves of *Meliosma simplicifolia* (Roxb.) Walp. (Sabiaceae), Hoddur, 02 Dec 2009, C. Jagath Thimmaiah TBGT 5465, FMKMCC 195.

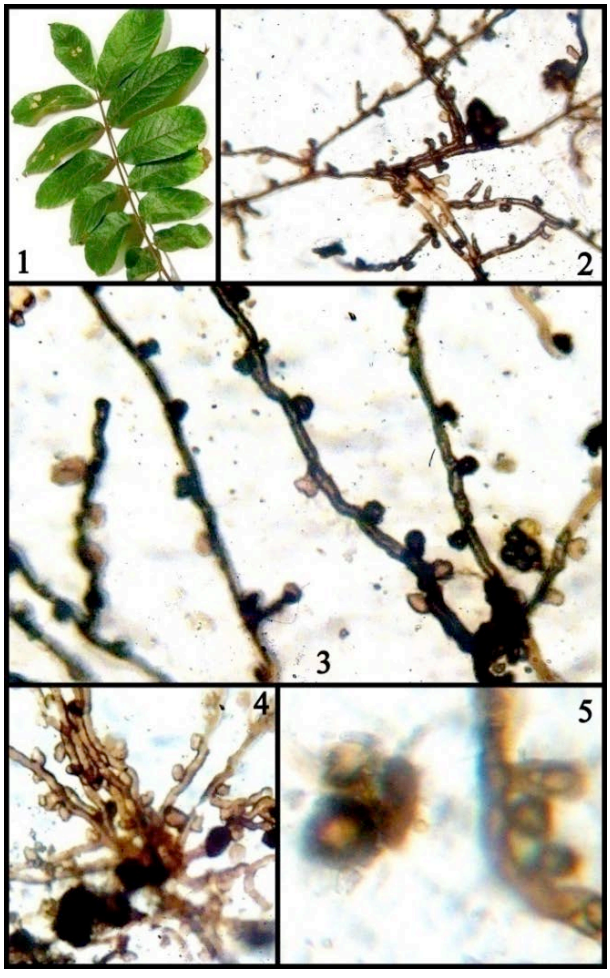


Image 151. *Asterina meliosmae-simplicifoliae*
1 - Infected leaflets; 2 - Loosely reticulate colony; 3 - Appressoriate hyphae; 4 - Young thyriothecia in the colony; 5 - An ascospore.

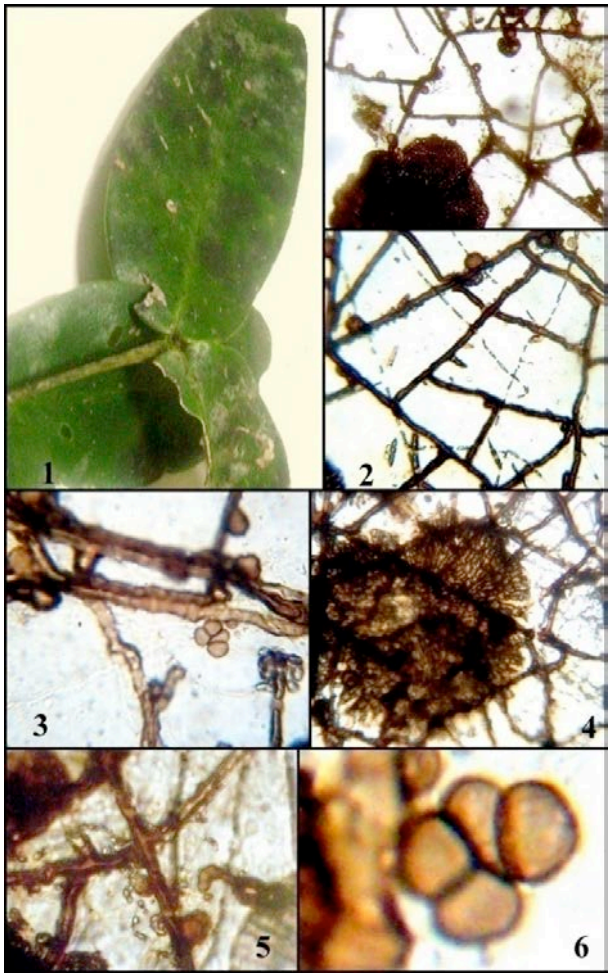


Image 152. *Asterina memecylonis*
1 - Infected leaves; 2 - Loosely reticulate colony; 3 - Hyphae enlarged; 4 - Young thyriothecium; 5&6 - Ascospores.

Colonies epiphyllous, dense, up to 4mm in diameter. Hyphae thin substraight, branching opposite to alternate at wide angles, closely reticulate. Cells 18–24x3–5.5 µm. Appressoria unicellular, unilateral to alternate, ovate, cylindric, entire to sublobate, 6–13x4–7 µm. Thyriothecia scattered, orbicular, stellately dehisced at the center, margin crenate to fimbriate, up to 200µm in diameter; asci octosporous, globose, up to 35µm in diameter. Ascospores oblong, conglobate, brown, 1-septate, slightly constricted at the septum, 22–25x10–13 µm, wall smooth.

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. et al. Asterinales Of Kerala, P. 116, 2011; Hosag., Mycosphere 2(5): 720, 2012. (Image 152).

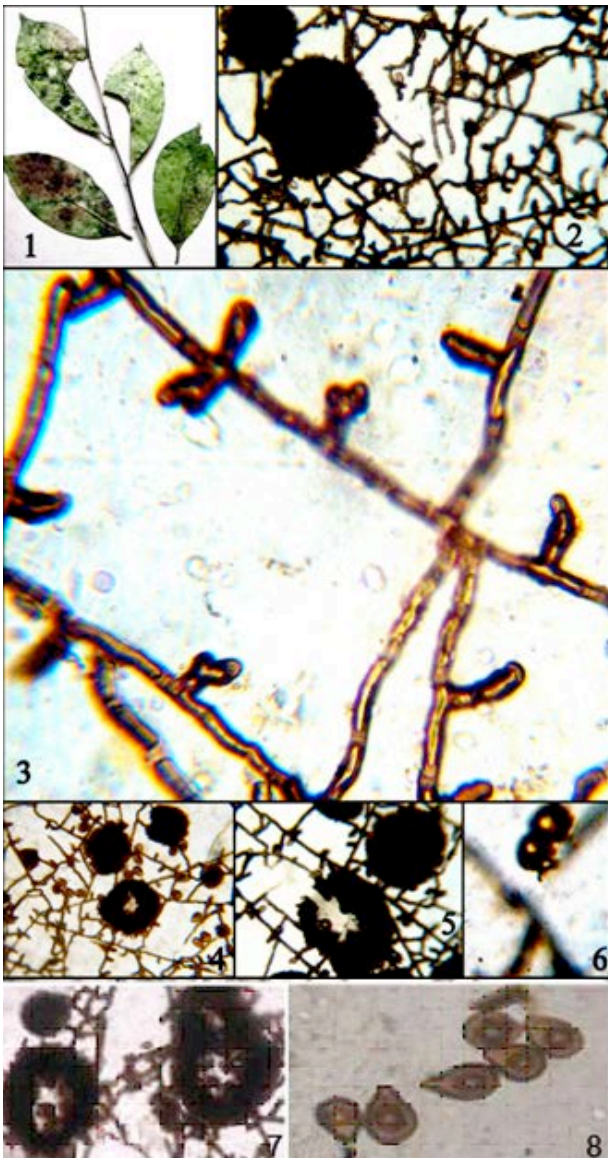


Image 153. ***Asterina mezonevronis***
1 - Infected leaves; 2 - Loosely reticulate colony; 3 - Appressoriate hyphae; 4 - Pycnothyria with Pycnothyriospores; 5 - Dehisced thyriothecium; 6 - An ascospores; 7&8 - Pycnothyria & pycnothyriopores.

Materials examined: TBGT 5468, FMKMCC 197, 4.xii.2009, on leaves of *Memecylon* sp. (Melastomataceae), Devarakadu, Hoddur, Karnataka, 4 Dec 2009, C. Jagath Thimmaiah; HCIO 49919, TBGT 4071, 26.xi.2008, Coorg, Hakathoor, V.B.Hosagoudar et al.

Asterina mezonevronis Hosag. & Jagath., Mycosphere 2(5): 720, 2012. (Image 153)

Materials examined: TBGT 5744, FMKMCC 197, 21.xi.2009, on leaves of *Mezonevron cucullatum* (Roxb.) Wight & Arn.(Caesalpiniaceae), Karnataka, Kodagu, Madikeri, Bharatiya Vidya Bhavan, Kodagu Vidyalaya campus, C. Jagath Thimmaiah.

Colonies epiphyllous, dense, up to 4mm in diameter. Hyphae straight to substraight, branching alternate to opposite at acute to subacute angles, loosely reticulate, cells 13–22x4–6 µm. Appressoria about 80% opposite, subopposite to alternate, rarely two borne from the same place from a cell, antrorse, subantrorse to retrorse, straight to slightly curved, 9–15 µm long; stalk cells cylindrical, 2–4 µm long; head cells ovate, cylindrical, entire, lobate, angular, 7–12x4–7 µm. Thyriothecia scattered, orbicular, irregularly dehisced at the center, up to 130µm in diameter, margin mostly crenate; asci few, globose, up to 25µm in diam.; ascospores few, brown, conglobate, uniseptate, constricted at the septum, 23–26x10–13 µm, wall ciliated. Pycnothyria numerous, similar but smaller than the thyriothecia; pycnothyriospores unicellular, globose, ovate, pyriform, often apiculate, 16–20×12–14 µm.

Opposite appressoria (80%) with entire to sublobate head cells distinguishes this species from rest known on the members of Caesalpiniaceae (Hosagoudar & Abraham, 2000). Ascospores were few. Further, there were aerial whip like hyphae but could not confirm the intercalary appressoria to place it in Bheemamyces.

Asterina naraveliae Hosag., Biju & Agarwal, Indian Phytopath. 55: 499, 2002; Hosag. et al. Asterinales of Kerala, p. 126, 2011; Hosag., Mycosphere 2(5): 730, 2012. (Image 154).

Materials examined: TBGT 5395, FMKMCC 198, 11.i.2009, on leaves of *Naravelia zeylanica* (L.) (Ranunculaceae), Hoddur, C. Jagath Thimmaiah;TBGT 5395, 5433, FMKMCC 199, 1.xi.2009, Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense up to 5mm in diameter. Hyphae substraight, flexuous, branching irregular at subacute angles, loosely reticulate. Cells 15–30x4–6 µm. Appressoria 2- celled, mostly alternate to unilateral (30%), antrorse to retrorse, straight to crooked, 12–17 µm long; stalk cells cuneate to cylindrical, 2.5–6 µm long; head cells ovate, sublobate to lobate, rarely entire, up to 7–9x7–9 µm. Thyriothecia grouped, globose, margin crenate, up to 160µm in diameter, stellately dehisced at the center; asci globose, octosporous, up to 28µm in diameter. Ascospores uniseptate, brown, conglobate, constricted at the septum 25–30x11–15 µm, wall smooth. Pycnothriothecia similar but smaller than thyriothecia; Pycnothyriospores simple, ellipsoidal, unicellular, brown, 14–16x5–6 µm.

Asterina nothopegiae Ryan, Mem. Dept. Agri, India 15: 104, 1928; Patil & Thite, J. Shivaji Univ, 17: 152, 1977; Hosag., Balkar. & Goos, Mycotaxon 59:182, 1996; Hosag. & Abraham, J. Econ.Taxon. Bot.4:576, 2000; Hosag., J. Econ. Taxon. Bot. 4: 559, 2000; Hosag. Biju & Abraham, J. Econ. Taxon. Bot. 25: 305, 2001; Hosag., Zoos' Print J.18:1280, 2003; 2328, 2006; Hosag. et al. Asterinales of Kerala, p. 128, 2011; Hosag., Mycosphere 2(5): 732, 2012. (Image 155)

Materials examined: TBGT 5391, FMKMCC 200, 8.i.2010, on leaves of *Nothopegia racemosa* (Dalz.), Ramam. (Anacardiaceae), Mandrane, Hoddur, C. Jagath Thimmaiah; TBGT 5464, FMKMCC 201, 2.xii.2009, Devarakadu, Hoddur, Karnataka, 02 Dec 2009, C. Jagath Thimmaiah.

Colonies epiphyllous, dense to subdense, up to 4mm in diameter. Hyphae thin, straight, slightly flexuous, branching opposite to subopposite, few alternate at subacute angles, loosely reticulate, confluent, forms a loose mycelial net, cells 8–15x3–4.5 µm. Appressoria mostly opposite to unilateral, few alternate, ovate, cylindrical, lobate to sublobate, angulose, rarely entire, few crooked, 5–12x3–6 µm. Thyriothecia scattered, orbicular, stellately dehisced at the center, up to 120µm diameter, margin crenate to slightly fimbriate; asci globose to ovate, octosporous, up to 32µm. Ascospores 1-septate, brown, conglobate, constricted at the septum, 16–18x6–8 µm, wall smooth.

Asterina oreocnidecola Hosag., Balakr. & Goos, Mycotaxon 59: 183, 1996; Hosag. & H. Biju, J. Mycopathol. Res. 44: 42, 2006; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala, p. 130, 2011: Hosag., Mycosphere 2(5): 734, 2012. (Fig. 44).

Material examined: TBGT 6643, 16.xi.2010, on leaves of *Boehmeria glomerulifera* Miq. (Urticaceae), Madikeri,

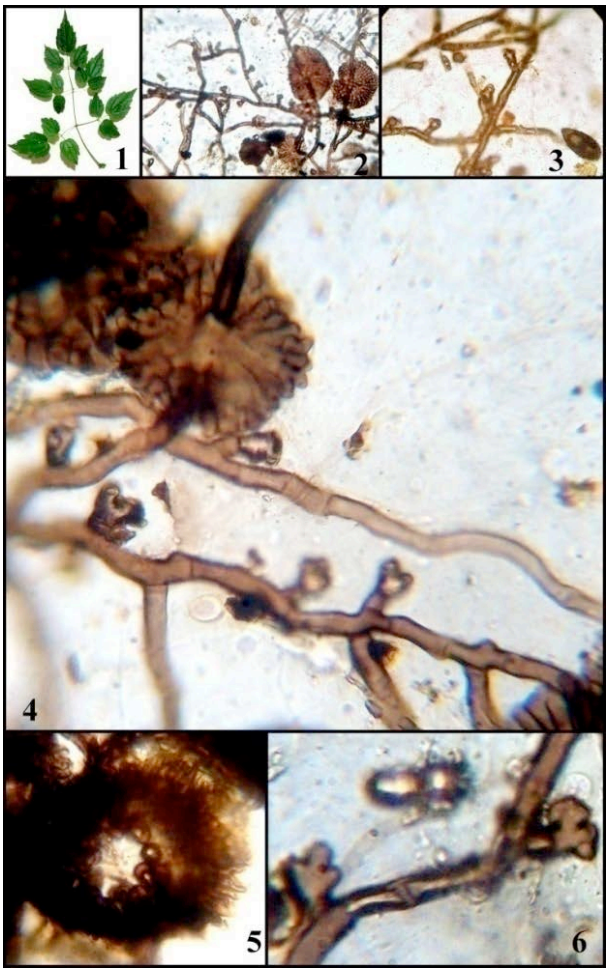


Image 154. *Asterina naraveliae*
1 - Infected leaves; 2 - Colony; 3 - Pycnothyriospore; 4 - Appressoriate hyphae with pycnothyriothecia; 5 - Dehisced pycnothyriothecium; 6 - An ascospore.

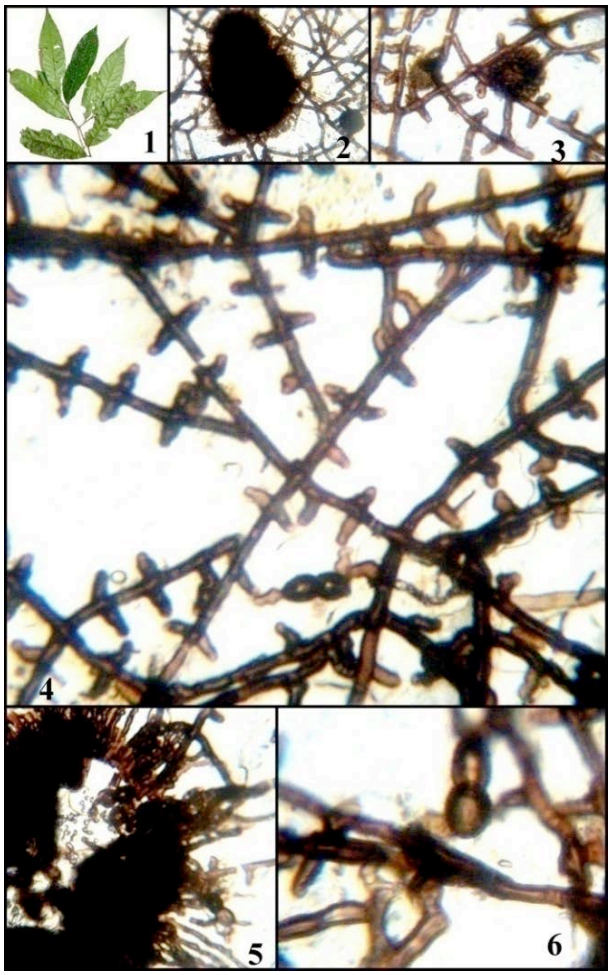


Image 155. *Asterina nothopegiae*
1 - Infected leaves; 2&3 - Colonies; 4 - Appressoriate hyphae; 5 - Dehisced thyriothecium; 6 - An ascospore.

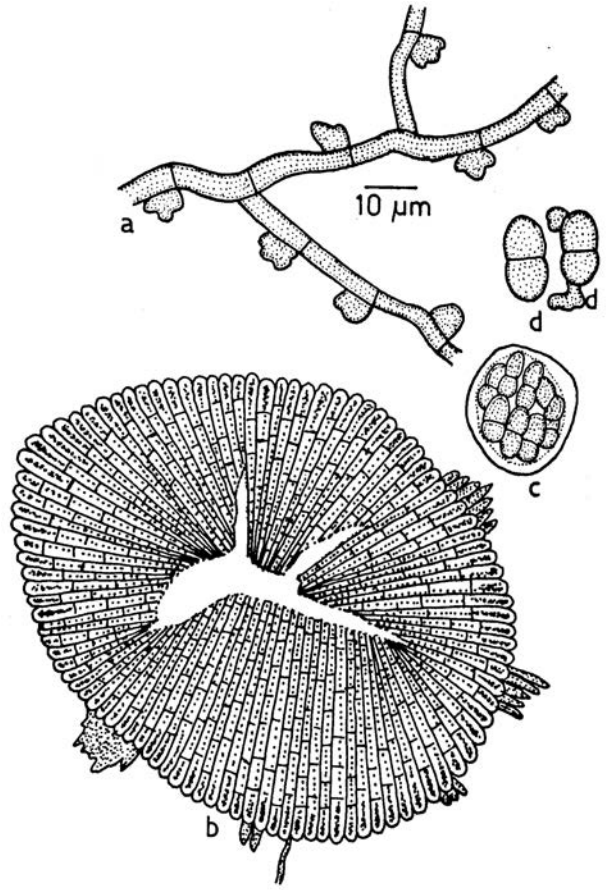


Figure. 44. ***Asterina oreocnidecola***
a - Appressoriate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores

C. Jagasth Thimmaiah.

Colonies amphigenous mostly epiphyllous, rarely hypophyllous, up to 3mm in diameter, confluent, very thin, sometimes difficult to trace. Hyphae brown, straight to undulate, branching alternate to opposite at wide angles, loosely reticulate, cells 9–16×3–5 µm. Appressoria pale brown, unicellular, alternate to unilateral, globose, stellately sublobate, rarely entire, 4–6×7–10 µm. Thyriothecia scattered, mostly rounded, up to 100µm in diameter, dehiscing stellately at the center, margin crenate to fimbriate, fringed hyphae yellow, slightly flexuous; asci many, globose to ovate, eight spored, 27–28×21–25 µm; ascospores brown, conglobate, 1-septate, 18–19×9–11 µm, one cell slightly larger, wall smooth.

Asterina parsonsiae Hosag., J. Mycopathol. Res. 44: 9, 2006; Hosag., Mycosphere 2(5): 736, 2012. (Fig.45).

Material examined: HCIO45657 (type), TBGT 1403 (isotype), 13.xi.2003, on leaves of *Parsonsia alboflavescens* (Dennst.) Mabberley (Apocynaceae), Medicinal Plant Conservation Area, Brahmagiri, Talacauvery, Madikeri, V.B. Hosagoudar et al.

Colonies amphigenous, mostly hypophyllous, subdense to dense, up to 5mm in diameter, confluent. Hyphae undulate, branching irregular at acute to wide angles, loosely reticulate and form a loose net, cells 16–24x3–5 µm. Appressoria alternate to unilateral, mammiform, broad based, crenately to irregularly lobate, 7–9x11–14 µm. Thyriothecia scattered to connate, orbicular, up to 130µm in diameter, stellately dehisced at the centre, margin crenate; asci globose, octosporous, up to 30µm in diameter; ascospores oblong, conglobate, uniseptate, slightly constricted, brown, 14–18x7–9 µm, wall smooth.

Based on the morphology and measurements of the ascospores and appressoria, *Asterina parsonsiae* is similar to *A. aganosmae* Sydow but differs from it having mammiform and crenately lobate appressoria (Sydow & Petrak, 1931).

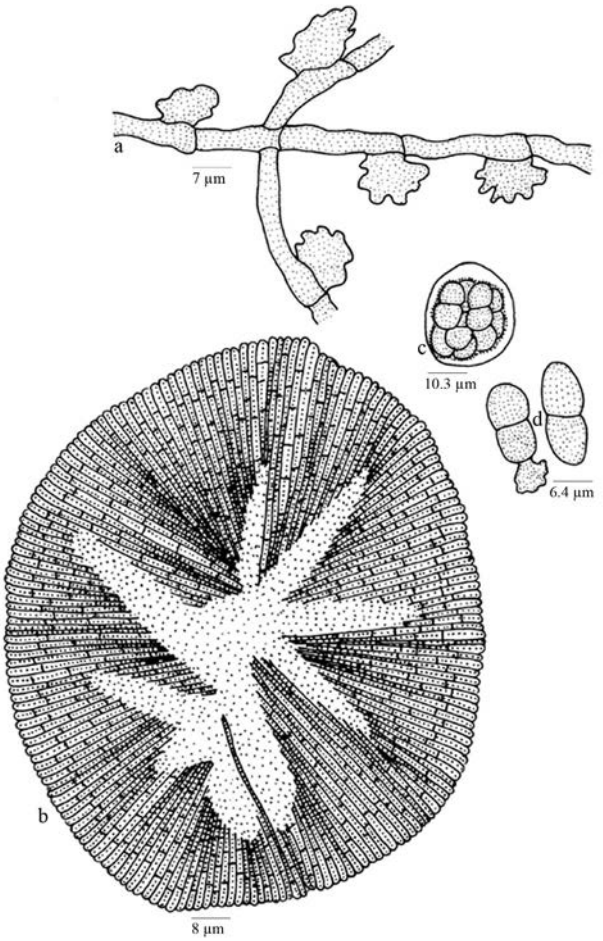


Figure 45. ***Asterina parsonsiae***
a - Appressoriate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores

Asterina piperina Sydow, Ann. Mycol. 15: 243, 1917; Hosag, H. Biju and Anu Appaiah, J. Mycopathol. Res. 44(1): p.10, 2006; Hosag., Mycosphere 2(5): 740, 2012.

Asterina piperis Yates, Philippine J. Sci. 13: 374, 1918. (Image 156).

Materials examined: HCIO 45685, TBGT 1432, 12.xi.2003, on leaves of *Piper* sp. (Piperaceae), Jodupal, Madikeri, V.B. Hosagoudar et al; FMKMCC 202, 16.xi.2010, *P. nigrum* L., Iguthappa temple, C. Jagath Thimmaiah; FMKMCC 203, 16.x.2010, Abbey falls, C. Jagath Thimmaiah.

Colonies amphigenous, up to 2mm in diameter, thin, discrete. Hyphae flexuous, branching irregular, loosely reticulate. Cells 19–26x4–6 µm. Appressoria distantly placed, mostly alternate to unilateral, antrorse to subretrorse, straight to curved 12–17 µm long;stalk cells cylindrical to cuneate, 3–6 µm long; head cells oblong, ovate, lobate, crenulate, angulose, crooked, few straight 9–12x4–6 µm. Thyriothecia scattered, orbicular, up to 110µm in diameter, stellately dehisced at the center, margin fimbriate; asci globose, octosporous, up to 28µm in diameter. Ascospores conglobate, brown, 1-septate, constricted, 15–18x6–7 µm, one cell is bigger than the other, wall smooth.

This fungus was associated with *Meliola stenospora.*

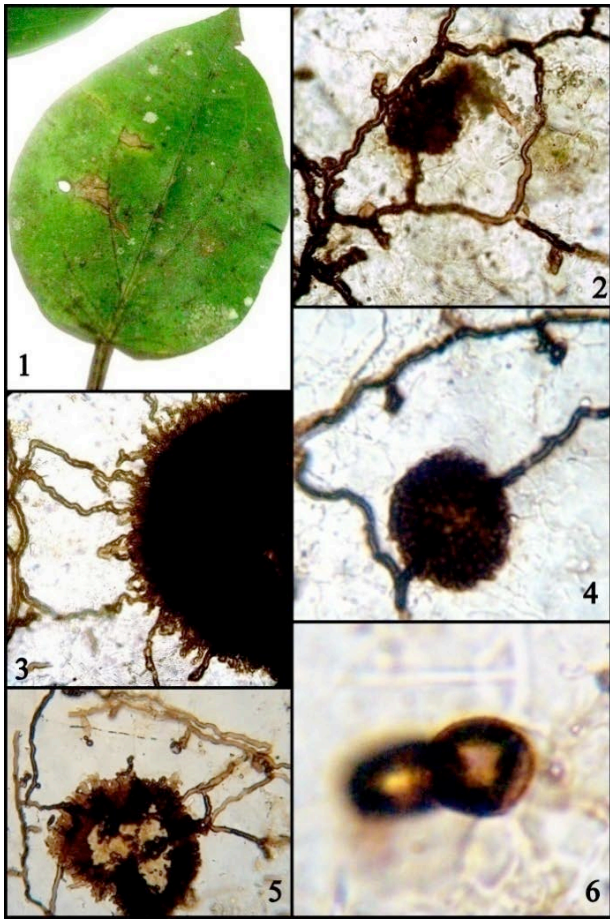


Image 156. *Asterina piperina*
1 - Infected leaf; 2 - Colony; 3 - Thyriothecium; 4 - Enlarged portion of the colony; 5 - Dehisced thyriothecium with asci; 6 - An ascospore

Asterina elachista Sydow, *A. piperina* Sydow and *A. piperis* Yates are known on the host genus *Piper* (Sydow & Sydow, 1917; Yates, 1918a,b; Hosagoudar & Abraham, 2000). The former species known from Uganda and the latter two species are known from Philippines. *A. piperis* Yates is identical with that of *A. piperina* in having two celled appressoria. The present collection matches well with the assigned species except having slightly longer appressoria and larger ascospores.

Asterina pusilla Sydow in Sydow & Sydow, Philippine J. Sci. 8: 488, 1913; Hosag. & Abraham, J. Econ. Taxon. Bot.4: 586, 2000; Hosag. & Sabeena, Zoos' Print J. 22:2786, 2007; Hosag., Chandra. & Agarwal, Asterinales of Kerala, 137, 2011; Hosag., Mycosphere 2(5): 746, 2012. (Image 157)

Materials examined: TBGT 5394, FMKMCC 203, 11.i.2010, on leaves of *Premna* sp. (Verbenaceae), Hoddur, C. Jagath Thimmaiah.

Colonies hypophyllous, subdense up to 5mm in diameter. Hyphae substraight, flexuous, branching opposite to alternate at subacute to wide angles, loosely to closely reticulate. Cells 18–20x4–5.5 µm. Appressoria alternate, unicellular, antrorse, sublobate, straight, globose, ovate, up to 5–7x4–8 µm. Thyriothecia scattered to connate, orbicular, up to 110µm in diameter, stellately dehisced at the center, margin fimbriate; asci globose up to 50µm in diameter. Ascospores brown, conglobate, 1-septate, constricted at the septum, one cell is bigger than the other, 16–19x8–10 µm, wall smooth.

Asterina talacauveriana Hosag., J. Mycopathol. Res.44 (1): Micro fungi of Coorg, Karnataka P.11, 2006; Hosag., Mycosphere 2(5): 755, 2012. (Image 158)

Material examined: HCIO 45700 (holotype), TBGT 1448 (isotype), 13.xi.2003, on leaves of *Scolopia* sp. (Flacourtiaceae), Medicinal Plant Conservation Area, Brahmagiri, Talacauvery, Madikeri, Kodagu (Coorg), Karnataka, V.B. Hosagoudar et al; HCIO 49432, TBGT 3677, 24.xi.2008, *Scolopia crenata* (Wight & Arn.) D. Clos, Galibeedu, V.B. Hosagoudar et al; HCIO 49434, TBGT 3679, 25.xi.2008, Talacauveri, November 25,2008, V.B. Hosagoudar et al; TBGT 5320, 24.xi.2008, Vanachalu, C. Jag-

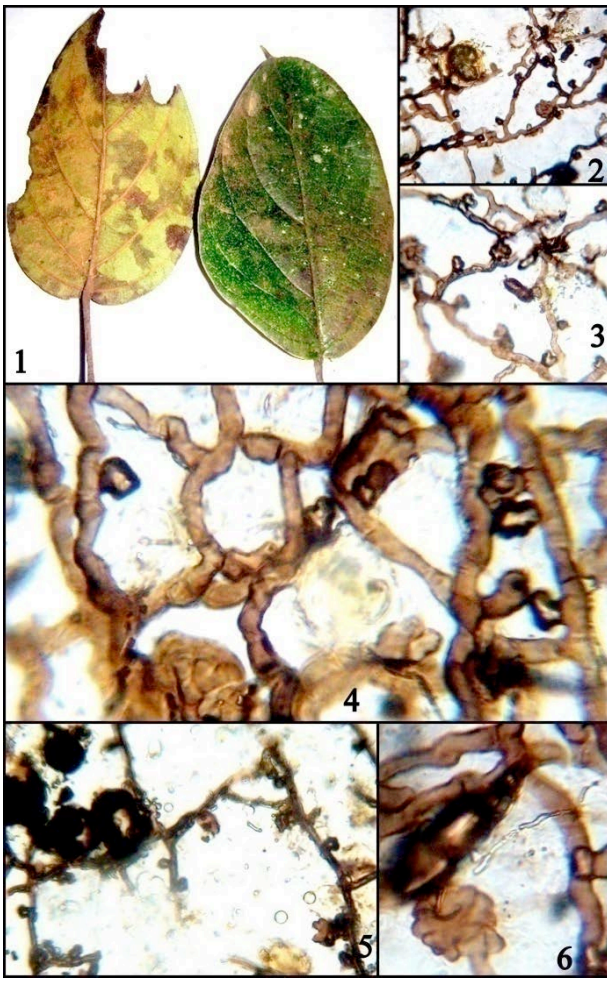


Image 157. *Asterina pusilla*
1 - Infected leaves; 2&3 - Colonies; 4 - Appressoriate hyphae; 5 - Dehisced thyriothecium; 6 - ascospore

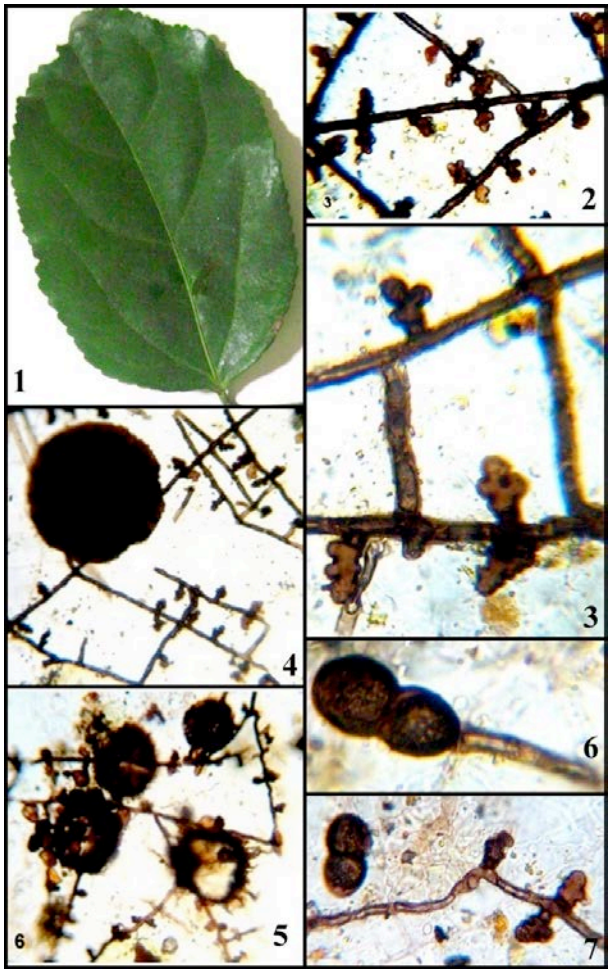


Image 158. *Asterina talacauveriana*
1 - Infected leaf; 2 - Colony. 3 - Appressoriate hyphae; 4 - Thyriothecium; 5 - Dehisced thyriothecia & pycnothyria; 6 &7 - Ascospores

ath Thimmaiah.

Colonies hypophyllous, dense, up to 3mm in diameter, confluent. Hyphae straight to substraight, branching mostly opposite at subacute to wide angles, loosely reticulate. Cells 25–30x4–5 µm. Appressoria opposite, few alternate, about 20% unilateral, antrorse to subantrorse, rarely retrorse, two celled, 10–18 µm long; stalk cells cylindrical to cuneate, 2–5 µm long; head cells shallowly or irregularly lobate, few angulose, 9–12x5–10 µm. Thyriothecia scattered, orbicular, stellately dehisced at the center, up to 90µm in diameter, margin fimbriate; asci not seen. Ascospores brown, conglobate, uniseptate, constricted 24–26x12–14 µm, wall smooth. Pycnothyria similar to thyriothecia, but smaller; pycnothyriospores brown, globose to broadly pyriform, 12–19x10–11 µm, wall smooth.

This species is close to *Asterina cylindrophora* Sydow and *A. flacourtiae* Petrak in having opposite appressoria. However, differs from both in having lobate head cells of the appressoria and smaller ascospores (Sydow & Sydow, 1917; Petrak & Sydow, 1931).

Asterina tertia Racib., Die Gattung Asterina 7: 103, 1913; Sacc., Sylloge Fungorum 24: 443, 1926; Hosag. & Abraham, J. Econ.Taxon. Bot4: 558, 2000: Hosag., Zoos' Print J. 21: 2329, 2006; H. Biju & Appaiah, J. Mycopathol. Res.43: 204, 2005; 44: 12, 2006; Hosag; Hosag. et al. Asterinales of Kerala, p.147, 2011; Hosag., Mycosphere 2(5): 755, 2012. (Image 159)

Materials examined: HCIO 45644, TBGT 1390, 11.xi.2003, on leaves of *Asystasia chelanoide* Nees (Acanthaceae), Abbe falls, V.B. Hosagoudar et al.;

HCIO 45611, TBGT 1354; HCIO 45671, TBGT 1418, 12.xi.2003 *Adathoda vasica* Nees (Acanthaceae), Jodupal, V.B. Hosagoudar et al.; HCIO 45746, TBGT 1495, 15.xi.2003, *Adhatoda zeylanica* Medikus (A. vasica Nees) (Acanthaceae), V.B.Hosagoudar et al.; HCIO 45732, TBGT

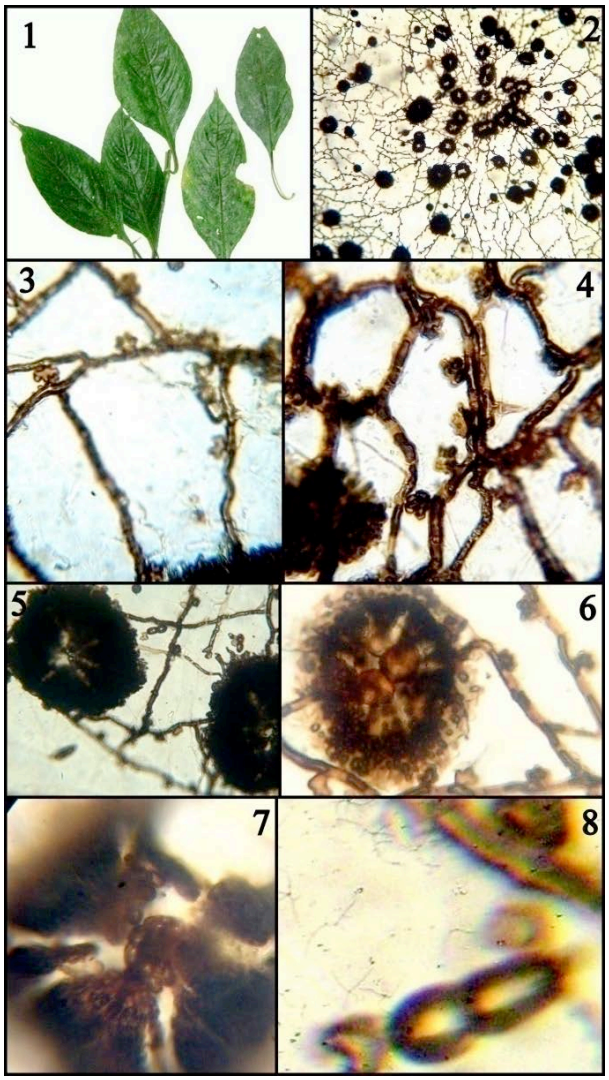


Image 159. *Asterina tertia*
1 - Infected leaves; 2 - Colony; 3&4 - Appressoriate hyphae; 5 - Thyriothecia dehisced; 6 - Dehisced pycnothyrium; 7 - Ascus; 8 - Germinating ascospore

1481, 12.xi.2003, *Justicia betonica* L. (Acanthaceae), Jodupal, V.B. Hosagoudar et al.; HCIO 45734, TBGT 1483, 12.xi.2003, *Barleria* sp. (Acanthaceae), Jodupal, V.B. Hosagoudar et al.; HCIO 45732, TBGT 1481, 12.xi.2003, *Crossandra* sp. (Acanthaceae), Jodupal, V.B. Hosagoudar et al.; TBGT 1558, 12.xi.2003, Jodupal, V.B. Hosagoudar et al.; TBGT 5378, FMKMCC 205, 26.xi.2008, on leaves of *Justicia wyanadensis* (Nees) T. Andres. (Acanthaceae), Hoddur, C. Jagath Thimmaiah; TBGT 5348, 25.xi. 2008 Strobilanthus sp., C. Jagath Thimmaiah; TBGT 5386, 25.xi. 2008 Hoddur, Jagath Thimmaiah.

Colonies amphigenous thin and scattered, up to 2mm in diameter. Hyphae flexuous, branching subopposite to opposite at subacute to wide angles, loosely reticulate. Cells 10–18x3–5 µm. Appressoria unicellular, alternate to unilateral antrorse, straight 6–10 µm, lobate, mostly 3 lobed, 6–10x4–7 µm. Thyriothecia grouped, orbicular with stellate dehiscence at the center, up to 120µm in diameter. Ascospores uniseptate, ellipsoidal, constricted, 19–25x8–12 µm, wall smooth. Pycnothyria many, similar but smaller than Thyriothecia; pycnothyriospores numerous, brown, pyriform, wall smooth, unicellular, up to 12–20x8–10 µm.

Asterina thotteae Hosag. & Hanlin, New Botanist 22: 188, 1995; Hosag. & Hosag., H. Biju & Appaiah, J. Mycopathol. Res. 44:12, 2006; Hosag., Chandra. & Agarwal, Asterinales of Kerala, p. 152, 2011; Hosag., Mycosphere 2(5): 759, 2012. (Fig.46).

Material examined: HCIO 45627, TBGT 1370, 12.xi.2003, on leaves of *Thottea* sp. (Aristolochiaceae), Jodupal, V.B. Hosagoudar et al.

Colonies epiphyllous, thin to subdense, spreading, up to 3mm in diameter, confluent. Hyphae substraight to

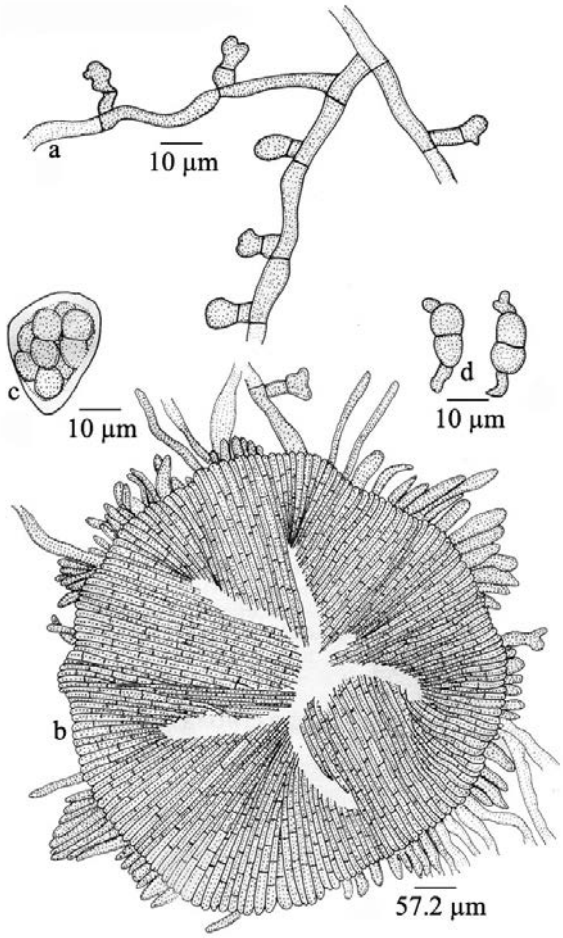


Figure 46. *Asterina thotteae*
a - Appressoriate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores

rarely crooked, branching alternate to opposite at acute to wide angles, loosely reticulate, cells 31–38×3–4 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, 6–13×6–10 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, 30–38×27–31 µm; ascospores conglobate, oblong, deep brown, rounded at both ends, 1-septate, constricted at the septum, 18–20×9–10 µm, wall verrucose.

Asterina toddaliicola Hosag., Agarwal, H. Biju & Archana, Indian Phytopathol. 59: 525, 2006; Hosag., Mycosphere 2(5): 763, 2012. (Fig.47)

Material examined: HCIO 46176 (type), TBGT 1588 (Isotype), 11.xi.2003, on leaves of *Toddalia* sp. (Rutaceae), Nishane motta, Madikeri, Coorg, Karnataka, V.B. Hosagoudar et al.

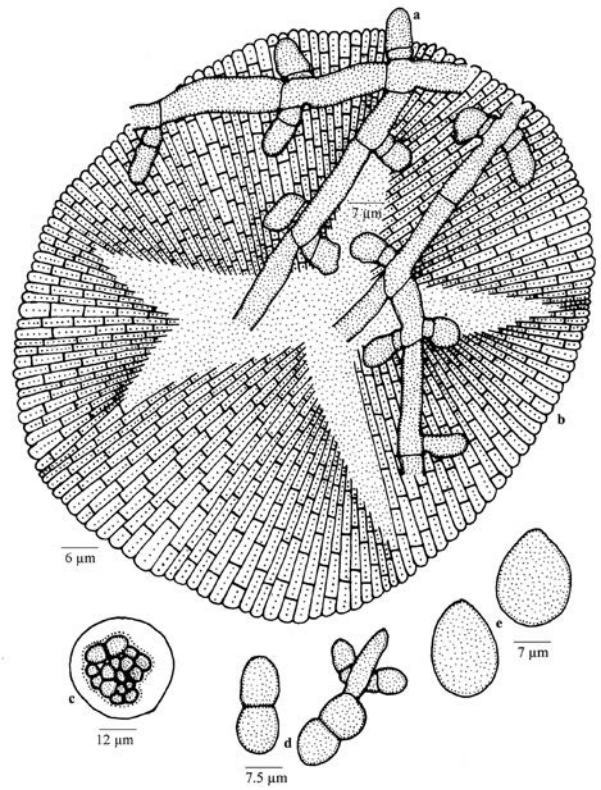


Figure 47. *Asterina toddaliicola*
a - Appressoriate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores; e - Pycnothyriospores

Colonies amphigenous, dense, velvety, up to 2mm in diam., often confluent. Hyphae straight, substraight to rarely crooked, branching alternate, opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 12–24x3–5 µm. Appressoria about 90% opposite, often solitary and alternate, mostly perpendicular to the hyphae, often slightly antrorse, two celled, 9–13 µm long; stalk cells cylindrical to cuneate, 3–4 µm long; head cells ovate, globose, entire, angular, rarely sublobate to lobate, 6–10x6–8 µm. Thyriothecia scattered to loosely grouped, orbicular, up to 100 µm in diam., stellately dehisced at the centre, margin crenate; asci very few, globose, octosporous, up to 35 µm in diam.; ascospores oblong, conglobate, brown, uniseptate, constricted at the septum, 19–21x12–13 µm, wall smooth. Pycnothyria similar to thyriothecia, smaller; Pycnothyriospores pyriform, apiculate at one end, brown, 19–21x13–15 µm, wall smooth.

Asterina toddaliae Kar & Ghosh (toddalae) is known on this host genus from West Bengal (Kar& Ghosh, 1986.). *Asterina toddaliicola* differs from it in having opposite, bicellular and straight appressoria.

Asterina tragiae Hosag. & Jagath., Plant Pathol. & Quarantine 3(1): 4, 2013. (Fig.48).

Materials examined:TBGT 6238c (holotype), 1.i2010, on leaves of *Tragia* sp. (Euphorbiaceae), Medikari, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense, spreading, up to 2mm in diameter. Hyphae straight to substraight, branching mostly alternate at acute angles, loosely reticulate, cells 17–25×2–3 µm. Appressoria 2-celled, distantly placed, mostly perpendicular to the hyphae,

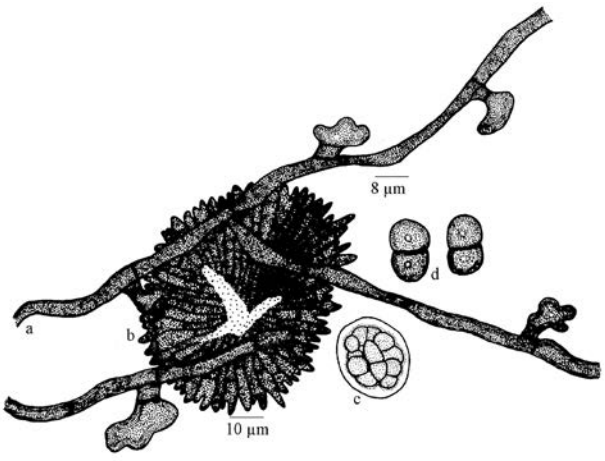


Figure 48. *Asterina tragiae*
a - Appressoriate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores; e - Pycnothyriospores

12–15 µm long; stalk cells cylindrical to cuneate, 5–7 µm long; head cells ovate to globose, straight to often variously curved, irregularly angular to sublobate, 7–10×5–8 µm. Thyriothecia scattered, up to 70µm in diameter, stellately dehisced at the centre; ascospores brown, conglobate, oblong, 1-septate, constricted at the septum, rounded at both ends, 12–15×10–12 µm., wall smooth.

Asterina trichiliae Doidge, Trans. Royal Soc. South Africa 8: 253, 1920. Hosag. & Goos, Mycotaxon 60: 161, 1996; Hosag., Mycosphere 2(5): 765, 2012. (Image 160).

Materials examined: TBGT 5440, FMKMCC 206, 1.xi.2009, on leaves of *Trichilia connaroides* (Wight & Arn.) Bentv. (Meliaceae), Hoddur, C. Jagath Thimmaiah.

Colonies amphigenous, mostly epiphyllous, up to 3mm in diameter. Hyphae straight, branching unilateral, opposite to subopposite at subacute angles, loosely reticulate. Cells 16–23x4.5–6 µm. Appressoria unicellular, opposite to subopposite, antrorse, few retrorse, ovate to bottle shaped, cylindrical, entire, 8–12x5–7 µm. Thyriothecia orbicular, stellately dehisced at the center, up to 200µm in diameter, margin fimbriate; asci globose, octosporous, up to15µm in diameter. Ascospores 1-septate, conglobate, constricted at the septum, 21–28x12–15 µm, wall smooth.

Asterina triumfetticola Yamam. Sci. Rep. Hyogo univ. Agri., Agric. Boil. Ser. 3: 29, 1957; Hosag. & Abraham, J. Econ. Taxon. Bot. 4: 585, 2000; Hosag. Zoos'Print J. 17: 945, 2002; 21: 2329, 2006; Hosag. et al. Asterinales of Kerala, p 158, 2011; Hosag., Mycosphere 2(5): 765, 2012. (Image 161).

Materials examined: on leaves of T*riumfetta rhomboidea* L. (Tiliaceae), Hoddur, 31Oct 2009, C. Jagath

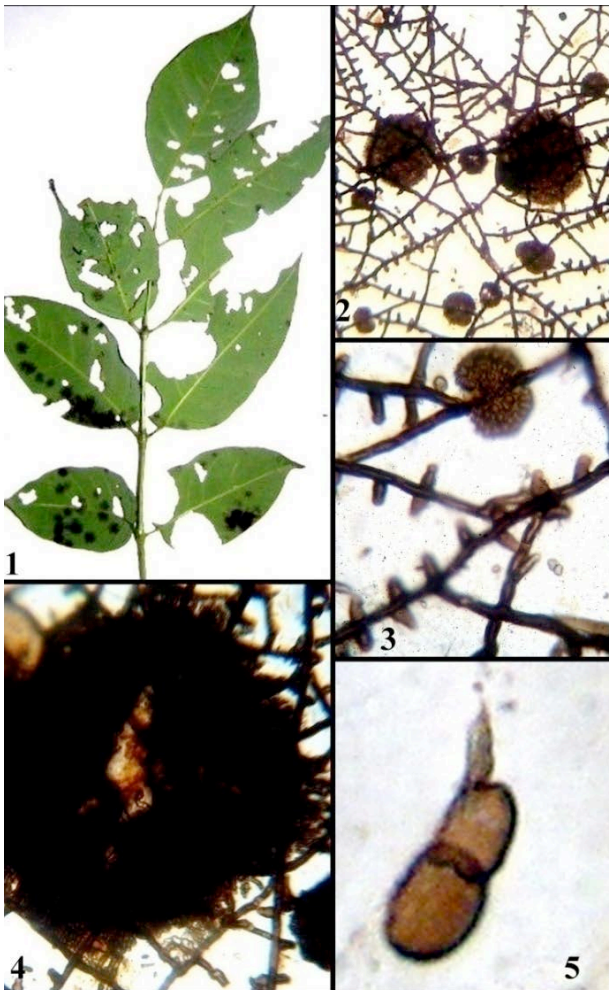


Image 160. *Asterina trichiliae*
1 - Infected leaflets; 2 - Colony; 3 - Appressoriate hyphae; 4 - Dehisced thyriotheciumk; 5 - Ascospore

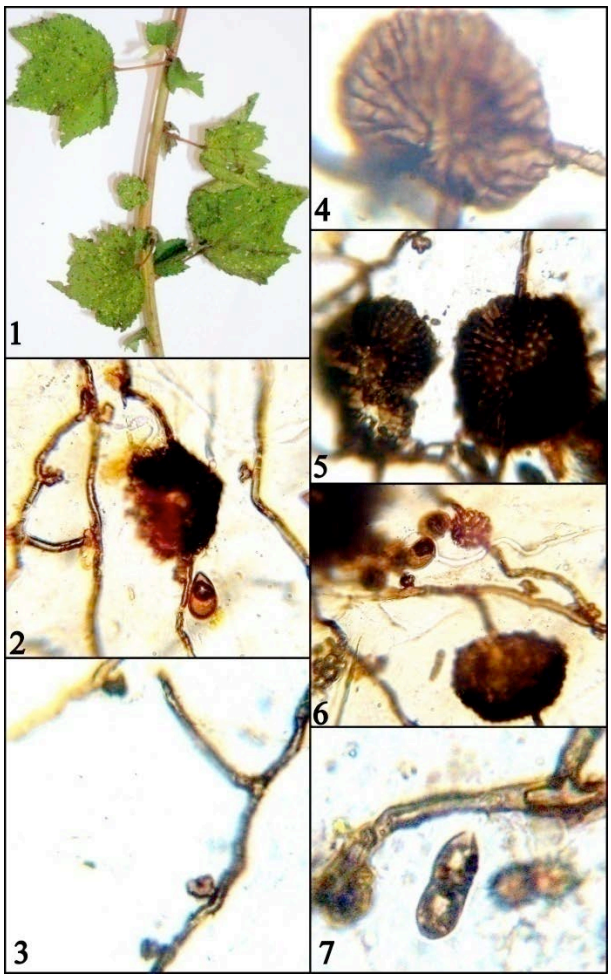


Image 161. *Asterina triumfetticola*
1 - Infected leaves; 2 - Colony; 3 - Appressoriate hyphae; 4 - Young thyriothecium; 5 - Dehisced thyriothecium; 6 - Pycnothyrium with pycnothyriospores; 7 - Ascospores

Thimmaiah TBGT 5436, FMKMCC 207; Hoddur, 29 Nov 2009, FMKMCC 208.

Colonies epiphyllous, thin, up to 2mm in diameter, confluent. Hyphae crooked, branching alternate to irregular at wide angles, loosely reticulate. Cells 25–31x3.5–5 µm. Appressoria alternate, unilateral, unicellular, ovate, lobate, sessile, 7–10x3–5 µm. Thyriothecia scattered, orbicular, up to 60µm in diameter, margin crenate, stellately dehisced at the center; asci globose, octosporous, up to 25µm in diameter. Ascospores oblong, conglobate, brown, uniseptate, constricted at the septum, 13–15x4–6 µm, wall smooth.

Asterina ushae Hosag., Jagath. & G.R. Archana, J. Threatened Taxa 5(2): 3663, 2013 (Image 162).

Materials examined: FMKMCC 209, 30.viii.2010, on leaves of Glochidion bourdillonii Gamble (Euphorbiaceae), Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, thin, up to 2mm in diameter. Hyphae straight to substraight, branching opposite, unilateral to irregular, loosely reticulate, cells 15–32x3–4 µm. Appressoria distantly placed, unilateral, alternate, long, cylindrical, 5–7 µm long; stalk cells mostly cylindrical, 5–7 µm long; head cells cylindrical, straight, slightly bilobed, attenuated at the apex, margin entire, few head cells crooked with fringed margin, 11–13x4–6 µm. Appressoria 15–29x4–5 µm. Thyriothecia scattered, orbicular, margin crenate, stellately dehisced at the center, up to 110µm in diameter; asci not seen. Ascospores 1-septate, conglobate, one cell globose, other one elongated 20–23x6–8 µm.

Asterina vitacearum Hosag., Jagath. & A. Sabeena, J. Threatened Taxa 5(2): 3664, 2013. (Image 163).

Materials examined: FMKMCC 210, 24.x.2010, on

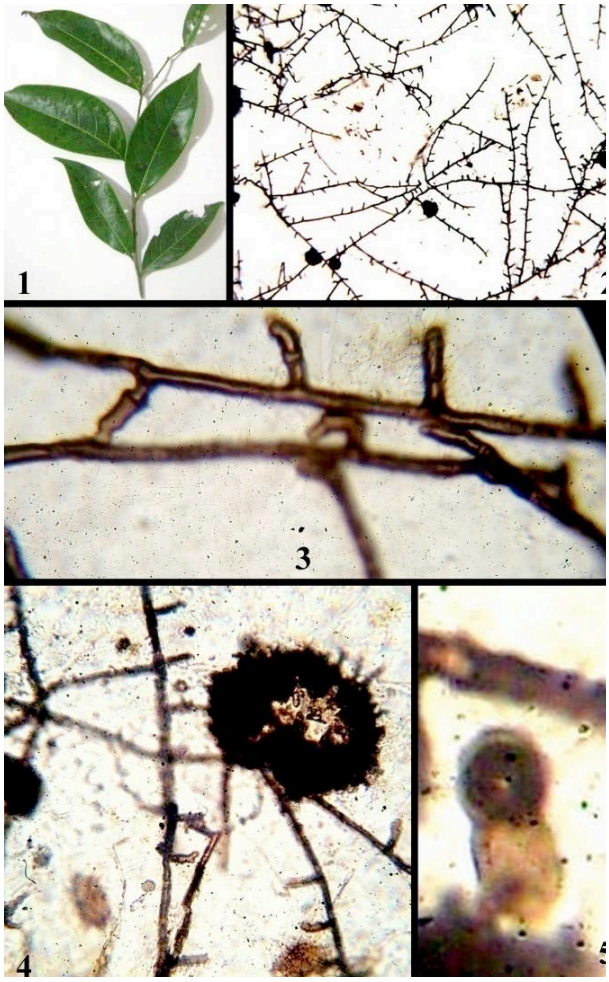


Image 162. *Asterina ushae*
1 - Infected leaves; 2 - Colony; 3 - Appressoriate hyphae; 4 - Dehisced thyriothecium; 6 - Ascospore

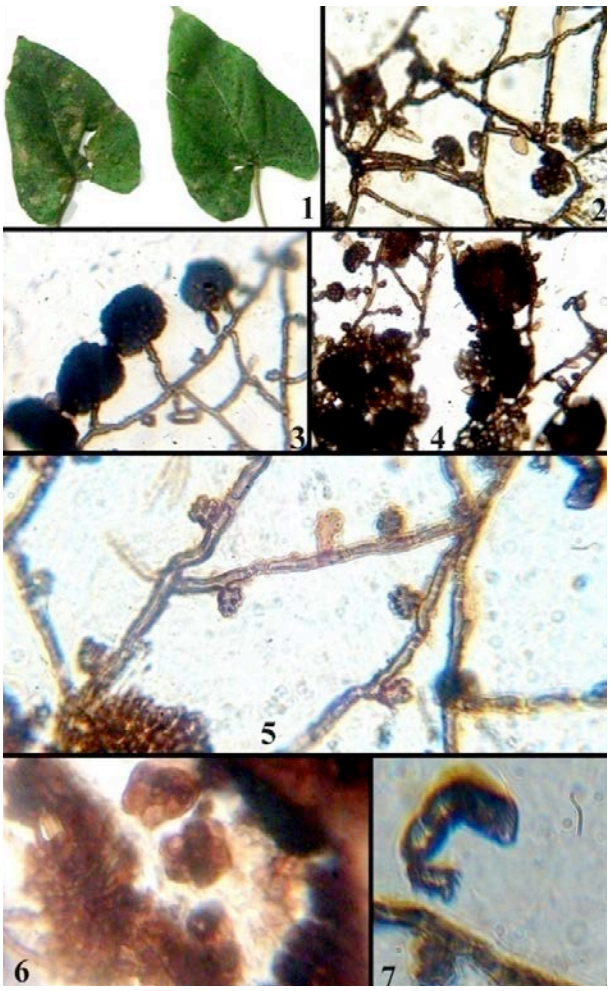


Image 163. *Asterina vitacearum*
1 - Infected leaves; 2 - Colony; 3&4 - Colonies with young thyriothecia; 5 - Appressoriate hyphae; 6 - Dehisced thyriothecium with asci; 7 - Germinating ascospore

leaves of *Cissus repens* Lam.(Vitaceae), Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, thin, up to 4mm in diameter. Hyphae thin, substraight to flexuous, distantly placed, unilateral, alternate, sublobate to deeply lobed, 6–12x7–11 µm; Thyriothecia grouped to scattered, orbicular, margin crenate to fimbriate, stellately dehisced at the center, up to 140µm in diameter; asci up to 32µm in diameter, octoporous. Ascospores 1-septate, conglobate, constricted at the septum, 15–19x8–10 µm.

Asterina cissi and *Asterina viticola* are known on the members of Vitaceae. This species differs from the former in having typically sublobate head cells of the appressoria and the latter in having only alternate and unilateral appressoria.

Asterina viticola Kar & Ghosh, Indian Phytopathol. 39: 207, 1986; Hosag., Mycosphere 2(5), 768, 2012. (Image 164)

Materials examined: TBGT 5709, FMKMCC 211, 23.ix.2009, on leaves of Vitaceae member, Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense, up to 4mm in diameter. Hyphae straight, flexuous to crooked, branching alternate, opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 10–21×4–7 µm. Appressoria scattered, alternate to unilateral, about (1%) opposite, sessile to stipitate, unicellular, ovate, globose to mammiform, crenately to deeply lobate, often attenuated at the apex, 6–12×7–11 µm. Thyriothecia loosely to closely grouped, orbicular, stellately dehisced at the center, up to 140µm in diam., margin crenate to fimbriate; asci globose, 8- spored, up to 32µm in diam.; Ascospores brown, conglobate, oblong, cylindrical, uniseptate, constricted at the septum, 15–20×8–11 µm, wall smooth. Pycnothyria numerous, scattered to closely grouped, orbicular, smaller than thyriothecia, stellately dehisced at the center; pycnothyria numerous, ovate, oblong, pyriform, 11–16×7–9 µm.

This species was known on *Vitis japonica* from Darjeeling, West Bengal (Kar & Ghosh, 1986) and the present locality reveals its extended distribution.

Asterina wingfieldii Hosag. Balakr. & Goos, Mycotaxon 59: 184, 1996; Hosag., Mycosphere 2(5): 771, 2012. (Image 165).

Materials examined: FMKMCC 212, 4.xii.2009, on leaves of *Grewia* sp. (Tiliaceae), Deavarakadu, Hoddur,

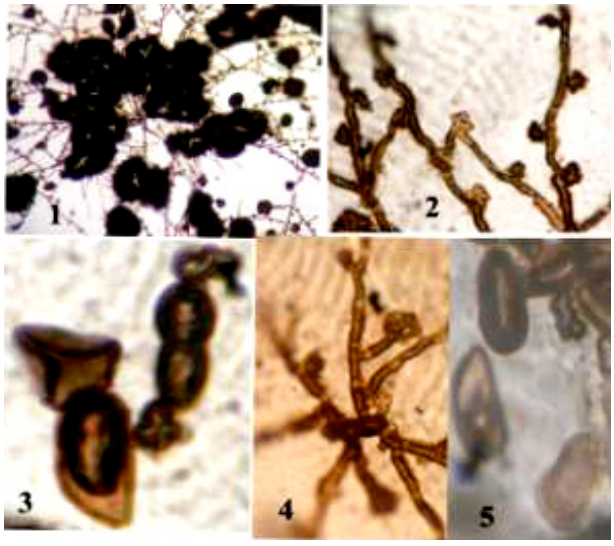


Image 164. ***Asterina viticola***
1 - Colony & dehisced thyriothecia; 2 - Hyphae & appressoria; 3 - Germinated ascospores; 4 - Young colony; 5 - Pycnothyriospores.

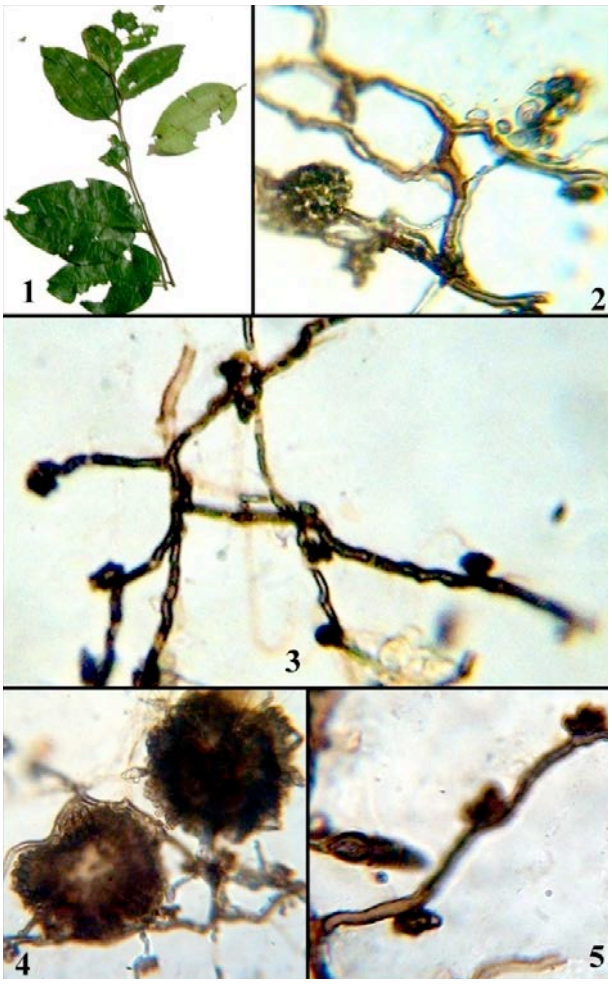


Image 165. ***Asterina wingfieldii***
1 - Infected leaves; 2 - Loosely reticulate colony; 3 - Branching & Appressoria; 4 - Dehisced thyriothecia; 5 - Ascospore

C. Jagath Thimmaiah.

Colonies epiphyllous, thin, up to 2mm in diameter, confluent. Hyphae thin, brown, substraight to flexuous, branching opposite to irregular at acute angles, loosely reticulate. Cells 14–18x3–4 µm. Appressoria unicellular, alternate to irregular, straight to variously curved, globose, angular to sublobate, 3–7x6–8 µm. Thyriothecia scattered to grouped, often connate, circular to ovate, up to 110µm in diameter, dehiscing stellately at the center, margin crenate to fringed; asci many, globose, eight spored, 24–32 µm in diameter. Ascospores conglobate, brown, 1-septate, deeply constricted at the septum, 18–21x8–10 µm, upper cell slightly larger, wall smooth.

This species is similar to Asterina delicate Doidge (Doidge, 1942) but differs from it in having only epiphyllous colonies, flexuous to crooked hyphae, unicellular and smaller appressoria, and smaller thyriothecia, asci and ascospores.

This species was associated with I*renopsis coimbatorica.*

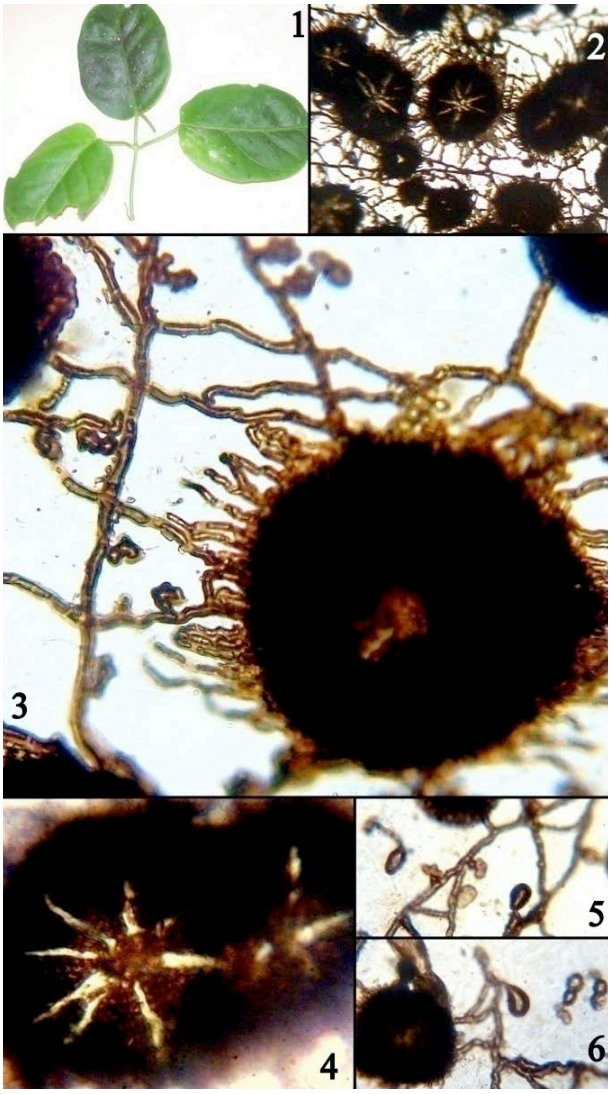


Image 166. *Asterina wrightiae*
1 - Infected leaves; 2 - Colony; 3 - Appressoriate hyphae with Thyriothecia; 4 - Dehisced thyriothecium with asci; 5. Germinating pycnothyriospores; 6. Germinating ascospores & pycnothyrithecium

Asterina wrightiae Sydow in Sydow & Petrak, Ann. Mycol. 29: 236, 1931; Hosag. & Abraham, Indian Phytopath. 51: 390, 1998; J. Econ.Taxon. Bot. 4: 560, 2000; Hosag. C.K. Biju & Abraham, J. Econ.Taxon. Bot. 25: 305, 2001; Hosag. Zoos' Print J.18: 1280, 2003; 21: 2329, 2006; Hosag. et al. Asterinales of Kerala, p 160, 2011; Hosag., Mycosphere 2(5): 769, 2012. (Image 166)

Materials examined: FMKMCC 213, 8.i.2009, on *Wrightia* sp. (Apocyanaceae), Hoddur, Jan 8, 2009, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense to dense, up to 2mm in diameter. Hyphae straight to flexuous, branching irregular at acute angles loosely reticulate. Cells 13–20x3–4.5 µm. Appressoria 2-celled, few appressoria are unicellular, unilateral to alternate, few opposite, antrorse to subantrorse, reflexed, straight to curved, up to 12–18 µm long; stalk cells cuneate to cylindrical, up to 3–9 µm; head cells ovate, globose, cylindrical, angular to sublobate, rarely entire to deeply lobate, few head cells attenuated at the apex, rarely crenate margin, straight to crooked, hamate, up to 8–10x6–11 µm. Thyriothecia grouped, orbicular, stellately dehisced at the center, up to 140µm diameter, margin crenate to fimbriate, fringed hyphae short, flexuous to crooked; asci globose, octosporous up to 34µm in diameter. Ascospores brown, conglobate, uniseptate, constricted, 15–22x6–8 µm. Pycnothyria mixed with thyriothecia, Pycnothyriospores many, ovate, pyriform, brown and unicellular, up to 15–22x8–11 µm.

Reported for the first time from Karnataka.

Asterina zanthoxyli Yamam. Sci. Rep. Hyogo Univ. Agric. Biol. Ser.3: 28, 1957; Hosag., Jacob Thomas and P.J. Robin,Indian J. Sci. & Techn. 2 (6): 1, 2009; Hosag., Mycosphere 2(5): 772, 2012. (Image 167)

Materials examined: on leaves of *Zanthoxylum rhetsa* (Roxb.) DC. Prodr. (Rutaceae), Galibeedu, Kodagu, 24 Nov 2008, C. Jagath Thimmaiah TBGT 5341, FMKMCC 214, Zanthoxylum sp. (Rutaceae), Bhagamandala, 25 Nov 2008, C. Jagath Thimmaiah TBGT 5356, FMKMCC 215.

Colonies epiphyllous, dense up to 4mm in diameter. Hyphae substraight, branching opposite at subacute angles, closely reticulate. Cells 15–26x4–6 µm. Appres-

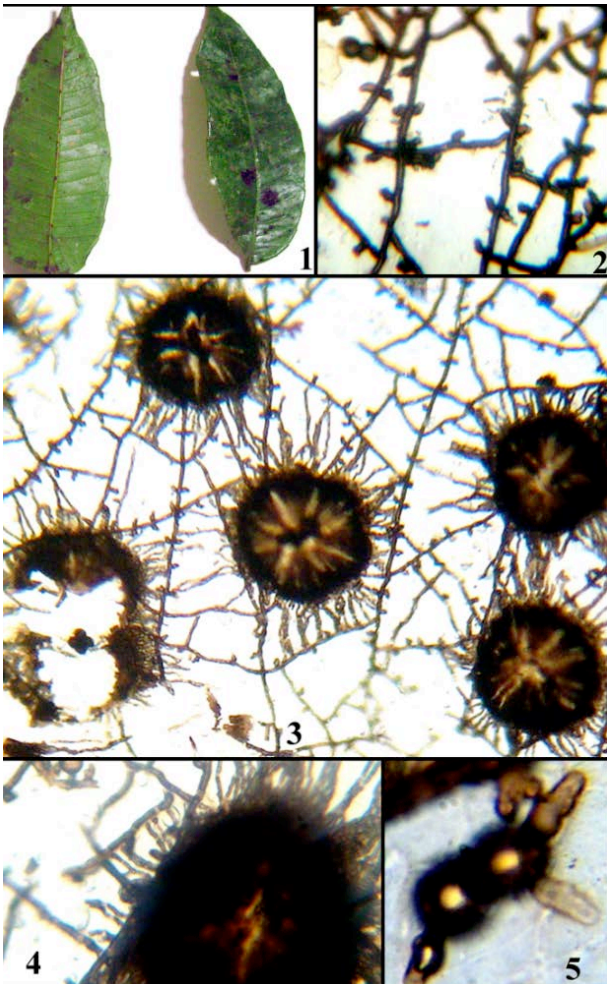


Image 167. *Asterina zanthoxyli*
1 - Infected leaves; 2 - Appressoriate hyphae; 3 - Colony with dehisced thyriothecia & asci; 4 - Dehisced thyriothecium; 5 - Germinating ascospore

soria, unicellular opposite, few unilateral et alternate, straight, few reflexed, ovate, lobate, curved inwards 7–10x4–6 µm. Thyriothecia orbicular, grouped to scattered, up to 160µm in diameter, stellately dehisced at the center, margin crenate to fimbriate; asci few, ovate to globose, octosporous, 28µm in diameter. Ascospores 2-celled, conglobate, constricted at the septum, 20–23x9–10 µm, wall smooth.

Reported for the first time from Karnataka.

Genus *Asterolibertia*

Asterolibertia Arn., Les Asetrinees, 1: 161, 1918; Hansf. Mycol. Pap. 15: 189, 1946; Muller & Arx, Beitr. Krypt. Schw.11: 97, 1962; Luttrell in Ainsworth et al. (eds). The Fungi An advanced Treatise 4: 207, 1973; Arx & Muller, Stud. Mycol. 9: 43, 1975; Biligrami, Jamaluddin & Rizvi, 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.

Steyaertia Bat. & Maia, Univ. Recife, Inst. Mycol. Publ. 295: 5, 1960.

Wardina Arn., Les Asetrinees 1: 165, 1918.

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

Type sp. *Asterolibertia couepiae* (Henn.) Arn.

Asterolibertia mangiferae Hansf.&Thirum., Farlowia 3: 303, 1948; Hosag., Zoo's print J. 18: 1280, 2003; Hosag. & Appaiah, J. Mycopathol. Res. 43:171, 2005; Hosag., & Archana & Sabeena, Indian J. Sci. Techn. 2(6): 28, 2009; Hosag et al., Asterinales of Kerala, p. 164, 2011. (Image 168).

Materials examined: TBGT, FMKMCC 216, 16.iii.2010, on leaves of *Mangifera indica* L. (Anacardiaceae), Karnataka, Kodagu, Hoddur, C. Jagath Thimmaiah .

Reported for the first time from Karnataka

Colonies epiphyllous, dense, crustose, up to 4mm in diameter, confluent. Hyphae straight to substraight, branching opposite at subacute angles to unilateral, loosely reticulate. Cells 21–38x5–7 µm. Appressoria intercalary, resulting in bulging of the hyphae indicating the location of appressoria with a central hyaline spot, usually found between two, three or more cells, 10–13x7–11 µm. Thyriothecia grouped to scattered, orbicular, up to 400µm in diameter, margin fimbriate, stellately dehisced at the center; asci not seen. Ascospores 1-septate, conglobate, constricted at the septum, brown, 22–25x8–10 µm, wall smooth.

Asterolibertia vateriae Hosag., J. Mycopathol. Res. 44: 13, 2006; Hosag., Chandra. & Agarwal, Asterinales of Kerala, p. 168, 2011; Hosag. Mycosphere 2(5): 774, 2012. (Fig. 49).

Material examined: HCIO 45752 (holotype), TBGT 1501 (isotype), 12.xi.2003, on leaves of *Vateria indica* L. (Dipterocarpaceae), Jodupal, Madikeri, V.B. Hosagoudar 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

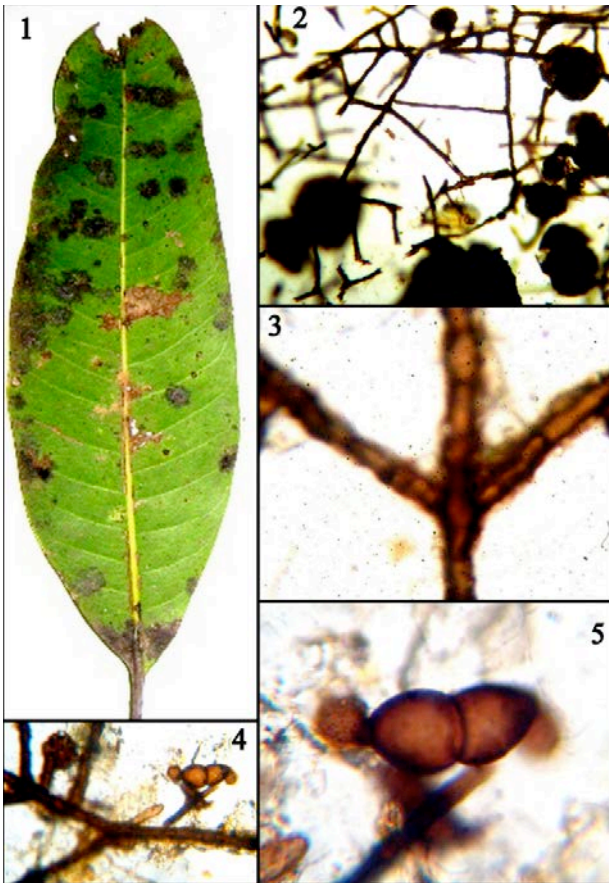


Image 168. ***Asterolibertia mangiferae***
1 - Infected leaf; 2 - Colony with thyriothecia; 3 - Hyphae with intercalary appressoria; 4&5 - Germinating ascospores

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, consctricted 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, 1997).

The colonies were hyper parasitized by Hansfordiellina asterinarum Hughes

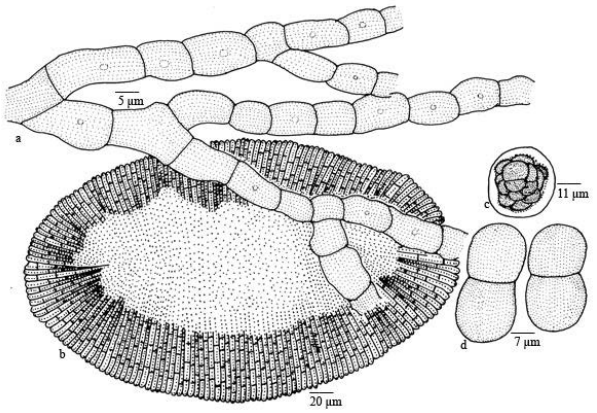


Figure 49. ***Asterolibertia vateriae***
a - Intercalary appressoria; b - Thyriothecium; c - Ascus; d - Ascospores

Genus *Ishwaramyces*

Ishwaramyces Hosag., J.Econ. Taxon. Bot. 28: 183, 2004.

Leaf parasites. Mycelium ectophytic, appressoria 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. *Ishwaramyces flacourtiae* Hosag. et al.

The genus Ishwaramyces differs from the genus Asterina in having axillary clusters of appressoria (Muller & Arx, 1962; Arx & Muller, 1975).

Ishwaramyces flacourtiae Hosag., Kumar & Sabu in Hosag., C.K. Biju & Abraham, J Econ.Taxon. Bot. 28: 183, 2004; Hosag., Zoos' print J. 21: 2414, 2006., Hosag., Chandra. & Agarwal, Asterinales of Kerala, p. 169, 2011; Hosag. Mycosphere 2(5): 780, 2012. (Image 169)

Materials examined: FMKMCC 217, 4.xii.2009, on leaves of *Flacourtia montana* Graham, (Flacourtiaceae), Devarakadu, Hoddur, C. Jagath Thimmaiah; FMKMCC 218, xiii.2010, Sampaje Ghats, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense, up to 4mm in diameter, confluent. Hyphae straight to substraight, branching opposite at subacute to wide angles, closely reticulate. Cells 13–30x4–6 µm. Appressoria opposite, produced in clusters, 2-celled, antrorse, 9–14 µm long; stalk cells cylindrical to cuneate, 2–4 µm long; head cells ovate, globose, entire, 6–10x5–8 µm. Thyriothecia scattered to grouped, orbicular, margin crenate, up to 370µm in diameter, dehisces stellately at the center; asci not seen. Ascospores 1-septate, conglobate, constricted at the septum, broadly elliptic, 22–25x09–12 µm, wall smooth. Pycnothyriothecia similar to thyriotyhecia, smaller, pyc-

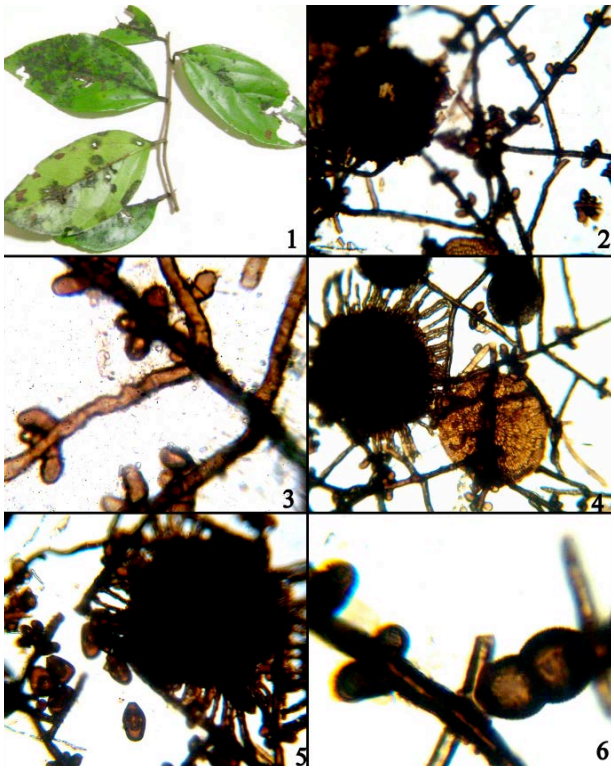


Image 169. *Ishwaramyces flacourtiae*
1 - Infected leaves; 2 - Colony with dehisced thyriothecium; 3 - Appressoriate hyphae; 4 - Pycnothyriothecia; 5 - Pycnothyriospores; 6 - An ascospore.

nothyriospores pyriform, brown, 10–13x6–7 µm.

Reported for the first time from Karnataka.

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.

Patouillardina Arn., Les Asetrinees, 1: 181, 1918.

Leaf parasites. Mycelium ectophytic, appressoria lateral Thyriothecia orbicular with radiating cells, astomatous, dehisce stellately at the center; 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. *Meliolaster claviforus* (Pat.) Hohn.

Meliolaster aporusae Hosag., Harish & Archana, Indian J. Sci. Techn. 2 (6): 14, 2009; Hosag., Chandra. & Agarwal, Asterinales of Kerala, p. 171, 2011. (Image 170).

Materials examined: TBGT 5434, FMKMCC 219, 5.xi.2009, on leaves of *Aporusa lindleyana* (Wight) Baill., (Euphorbiaceae), Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense, scattered up to

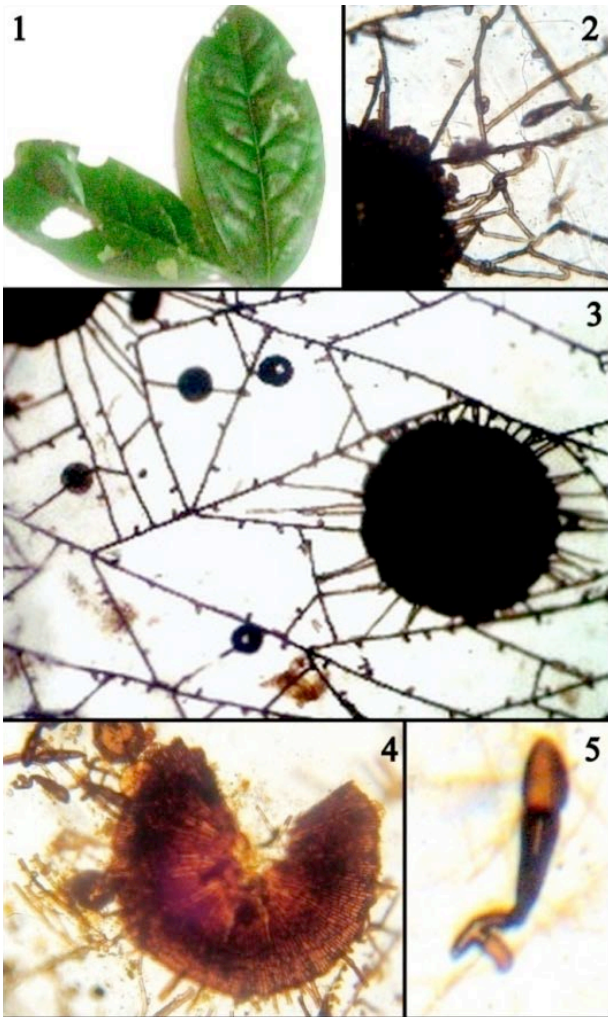


Image 170. *Meliolaster aporusae*
1 - Infected leaves; 2 & 3 - Colonies; 4 - Dehisced thyriothecium; 5 - 2-septate Ascospore

4mm in diameter, confluent. Hyphae thin, straight, branching opposite at subacute to wide angles, loosely reticulate. Cells 26–29x5–6.5 µm. Appressoria unilateral, alternate, unicellular, subantrorse, straight, ovate, rounded at apex, broad based, entire, 10–12x7–8 µm. Thyriothecia scattered, orbicular, stellately to irregularly dehisced at the center, up to 260µm in diameter, margin crenate to fimbriate, fringed hyphae straight; asci globose to ovate, octosporous, 55–60x50–55 µm. Ascospores 2-septate,upper cell globose, lower two cells narrowed and taper towards base, constricted only at the upper septum, 41–45x12–14 µm, wall smooth.

This species was associated with Asterina aporusae.

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 Ainsworth et al. (ends). The Fungi An advanced Treatise 4: 207, 1973; Arx & Muller, Stud. Mycol. 9: 44, 1975; Biligrami, Jamaluddin & Rizvi, Fungi of India P. 54, 1991; Hosag., Abraham & C. K. Biju, J. Mycopathol. Res. 39: 62, 2001; Singh, Duke, Bhandari & Jain, J. Econ. Taxon. Bot. 30: 191, 2008.

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

Type sp. *Prillieuxina winteraria* (Pazschke) Arn.

Prillieuxina elaeagni Hosag. & C. K. Biju in Hosag., C. K. Biju & Abraham, J. Mycopathol. Res. 40: 195, 2002; Hosag. C. K. Biju & Abraham, Indian Phytopath. 57: 115, 2004; Hosag. et al, Asterinales of Kerala, p. 175, 2011. (Image 171).

Materials examined: FMKMCC 220, 16.xi.2010, on leaves of *Elaeagnus kologa* Schlecht. (Elaeagnaceae), Mandalpatti, Karnataka, Kodagu, C. Jagath Thimmaiah.

Reported for the first time from Karnataka.

Colonies epiphyllous, thin, dense, up to 1mm in diameter. Hyphae straight to flexuous, branching alternate at acute to wide angles, loosely reticulate. Cells 20–30x3–4 µm. Appressoria absent. Thyriothecia mostly aggregated, orbicular, up to 200µm in diameter, stellately dehisced at the center, margin crenate to fimbriate, fringed hyphae straight to substraight, long and run parallel; asci not seen. Ascospores conglobate, brown, 1-septate, constricted at the septum, 20–25x9–11 µm, wall smooth.

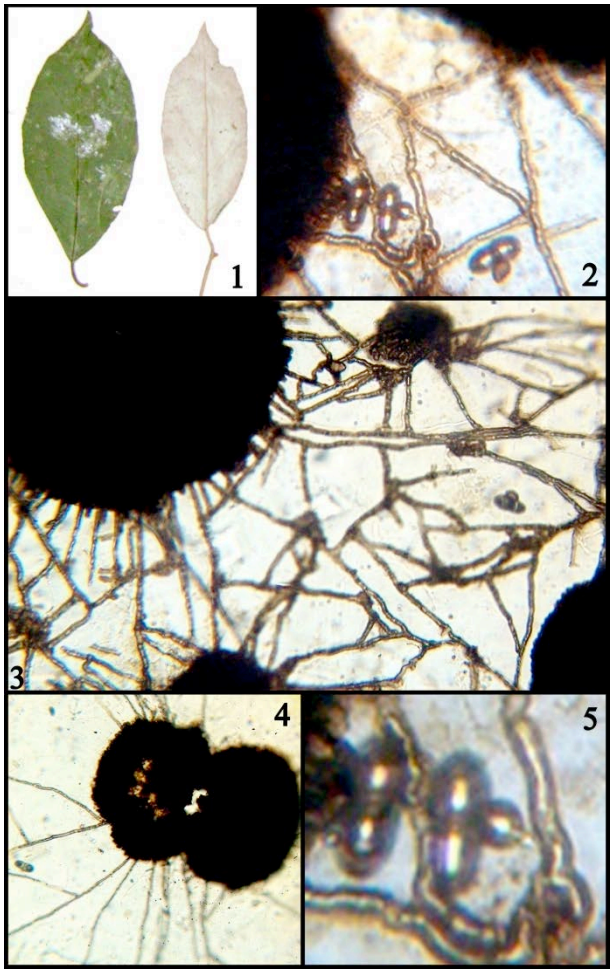


Image 171. *Prillieuxina elaeagni*
1 - Infected leaves; 2 & 3 - Colonies; 4 - Dehisced thyriothecium; 5 - Ascospores

Prillieuxina humboltiae Hosag., Jagath & G.R. Archana, J. Threatened Taxa 5(2): 3666, 2013. (Fig. 50).

Material examined: TBGT 5791 (holotype), 1.viii.2010, on leaves of *Humboltia* sp. (Fabaceae), Sampaje Ghats, C. Jagath Thimmaiah.

Colonies hypophyllous, thin, crustose, up to 3mm in diameter, confluent. Hyphae substraight, flexuous to slightly crooked, branching opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 8–32x3–5 µm. Thyriothecia scattered to loosely grouped, orbicular, up to 245µm in diameter, stellately dehisced at the centre, margin fimbriate, fringed hyphae small; asci globose, octosporous, up to 28µm in diameter; ascospores conglobate, uniseptate, constricted at the septum, 20–24x9–12 µm. Pycnothyriospores oval, pyriform, unicellular, 16–24x9–13 µm.

The genus *Humboldtia* is known to have three *Lem-*

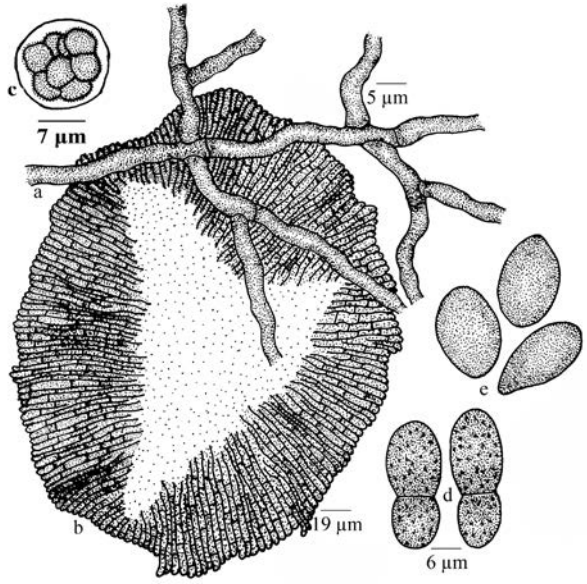


Figure 50. *Prillieuxina humboltiae*
a - Mycelium; b - Thyriothecium; c - Ascus; d - Ascospores

bosia species from the Western Ghats (Hosagoudar et al. 2009) but the present fungus differs from them in having orbicular thyriothecia and the mycelium being free from appressoria.

II. FAMILY LEMBOSIACEAE

Leaf parasites. Mycelium ectophytic, with or without appressoria, nutrient mycelium and leaf penentrating stroma present. Ascomata ectophytic, dimidiate, oval, ellipsoidal, X or Y shaped, elongated with radiating cells, astomatous, dehisce longitudinally at the center; asci globose, spherical, octoporous, bitunicate; ascospores one to many septate, conglobate, hyaline to brown.

Key to the Genera

1. Appressoria present.....2
1. Appressoria absent 3
2. Appressoria intercalary .....*Cirsosia*
2. Appressoria lateral.....*Lembosia*
3. Conidia present.....4
3. Conidia absent.....5
4. Conidia 1-3 septate.....*Eupelte*
5. Hypostroma absent.....*Echidnodella*

Key to the species

Caesalpinaceae

Lembosia

Single species.....*Lembosia humboldtiae*

Lembosia

Single species.....*Lembosia garciniae*

Dipterocarpaceae

Cirsosia

1.On Hopea.....*Cirsosia hopeae*

1.On Vateria.....*Cirsosia vateriae*

Echidnodella

Single species.....*Echidnodella vateriae*

Myrtaceae

Lembosia

Single species .....*Lembosia hosagoudarii*

Oleaceae

Eupelte

Single species.....*Eupelte amicta*

Pandanaceae

Lembosia

Single species.....*Lembosia pandanacearum*

Sapotaceae

Echidnodella

Single species.....*Echidnodella mimusopsidis*

Descriptions of species

Genus *Cirsosia*

Cirsosia Arn., Ann.Ecol. Nat. Agric. Montpellier 16: 127, 1918; Hansf. Mycol. Pap. 15: 189, 1946; Muller & Arx, Beitr. Krypt. Schw. 11: 113, 1962; Luttrell in Ainsworth et al. (eds). The Fungi An advanced Treatise 4: 207, 1973; Arx & Muller, Stud. Mycol. 9: 44, 1975; Hosag. Abraham & C.K. Biju, J. Mycopathol. Res. 39: 62, 2001; Singh, Duke, Bhandari & Jain, J. Econ. Taxon. Bot. 30: 186, 2008.

Cirsosiella Arn., Les Asterinees 1: 127, 1918.

Halbania Arn., Les Asterinees1: 163, 1918.

Lembopodia Bat., Publ. Inst. Mycol. Univ. Recife 229: 15, 1963.

Leaf parasites. Mycelium ectophytic, appressoria intercalary. 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.: *Cirsosia manaosensis* (Henn.) Arn.

Cirsosia hopeae Hosag. & Jacob Thomas, Taprobanica 3: 17, 2011; Hosag., Mycosphere 2(5): 797, 2012. (Image 172).

Materials examined: FMKMCC 221, 23.xii.2010, on leaves of *Hopea ponga* (Dennst.) Mabb, (Dipterocarpaceae), Makutta, C. Jagath Thimmaiah.

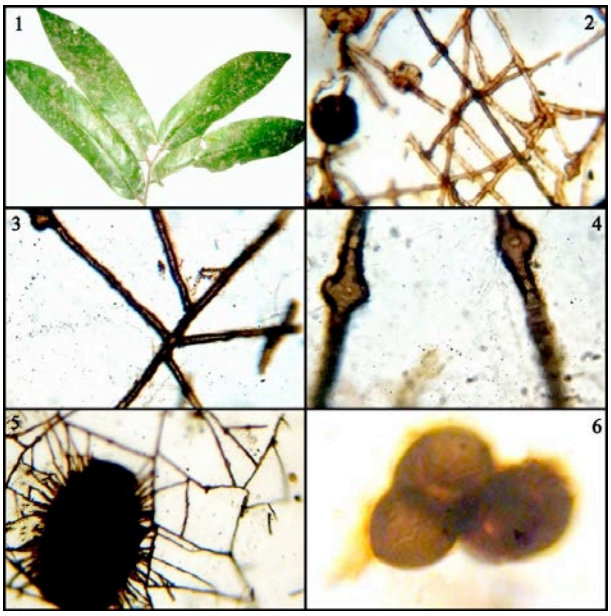


Image 172. *Cirsosia hopeae*
1 - Infected leaves; 2 - Colony; 3 - Branched hyphae; 4 - Intercalary appressoria; 5 - Thyriothecium; 6 - Ascospores

Colonies epiphyllous, black, up to 10mm in diameter, confluent. Hyphae mostly straight, substraight, branching opposite at wide angels to alternate, loosely reticulate. Cells 30–35x4–5 µm. Appresoria intercalary, bulged with a hyaline at the spot at the center, ovate, 13–17x10–15 µm. Thyriothecia initially orbicular, scattered to grouped, few connate, later elongated at maturity, dehisce longitudinally at the center, 300–500x170–210 µm. Margin fimbriate; asci not seen. Ascospores conglobate, uniseptate, constricted at the septum, brown, upper cell slightly larger, 26–30x16–18 µm, wall smooth.

Cirsosia vateriae Hosag., Mycosphere 2(5): 799, 2012. (Image 173)

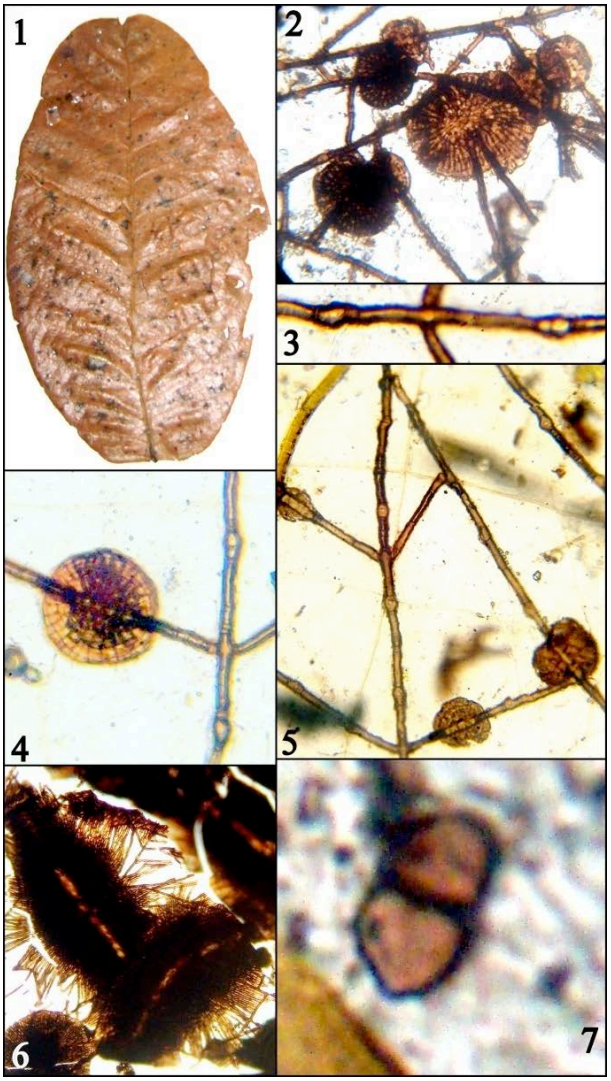


Image 173. *Cirsosia vateriae*
1 - Infected leaf; 2 - Colony; 3 - Branched hyphae & Intercalary appressoria; 4 - Young thyriothecium; 5 - Loose reticulum; 6 - Dehisced elongate thyriothecia; 7 - An ascospore

Materials examined: HCIO 46332 (holotype), TBGT 1978 (isotype), 12.xi.2003, on leaves of *Valeria indica* L. (Dipterocarpaceae), Jodupal, Madikeri, V.B. Hosagoudar et al; FMKMCC 222, 29.i.2011, Mandrane, Hoddur, C. Jagath Thimmaiah.

Colonies hypophyllous, velvety, up to 3mm in diameter. Hyphae straight, branching opposite at wide angles, loosely reticulate. Cells 35–40x9–10µm. Appressoria intercalary 12–13x11–12 µm. Thyriothecia initially ovate to orbicular, mature ones longitudinal, aggregated, dehiscing by longitudinal slit, margin fimbricate, 500–1000x175–400 µm. Ascospores 1-septate, large, conglobate, deeply constricted at the septum, brown other small, 40–48x18–20 µm, wall smooth.

Cirsosia irregularis (Sydow) Arx is known on Vatican obtusifolia from Philippines. However, C. vateriae differs from it in having smaller thyriothecia (in contrast to 500–1000x190–280 µm), asci (in contrast to 60–80x50–65µm) and smaller ascospores (in contrast to 32–38x15–18 µm).

Genus *Echidnodella*

Echidnodella Thesis. & Sydow, Ann. Mycol. 15: 422, 1917; Muller & Arx, Beitr. Krypt. Schw.11: 118, 1962; Luttrell in Ainsworth et al. (eds). The Fungi An advanced Treatise 9: 46, 1973; Arx & Muller, Stud. Mycol. 9: 46, 1975; Biligrami, Jamaluddin & Rizvi, 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.

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. *Echidonodella linearis* (Sydow) Theiss. & Sydow.

Echidnodella mimusopsidis Hosag., C. Jagath Thimmaiah & A. Sabeena, J. Threatened Taxa 5(2): 3666, 2013. (Image 174)

Materials examined: FMKMCC 223, 31.i.2010, on leaves of *Mimusops elengi* L. (Sapotaceae), Mandrane, Hoddur, C. Jagath Thimmaiah.

Colonies hypophyllous, dense, up to 8mm in diameter. Hyphae thin, flexuous, irregularly branched, few branches are unilateral, loosely reticulate. Cells 25–28x3–5 µm. Non appressoriate. Thyriothecia, large,

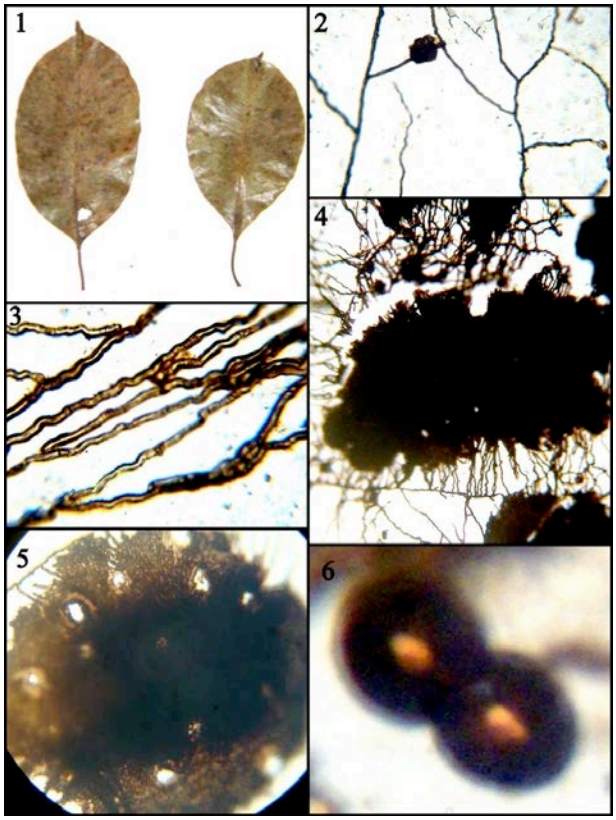


Image 174. *Echidnodella mimusopsidis*
1 - Infected leaves; 2 - Thin Colony; 3 - Non appressoriate hyphae; 4 - Elongate thyriothecium; 5 - Thyriothecium with peripheral pores; 6 - An ascospore

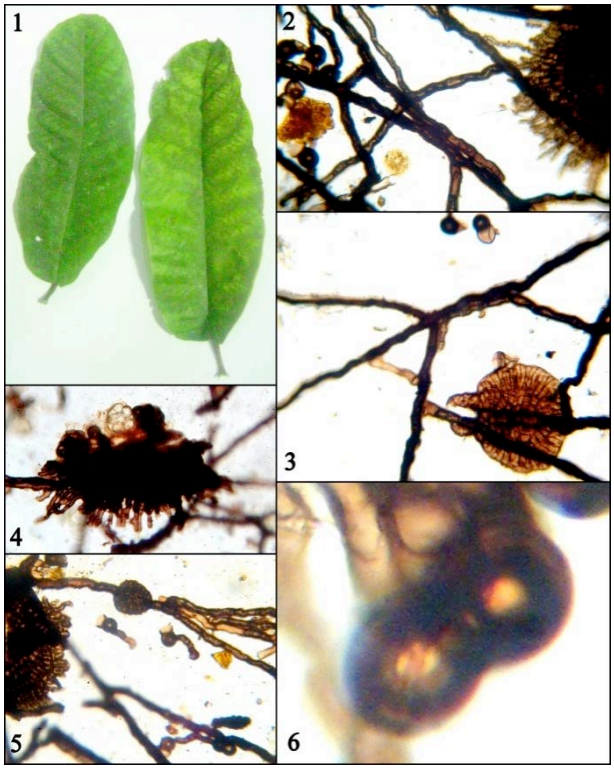


Image 175. *Echidnodella vateriae*
1 - Infected leaves; 2 - Colony; 3 - Non- appressoriate hyphae; 4 - Dehisced Thyriothecia with ascus; 5 - Germinating ascospores; 6 - An ascospore

elongate, fimbriate, pores are present at the periphery, up to 1000x300 µm in measurement, dehisces longitudinally; asci not seen. Ascospores 1- septate, conglobate, deeply constricted at the septum, brown, 26–32x10–17 µm, wall smooth.

Echidnodella vateriae Hosag. & Kamar in Hosag., Zoos' Print J. 17: 945, 2002; Hosag. & Appaiah, J. Mycopathol. Res. 43: 172, 2005; Hoag., Zoos' Print J. 21: 2413, 2006: Hosag., Chandra. & Agarwal, Asterinales of Kerala, p. 198, 2011. (Image 175)

Materials examined: FMKMCC 224, 12.xii.09, on leaves of *Vateria indica* L. (Dipterocarpaceae), Arav, Near BVBKV School, Madikeri, C. Jagath Thimmaiah.

Colonies epiphyllous, thin to subdense, spreading, confluent. Hyphae flexuous to crooked, branching unilateral, loosely reticulate. Cells 21–29x6–9 µm. Non appressoriate. Thyriothecia orbicular, oval, ellipsoidal to elongated, dehiscence vertical at the centre, 300–550x150–200 µm, margin fimbriate, fringed hyphae run parallel, compact; asci globose to oval, octosporous, 40–45x35–40 µm in diameter. Ascospores globate, brown, uniseptate, deeply constricted at the septa, 27–35x15–17 µm.

Reported for the first time from Karnataka.

Genus *Eupelte*

Eupelte H. Sydow, Ann. Mycol. 22:426, 1924; Hansf., Mycol. Pap. 15: 168, 1946: Hosag., Zoos'Print J. 21:2413, 2006; Muller & Arx, Beitr. Krypt. Schw.11: 137, 1962; Luttrell in Ainsworth et al. (eds); Muller & Arx, stud. Mycol. 9:43, 1975; Hosag., Abraham & C. K. Biju, J. Mycopathol. Res. 39: 62, 2001.

Maurodothina Arn. Ex Piroz. & Shoemaker, Can. J. Bot. 48: 1326, 1970.

Anamorph: *Sporidesmium* sp.

Leaf parasites, hyphae partly superficial and partly immersed. Conidia present, cylindrical, obclavate, broadly rounded at the apex, truncate at the base. Thyriothecia orbicular, elliptic to elongated, dehisce stellately, vertically at the center, asci clavate, spherical, octosporous, bitunicate, ascospores conglobate, uniseptate, brown.

Type sp. *Eupelte amicta* Syd.

Eupelte amicta Sydow, Ann. Mycol. 22: 426, 1924; Hosag., Zoos'Print J. 21:2413, 2006; Hosag., Chandra. & Agarwal, Asterinales of Kerala, p. 202, 2011. (Image 176).

Materials examined: TBGT 5330, FMKMCC 224, 24.xi.2008, on leaves of *Olea dioica* Roxb. (Oleaceae), Galibeedu, C. Jagath Thimmaiah; HCIO 49153, TBGT 3408, 24.xi.2008, V. B. Hosagoudar et al; HCIO 49172, TBGT 3427, 25.xi.2008, Bagamandala, V. B. Hosagoudar et al.

Colonies epiphyllous, dense, crustose, up to 10mm in diameter, confluent. Hyphae partly superficial and partly immersed, hyphae brown, septate, flexuous, irregularly branched at acute to wide angles, loosely to closely reticulate. Cells 15–30x3–5 µm. External mycelium enters the host through the stomata extend up to palisade tissues. Conidiophores arise from the external mycelium.

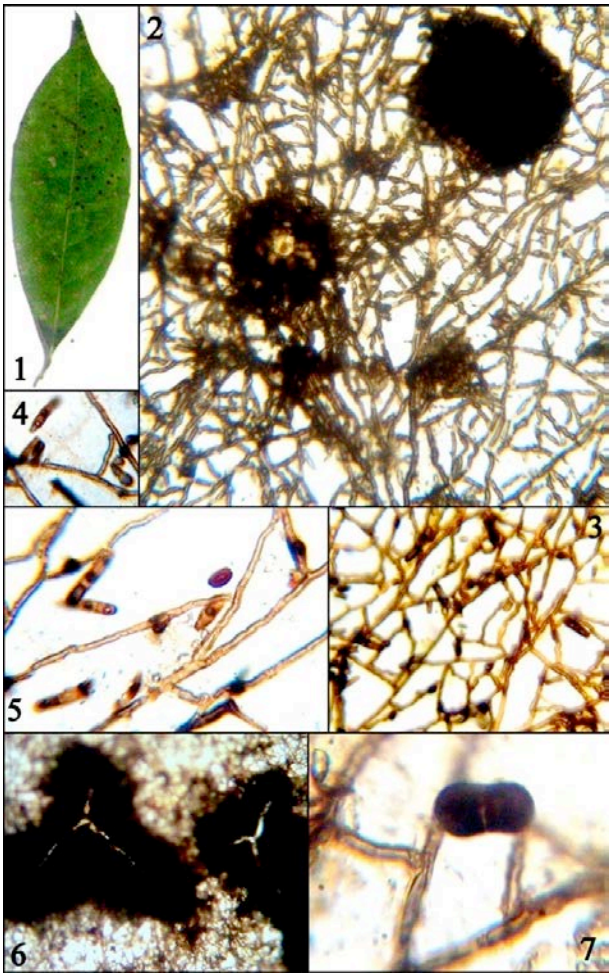


Image 176. *Eupelte amicta*
1 - Infected leaf; 2 - Closely reticulate colony; 3 - Enlarged portion of the colony; 4&5 - Conidiophores & conidia; 6 - X- shaped thyriothecia; 7 - An ascospore

brown 0-1 septate, erect, simple, smooth, 23–27 µm long; conidiogenous cells terminal, integrated, monoblastic, determinate; conidia brown, 0–3 septate, not constricted at the septa, straight to curved, cylindrical, obclavate, broadly rounded at the apex, truncate at the base, 22–30x9–10 µm, wall smooth. Thyriothecia scattered to grouped, initially orbicular, and later elliptic to elongated X or Y shaped, dehisce vertically at the center, 400–700x100–150 µm; asci not seen. Ascospores conglobate, brown, oblong, 1-septate, constricted at the septa, 16–20x9–11 µm, wall smooth.

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; Biligrami, Jamaluddin & Rizvi, 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: 188, 2008.

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 with radiating cells, astomatous, dehisce longitudanally at the center; asci oval, octosporous, bitunicate, acopspores conglobate, uniseptate, brown.

Type sp. *Lembosia melastomatum* Mont.

Lembosia garciniae Hosag. & Jagath., Mycosphere 2(5): 808, 2012. (Image 177).

Colonies epiphyllous, thin, up to 3mm in diameter. Hyphae straight to flexuous, branching irregular at acute to wide angles loosely reticulate, cells 25–30×5–7 µm. Appressoria more scattered, globose, mammiform, broad based, often ovate, mostly entire, rarely sublobate, 7–10×5–7 µm. Thyriothecia initially ovate with hyaline suture in the center, later elongated, simple, dehisce vertically at the center, 200–400×115–125 µm, margin mostly crenate, often fimbricate, fringed hyphae singular, straight to flexuous; asci globose, 8-spored, up to 20µm in diameter; ascospores conglobate, oblong, uniseptate, constricted at the septum, 25–30×10–13 µm, wall smooth.

Materials examined: TBGT 5702 (holotype), FMK-

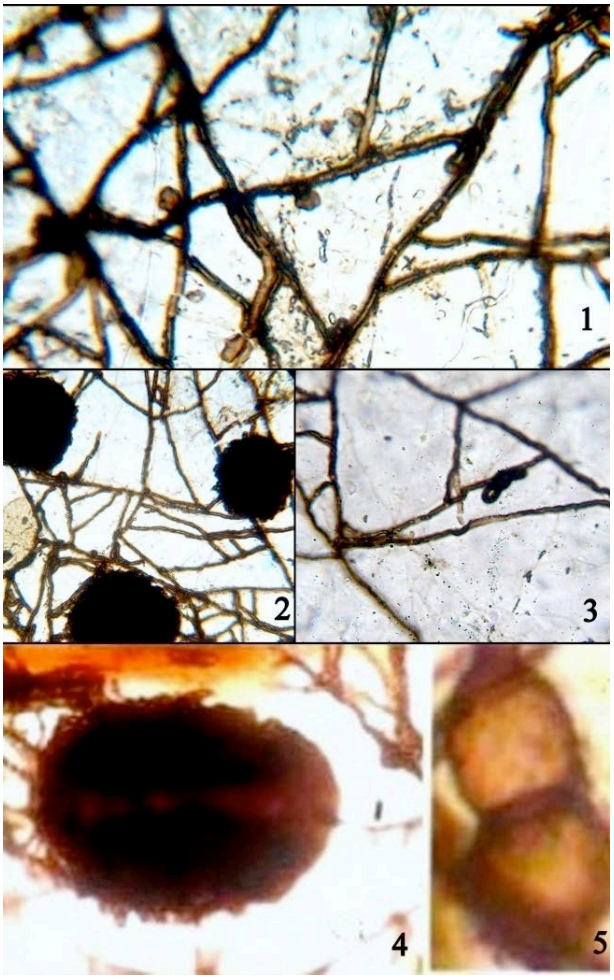


Image 177. *Lembosia garciniae*
1 - Appressoriate hyphae; 2 - Young thyriothecia; 3 - Branched hyphae; 4 - Elongate thyriothecium; 5 - Ascospore

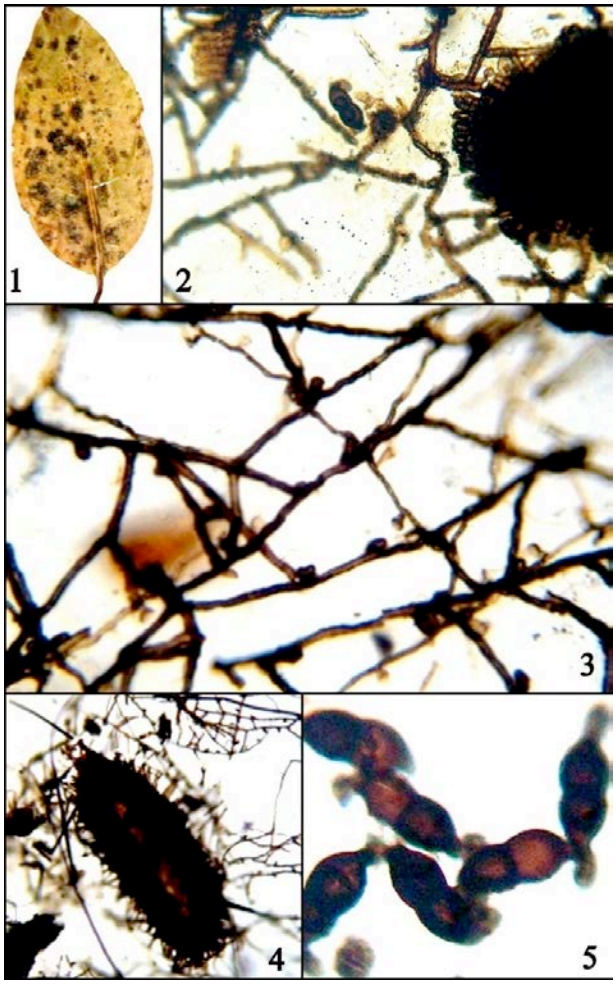


Image 178. *Lembosia hosagoudarii*
1 - Infected leaf; 2 - Colony with thyriothecium & ascospores; 3 - Appressoriate hyphae; 4 - Dehisced thyriotheium; 5 - Germinating ascospores.

MCC 225, 22.kii.2009, on leaves of *Garcinia gummigutta* (L.) Robs. (Clusiaceae), Karnataka, Kodagu, Mandrane, Hoddur, Jagath Thimmaiah.

This is the first report of the Lembosia species on the members of the family Clusiaceae (Song & Hosagoudar, 2003). This species was associated with *Meliola garciniae* and *Asterina clusiacearum*.

Lembosia hosagoudarii Sivanesan & Shivas, Fungal Diversity 11: 163, 2002.

Lembosia syzygiicola Hosag., Indian J. Forestry 18: 276, 1995; Hosag, C.K. Biju & Abraham, J. Econ. Taxon. Bot. 25: 306, 2001; Hosag, Zoos' print J. 8: 1284, 2003; Song Bin & Hosag., Guizhou Science 21: 99, 2003; Hosag., Zoos' print J. 21: 2414, 2006; Sing, Duke, Bhandari & Jain, J. Econ. Taxon. Bot. 30: 189, 2008. (Image 178).

Materials examined: FMKMCC 226, 23.ii.2011, on leaves of Syzygium sp. (Myrtaceae), Hoddur, C. Jagath Thimmaiah

Colonies amphigenous, mostly epiphyllous, dense, up to 5mm in diameter, rarely confluent. Hyphae flexuous, branching opposite at wide angels to alternate or irregular, loosely reticulate, cells 15–29x5–9 µm. Appressoria alternate to unilateral, two celled, alternate, straight to slightly curved, 10–14 µm long; stalk cells cylindrical to cuneate, 4–6 µm long; head cells ovate, globose, entire, few slightly lobed 8–10x6–7 µm. Thyriothecia scattered to grouped, initially orbicular, linear to elliptical at maturity, brown, margin fimbricate, fringed hyphae flexuous, dehiscing, by a longitudinal slit at the center, 300–500x180–250 µm; asci globose to oval, octosporous, 38–42x35–40 µm; Ascospores deep brown, conglobate, uniseptate, constricted at the septum, 27–33x10–12 µm, spore end are narrowed, wall smooth.

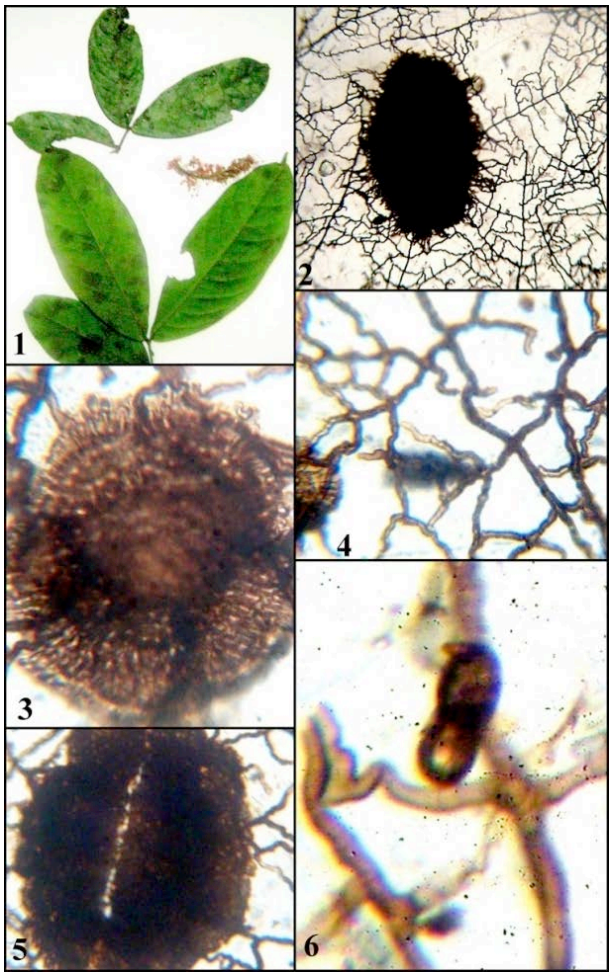


Image 179. *Lembosia humboldtiae*
1 - Infected leaves; 2 - Colony with thyriothecium; 3 - Young thyriothecia; 4 - Appressoriate hyphae; 5 - Dehisced thyriotheium; 6 - Germinating ascospore

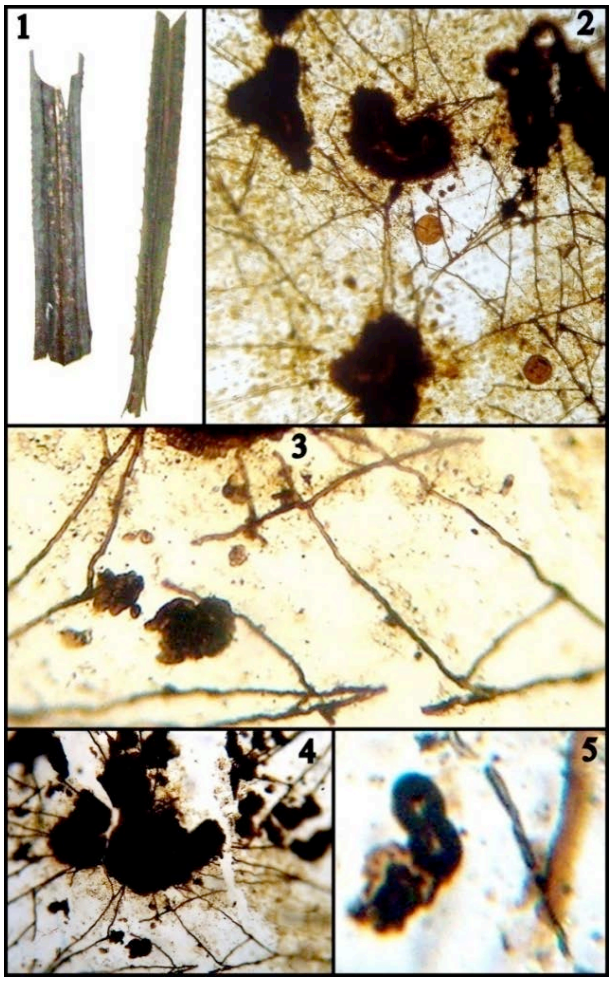


Image 180. *Lembosia pandanacearum*
1 - Infected part of the leaves; 2 - Colony with dehisced; thyriothecia; 3 - Appressoriate hyphae; 4 - Dehisced thyriothecium; 5 - Ascospore.

Lembosia humboldtiae Hosag. & Abraham, Mycol. Res. 102: 186, 1998; Hosag., C.K. Biju & Abraham, J. Econ. Taxon. Bot. 25: 306, 2001; Hosag., Zoos' Print J. 18: 1281, 2003; Song Bin & Hosag., Guizhou Science 21: 95, 2003; Hosag., Zoos' Print J. 21: 2414, 2006; Singh, Duke, Bhandari & Jain, J. Econ. Taxon. Bot. 30: 188, 2008; Hosag., Jacob Thomas & Sabeena, Indian J. Sci. Techn. 2(6): 19, 2009. Hosag & kumar in Hosag., Zoos' Print J. 17: 945, 2002; Hosag & Appaiah, J. Mycopathol. Res. 43: 172, 2005; Hoag., Zoos' Print J. 21: 2413, 2006, Hosag., Chandra. & Agarwal, Asterinales of Kerala, p. 207, 2011. (Image 179).

Materials examined: FMKMCC 227, 1.viii.2010, on infected Infected leaves of *Humboldtia vahliana* Wight, (Caesalpiniaceae), Sampaje Ghats, C. Jagath Thimmaiah.

Colonies epiphyllous sub dense, up to 4mm in diameter, confluent. Hyphae crooked, branching irregular at subacute to wide angles, closely reticulate to form meshes. Cells 12–18x2–3 µm. Appressoria 1-3 celled, opposite, unilateral, straight, angular or curved, 12–23 µm long; stalk cells 1-2 septate, flexuous, crooked, 9–14 µm long; head cells angular, ovate, cylindrical, entire, 5–7x4 µm. Thyriothecia scattered, initially orbicular, later becomes elongated, dehisce longitudinally along the center, 360–430x120–200 µm. Ascospores oblong, conglobate, brown, 1-septate, one cell smaller than the other, smaller globose to ovate, larger ovate, 15–29x5–11 µm, wall smooth.

Lembosia pandanacearum Hosag. & Jagath., Mycosphere 2(5): 816, 2012. (Image 180).

Materials examined: on leaves of *Pandanus* sp. (Pandanaceae), Hoddur, August 23, 2009, C. Jagath Thimmaiah TBGT 5729 (holotype), FMKMCC 228.

Colonies amphigenous, mostly epiphyllous, subdense to dense, scattered, up to 4mm in diameter. Hy-

phae straight, branching irregular at wide angles, loosely reticulate, cells 17–35x4–8 µm. Appressoria scattered, distantly placed, unicellular, unilateral to alternate, globose, broad based, entire, often covered with a membrane continuous with hyphal cell wall, 8–13x9–12 µm. Thyriothecia scattered, oval, elongated, 350–550x200–300 µm, margin crenate to fimbriate, fringed hyphae small, flexuous; asci many, globose, 28–35 µm; ascospores conglobate, uniseptate, constricted at the septum, 23–27x11–14 µm, wall smooth.

III. ANAMORPHIC GENERA

Pleomorphy is common phenomenon in fungi. These may be macrocyclic by having all the stages or would have lost certain stages or the stages are yet to be discovered. In the absence of teleomorphs, anamoprhs are considered as form genera. These anamorphs are vital during the identification of the fungi.

In absence of the telemorphs, anamorphs are placed as form genera and these anamorphs are vital during the identification of the fungi.

Key to the Anamorphic Genera

1. Pycnothyriospores pyriform, ovate.....*Asterostomella*
2. Pycnothyriospores angular, truncate at the base ....*Mahanteshamyces*

Key to the Anamorphic Species

Fabaceae
Asterostomella
Single species.....*Asterostomella derissii*

Lauraceae
Mahanteshamyces
Single species.....*Mahanteshamyces litseae*

Magnoliaceae
Asterostomella
Single species.....*Asterostomella micheliae*

Taxonomic description

Genus *Asterostomella*

Asterostomella Speg., Ann. Soc. Cien. Arg. 22: 198, 1886.

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. *Asterostomella paraguayensis* Speg.

Asterostomella elaeocarpi-serrati Hosag. in Hosag., H. Biju & Appaiah, J.Mycopathol. Res. 44: 13, 2006; Hosag. J. Appl. & Nat. Sci. 1(1):29, 2009; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala, p. 231, 2011. (Fig. 51)

Material examined: HCIO 45817 (type), TBGT 1567 (isotype) 11.xi.2003, on leaves of *Elaeocarpus serratus* L. (Elaeocarpaceae), Abbe falls, Madikeri, V.B. Hosagoudar et al.

Colonies amphigenous, dense, up to 1mm in diameter, rarely confluent. Hyphae straight to flexuous, branching mostly opposite at acute angles, loosely to closely reticulate, cells 8–24x5–7 µm. Appressoria alternate, about 30% opposite, unicellular, conoid, ovate, entire, straight, attenuated and broadly rounded at the apex, 8–13x6–8 µm. Thyriothecia scattered, orbicular, up to 258µm in diam., stellately dehisced at the centre, margin crenate; pycnothyriospores pyriform, brown, unicellular, 20–26x19–21 µm, wall smooth.

This is an anamorph of the genus Asterina and is close to *A. borneensis* Hansf. in having smaller and alternate to opposite appressoria. However, differs from it in having conoid but 30% opposite appressoria (Hansford, 1954).

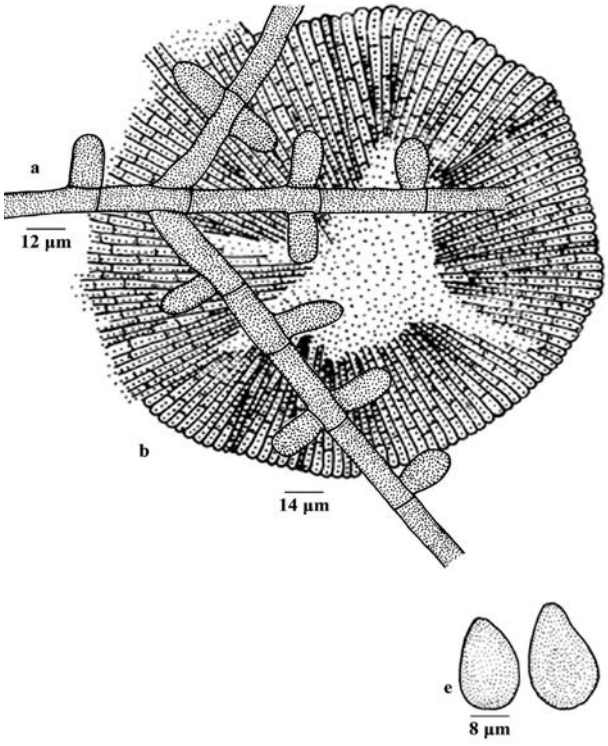


Figure 51. *Asterostomella elaeocarpi-serrati*
a - Appressoriate mycelium; b - Pycnothyrium; e - Pycnothyriospores

Asterostomella derridicola Hosag., C. Jagath Thimmaiah & A. Sabeena, J. Threatened Taxa 5(2): 3665, 2013. (Image 181).

Materials examined: FMKMCC 229, 13.ii.2010, on leaves of *Derris conarensis* (Dalz.) (Fabaceae), Hoddur, C. Jagath Thimmaiah.

Colonies amphigenous, mostly epiphyllous, thin. Hyphae thin, irregularly branched, loosely reticulate. Cells 20–29x3–4 µm. Appressoria few, unicellular, unilateral, rarely alternate, irregularly lobed, 9–17x5–9 µm. Pycnothyria grouped to scattered, orbicular, margin fimbriate, stellately dehisced at the center, up to 50µm in diameter. Pycnothyriospores pyriform to ovate, unicellular, brown, 12–16x8–10 µm, wall smooth.

Asterostomella micheliae Hosag. & Goos, Mycotaxon 59: 162, 1996; Hosag., Zoo's Print J. 18: 1283, 2003; 21: 2412, 2006; Hosag., Chandra. & Agarwal, Asterinales of Kerala, p.234, 2011. (Image 182).

Materials examined: FMKMCC 230, 26.i.2010, on leaves of *Michelia champaka* L. (Magnoliaceae), Hoddur, Kodagu, C. Jagath Thimmaiah.

Colonies hypophyllous, dense, up to 6mm in diameter. Hyphae flexuous to crooked, branching irregular, closely reticulate. Cells 18–22x5–6 µm. Appressoria unicellular, alternate to unilateral and subopposite, straight, antrorse, globular, entire, 6–8x6–7 µm. Pycnothyria globose, many, scattered up to 45µm in diameter, dehisces stellately at the center. Pycnothyriospores spherical to pyriform, unicellular, brown, 24–27x17–18 µm, wall smooth.

This species differs from the type in having spherical and larger pycnothyriospores.

Asterostomella scolopiae-crenatae Hosag. & Abraham, New Botanist 24: 111, 1997; Hosag.,C.K. Biju &

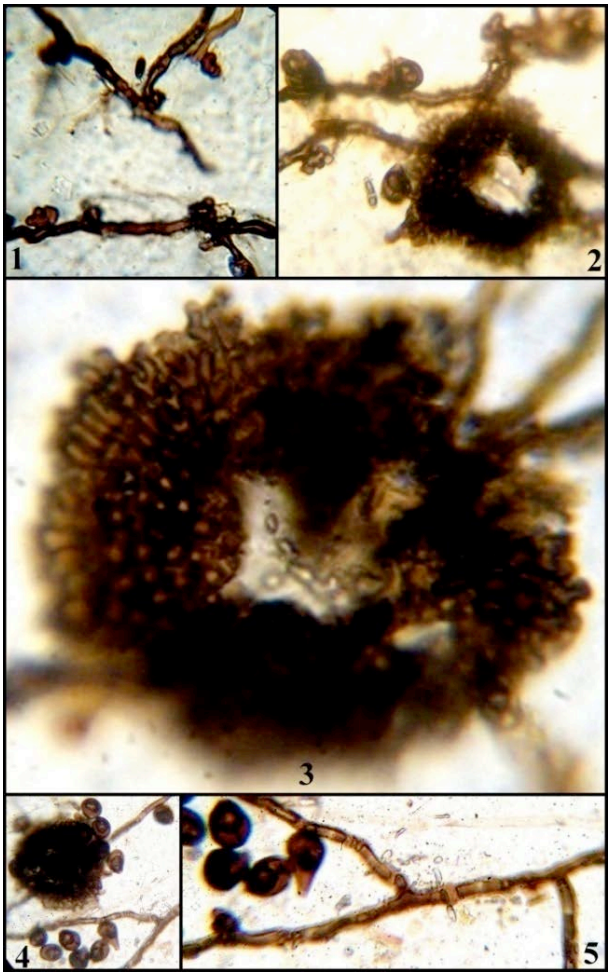


Image 181. ***Asterostomella derridis***
1 - Thin colony; 2 - Appressoriate hyphae; 3 - Dehisced pycnothyriothecium; 4 &5 - Pycnothyriospores.

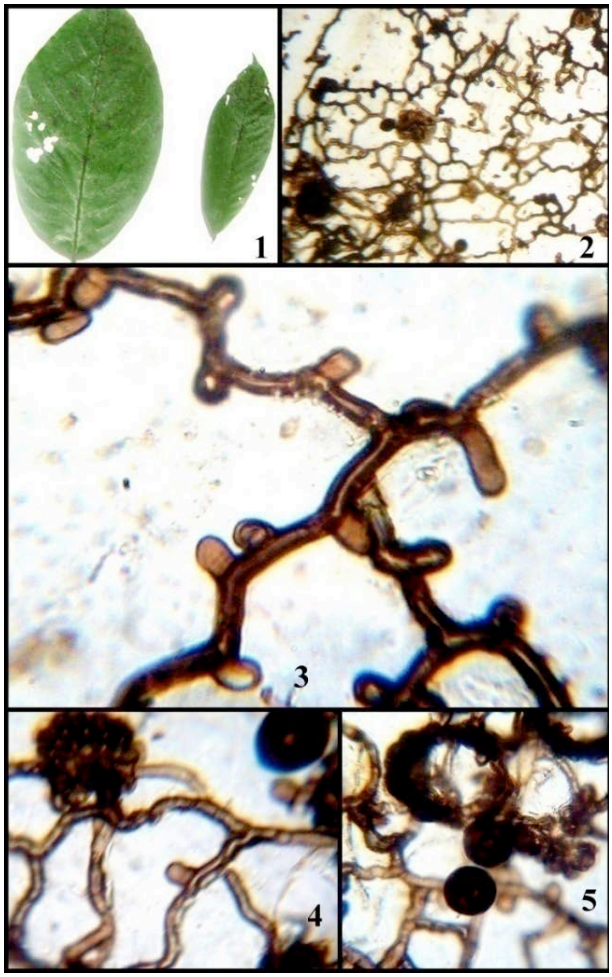


Image 182. ***Asterostomella micheliae***
1 - Infected leaves; 2 - Reticulate colony; 3 - Appressoriate hyphae; 4 - Young pycnothyriothecium; 5 - Dehisced pycnothyriothecium with pycnothyriospores

Abraham, J. Econ. Taxon. Bot. 25: 307, 2001; Hosag., Zoos' Print J. 18: 1283, 2003; Hosag., Zoos' Print J. 21: 2412, 2006; Hosag., H. Biju & Appaiah, J. Mycopathol. Res. 44:14, 2006; Hosag. & H. Biju, J. Mycopathol. Res. 44: 43, 2006; Hosag., Chandra. & Agarwal, Asterinales of Kerala, p. 237, 2011. (Fig. 52).

Material examined: HCIO 45793, TBGT 1542, 11.xi.2003, on leaves of *Scolopia crenata* (Wight & Arn.) Clos (Flacourtiaceae), Nishane motta, V.B. Hosagoudar et al; HCIO 45813, TBGT 1563; MPCA,HCIO 46269, 13.xi.2003, *Scolopia* sp., Nishane motta, V.B. Hosagoudar et al; TBGT 1915, 13.xi.2003, Talacauvery, V.B. Hosagoudar.

Colonies hypophyllous, very thin, spreading, up to 10mm in diameter, confluent. Hyphae fledxuous to rarely crooked, branching irregular at acute to wide angles, loosely reticulate, cells 24–30×3–3.5 µm. Appressoria alternate, about 30% opposite, 2-celled, straight, flexuous, curved, uncinate, 12–19.5 µm long; stalk cells cylindrical, 3–5 µm long; head cells cylindrical, straight, curved, uncinate, flexuous, crooked, entire, angular, hamate, 9–14.5×4–5 µm. Pycnothyria scattered, orbicular, up to 75µm in diameter, stellately dehisce at the center, margin crenate to fimbriate, fringed hyphae small, flexuous to crooked; Pycnothyriospores pyriform, acute at one end and broadly rounded at another, cinnamon brown, unicellular, 19–22.5×14–16 µm, wall smooth, germ pore distinct in some spores.

These colonies were associated with the colonies of *Asteridiella scolopiae* Hosag. and *Meliola scolopiae* Doidge var. *indica* Hosag.

Asterostomella vernoniae Hosag., Jagath. & G.R. Archana, J. Threatened Taxa 5(2): 3665, 2013. (Fig. 53).

Material examined: TBGT 5813 Holotype, 9.i.2010, on leaves of *Vernonia monosis* Benth. ex C.B. Clarke (Asteraceae), Tadiyandamol, Kodagu, Karnataka, coll. C. Jagath Thimmaiah.

Colonies epiphyllous, thin, crustose, up to 3mm in diameter, confluent. Hyphae substraight to flexuous, branching opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 11–29x3–5 µm. Appressoria alternate to unilateral, sessile to slightly stipitate, globose, ovate, entire, 4–8x4–9 µm. Pycnothyria scattered, orbicular, up to 75µm in diameter; stellately dehisced at the centre, margin fimbriate; pycnothyriospores brown, unicellular, ovate, pyriform, 16–24x8–13 µm.

Genus *Mahanteshamyces*

Mahanteshamyces Hosag. J. Econ. Taxon. Bot. 28: 189, 2004; Hosag., Chandraprabha & Agarwal, Asterinales of Kerala, p.241, 2011.

Foliicolous, ectophytic, parasitic. Mycelium brown, superficial, appressoriate. Pycnothyria scutate, dimidiate, radiate, orbicular, stellately dehisced at the center; pycnothyriospores brown, angular, wall straight to sinu-

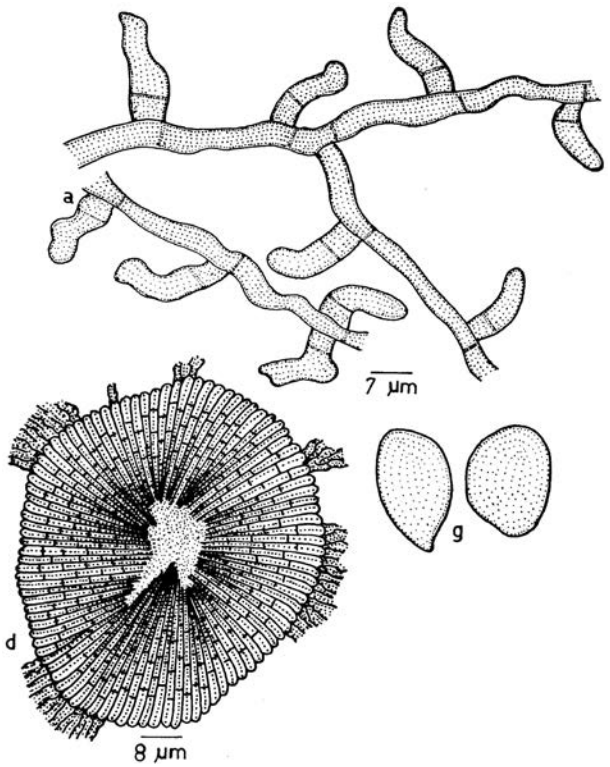


Figure 52. ***Asterostomella scolopiae-crenatae***
a - Appressoriate mycelium; d - Pycnothyrium; g - Pycnothyriospores

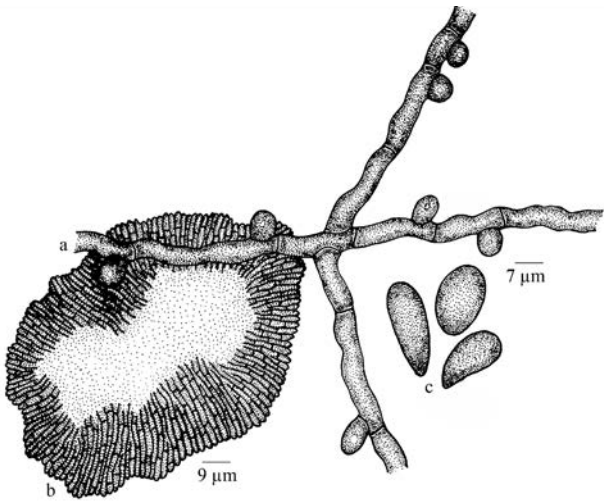


Figure 53. ***Asterostomella vernoniae***
a - Appressoriate mycelium; b - Pycnothyrium; c - Pycnothyriospores

ate.

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 (Sutton, 1980). Hofmann & Pipenbaring (2008) showed that this is an anamorph of the genus *Asterina*.

Mahanteshamyces litseae Hosag., Jagath. & A. Sabeena, J. Threatened Taxa 5(2): 3666, 2013. (Image 183)

Materials examined: on leaves of *Litsea* sp. (Lauraceae), Tadiandamol, January 9, 2010, C. Jagath Thimmaiah FMKMCC 231.

Colonies epiphyllous, thin spreading, up to 4mm in diameter. Hypphae substraight, branching when opposite at wide angles, rest of the branches are alternate, loosely reticulate. Cells 15–22x3–4 µm. Appressoria unicellular, alternate and unilateral, 8–10x4–6 µm. Pycnothyria scattered, orbicular, up to 100µm in diameter, stellately dehisced at the center, margin crenate; Pycnothyriospores brown, unseptate, spherical, angular, few pyriform, truncate at the base, thick walled, wall smooth.

Till now this genus was considered as monospecific representing only *Mahanteshamyces agrostistachdis* Hosag. (Hosagoudar, 2004 a, b).

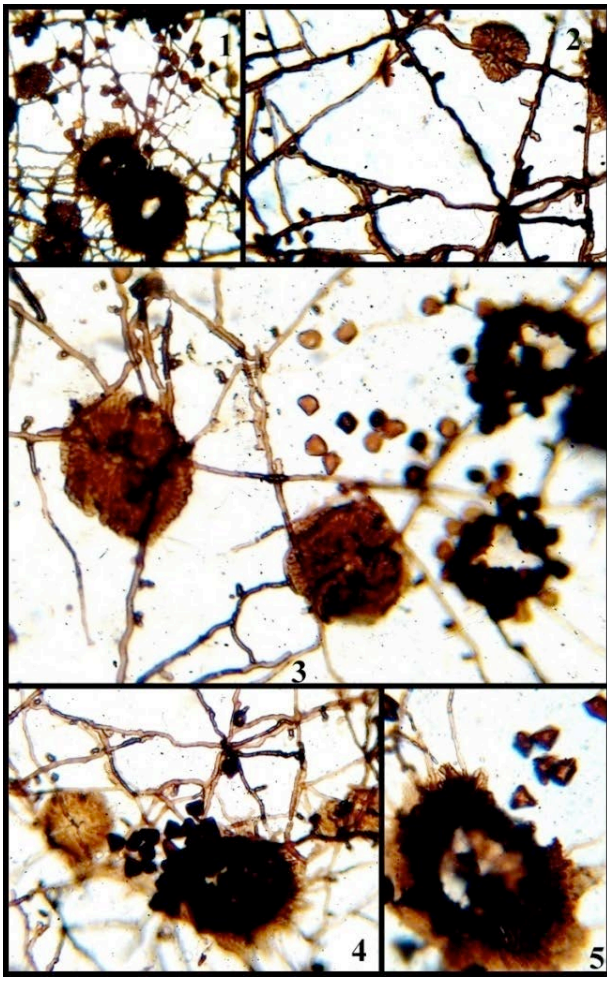


Image 183. *Mahanteshamyces litseae*
1&2 - Reticulate colonies; 3 - Appressoriate hyphae; 4 - Orbicular pycnothyriothecia; 5 - Dehisced pycnothyriothecium with angular pycnothyriospores

Schiffnerulaceae

Colonies formed on the leaf surface, black; mycelium brown, superficial, septate, appressoriate; appressoria unicellular, formed laterally. Thyriothecia orbicular, cells on the upper surface radiating, dissolute at the centre at maturity; asci globose, bitunicate, 8-spored; ascospores conglobate, brown, uniseptate, constricted at the septum.

a) Key to the genera of the family Schiffnerulaceae

1. Teleomorph known.....*Schiffnerula*
1. Teleomorph not known.....2
2. Conidia globose, sarciniform, brown to black .....*Sarcinella*
2. Conidia not so.....3
3. Conidia pale brown, falcate, 3-septate .....*Questieriella*

b) Key to the species of Sciffenerulacae

Aristolochiaceae
Schiffnerula
Single species.....*Schiffnerula artistolochiae*

Celastraceae
Schiffnerula
Single species.....*Schiffnerula celastri* stat. *Sarcinella*

Euphorbiaceae
Sarcinella
On Allophyllus.....*Sarcinella allophylli*
On Bischofia.....*Sarcinella bischofiae*
On Securinega.....*Sarcinella secrunigae*
Schiffnerula
On Glochidion.....*Schiffnerula glochidii* stat. *Sarcinella*
On Ricinus.....*Schiffnerula ricini* stat. *Sarcinella*

Lamiaceae
Sarcinella
Single species.....*Sarcinella pogostemonis*

Myrsinaceae
Questieriella

Single species.....*Questieriella ardisiae*

Rhizophoraceae
Sarcinella
Single species.....*Sarcinella caralliae*

Rubiaceae
Questieriella
Single species.....*Questieriella ophiorhizae*

Rutaceae
Questieriella
Single species.....*Questieriella zanthoxyli*

Urticaceae
Sarcinella
Single species.....*Sarcinella pouzolziae*

Verbenaceae
Schiffnerula
Single species.....*Schiffnerula hoddurensis*

Taxonomic description
Genus *Questieriella*

Questieriella Arn. ex Hughes, Can. J. Bot. 61: 1729, 1983.

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 incurporated in the hyphae. Conidia blastic, ter-minal, solitary, narrowly ellipsoidal to obovoi-dal, curved, falcate, sigmoid, truncate at the base, 3-septate.

Type – Q. *pulchra Hughes*

Questieriella ardisiae Hosag. & Vijay., Zoos' Print J. 19: 1386, 2004; Hosag., Plant Pathology & Quarantine 1(2):136, 2011. (Image 184).

Materials examined: BGT 5422, FMKMCC 232, 21.xi.2009, on leaves of *Ardisia solanacea* Roxb. (Myrsinaceae), Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, dense up to 3mm in diameter. Hyphae substraight, branching opposite to alternate at subacute angles, closely reticulates. Cells 15–26x6–8.5 µm. Appressoria unicellular, mostly unilateral to alternate, globose, ovate, broad based, entire, truncate, up to 7–11x7–12 µm. Conidiophores produced lateral to the hyphae, simple, micronematous, macronematous, 0–2-septate, 12–40x6–8 µm. Conidiogenous cells terminal, integrated, oval to cylindrical, 8–13x4–8 µm. Conidia solitary, simple, dry, ellipsoidal, fusiform, falcate, sigmoid, deep brown to pale brown, 3-septate, terminal cells acute at the tip, 42–46 µm long, 9–11 µm broad at the middle, 3–5 µm broad at the apex.

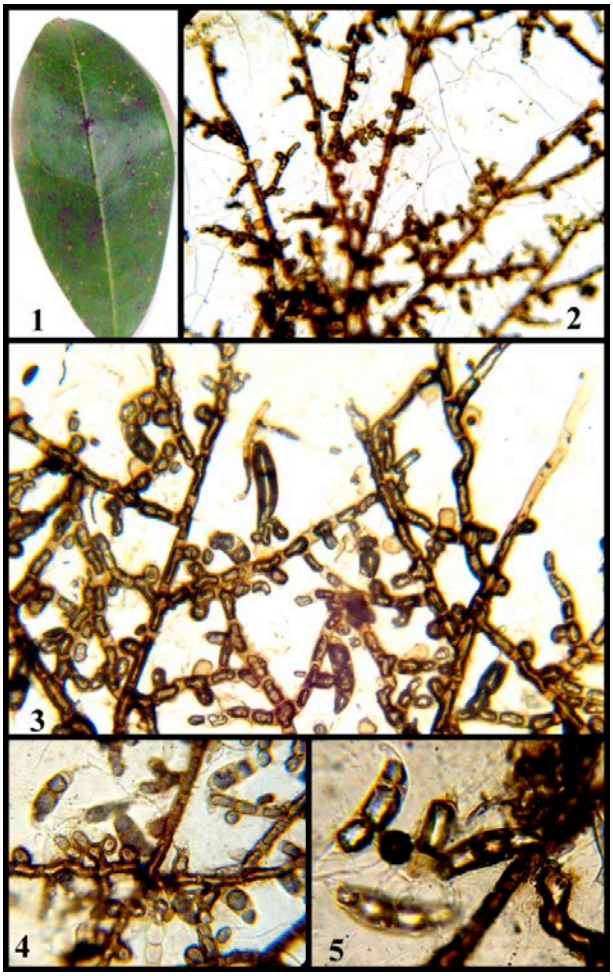


Image 184. *Questieriella ardisiae*
1 - Infected leaf; 2 - Well spread colony; 3 - Colony with Questieriella conidia; 4 - Conidiophores & Conidia; 5 - 3-septate Questieriella conidia.

Questieriella ophiorhizae Hosag., Jagath. & Jayashankara, J. Threatened Taxa 3 (12): 2268, 2011. (Image 185).

Materials examined: TBGT 5706 (holotype), FMKMCC 233 (isotype), 21.xi.2009, on leaves of *Ophiorrhiza* sp. (Rubiaceae), in the campus of Bharatiya Vidyabhavan, Kodagu Vidyalaya, Madikeri, C. Jagath Thimmaiah.

Colonies epiphyllous, thin, velvety, up to 3mm in diameter, confluent. Hyphae straight to flexuous, branching alternate, opposite to irregular at acute to wide angles, loosely reticulate, cells 12–19x5–7 µm. Conidiophores produced lateral to the hyphae, simple, micronematous, macronematous, 0–2-septate, simple, rarely branched, 15–18x6–8 µm; conidiogenous cells terminal,

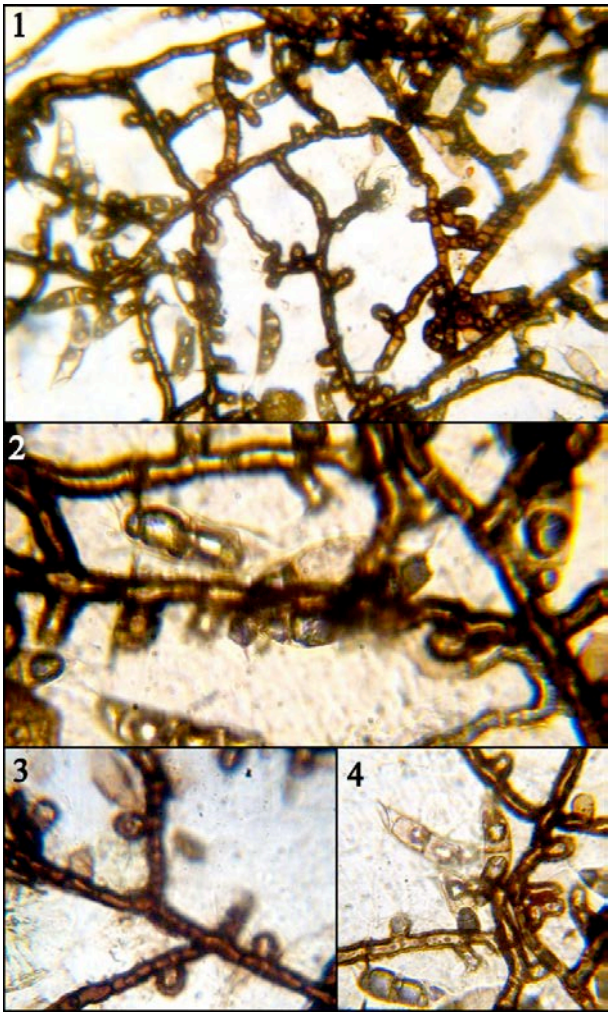


Image 185. *Questieriella ophiorhizae*
1 - Well spreaded colony; 2 - Enlarged portion of the colony; 3 - Branched appressoriate Hyphae; 4 - Questieriella conidia

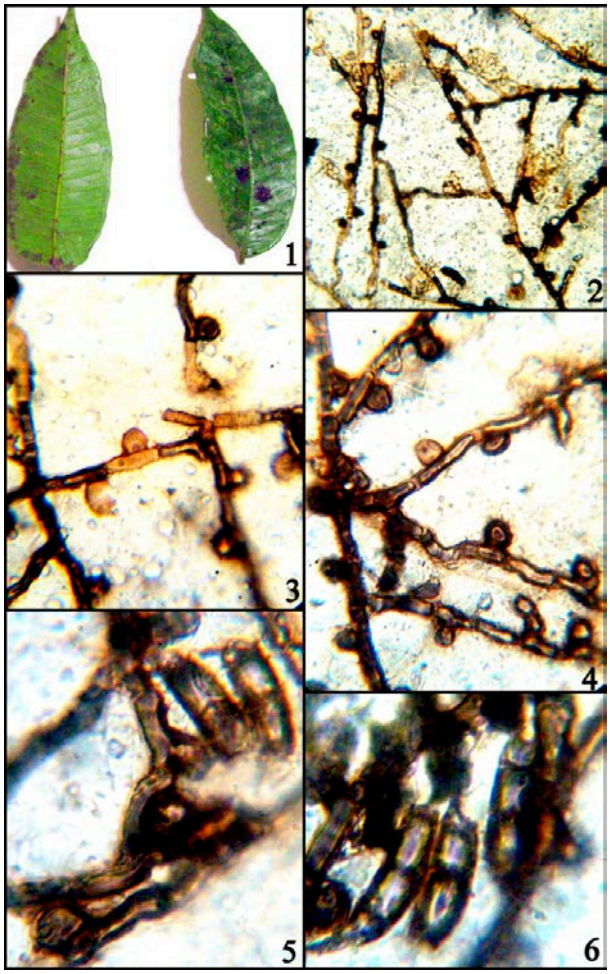


Image 186. Questieriella zanthoxyli
1 - Infected leaves; 2 - Reticulate mycelium; 3& 4 - Appressoriate hyphae; 5&6 - 3-septate Questieriella conidia

integrated, oval to cylindrical; conidia solitary, simple, dry, ellipsoidal, fusiform, falcate, sigmoid, pale brown, 3-septate, terminal cells acute at the tip, 38–45x9–11 µm.

Schiffnerula craterispermi (Hansf.) Hughes, S. hendrickxii (Hansf.) Hughes, *S. psychotriae* (Doidge) Hughes, *S. palicoureae* (Farr) Hughes, *S. ugandensis* (Hansf.) Hughes is known from other parts of the country (Hosagoudar 2003). From India, *Schiffnerula canthii* Hosag. & Archana on *Canthium* sp. and *Schiffnerula braunii* Hosag. & Sabeena on *Morinda* spp. are known on the members of the family Rubiaceae (Hosagoudar & Sabeena 2010). All these species are in their telomorphs but the present fungus persists only in its *Questieriella* form.

Questieriella zanthoxyli Hosag., Jacob & Robin, Indian J. Sci. & Techn. 2 (6): 4, 2009. (Image 186).

Materials examined: TBGT 5356, FMKMCC 234, 25.xi.2008, on leaves of *Zanthoxylum* sp. (Rutaceae), Bhagamandala, C. Jagath Thimmaiah.

Colonies epiphyllous, minute, up to 2mm in diameter, confluent. Hyphae straight to substraight, slightly flexuous, branching opposite to alternate at acute angles, loosely reticulate. Cells 9x7 µm. Appressoria scattered, mammiform, entire to angular, 7–12x5–7 µm. Conidia numerous, borne directly from the hyphal cells, pale brown, straight to curved, 3-septate, rarely constricted at the septa, 26–35x7–10 µm.

Genus *Sarcinella*

Sarcinella Sacc., Michelia 2: 31, 1880.

Colonies black. Hyphae superficial, bran-ched, septate, appressoriate. Appressoria late-ral, unicellular. Conidiophores macronematous, semi-macronematous,

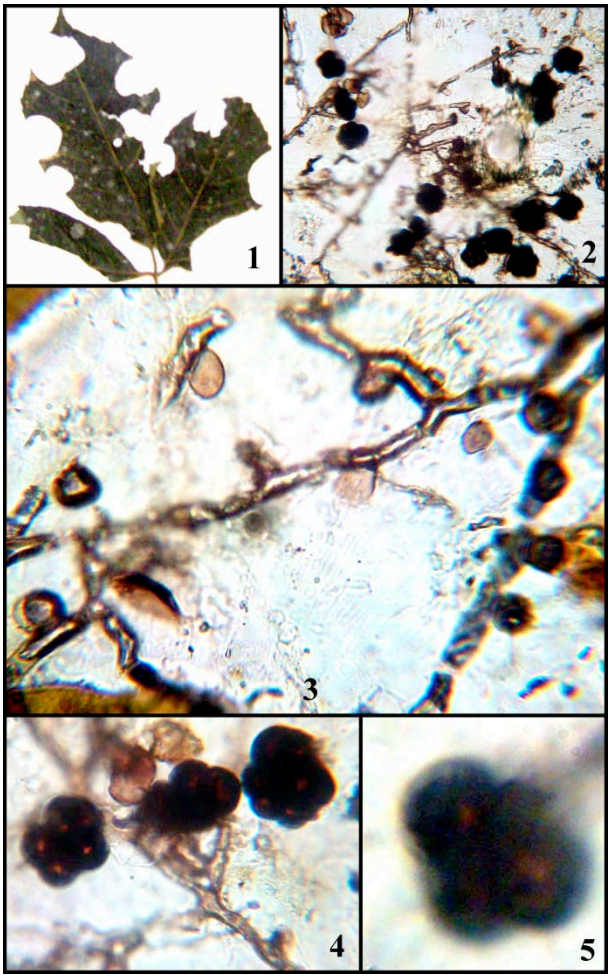


Image 187. *Sarcinella allophyli*
1 - Infected leaves; 2 - Thin colony; 3 - Appressoriate hyphae; 4 - Conidiophores & conidia of Sarcinella

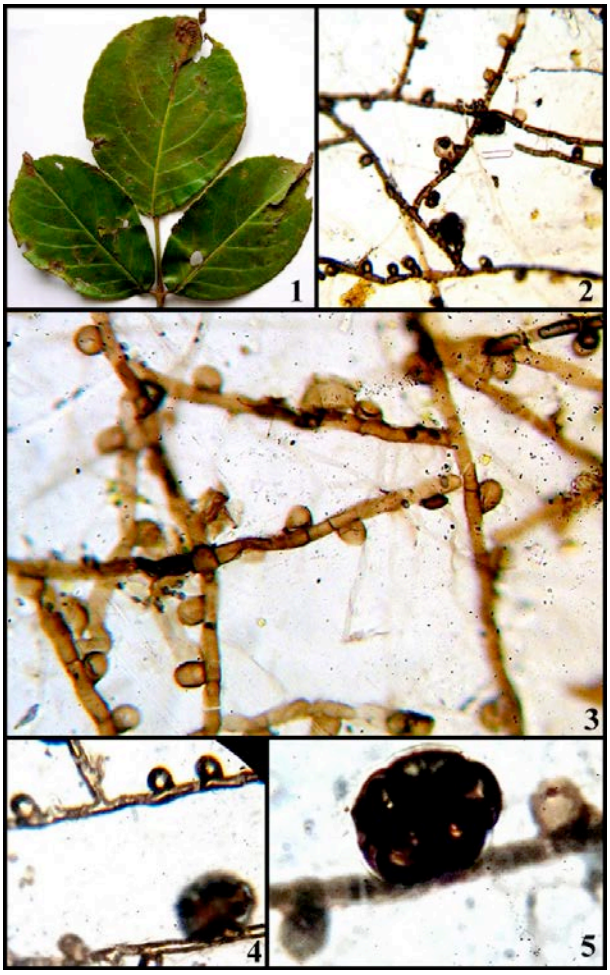


Image 188. *Sarcinella bischofiae*
1 - Infected leaflets; 2 - Thin colony; 3 - Appressoriate hyphae; 4&5 - Conidia of Sarcinella

simple to branched. Co-nidiogenous cells monoblastic, integrated, ter-minal, intercalary, determinate. Conidia solita-ry, acrogenous or acropleurogenous, subspherical, sarciniform, dark brown to reddish brown, smooth, constricted at the septa.

Type: *S. heterospora* Sacc.

Descriptions of species

Sarcinella allophyli Hosag., J. Mycopathol. Res. 44: 20, 2006; Hosag. & Riju, Indian J. Sci. & Techn. 2(6): 7, 2009. (Image 187).

Materials examined: HCIO 45814 (holotype), TBGT 1562 (isotype); BVBKV, 12.xi.2003, on leaves of *Allophylus cobbe* (L.) Raensch. (Sapindaceae), Jodupal, Madikeri, V.B. Hosagoudar et al.; FMKMCC 235, 21.xi.2009, Madikeri, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense to dense, up to 4 mm in diameter, confluent. Hyphae brown, straight to substraight, branching alternate to unilateral at acute to wide angles, loosely reticulate. Cells 15-20x3-4 µm. Appressoria alternate to unilateral, unicellular, globose, broad based, entire, 8–10x6–7 µm. Conidiophores produced lateral to the hyphae, single, straight, mononematous; conidiophores 8–12x4–5 µm. Conidiogenous cells terminal, monoblastic, integrated, cylindrical. Sarciniform conidia, terminal, mostly sessile, solitary, ovate to globose, 2–8 celled, constricted at the septa, 25–30x22–30 µm in diameter, wall smooth.

Sarcinella bischofiae Hosag., Jagath. & Sabeena, J. Threatened Taxa 5(2): 3667, 2013. (Image 188).

Materials examined: TBGT 5805 (holotype), FMKMCC 236 (isotype), 21.xi.2009, on leaves of *Bischofia javanica* Blume (Euphorbiaceae), FMCC Campus, Madikeri, C. Jagath Thimmaiah.

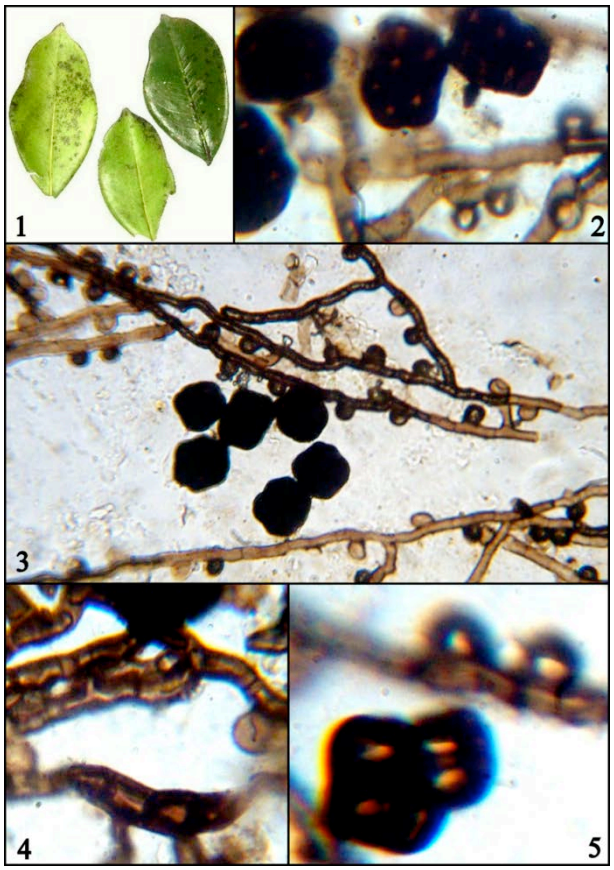


Image 189. *Sarcinella caralliae*
1 - Infected leaves; 2 - Colony; 3 - Appressoriate hyphae; 4 - Germinating conidia of Questieriella; 5 - Conidia of Sarcinella

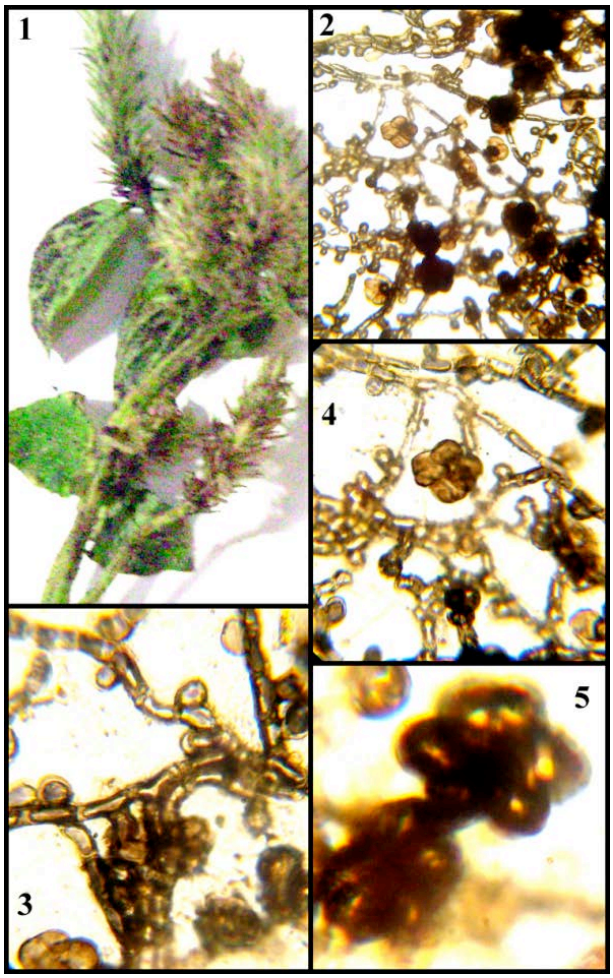


Image 190. *Sarcinella pogostemonis*
1 - Infected leaves; 2 - Colony; 3 - Appressoriate hyphae; 4&5 - Conidia of Sarcinella

Colonies epiphyllous, velvety, subdense, up to 4mm in diameter, confluent. Hyphae brown, straight to substraight, branching alternate to unilateral at wide angles, loosely reticulate. Cells 13–18x3–4 µm. Appressoria alternate to unilateral, unicellular, hemispherical, globose, broad based, entire, 8–10x8–10 µm. Conidiophores produced lateral to the hyphae, single, straight, mononematous, seems to be sessile; conidiogenous cells terminal, monoblastic, integrated, sarciniform conidia terminal, dark brown, constricted at the septa, mostly sessile, solitary, ovate to globose, 25–33 µm in diameter, wall smooth.

Sarcinella caralliae Hosag., Jagath. & Jayashankara, J. Threatened Taxa 3 (12): 2269, 2011. (Image 189).

Materials examined: TBGT 5708 (holotype), FMK-MCC 237 (isotype), on leaves of *Carallia brachiata* (Lour.) Merr. (Rhizophoraceae), Kaimada field, Hoddur, C. Jagath Thimmaiah.

Colonies amphigenous, mostly epiphyllous, thin to dense, spreading, up to 3mm in diameter. Hyphae straight to flexuous, pale brown, branching irregular at acute to wide angles, loosely reticulate, cells 12–20x4–6 µm. Appressoria scattered, alternate, unilateral, ovate to mostly globose, entire, 8–10x6–8 µm. Conidia of Questieriella borne on the hyphal cells, brown, straight to curved, 3-septate, somewhat constricted at the septa, 25–36x7–9 µm. Conidiophores produced lateral to the hyphae, simple, micronematous, 6–8 µm long; conidiogenous cells terminal, intercalary, monoblastic, integrated, determinate, cylindrical. Conidia solitary, dry, simple, subspherical to oval, 2–10-celled, brown to charcoal black, muriform, sarcinately septate, constricted at the septa, 21–30 µm in diameter, wall smooth.

Sarcinella pogostemonis Hosag., Jagath. & Sabeena, J. Threatened Taxa 5(2): 3668, 2013. (Image 190).

Materials examined: TBGT 5784 (holotype), FMK-MCC 238 (isotype), 9.i.2010, on leaves of *Pogostemon*

sp. (Lamiaceae), Mandalpatti, C. Jagath Thimmaiah.

Colonies amphigenous, velvety, confluent, up to 4mm in diameter, confluent. Hyphae brown, substraight to flexuous, branching alternate to irregular at subacute to wide angles, loosely reticulate. Cells 15-18x4-5µm. Appressoria mostly alternate few unilateral, unicellular, globose, few oblong to mammiform, entire, 9–10x7-8 µm. Conidiophores produced lateral to the hyphae, macronematous, mononematous, 1-2 septate; conidiophores 8-15x5-7µm. Conidiogenous cells terminal, determinate, monoblastic, integrated, Sarciniform conidia simple, straight, dry acrogenous, sarcinately septate, constricted at the septa, smooth, 25–32 µm in diameter.

Sarcinella pouzolziae Hosag., J. Mycopathol. Res. 44: 20, 2006; Plant Pathology & Quarantine 1(2): 159, 2011. (Image 191).

Materials examined: HCIO 45816 (holotype), TBGT 1566 (isotype), 13.xi.2003, on leaves of *Pouzolzia* sp.

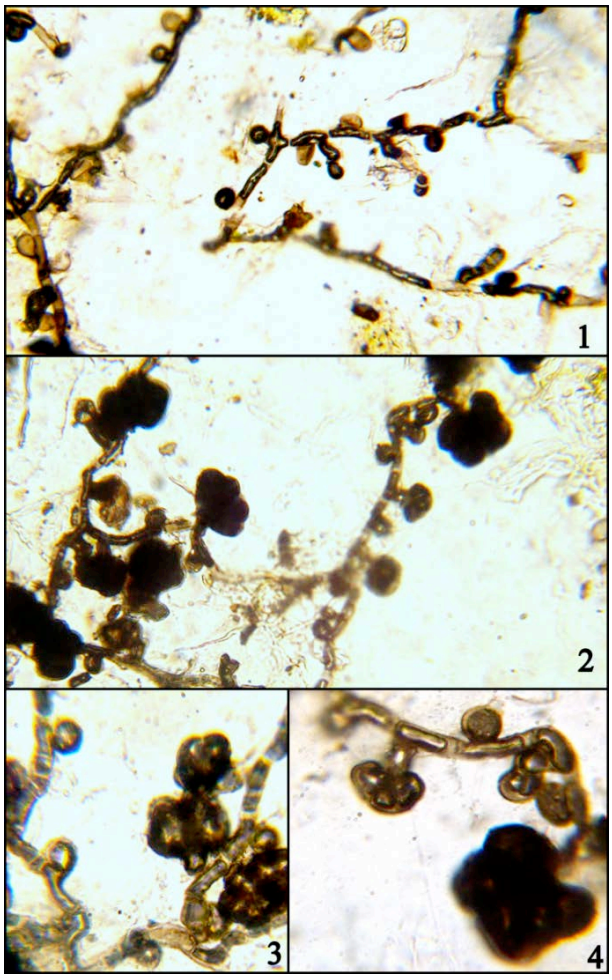


Image 191. Sarcinella pouzolziae
1 - Thin colony; 2 - Hyphae with appressoria & Sarcinella conidia; 3&4 - Immature & mature Sarcinella conidia

(Urticaceae), Nishane motta, Madikeri, November 13, 2003, V.B. Hosagoudar et al; FMKMCC 239, 16.xi.2010, *P. zeylanica* (L.) Bennett, Mandalpatti, C. Jagath Thimmaiah.

Colonies epiphyllous, thin to subdense, up to 2mm in diameter, rarely confluent. Hyphae flexuous, branching irregular at wide angles, loosely reticulate. Cells 10–17x4–5 µm. Appressoria alternate, unilateral, spherical, entire, 9–11x6–8 µm. Conidia of Questieriella are scattered, not attached, pale brown, fusiform, curved, 3-septate, and constricted at the septa, tapering towards both the ends, 30–35x7–9 µm. Sarcinella Conidiophores micronematous, concolorous, mostly simple, rarely branched, straight to flexuous, pale brown, 0–2-septate, smooth, 25–35x5–7 µm; conidiogenous cells monoblastic, integrated, mostly terminal, determinate, cylindrical; conidia solitary, dry, acrogenous, simple, subspherical, sarciniform, brown when young, charcoal black at maturity, sarcinately septate, constricted at the septa, smooth, 16–20 µm in diameter.

Sarcinella securinegae Hosag., Jagath. & Sabeena, J. Threatened Taxa 5(2): 3668, 2013. (Image 192).

Materials examined: TBGT 5757 (holotype), FMKMCC 240 (isotype), 23.xi.2009, on leaves of *Securinega leucopyrus* (Willd.) Muell.-Arg. (Euphorbiaceae), FMC compound, C. Jagath Thimmaiah.

Colonies epiphyllous, up to 7mm in diameter, confluent. Hyphae substraight to undulate, branching opposite, alternate to irregular, loosely reticulate, cells 20–26x4–5 µm. Appressoria unicellular, mostly unilateral, few alternate & opposite, globose, 8–10x6–9 µm. Conidiogenous cells terminal, monoblastic, integrated, cylindrical. Sarciniform conidia terminal, mostly sessile, solitary, ovate to globose, up to 7- celled, constricted at the septa, 26–42x19–25 µm, wall smooth.

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.

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.

Hyphae superficial, colonies foliicolous, brown, ap-

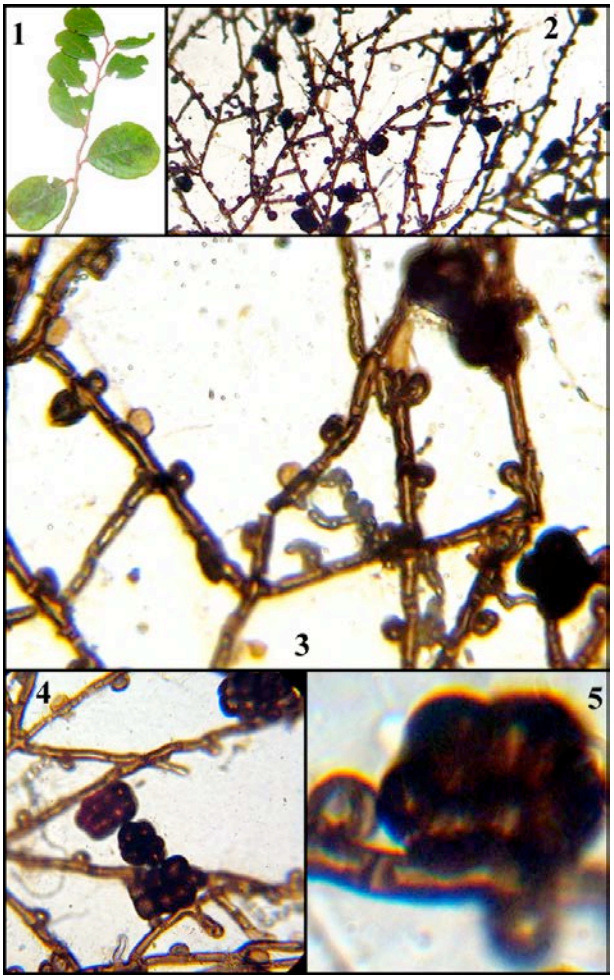


Image 192. *Sarcinella securinegae*
1 - Infected leaves; 2 - Colony; 3 - Appressoriate Hyphae; 4&5 - Conidia of Sarcinella

pressoriate, 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 deliquescing the ascomatal wall; ascospores brown, 1-septate, constricted at the septum.

Type: S. mirabilis Hohnel

Schiffnerula aristolochiae Hosag., Jagath. & Jayashankara, J. Threatened Taxa 3(12): 2269, 2011. (Image 193)

Materials examined: TBGT 5703 (holotype), MKMCC 241 (isotype), 4.xii.2009, on leaves of *Aristolochia tagala* Cham. (Aristolochiaceae), Devara kadu, Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense to dense, up to 2mm in diameter, confluent. Hyphae straight to substraight, branching alternate to opposite at acute to wide angles, loosely reticulate, cells 16–20x5–8 µm. Appressoria unilateral, alternate to rarely opposite, ovate, globose, mammiform, broad based, entire, 10–15x7–10 µm. Conidiophores of Questieriella produced lateral to the hyphae, simple, straight, micronematous, mononematous, 0–2-septate, 20–25x4–6 µm; conidiogenous cells terminal, monoblastic, integrated, solitary, ellipsoidal; conidia straight to curved, pale brown, 3-septate, mostly scattered in the colonies, 20–25x4–6 µm. Thyriothecia numerous, orbicular, central portion dissolved by exposing asci but the marginal cells remain intact and radiating, up to 50µm in diameter; asci oval, globose, octosporous, up to 20µm in diameter; ascospores conglobate, brown, uniseptate, more or less constricted at the septum, 25–30x12–15 µm. The conidia of Questieriella are scattered in the colonies, initially produced spores were intact and formed colonies. In case of subsequently produced spores, terminal cells were disintegrated, middle cells were deep brown, appressoria and mycelium produced from the central cells.

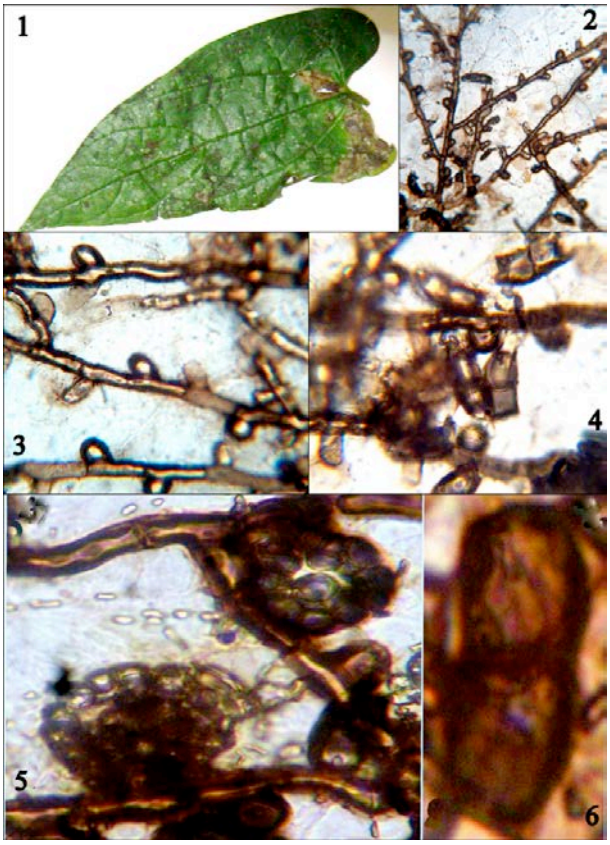


Image 193. *Schiffnerula aristolochiae*
1 - Infected Leaf; 2 - Colony; 3 - Appressoriate hyphae; 4 - Questieriella conidia; 5 - Thyriothecia; 6 - Ascospore

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 194)

Materials examined: FMKMCC 242, 9.i.2010, on leaves of C*elastrus paniculatus* Willd. (Celastraceae), Tadiandamol hills, C. Jagath Thimmaiah.

Colonies epiphyllous, thin, confluent, up to 4mm in diameter. Hyphae substraight to flexuous, branching irregular, loosely reticulate, cells 20–30x3–4 µm. Appressoria opposite, few are in bunch of three, one is bigger than the other, unicellular, globular, obovate, cylindrical, 4–5x6–9 µm. Conidiophores produced lateral to the hyphae, single, straight, mononematous; conidiophores 10–30x4–5 µm. Conidiogenous cells terminal, monoblastic, integrated, cylindrical. Sarciniform conidia, terminal, mostly sessile, solitary, ovate to globose, 2–6 celled, constricted at the septa, 24–32 µm in diameter, wall smooth. Questieriella conidia, thyriothecia and ascospores are not seen.

Schiffnerula glochidii Hosag., J. Mycopathol. Res. 44: 21, 2006; Plant Pathology & Quarantine 1(2): 186, 2011. stat. *Sarcinella* Hosag., J. Mycopathol. Res. 44: 21, 2006. (Image 195)

Materials examined: HCIO 45723 (holotype), TBGT 1472 (isotype), 13.xi.2003, on leaves of *Glochidion* sp. (Euphorbiaceae), MPCA, Brahmagiri, Talacauvery, Madikeri, V.B.Hosagoudar et al. FMKMCC 243, 16.xi.2010, *G. ellipticum* Wight, Mandalpatti, C. Jagath Thimmaiah.

Colonies epiphyllous, subdense to dense, light brown

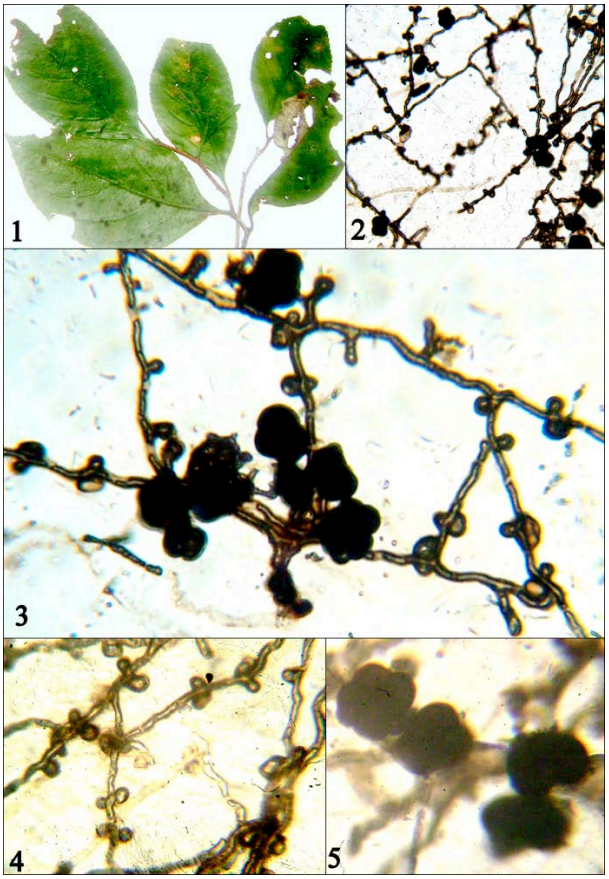


Image 194 *Schiffnerula celastri* 1 - Infected leaves; 2 - Colony; 3 - Appressoriate hyphae with conidia; 4 - A portion of the colony enlarged; 5 - Conidia of Sarcinella

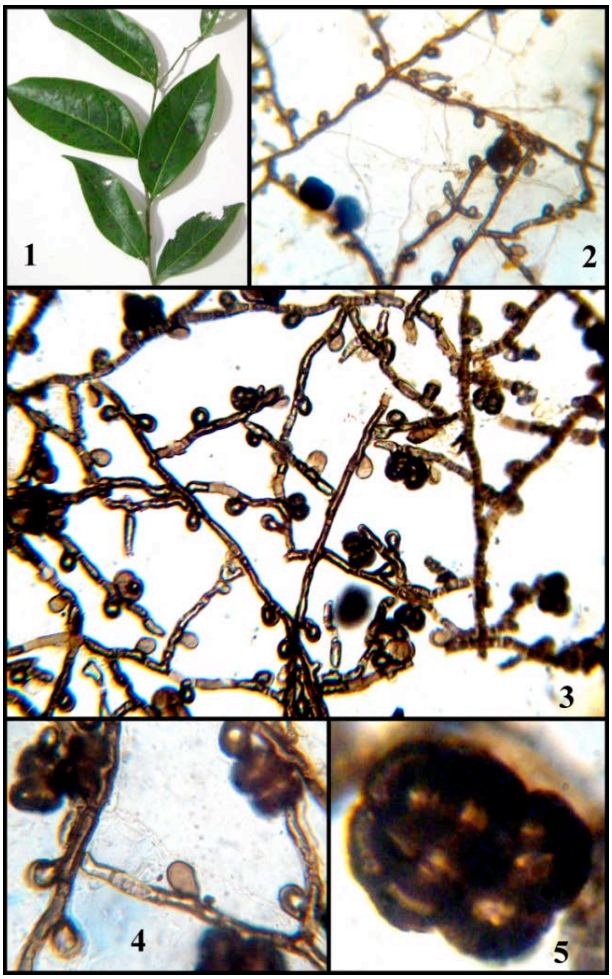


Image 195. *Schiffnerula glochidii* 1 - Infected leaves; 2 - Colony; 3 - Appressoriate Hyphae; 4 - Sarcinella conidia; 5 - Conidia of Sarcinella enlarged

to black, small, scattered, separate. Hyphae superficial, thick walled, light brown, brown, and thick walled, branching mostly opposite and occasionally irregular, loosely reticulate, cells measuring 4–7 µm in width. Appressoria alternate to unilateral, hemispherical, occasionally subglobose, light brown, 6–9 µm in diameter. Conidiophores micronematous, small, unbranched, straight, rarely flexuous, light brown, arising usually on the hyphae, simple, smooth walled, slightly paler towards the apex, 4–7 µm thick; conidiogenous cells monoblastic, terminal, determinate, cylindrical; conidia solitary, acrogenous, subspherical, smooth, dark brown, muriform, deeply constricted at the septa, sarciniform, septa usually cruciately arranged, up to 10 lobate in surface view, 19–35 µm in diameter. Questieriella conidia, thyriothecia and ascospores are not seen.

Schiffnerula ambigua Petrak, S. brideliae Hansf., S. crotonis Hansf. And S. ricini Hansf., are known on the members of the family Euphorbiaceae (Hosagoudar 2003b) but this is the only species on this host genus.

Schiffnerula hoddurensis Hosag., Jagath. & Jayashankara, J. Threatened Taxa 3 (12): 2270, 2011. (Image 196)

Materials examined: TBGT 5698 (holotype), FMK-MCC 244, 16.ix.2009on leaves of *Vitex negundo* L. (Verbenaceae), Hoddur, C. Jagath Thimmaiah.

Colonies epiphyllous, dense, up to 7mm in diameter. Hyphae flexuous, branching subopposite to alternate at acute to subacute angles, closely to loosely reticulate, cells 23–28x4–6 µm. Appressoria scattered, unilateral to alternate, rarely opposite, unicellular, globose, mammiform, broad based, entire, rarely angular, 5–10x6–11 µm. Questieriella conidia few, scattered, 3-septate, slightly constricted at the septa, straight to curved, taper towards both ends, end cells acute to subacute, 17–36x8–10 µm. Thyriothecia scattered, orbicular, initially charcoal black, central portion dissolved at the centre at maturity; asci globose to ovate, 15–18 µm in diameter; ascospores brown, conglobate, uniseptate, 23–26x11–13 µm.

Sarcinella jabalpurensis R.C. Rajak & Soni is known on this host from Jabalpur, Madhya Pradesh (Rajak & Soni 1981). Since the *Sarcinella* state is not known in the present collection, it is not worth to state that both the taxa are the same. Hence, it has been placed under an anmorphic species of its teleomorph.

Schiffnerula lagerstroemiae Hosag. & Riju, Plant Pathology & Quarantine 1(2): 186, 2011.

Sarcinella lagerstroemiae Hosag. & Mohanan, New Botanist 22: 31, 1995. (Fig. 54)

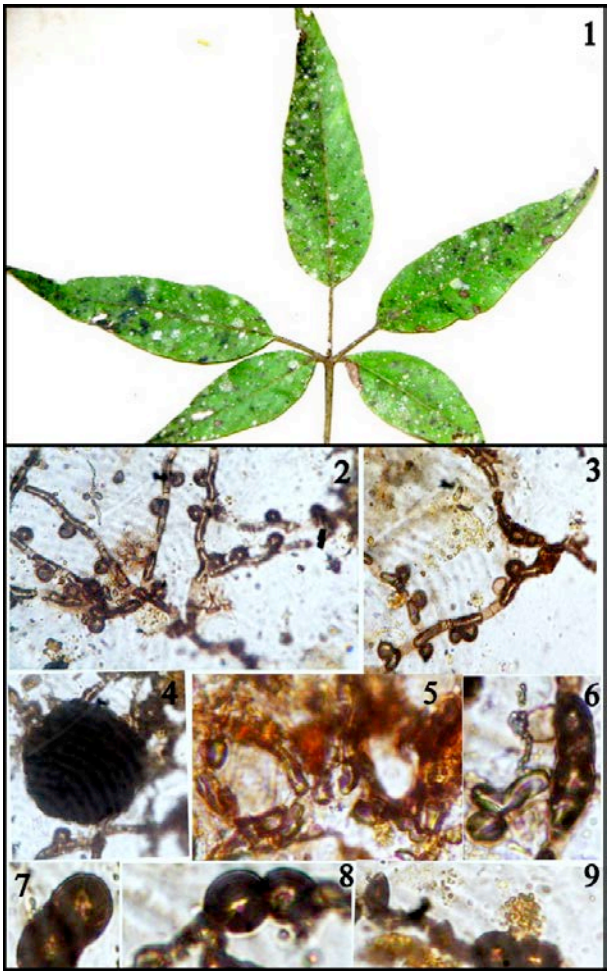


Image 196. *Schiffnerula hoddurensis*
1 - Infected Leaflets; 2&3 - Appressoriate Hyphae; 4 - Thyriothecium; 5&6 - Questieriella conidia; 7 - An ascospore; 8&9 - Germinating ascospores

Material examined: HCIO 45622, TBGT 1365; HCIO 45626, TBGT 1369, 12.xi.2003, on leaves of *Lagerstroemia* sp. (Lythraceae), Jodupal, V.B. Hosagoudar et al.

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 11–26×4–7 µm. Appressoria alternate, unilateral, globose, mammiform, entire, 6–9×8–11 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, 28–37×8–11 µm. Sarcinella conidiophores produced lateral to the hyphae, single, straight, flexuous, macronematous, mononematous, 0–3 septate, 20–31×4–6 µm; conidiogenous cells terminal, monoblastic, integra-ted, cylindrical. Sarcinella conidia blastic,

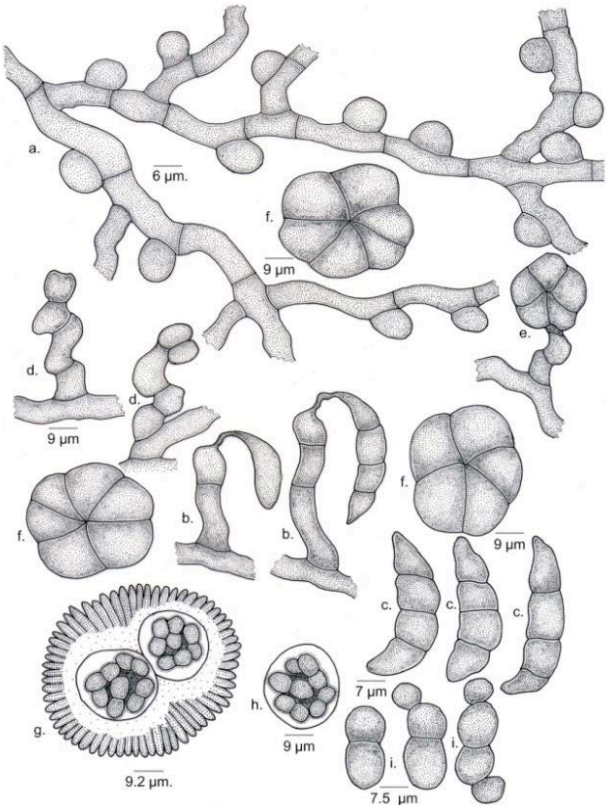


Figure: 54. *Schiffnerula lagerstroemiae*
a - Appressoriate mycelium; b - Conidiophores; c - Conidia of Questieriella; d - Conidiophore; e - Sarcinella conidium on conidiophores; f - Sarcinella conidium; g - Thyriothecium; h. Ascus; I - Ascospores

terminal, mostly sessile, solitary, dry, ovate to globose, sarciniform, 2–8 celled, con-stricted 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 66 µm in diameter, marginal cells radiating; asci 1–2 per thyriothecia, globose, 4–6 spored bitunicate, 17–26 µm in diameter; asco-spores cylindrical, oblong, uniseptate, con-stricted at the septum, 17–22×6–9 µm, remain hyaline for some time but turn brown at maturity.

Colonies were associated with the colonies of *Acremoniula sarcinellae* (Pat. & Har.) Arn. ex Deight.

Schiffnerula mirabilis Hohn., Sitz. K. Akad. Wiss. Wien., math.-nat. kl. I Abt. 118: 867, 1909; Hosag., Plant Pathology & Quarantine 1(2): 190, 2011.

= *Schiffnerula pitteriana* Sydow, Ann. Mycol. 28: 161, 1930.

= *Schiffnerula malabarensis* Ramakr. & Sund., Proc. Indian Acad. Sci. 38: 188, 1953. Stat. Questieriella (Fig. 55)

Material examined: HCIO 45731, 11.xi.2003, on

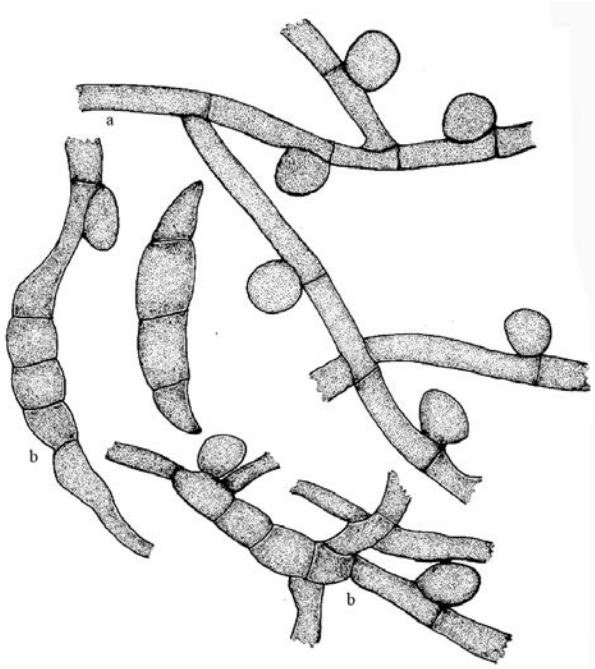


Figure. 55. *Schiffnerula mirabilis*
a - Appressoriate mycelium; b - Conidia

leaves of *Passiflora foetida* L. (Passifloraceae), Nishane motta, V.B. Hosagoudar et al, ; HCIO 45620, TBGT 1363, 14.xi.2003, V.B. Hosagoudar et al.

Colonies amphigenous, subdense, up to 2mm in diameter, confluent. Hyphae sub-straight to flexuous, branching opposite to unilateral at acute to wide angles, loosely reti-culate, cells 20–35×5–7 µm. Appressoria alternate to unilateral, unicellular, globose, ovate, broad based, entire, 7–12×10–15 µm. Conidia of Questieriella were numerous, scat-tered, germinating to form colony, curved, 3-septate, slightly constricted at the septa, taper towards both ends, 32–55×10–15 µm. Thyriothecia scattered, globose, orbicular, peridial cells initially radiating, later central portion dissolved by exposing asci, up to 53 µm in diameter; asci 1–2 per thyriothecia, globose, ovate, octosporous, 17–30 µm in diameter; ascospores conglobate, uniseptate, constricted at the septum, 17–25×7–12 µm.

Schiffnerula pulchra (Sacc.) Petrak, Ann. Mycol. 26: 397, 1928; Hughes, Can. J. Bot. 61: 1738, 1983; Hosag., Plant Pathology & Quarantine 1(2): 192, 2011.

Apiosporium pulchrum Sacc., Thumen, Mycotheca Universalis No. 52, 1875.

Dimerosporium pulchrum Sacc., Nuovo G. Bot. Ital. 7: 299, 1875.

Dimerina pulchra (Sacc.) Theiss., Bot. Centralbl. Beih. 29: 64, 1912.

Questiera pulchra (Sacc.) Arnaud, Les Asterinees, p. 187, 1918.

Synanamorph: *Sarcinella heterospora* Sacc., Fungi Italici no. 126, 1877.

Stat.- *Sarcinella* (Fig. 56).

Materials exmined: HCIO 45794, TBGT 1543, 11.xi.2003, on leaves of *Ligustrum* sp. (Oleaceae), Nishanemotta, Madikeri, V.B. Hosagoudar.

Colonies epiphyllous, dense, velvety, up to 2mm in diameter, rarely confluent. Hyphae straight to flexuous, branching irregular at acute angles, loosely reticulatae, cells 12–16x4–6 µm. Appressoria alternate to unilateral, globose, broad based, entire, 8–11x6–8 µm. Conidiophores micronematous, mononematous, simple, straight to slightly flexuous, aseptate to 1-2-septate, 12–22x4–6 µm; conidiogenous cells monoblastic, integrated, determinate, cylindrical. Conidia solitary, dry, acrogenous, simple, oval, spherical, charcoal black, sarciniform, 2-5-septate, constricted at the septa, 19–32 µm in diameter, wall smooth.

This is the only species known on this host genus from Europe and America and is known here for the first time from India (Hughes, 1983, Bilgrami et al. 1991; Hosagoudar, 2011).

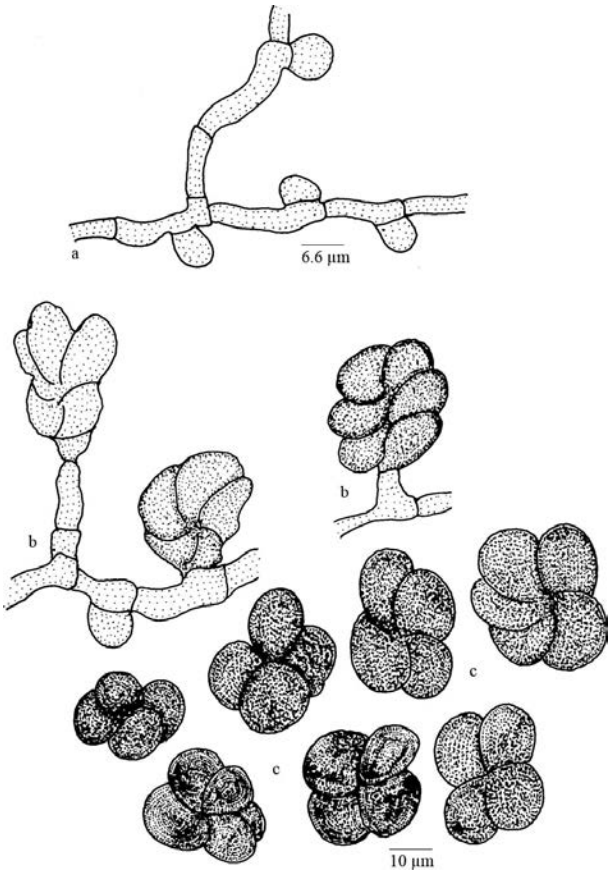


Figure. 56. ***Schiffnerula pulchra***
a - Appressoriate mycelium; b - Conidia on conidiophores; c - Conidia

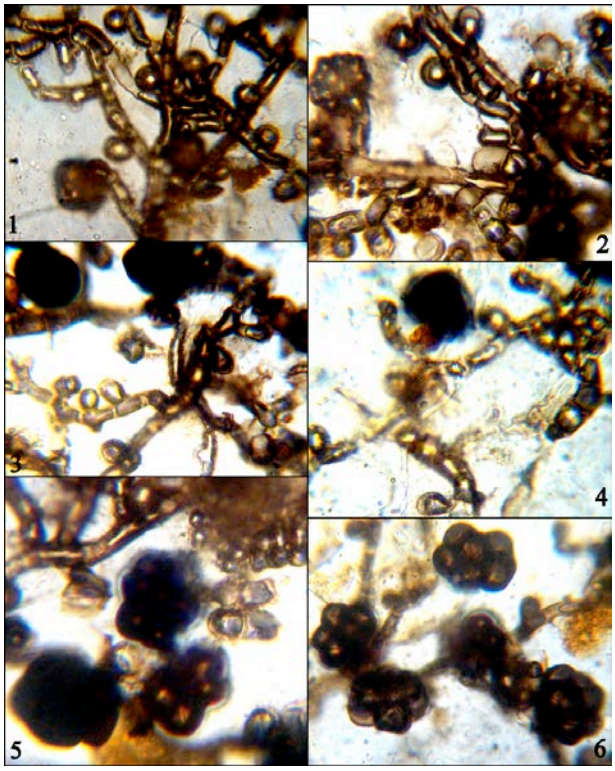


Image 197. ***Schiffnerula ricini***
1&2 - Appressoriate colonies; 3&4 - Conidia of Questieriella germinating; 5&6 - Young & mature conidia of Sarcinella

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), p 191, 2011. stat. Sarcinella (Image 197).

Materials examined: HCIO 45663, TBGT 1410, 14.xi.2003, on leaves of *Ricinus communis* L. (Euphorbiaceae), Nishane motta, V.B. Hosagoudar; TBGT 5435, FMKMCC 245, 27.xi.2009, Hoddur, October 27, 2009, C. Jagath Thimmaiah.

Colonies epiphyllous, dense up to 8mm in diameter, confluent. Hyphae substraight, branching opposite to alternate at subacute angles, cells 9–18x6–7 µm. Appressoria unicellular, alternate, unilateral, few opposite, antrorse to subantrorse, globose, ovate, few angulose, broad based,7–9x7–11µm. Conidia of Questieriella were scattered, mostly not attached, curved, 3-septate, slightly constricted at the septa, taper towards both ends, 17–25x6–8 µm. Sarcinella conidiophores produced lateral to the hyphae, single, straight to flexuous, macronematous, mononematous, 0-2-septate, 9–12x2–4 µm,

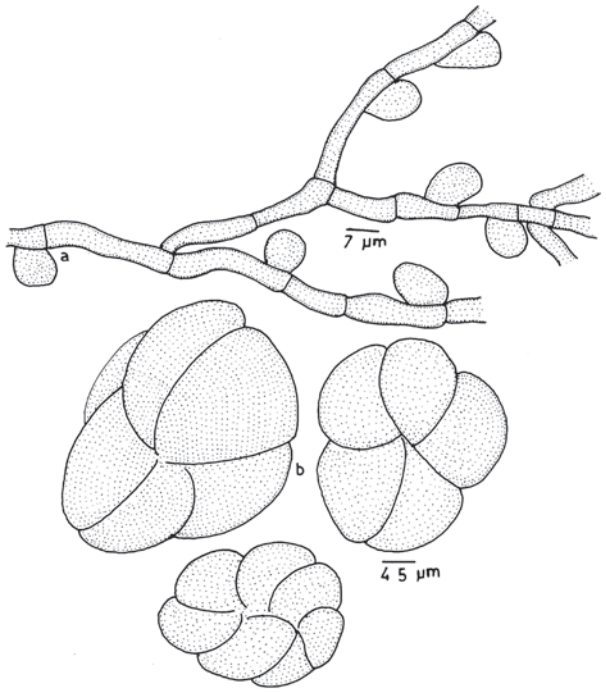


Figure. 57. *Schiffnerula tectonae*
a - Appressoriate mycelium; b - Conidia

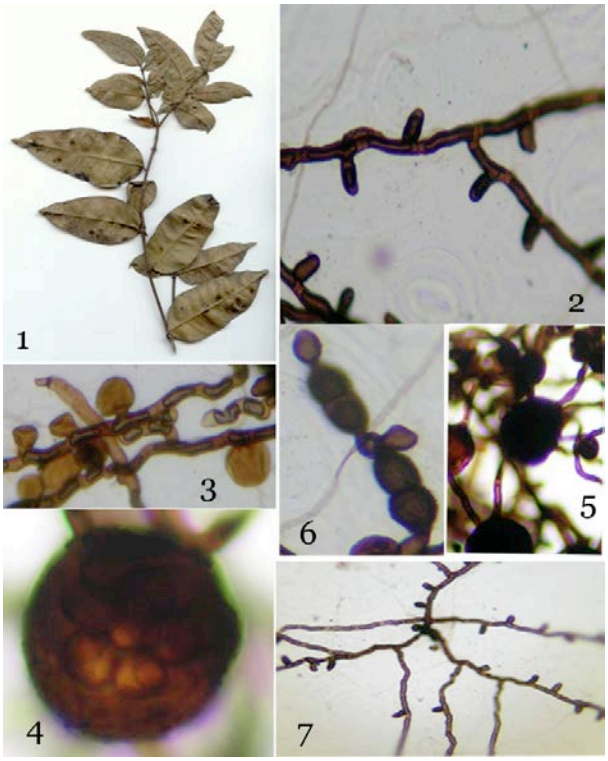


Image. 198. *Balladynocallia glabra*
1 - Infected leaves; 2 - Appressoriate mycelium; 3-5 - Perithecia; 6 - Germinating ascospores; 7 - Colony formed ascospore

condiogenous cells terminal, monoblastic, integrated, cylindrical; conidia, blastic, terminal, solitary, dry, ovate to globose, sarciniform, cruciately septate, 4–8 celled, constricted at the septa,19–31µm in diameter, brown which turns dark at maturity, wall smooth. Thyriothecia and ascospores are not seen.

This is the only species of the genus Schiffnerula known on the host genus Ricinus (Hansford, 1948). However, the ascomata were without asci and ascospores.

Schiffnerula tectonae (Thite & Patil) Hosag., Zoos Print J. 18: 1077, 2003; Plant Pathology & Quarantine 1(2): 196, 2011.

Clypeolella tectonae Thite & Patil, Geophytology 15: 84, 1985.

Sarcinella tectonae Hosag. & Manoj., Zoos'Print J. 19: 1389, 2004. (Fig. 57).

Material examined: HCIO 45633, TBGT 1377, 11.xi.2003, on leaves of *Tectona grandis* L.f. (Verbenaceae), Jodupal, V.B. Hosagoudar et al; HCIO 45613, TBGT 1356; HCIO 45625, TBGT 1368; HCIO 45632, TBGT 1376, 12.xi.2003, V.B. Hosagoudar et al.

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 12–20×4–7 µm. Appressoria brown, scattered, alter-nate, globose to slightly ovate, entire, 9–12 µm in diameter; conidiophores simple, micro-nematous, 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.

Colonies were hyper parasitized by Acremoniula sarcinellae (Pat. & Har.) Arn. ex Deight.

Balladynocallia glabra (Hansf.) Batista in Bat., Silva & Bezerra, Atas Inst. Micol. 2 : 216. 1965; Hosag., Biju, C.K. and Abraham, T.K. J. Econ. Taxon. Bot. 25: 307, 2001. (Fig. 58 & Image 198)

Materials examined: TBGT 6642, 16.xi.2010, on leaves of *Canthium coromandalicum* (Rubiaceae), Madikeri, C. Jagasth Thimmaiah.

Colonies amphigenous, carbonaceous black, woolly, up to 5mm in diameter, rarely confluent. Hyphae straight, branching alternate to irregular at acute angles, loosely reticulate, cells 24–40x3–4 µm. Appressoria unicellular, scattered, alternate to unilateral, oval, clavate, globose, mostly entire, rarely angular, often strongly

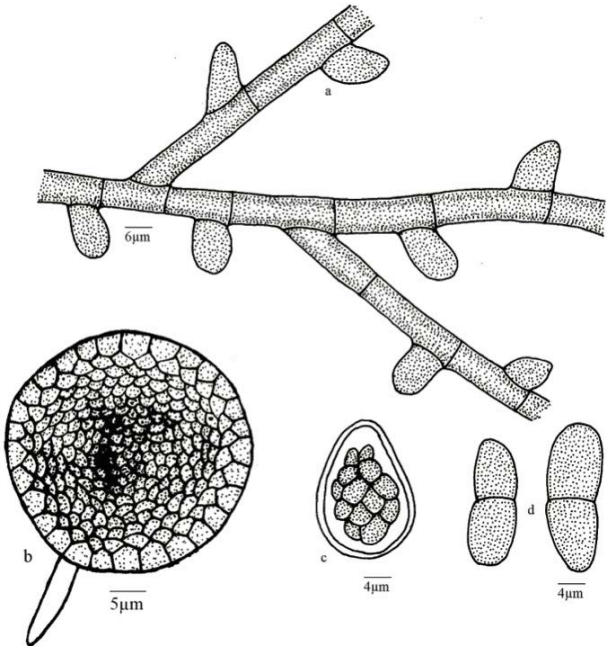


Figure. 58. *Balladynocallia glabra*
a - Appressoriate mycelium; b - Perithecium; c - Ascus; d - Ascospores

constricted at the base, 8–12x4–7 µm. Perithecia closely scattered, initially stipitate, stipes up to 10µm long, later broad based, ovate, pyriform, irregularly opened at the apex, 50–80x22–30 µm, wall 1–2 layered; asci 4–5 µm in each perithecium, ovate, clavate, sessile, become globose after their release, octosporous, bitunicate, tunica thick at the apex, 41–60x28–32 µm; ascospores initially hyaline, brown at maturity, conglobate, 1-septate, constricted at the septum, both the cells unequal in size, broadly rounded at both ends, 17–20x7–9 µm, wall smooth.

REFERENCES

Bilgrami, K.S., M. Jamaluddin & M.A. Rizwi (1991). *Fungi of India. List and References.* Today and Tomorrow's Printers & Publishers, New Delhi, 798pp.

Crane, J.L. & A.G. Jones (2001). Nomenclatural and taxonomic revisions in the Meliolaceae. *Mycotaxon* 77: 145–151.

Doidge, E.M. (1942). A revision of the South African Microthyriaceae. *Bothalia* 4: 273–344.

Hansford, C.G. (1947). New or interesting tropical fungi-I. *Proceedings of Linnean Society of London* 158: 28–50.

Hansford, C.G. (1948). Chinese fungi collected by Cheo. *Farlowia* 3: 260–283.

Hansford, C.G. (1954). Some Microthyriales and other fungi from Indonesia. *Reinwardtia* 3: 113–144.

Hansford, C.G. (1961). The Meliolineae. A Monograph. *Sydowia Beihefte* 2: 1–806.

Hofman, T.A. & M. Piepenbring (2008). New species and records of Asterina from Panama. *Mycological Progress* 7: 87–98.

Hosagoudar, V.B. & M. Harish (2009). *Vishnumyces*, a new genus of the family Asterinaceae from India. *Indian Phytopathology* 63: 85–86.

Hosagoudar, V.B. (1996). *Meliolales of India*. Botanical Survey of India, Calcutta, 363pp.

Hosagoudar, V.B., T.K. Abraham & P. Puspangadan (1997). *The Meliolaceae - A Supplement.* Tropical Botanic Garden and Research Institute, Palode, Thiruvananthapuram, Kerala, India, 201pp.

Hosagoudar, V.B. (2003a). The genus *Schiffnerula* and its synanamorphs. *Zoos' Print Journal* 18(4): 1071–1078; http://dx.doi.org/10.11609/JoTT.ZPJ.18.4.1071-8

Hosagoudar, V.B. (2003b). Studies on foliicolous fungi – XII. New species, new records and hyperparasites. *Zoos' Print Journal* 18(3): 1037–1040; http://dx.doi.org/10.11609/JoTT.ZPJ.18.3.1037-40

Hosagoudar, V.B. (2004a). Studies on foliicolous fungi - VII. *Journal of Economic and Taxonomic Botany* 28: 187–195.

Hosagoudar, V.B. (2004b). Studies on foliicolous fungi - XV. New species, new records and rare fungus. *Zoos' Print Journal* 19(3): 1386–1389; http://dx.doi.org/10.11609/JoTT.ZPJ.19.3.1386-9

Hosagoudar, V.B. & T.K. Abraham (2000). A list of *Asterina* Lev. species based on the literature. *Journal of Economic and Taxonomic Botany* 24: 557–587.

Hosagoudar, V.B. & J.N. Kapoor (1984). New Technique of mounting Meliolaceous fungi. *Indian Phytopathology* 38: 548–549.

Hosagoudar, V.B. & D.K. Agarwal (2008). *Taxonomic Studies of Meliolales. Identification Manual.* International Book Distributors, Dehra Dun, 263pp.

Hosagoudar, V.B. (2013). Meliolales of India - Volume III. *Journal of Threatened Taxa* 5(6): 3993–4068; http://dx.doi.org/10.11609/JoTT.o3307.3993-4068

Hosagoudar, V.B. & A. Sabeena (2010). New and less known fungi from Kerala, India. *Taiwania* 55 (3): 249–253.

Hosagoudar, V.B. (2011). The genus *Schiffnerula* in India. *Plant Pathology & Quarantine* 1(2): 131–204; http://dx.doi.org/10.5943/ppq/1/2/4

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. (1983). Five species of Sarcinella from America, with notes on *Questieriella* n. gen, *Mitteriella, Endophragmiopsis, Schiffnerula,* and *Clypeolella*. *Canadian Journal of Botany* 61: 1727–1767.

Hughes, S.J. (1953). Fungi from the Gold coast - I. *Mycological Papers* 48: 1–91.

Jana, T.K., S.N. Ghosh & A.K. Das (2005). Meliolaceae of Nagaland (India). *Journal of Mycopathological Research* 43: 33–40.

Kar, A.K. & S.N. Ghosh (1986). New *Asterina* species from West Bengal. *Indian Phytopathology* 39: 204–220.

Rajak, R.C. & K.K. Soni (981). Foliicolous ectoparasites from Jabalpur – I. Some Sarcinellae. *Indian Journal of Mycology & Plant Pathology* 11: 89–91.

Rangaswamy, G. (1975). *Diseases of Crop plants in India.* Prentice- Hall of India, Pvt. Ltd., New Delhi.

Ryan, R.W. (1928). Asterina species from the India. *Memoirs of Department of Agriculture Indian Botany* 15: 103–105.

Song, B. & V.B. Hosagoudar (2003). A list of Lembosia species based on the literature. *Guizhou Science* 21: 93–101.

Stevens, F.L. & M.H. Ryan (1939). The Microthyriaceae. *Illionis Biological Monographs* 17: 1–138.

Sutton, B.C. (1980). *The Coelomycetes: Fungi Imperfecti with Pycnidia, Acervuli and Stromata*. CMI, Kew, 696pp.

Sydow, H. & F. Petrak (1931). Micromycetes Philippinensis II. *Annales Mycologici* 29: 145–279.

Sydow, H. & P. Sydow (1917). Beitrage Zur Kennitius der Pilze flora der Philippinen – Inseln. *Annales Mycologici* 15: 165–268.

Sydow, H. & P. Sydow (1939). Fungi from the Island of Palawan. *Leaflet Phillippine Botany* 5: 1533–1547.

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 Journal of Science* 13: 361–384.

Table 1. Key to the species of Meliolales based on their host families and digital formule.

ACANTHACEAE		
Meliola 3111.3222	Colonies epiphyllous, dense; hyphae straight; appressoria alternate, antrorse, straight to slightly curved; head cells cylindrical, few ovate, few attenuated at the apex; phialides few, mixed with appressoria; mycelial setae numerous, simple, straight, acute to obtuse at the tip	*Meliola acanthacearum*
	ANACARDIACEAE	
Meliola 31½1.4232	Colonies epiphyllous, dense, confluent; hyphae substraight; appressoria distantly placed, alternate, about 10% unilateral, straight, antrorse; head cells oblong, clavate, slightly curved, entire; phialides on separate mycelial branches, few mixed with appressoria; mycelial setae simple, curved or straight, forked, dentate up to five times, obtuse	*Meliola geniculata*
3111.4322	Colonies amphigenous, dense, velvety; hyphae straight to substraight; appressoria alternate, antrorse, straight to curved, rarely retrorse; head cells cylindrical to ovate, entire to angulose, rarely sublobate; phialides few, mixed with appressoria; mycelial setae numerous, grouped around perithecia, simple, straight, acute tip	*Meliola mangiferae*
3111.4223	Colonies amphigenous, mostly epiphyllous, subdense; hyphae straight to crooked; appressoria alternate, antrorse to subantrorse; head cells cylindrical or of various forms, slightly angulose, entire; phialides mixed with appressoria; mycelial setae scattered to grouped, straight, simple acute at the tip	*Meliola nothopegiae*
3111.7333	Colonies hypophyllous, dense, velvety; hyphae strongly appressed to the host surface, crooked; appressoria scattered, alternate to unilateral, antrorse to reflexed, curved variously; 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	*Meliola holigarnae*
	ANGIOPTERIDACEAE	
Meliola 3113.3223	Colonies hypophyllous; hyphae substraight to flexuous; appressoria alternate, unilateral, few opposite, mostly antrorse, few retrorse, curved; head cells ovate, few curved inwards, entire; phialides few, mixed with appressoria, cylindrical to ampulliform; mycelial setae simple, straight to slightly bent, acute to obtuse at the tip	*Meliola angiopteridis* var. *indica*
	ANNONACEAE	
Meliola 3141.4221	Colonies amphigenous, subdense, scattered; hyphae straight to substraight; appressoria alternate to unilateral, antrorse to subantrorse, straight to rarely curved, head cells ovate to oblong, often attenuated to truncate the tip, entire; phialides mixed with appressoria; mycelial setae densely scattered, dichotomously and irregularly furcated, branchlets recurved, acute to dentate at the tip	*Meliola goniothalamigena*
	APOCYNACEAE	
Meliola 3111.3222	Colonies epiphyllous, discrete, subdense; hyphae substraight; appressoria alternate, straight to slightly curved, antrorse to retrorse; head cells oblong, clavate, slightly curved, entire; phialides borne on separate mycelial branches, alternate to unilateral, conoid to ampulliform; mycelial setae few, simple, slightly curved, acute at the tip	*Meliola alstoniae*
3111.3222	Colonies epiphyllous, confluent, dense; hyphae substraight to straight; appressoria alternate, straight, antrorse; head cells oblong, angular, lobed; phialides on separate mycelial branches, alternate, few unilateral, ampulliform; mycelial setae simple, acute to obtuse at the tip	*Meliola carissae* var. *indica*
3111.4221	Colonies epiphyllous, dense; hyphae substraight; appressoria alternate, few unilateral, antrorse, straight, few curved inwards; head cells ovate, entire, few lobate & angulose; phialides many, mixed with appressoria, opposite to unilateral, ampulliform; mycelial setae few, straight, simple, acute to obtuse at the tip	*Meliola ervatamiae*
3121.3222	Colonies epiphyllous, dense; hyphae straight to substraight; appressoria alternate, few unilateral, antrorse, straight; head cells ovate, globose, entire; phialides many, borne on separate branches, unilateral, few alternate to opposite, ampulliform; mycelial setae few, simple, variously curved at the tip	*Meliola pepparaensis*
31½1.3223	Colonies amphigenous, mostly hypophyllous, caulicolous, subdense to dense, confluent; hyphae straight to substraight; appressoria alternate, antrorse, closely antrorse to rarely retrorse, head cells ovate, entire, rarely angular to slightly lobate, attenuated and broadly rounded to truncate at the apex; phialides mixed with appressoria; mycelial setae scattered, simple, straight to curved, not constantly uncinate, acute at the tip	*Meliola parsonsiicola*
	ARALIACEAE	
Meliola 31¼3.4221	Colonies epiphyllous, dense; hyphae substraight; appressoria opposite, alternate, few unilateral, antrorse, few curved and retrorse, entire; head cells ovate to globose, entire; phialides few, opposite, cylindrical; mycelial setae grouped around perithecia, branched dichotomously, few simple, straight, acute to obtuse at the tip	*Meliola dichotoma*
	ASCLEPIADACEAE	
Meliola 3111.3221	Colonies dense; hyphae substraight, flexuous; appressoria alternate to unilateral (few), antrorse, straight to curved; head cells ovate, entire, angulose; phialides many, borne on a separate mycelial branch; mycelial setae scattered, simple, straight, acute at the tip	*Meliola gymnemae*

31⅓3.3221	Colonies amphigenous, dense; hyphae substraight, flexuous; appressoria alternate to opposite (2%), antrorse, straight; head cells ovate to globose, entire, angulose, sublobate to lobate, attenuated and broadly rounded at the apex; phialides many, mixed with appressoria, also borne on separate mycelial branch; mycelial setae many, scattered, simple, straight to slightly curved, acute to obtuse at the tip	*Meliola tylophorae-indicae*
3111.4323	Colonies amphigenous, mostly epiphyllous, dense; hyphae straight substraight; appressoria alternate, mostly antrorse, head cells ovate, globose, entire to angular, rarely slightly sublobate; phialides mixed with appressoria; mycelial setae scattered to grouped around perithecia, straight to curved, simple, acute at the tip	*Meliola toxocarpi*
	ASTERACEAE	
Asteridiella 3101.4220	Colonies amphigenous, subdense to dense; hyphae undulate; appressoria alternate and unilateral, antrorse, spreading; head cells globose, entire and rarely angular; phialides mixed with appressoria	*Asteridiella cyclopoda*
	BURSARACEAE	
Meliola 3111.4223	Colonies amphigenous; hyphae flexuous to straight; appressoria alternate, few unilateral, straight, antrorse; phialides mixed with appressoria; mycelial setae few, simple, straight, acute to obtuse at the tip	*Meliola canarii*
	CAESALPINIACEAE	
Meliola 3113.4221	Colonies epiphyllous, subdense; hyphae substraight; appressoria mostly alternate to unilateral, few opposite, antrorse to subantrorse, few retrorse, straight to curved; head cells ovate, few globose, bent like a hook, entire; phialides few, mixed with appressoria; mycelial setae many, simple, acute at tip	*Meliola atylosiae*
	CAPPARACEAE	
Asteridiella 3101.3220	Colonies amphigenous, mostly epiphyllous, dense, minute; hyphae straight to undulate; appressoria alternate, not crowded, antrorse to subantrorse, head cells ovate, oblong to cylindrical, mostly entire, rarely angular to sublobate; phialides mixed with appressoria	*Asteridiella capparidigena*
	CAPRIFOLIACEAE	
Meliola 3111.5223	Colonies amphigenous, thin; hyphae flexuous; appressoria alternate and unilateral, straight, antrorse, distantly placed; head cells ovate, clavate, and irregularly lobed; phialides few borne on separate branch; mycelial setae carboniferous, straight or slightly curved, acute at the tip.	*Meliola goosii*
	CLUSIACEAE	
Meliola 3111.3223	Colonies hypophyllous, dense; hyphae substraight; appressoria alternate to unilateral (40%), antrorse, straight to slightly curved; head cells ovate, cylindrical, rarely globose, entire, angulose; phialides many, mixed with appressoria; mycelial setae simple, straight to slightly curved, acute to obtuse at the tip	*Meliola garciniae*
	COMBRETACEAE	
Asteridiella 3101.3220	Colonies epiphyllous, subdense; hyphae substraight to slightly undulate; appressoria alternate, straight, antrorse, head cells globose, entire to angular; phialides numerous, borne on a separate mycelial branch	*Asteridiella combreti* var. *leonensis*
	CONVOLVULCEAE	
Meliola 3111.3221	Colonies epiphyllous, dense; hyphae flexuous; appressoria alternate to unilateral (50%), antrorse to subantrorse, straight; head cells globose, mostly entire, few angulose, truncate; phialides many, borne on separate mycelial branch; mycelial setae many, few grouped around perithecia, remaining present on mycelia, simple, curved, acute to obtuse tip at the tip	*Meliola clavulata*
3112.4221	Colonies epiphyllous, dense, scattered; hyphae substraight; appressoria regularly opposite, antrorse to subantrorse, straight; head cells ovate, globose, and entire; phialides few, mixed with appressoria; mycelial setae simple, straight, curved, acute at the tip	*Meliola malacotricha* var. *major*
3141.4331	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; mycelial setae dichotomously branched, obtuse to acute at the tip	*Meliola quadrispina*
	EBENACEAE	
Meliola 3113.4223	Colonies epiphyllous, thin, discrete; hyphae substraight; appressoria alternate, unilateral and opposite, straight, antrorse; head cells oblong, attenuating at the apex, few curved, angulose, entire; phialides mixed with appressoria; mycelial setae acute to obtuse at the tip	*Meliola diospyri*
	ELAEAGNACEAE	
Meliola 3111.3223	Colonies epiphyllous, subdense to dense ; hyphae substraight to flexuous; appressoria mostly alternate few unilateral, antrorse, retrorse, straight to slightly curved; head cells ovate globose, few clavate and oblong, entire, angular; phialides few, ampulliform, mixed with the appressoria; mycelial setae acute at the tip	*Meliola elaegni*
	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	*Asteridiella elaeocarpi-tuberculati*

	ERYTHROPALACEAE	
Meliola 3111.3211	Colonies amphigenous, dense, thick; hyphae flexuous; appressoria alternate, about 20% unilateral, straight, antrorse to retrorse; head cells cylindrical, obovate, few slightly curved, entire; phialides few, on separate branches; mycelial setae many, simple	*Meliola erythropali*
	EUPHORBIACEAE	
Asteridiella 3101.4220	Colonies epiphyllous, dense; hyphae substraight to flexuous; appressoria alternate, antrorse, subantrorse to reflexed, straight to variously curved, head cells ovate, globose, cylindrical, entire, angular to rarely sublobate; phialides numerous, apparently borne on a separate mycelium; perithecia scattered, perithecial wall cells conoid, projected	*Asteridiella chowrirae*
3201.4320	Colonies epiphyllous, mainly at the junction of veins; hyphae substraight; appressoria alternate, antrorse, straight to curved; head cells globose, lobate, angulose, rarely entire; phialides numerous, borne on a separate mycelial branch; ascospores cylindrical to oblong, middle cell larger	*Asteridiella malloti*
3101.4220	Colonies epiphyllous, subdense, spreading; hyphae straight to substraight; appressoria alternate, straight to slightly curved, antrorse, subantrorse to spreading, head cells ovate to oblong, straight to curved, entire; phialides mixed with appressoria	*Asteridiella kodavae*
3101.3220	Colonies epiphyllous, subdense, spreading; hyphae straight to substraight; appressoria alternate to unilateral, mostly straight to rarely curved, antrorse to subantrorse, head cells ovate to globose, stellately to irregularly sublobate to deeply lobate; phialides mixed with appressoria	*Asteridiella tragiae*
Meliola 3111.3221	Colonies epiphyllous; hyphae straight to substraight; appressoria mostly alternate to unilateral, antrorse, straight to slightly curved; head cells globose, mostly entire, few angulose, rarely sublobate; mostly borne on separate mycelial branch, but few mixed with appressoria; mycelial setae many, simple, acute to obtuse at the tip	*Meliola ramosii*
31½1.3222	Colonies epiphyllous, subdense; hyphae straight, substraight to flexuous; appressoria alternate, about 1% opposite, straight to slightly curved, antrorse to subantrorse, head cells ovate, globose, entire, straight to curved, rarely truncate at the apex; phialides mixed with appressoria; mycelial setae numerous, simple, straight to about 10% uncinate, obtuse, 2–3-times variously and irregularly dentate, often furcate at the tip, about 10% uncinate	*Meliola tragiae*
	FABACEAE	
Meliola 3113.3221	Colonies epiphyllous; hyphae substraight; appressoria mostly opposite, few alternate and unilateral, straight, antrorse to retrorse; head cells globose, oblong, and entire; phialides few, mixed with appressoria; mycelial setae many, simple, acute to obtuse at the tip	*Meliola abrupta*
3113.3233	Colonies epiphyllous, dense; hyphae substraight, flexuous; appressoria mostly alternate to opposite, antrorse to subantrorse, few retrorse, straight to curved; head cells ovate, few globose, angulose, entire; phialides many, mixed with appressoria; mycelial setae numerous, mostly grouped around perithecia, simple, straight, acute to obtuse at the tip	*Meliola buteae*
3113.3212	Colonies epiphyllous, subdense; hyphae substraight; appressoria alternate to unilateral, few opposite, antrorse to subantrorse, retrorse; head cells ovate, slightly curved, angulose, entire; phialides many mixed with appressoria; mycelial setae numerous, grouped around perithecia, simple, straight to curved, acute to obtuse at the tip	*Meliola gliricidiicola*
3112.3221	Colonies epiphyllous, thin; hyphae straight; appressoria straight, antrorse, opposite; head cells attenuating towards the apex, slightly recurved, entire; phialides mixed with appressoria, opposite to each other or opposite to appressoria; mycelial setae simple slightly curved, obtuse to acute at the tip	*Meliola kingiodendri*
3111.4222	Colonies amphigenous, dense; hyphae substraight to flexuous; appressoria alternate, straight to curved, antrorse to reflexed; head cells globose to obovoidal, entire to rarely slightly angulose; phialides mixed with appressoria; mycelial setae grouped around perithecia, simple straight, acute to obtuse at the tip	*Meliola pterocarpi*
3113.4222	Colonies epiphyllous, discrete; hyphae substraight; appressoria mostly unilateral few alternate & opposite, straight, retrorse, few antrorse; head cells globose, slightly curved or crooked, entire; phialides mixed with appressoria; mycelial setae numerous, simple, straight to slightly curved, acute to obtuse at the tip	*Meliola phaseoli*
	FLACOURTIACEAE	
Amazonia 3102.3110	Colonies epiphyllous, distantly arranged; hyphae straight; appressoria opposite, antrorse, straight; head cells ovate, entire; phialides few, mixed with appressoria	*Amazonia flacourtiae*
Asteridiella 3103.4230	Colonies amphigenous, velvety; hyphae straight to substraight; appressoria densely arranged, mostly alternate, opposite, few unilateral, antrorse; head cells ovate, angular, entire; phialides mixed with appressoria	*Asteridiella scolopiae*
3103.3220	Colonies amphigenous, mostly epiphyllous, subdense; hyphae straight to substraight, appressoria alternate, about 5% opposite, antrorse to spreading, head cells ovate to obovate, entire to slightly angular' Phialides mixed with appressoria	*Asteridiella homaligena*
2101.3220	Colonies epiphyllous, thin; hyphae straight to substraight, appressoria alternate to unilateral, antrorse to subantrorse, straight to curved, head cells ovate, clavate, entire, truncate, straight to curved, Phialides mixed with appressoria; ascospores ellipsoidal, 3-septate, slightly curved	*Asterdiella hydnocarpigena*
Meliola 3121.3223	Colonies epiphyllous, dense; hyphae substraight; appressoria alternate, antrorse, straight to curved; head cells globose, oblong, irregularly and deeply stellately lobate; phialides mixed with appressoria, unilateral, cylindrical; mycelial setae numerous, simple, acute to obtuse at the tip	*Meliola scolopiae* var. *indica*

	GNETACEAE	
Meliola 3111.4322	Colonies amphigenous, mostly epiphyllous ; hyphae substraight; appressoria alternate, antrorse; head cells ovate, globose, slightly angulose; phialides many, mixed with appressoria; mycelial setae scattered, simple, straight, acute at the tip	*Meliola gneti*
	ICACINACEAE	
Meliola 3113.4222	Colonies hypophyllous; hyphae substraight, flexuous; appressoria alternate to opposite, antrorse, straight to curved; head cells globose, ovate, sublobate, rarely entire; phialides borne on separate branches; mycelial setae numerous, straight, acute at the tip	*Meliola chandrashekaranii*
	LAURACEAE	
Armatella 1101.3220	Colonies foliicolous, mostly epiphyllous;hyphae flexuous; appressoria very few, opposite, head cells ovate, attenuated, irregularly crenately lobate	*Armatella actinodaphnes*
11x1.3222	Colonies epiphyllous, thin; hyphae straight to substraight, smooth walled; head cells of appressoria ovoid, conoid, wall crenulated; perithecia on ex-appressoriate	*Armatella cryptocariae*
11x1.3234	Colonies hypophyllous, thin; hyphae flexuous to crooked, smooth walled; appressoria variously curved, stalk cells 1-several septate, smooth walled	*Armatella katumotoi*
1101.2220	Colonies hypophyllous, thin to dense; hyphae substraight to crooked, appressoria alternate, mostly perpendicular to the hyphae, often antrorse to retrorse, head cells globose, often ovate, straight to curved, entire, angular, crenately lobate to few deeply lobate	*Armatella cinnamomi*
Meliola 3111.5223	Colonies epiphyllous, dense; hyphae substraight; appressoria alternate, straight to curved, antrorse to retrorse; head cells versiform, obovate, entire; phialides mixed with appressoria; mycelial setae few, straight, simple, acute to obtuse at the tip	*Meliola litseae* var. *rotundipoda*
31½1.5232	Colonies hypophyllous, scattered, subdense to dense; hyphae flexuous to crooked; appressoria scattered, alternate, antrorse, spreading to irregularly curved,head cells ovate, globose, variously curved, entire to angular; phialides mixed with appressoria; mycelial setae simple, hamate, arcuate to irregularly curved, obtuse at the tip	*Meliola mannavanensis*
	LEEACEAE	
Irenopsis 3401.3210	Colonies epiphyllous; hyphae straight to substraight; appressoria mostly alternate, straight, antrorse; head cells globose, ovate, sublobate; phialides mixed with appressoria; perithecial setae 4-8, tortuous to straight	*Irenopsis leeae* var. *indica*
	LECYTHIDACEAE	
Meliola 3113.4212	Colonies epiphyllous, dense; hyphae flexuous; appressoria mostly opposite, few unilateral and alternate, straight, antrorse; head cells globose, few slightly angulose, cylindrical, entire; phialides mixed with appressoria; mycelial setae simple, straight, acute to obtuse at the tip	*Meliola careyae* var. *indica*
	LINACEAE	
*Meliola*31½1.4221	Colonies epiphyllous, thin, spreading; hyphae straight to substraight; appressoria alternate to unilateral, straight to slightly curved, antrorse, head cells ovate, entire to angular, straight to curved; phialides mixed with appressoria; mycelial setae very few, simple, straight, obtuse, acute to dentate at the tip	*Meliola reinwartiodendricola*
	LOGANIACEAE	
Meliola 3111.3223	Colonies hypophyllous, dense; hyphae substraight; appressoria alternate, antrorse, to retrorse; head cells ovate, slightly angulose; phialides mixed with appressoria; mycelial setae numerous, simple, straight, acute at the tip	*Meliola spigeliae*
3111.3222	Colonies epiphyllous, subdense, spreading; hyphae straight, substraight to flexuous; appressoria alternate to unilateral, antrorse, subantrorse to retrorse, head cells oblong to cylindrical, entire, angular; Phialides mixed with appressoria; mycelial setae few, simple, straight, acute to obtuse at the tip	*Meliola kodaguensis*
	LORANTHACEAE	
Meliola 31½1.5321	Colonies epiphyllous, dense; hyphae substraight to flexuous; appressoria mostly alternate to unilateral, antrorse; head cells ovate, globose, entire, angulose. Phialides mixed with appressoria; mycelial setae simple, straight, obtuse to 2-4–fid, often furcate at the apex	*Meliola prataprajii*
	MAGNOLIACEAE	
Meliola 3111.4232	Colonies amphigenous, subdense; hyphae substraight to flexuous; appressoria closely placed, recurved, antrorse and retrorse; head cells sublobate, clavate, oblong; phialides mixed with appressoria; mycelial setae simple, acute to obtuse at the tip	*Meliola cariappae*
	MALVACEAE	
Irenopsis 3401. 3220	Colonies epiphyllous, subdense, crustose; hyphae flexuous; appressoria mostly unilateral, about 25% alternate, antrorse to retrorse, more or less compactly arranged; head cells oblong, globose; phialides mixed with appressoria; perithecial setae few, simple, often coiled at the apex, obtuse at the tip	*Irenopsis madumalaiensis*

3301.3220	Colonies epiphyllous, subdense; hyphae flexuous; appressoria alternate to unilateral, antrorse to subantrorse; head cells globose, ovate, entire, angulose to sublobate; phialides mixed with appressoria; perithecial setae up to 8, straight, acute to obtuse at the tip	*Irenopsis molleriana*
	MELASTOMATACEAE	
Meliola 3111.4222	Colonies epiphyllous, subdense; hyphae substraight; appressoria alternate, antrorse; head cells ovate, entire; phialides mixed with appressoria; mycelial setae scattered, simple, acute at the tip	*Meliola memecyli*
31½3.3223	Colonies epiphyllous, dense, crustose; hyphae straight, appressoria alternate, about 2% opposite, antrorse to subantrorse, head cells ovate, entire; phialides mixed with appressoria; mycelial setae mostly grouped around perithecia, simple, straight, acute, obtuse to dentate at the tip	*Meliola memecyli* var. *microspora*
	MELIACEAE	
Irenopsis 3401.3120	Colonies amphigenous, mostly epiphyllous; hyphae straight to substraight, loosely reticulate; appressoria alternate, antrorse; phialides mixed with appressoria; perithecial setae 0-5 in number, straight, simple, obtuse at the apex	*Irenopsis trichiliae*
3401.4230	Colonies hypophyllous, subdense to dense, scattered; hyphae crooked; appressoria alternate, distantly arranged, straight to variously curved, head cells ovate, entire to angular; phialides few, mixed with appressoria; perithecial setae 10-15, straight, simple, septate, acute to obtuse at the tip	*Irenopsis indica*
Meliola 31½3.4231	Colonies epiphyllous, dense; hyphae substraight to flexuous; appressoria alternate, unilateral, few opposite to subopposite, antrorse to subantrorse; head cells ovate, angulose, entire; phialides mixed with appressoria; mycelial setae numerous, simple, straight, dentate to obtuse at the apex	*Meliola toonae*
3131.4221	Colonies amphigenous; hyphae substraight to flexuous; appressoria alternate to unilateral, antrorse to retrorse; head cells ovate to cylindrical, rarely angulose, entire; phialides many, mixed with appressoria, neck elongated; mycelial setae numerous, simple, straight, obtuse to dentate at the tip	*Meliola chukrasiae*
	MENISPERMACEAE	
Meliola 3111.3222	Colonies amphigenous, mostly epiphyllous, dense; hyphae substraight, slightly flexuous; appressoria alternate to unilateral, antrorse; head cells ovate, globose to cylindrical, rarely angulose, entire; phialides borne on separate mycelial branch; mycelial setae numerous, grouped to scattered around perithecia, simple, straight, obtuse to acute at the tip	*Meliola cycleae*
	MIMOSACEAE	
Meliola 31½3.3223	Colonies epiphyllous; hyphae substraight to flexuous; appressoria mostly opposite to unilateral, antrorse to retrorse; head cells ovate, angulose to truncate, entire; phialides mixed with appressoria; mycelial setae numerous, simple, straight, entire to dentate at the tip	*Meliola melanoxylonis*
	MYRSINACEAE	
Amazonia 3101.3240	Colonies amphigenous, mostly hypophyllous, crustose; hyphae straight to flexuous; appressoria alternate to unilateral, closely arranged, antrorse; head cells globose, entire; phialides mixed with appressoria	*Amazonia peregrine*
Meliola 3111.4241	Colonies epiphyllous; hyphae undulate to flexuous; appressoria alternate, antrorse; head cells mostly ovate, clavate, few angular, entire; phialides mixed with appressoria; mycelial setae few, straight, obtuse at the apex	*Meliola ardisiicola*
3113.4221	Colonies hypophyllous, dense; hyphae straight to slightly crooked; appressoria alternate, few opposite, antrorse; head cells globose, slightly angular, entire; phialides mixed with appressoria; mycelial setae numerous, straight, simple, acute at the tip	*Meliola groteana* var. *maesae*
3113.4222	Colonies hypophyllous, dense, velvety, corresponding upper surface of the leaf turned yellowish brown; hyphae straight to slightly crooked; appressoria alternate, about 10% opposite, antrorse, spreading, head cells globose, slightly angular; phialides mixed with appressoria; mycelial setae fairly numerous, straight, simple, acute at the tip	*Meliola groteana*
	MORACEAE	
Irenopsis 3301.4210	Colonies amphigenous, mostly epiphyllous, dense; hyphae substraight, flexuous; appressoria mostly alternate, few branches unilateral, antrorse to retrorse, straight to curved, crooked; head cells ovate to globose, cylindrical, angulose, sublobate to lobate; phialides many, borne on separate mycelial branch, alternate; perithecia scattered, verrucose; perithecial setae 2-5, straight or slightly curved.	*Irenopsisbenguetensis*
Meliola 3121.3221	Colonies epiphyllous, dense; hyphae straight to substraight. appressoria alternate, antrorse, straight; head cells ovoid, globose, entire to crenate, angulose; phialides mixed with appressoria; mycelial setae numerous, curved, uncinate, simple, mostly obtuse, few acute	*Meliola artocarpi*
	MYRTACEAE	
Amazonia 3101.4220	Colonies amphigenous, dense; hyphae substraight to substraight; appressoria alternate, antrorse; head cells ovate entire; phialides mixed with appressoria	*Amazonia syzygii*
Asteridiella 3101.4230	Colonies amphigenous, subdense; hyphae substraight to flexuous, appressoria alternate to unilateral, antrorse to subantrorse; head cells oblong, ovate, globose, entire; phialides mixed with appressoria	*Asteridiella brahmagiriensis*
Meliola 3111.4223	Colonies amphigenous, thin, scattered, spreading; hyphae straight; appressoria alternate, antrorse to subantrorse, head cells ovate, entire; Phialides mixed with appressoria; mycelial setae simple, straight, acute to obtuse at the tip	*Meliola cauveriana*

	OLEACEAE	
Meliola 3113.4222	Colonies amphigenous; hyphae straight; appressoria opposite, unilateral, antrorse, straight; head cells ovate, entire, rarely angulose; phialides few, mixed with appressoria, unilateral; mycelial setae few, scattered, simple, straight, obtuse at the tip	*Meliola gemellipoda*
3111.3212	Colonies amphigenous, subdense; hyphae straight to substraight; appressoria alternate to unilateral, antrorse, few retrorse; head cells ovate, globose, oblong, broadly rounded at the apex, entire, angulose, rarely sublobate; phialides borne on a separate mycelial branch; mycelial setae simple, straight, mostly acute, few obtuse	*Meliola jasmini*
3111.4322	Colonies epiphyllous, dense; hyphae substraight; appressoria alternate, antrorse to subantrorse; head cells ovate to cylindrical, angulose, entire; phialides mixed with appressoria; mycelial setae numerous, simple, acute to obtuse at the tip	*Meliola jasminicola* var. *indica*
3111.3212	Colonies epiphyllous, dense; hyphae substraight; appressoria alternate, antrorse; head cells ovate, cylindrical, few lobate; phialides mixed with appressoria; mycelial setae numerous, grouped around perithecia, simple, acute to obtuse at the tip	*Meliola ligustri*
31½1.3222	Colonies hypophyllous, dense, scattered; hyphae flexuous to crooked; appressoria alternate, antrorse, retrorse, spreading; head cells ovate, oblong, narrowly oblong, cylindrical, entire, rarely angular to sublobate; phialides mixed with appressoria; mycelial setae numerous, scattered, simple, straight, flexuous, sigmoid, curved, uncinate	*Meliola oleacearum*
3111.3222	Colonies epiphyllous, thin to dense; hyphae straight to slightly undulate; appressoria distantly placed, alternate, antrorse to spreading; head cells ovate, linear, entire; phialides mixed with appressoria; mycelial setae grouped around perithecia, straight, simple, acute at the tip	*Meliola malabarensis*
3111.3221	Colonies epiphyllous, dense; hyphae substraight; appressoria alternate, antrorse to subantrorse; head cells ovate, cylindrical, entire, broadly rounded at the apex, rarely sublobate, slightly curved inwards; phialides mostly mixed with appressoria; mycelial setae numerous, grouped around perithecia, scattered, simple, straight to slightly curved, acute to obtuse at the tip	*Meliola mayapeae*
31½1.4222	Colonies epiphyllous, dense; hyphae substraight, slightly flexuous; appressoria mostly alternate to unilateral, antrorse to subantrorse, few retrorse; head cells ovate, entire, few angulose; phialides few, borne on separate mycelial branch; mycelial setae many, simple, straight to slightly curved, acute, obtuse, few dentate at the tip	*Meliola mayapicola* var. *indica*
	PANADANACEAE	
Meliola 3111.5322	Colonies hypophyllous, dense; hyphae substraight; appressoria mostly alternate, antrorse, straight, few curved; head cells globose, ovate, sublobate, angulose; phialides few, mixed with appressoria; mycelial setae few, straight, simple, acute at the tip	*Meliola kapoorii*
	PIPERCEAE	
Meliola 3111.4223	Colonies hypophyllous, dense; hyphae substraight to undulate; appressoria alternate, few unilateral, spreading to antrorse, straight to curved; head cells subglobose with crenate to lobulate margin; mycelial setae numerous, simple, straight, acute to obtuse at the tip	*Meliola stenospora*
	RANUNCULACEAE	
Meliola 31½1.3223	Colonies amphigenous, dense; hyphae substraight; appressoria alternate, antrorse; head cells lobate; phialides mixed with appressoria; mycelial setae numerous, simple, straight to substraight, slightly uncinate, acute to obtuse at the tip	*Meliola knowltoniae*
	RHAMNACEAE	
Asteridiella 3101.3210	Colonies epiphyllous; hyphae straight to substraight; appressoria alternate, distantly placed, straight, antrorse to retrorse; head cells globose, oblong, c-shaped, sublobate, and entire; phialides few, mixed with appressoria; perithecial wall cells conoid to mammiform	*Asteridiella emciciana*
Irenopsis 3301.3130	Colonies epiphyllous, subdense; hyphae straight to substraight; appressoria alternate, few opposite, antrorse to subantrorse, few reflexed; head cells ovate, globose, entire, angulose, broadly rounded at the apex; phialides many, mixed with appressoria; perithecia scattered, globose to ovoid, perithecial setae 5-6 in number	*Irenopsis tenuissima*
Meliola 3121.4233	Colonies, dense; hyphae substraight; appressoria alternate to unilateral, antrorse to subantrorse, straight to curved; head cells ovate, angulose, entire; phialides few, borne on separate mycelial branch; mycelial setae many, simple, acute at the tip	*Meliola gouaniicola*
3121.21/212	Colonies hypophyllous, thin, along the midrib; hyphae substraight, flexuous; appressoria alternate, antrorse; head cells ovate, entire; phialides many, mixed with appressoria; mycelial setae numerous, simple, straight, acute at the tip	*Meliola ziziphi*
	ROSACEAE	
Appendiculella 2101.4230	Colonies epiphyllous, subdense; hyphae substraight to flexuous; appressoria alternate, antrorse, straight to curved; head cells globose, sublobate to lobate, few angulose; phialides few, mixed with appressoria; perithecial appendages numerous, larviform, striated	*Appendicullela calostroma*
	RUBIACEAE	
Meliola 3111.4214	Colonies amphigenous, dense; hyphae straight to substraight; appressoria alternate, antrorse; head cells cylindrical to clavate, entire to angulose; phialides mixed with appressoria; mycelial setae simple, straight, acute at the tip.	*Meliola canthii*

3111.5233	Colonies amphigenous; hyphae straight, substraight to slightly flexuous; appressoria closely arranged, head cells oblong, few slightly reflexed; phialides few, mixed with appressoria; mycelial setae numerous, simple, straight, acute to obtuse at the tip	*Meliola canthii-angustifolii*
3113.4223	Colonies amphigenous, subdense, scattered, spreading; hyphae straight to substraight; appressoria alternate to opposite(10%), straight to curved, mostly antrorse, often closely subantrorse to retrorse, head cells ovate , oblong to cylindrical, straight to curved, entire; phialides mixed with appressoria; mycelial setae numerous, simple, straight, acute to obtuse at the tip	*Meliola coorgiana*
3121.3221	Colonies epiphyllous ; hyphae substraight to flexuous; appressoria mostly alternate, few unilateral, antrorse; head cells globose, slightly lobed, entire; phialides few, mixed with appressoria; mycelial setae numerous, simple, uncinate, obtuse at the tip	*Meliola kanlyakumariensis* var. *brahmagiriensis*
3121.4222	Colonies hypophyllous, dense; hyphae substraight to flexuous; appressoria alternate to unilateral, variously curved; head cells entire to angulose, mostly curved, few straight; phialides few, mixed with appressoria; mycelial setae numerous, simple, straight, tip acute	*Meliola plectroniae*
3121.3221	Colonies hypophyllous, thin to subdense; hyphae substraight to flexuous; appressoria alternate, antrorse; head cells ovate, obovate, entire, few angulose, attenuated at the apex; phialides few, borne on separate branches; mycelial setae numerous, simple, straight, uncinate, acute at the tip	*Meliola wendlandiae*
	RUTACEAE	
Amazonia 3101.4320	Colonies epiphyllous, dense; hyphae substraight; appressoria alternate, antrorse; head cells ovate, globose, lobate, few angulose, broadly rounded at the apex, few attenuated, entire; phialides many, borne on a separate mycelial branch.	*Amazonia acronychiae*
Meliola 31½1.3223	Colonies hypophyllous; hyphae substraight to flexuous; appressoria alternate to unilateral, straight, antrorse and mostly placed at right angles to the hyphae; head cells cylindrical, rounded at the apex, entire; phialides mixed with appressoria; mycelial setae straight, simple, acute, obtuse to forked at the tip	*Meliola atalantiae*
Meliola 31½3.4233	Colonies hypophyllous; hyphae straight to substraight; appressoria opposite to alternate (40%), antrorse, straight to slightly curved; head cells ovate, cylindrical, clavate, few curved, entire, rarely sublobate; phialides mixed with appressoria; mycelial setae numerous, simple, straight, acute, obtuse to dentate at the tip	*Meliola butleri*
31⅓3.3213	Colonies amphigenous, dense; hyphae straight to substraight; appressoria alternate to unilateral, antrorse; head cells ovate, angulose, entire; phialides many, mixed with appressoria; mycelial setae numerous, grouped to scattered, simple, acute to obtuse, often forked at the tip	*Meliola citricola*
3113.4223	Colonies amphigenous, dense; hyphae substraight; appressoria opposite, alternate, antrorse to subantrorse; head cells ovate, globose, few angulose and entire; phialides many, mixed with appressoria; mycelial setae numerous, grouped, simple, straight, acute at the tip	*Meliola tecleae* var. *toddaliae- asiaticae*
3141.4233	Colonies mostly epiphyllous; hyphae substraight; appressoria alternate, antrorse, straight; head cells cylindrical, entire; phialides many, mixed with appressoria; mycelial seta, scattered, dichotomously branched, branches and branchlets reflexed, acute to obtuse at the tip	*Meliola tenella*
3121. 4332	Colonies epiphyllous, scattered, dense; hyphae straight to substraight; appressoria alternate, antrorse, straight; head cells ovate, globose, stellately lobate; phialides many, mixed with appressoria; mycelial setae numerous, simple, uncinate, obtuse at the tip	*Meliola zanthoxyli*
	SANTALACEAE	
Meliola 3111.3/41/211	Colonies amphigenous, dense; hyphae substraight; appressoria alternate to unilateral, antrorse; head cells ovate, globose, entire; phialides few, mixed with appressoria; mycelial setae numerous, grouped around perithecia, simple, straight, acute to obtuse at the tip	*Meliola scleropyri*
	SAPINDACEAE	
Meliola 3112.3233	Colonies epiphyllous, dense; hyphae straight to substraight; appressoria opposite, antrorse, straight; head cells ovate, entire, attenuated at the apex; phialides many, mixed with appressoria, opposite, few unilateral; mycelial setae many, grouped around perithecia, simple, straight, few curved, acute to obtuse at the tip	*Meliola capensis* var. *malayensis*
3113.3223	Colonies amphigenous, subdense, velvety; hyphae substraight; appressoria opposite, few alternate, straight, antrorse, few retrorse; head cells obovate, slightly recurved, few attenuating towards apex, rarely sublobate, entire; phialides many, mixed with appressoria; mycelial setae many, straight, few curved, acute to obtuse at the tip	*Meliola capensis* var. *schlecheriae*
3112.3233	Colonies epiphyllous, dense; hyphae straight to substraight, appressoria opposite, antrorse, head cells ovate, entire, attenuated at the apex; phialides many, mixed with appressoria; mycelial setae many, grouped around perithecia, simple, straight, few curved, acute to obtuse at the tip	*Meliola capensis* var. *malayensis*
3111.4222	Colonies hypophyllous, velvety; hyphae straight; appressoria alternate, few unilateral, antrorse; head cells angular, slightly lobed, clavate; phialides born on a separate mycelial branch; mycelial setae numerous, straight, acute at the tip	*Meliola otophoraevar. indica*
3121.3212	Colonies epiphyllous; hyphae flexuous; appressoria mostly alternate, few unilateral, antrorse to retrorse; head cells ovate, lobate, few globular, entire; phialides few, mixed with appressoria; mycelial setae many, simple, straight, acute at the tip	*Meliola serjaniae* var. *major*
	SAPOTACEAE	
Asteridiella 3101.3220	Colonies amphigenous, dense, crustose to velvety; hyphae substraight; appressoria alternate, antrorse to subantrorse, head cells ovate, entire; phialides mixed with appressoria	*Asteridiella sapotacearum*

Meliola 31½1.4223	Colonies amphigenous, dense; hyphae substraight to flexuous; appressoria alternate to unilateral, antrorse to subantrorse, straight to curved, head cells ovate, oblong to cylindrical, mostly entire, angular, often attenuated at the apex; phialides mixed appressoria; mycelial setae few to many, scattered, simple, straight, acute, obtuse to 1-3 dentate at the tip	*Meliola madhucae*
	SMILACACEAE	
Meliola 3121.3/4221	Colonies epiphyllous ; hyphae substraight to flexuous; appressoria alternate, antrorse, straight to curved; head cells ovate to clavate, slightly angular, entire; phialides mixed with appressoria; mycelial setae simple, straight, obtuse at the tip	*Meliola salleana* var. *smilacis*
	STERCULIACEAE	
Meliola 3113.3222	Colonies amphigenous, dense, crustose; hyphae substraight; appressoria densely arranged, mostly opposite, few unilateral; head cells globose, obovate, lobed, angulose; phialides few, born on a separate mycelial branch; mycelial setae many, simple, straight, acute to obtuse at the tip	*Meliola pterospermi*
	TILIACAEAE	
Asteridiella 3101.4220	Colonies epiphyllous, dense; hyphae substraight to slightly flexuous; appressoria mostly alternate to unilateral (10%), antrorse to retrorse; head cells globose, oblong, angulose, sublobate, rarely entire, truncate, clavate, few attenuated at the apex; phialides many, mixed with appressoria	*Asteridiella grewiae*
Irenopsis 3301.3220	Colonies epiphyllous, subdense; hyphae substraight, slightly flexuous; appressoria alternate to unilateral, antrorse, straight; head cells ovate, globose, entire, attenuated at the apex, rarely angulose; perithecial setae 4-5, straight to curved, acute to obtuse at the tip, back towards the base, brown at apex	*Irenopsis coimbatorica*
3301.3220	Colonies epiphyllous, subdense; hyphae substraight; appressoria alternate, antrorse, straight; head cells globose, ovate, few angulose and sublobate, entire; phialides many, mixed with appressoria; perithecial setae straight, coiled or curved at the apex.	*Irenopsis triumfettae* var. *indica*
	VERBENACEAE	
Asteridiella 3101.4220	Colonies epiphyllous, subdense; hyphae substraight, flexuous; appressoria alternate to unilateral, antrorse to retrorse; head cells ovate, few cylindrical, angulose, sublobate, few attenuated at the apex; phialides many, mixed with appressoria	*Asteridiella callista*
3101.3220	Colonies epiphyllous, dense; hyphae flexuous to crooked; appressoria alternate, closely placed, antrorse to closely antrorse, often appressed to the hyphae, straight to curved; head cells globose, clavate, distinctly angular to truncate; phialides many, mixed with appressoria; perithecial wall cells mammiform	*Asteridiella depokensis*
3101.4220	Colonies epiphyllous, subdense; hyphae undulate; appressoria alternate, antrorse to retrorse, straight to curved; head cells globose, few ovate, clavate, few angulose; phialides many, borne on separate mycelial branch; perithecial wall cells mammiform	*Asteridiella formosensis*
3101.4320	Colonies amphigenous, velvety; hyphae straight to substraight; appressoria densely arranged, mostly alternate, opposite, few unilateral, antrorse; head cells ovate, angular, entire; phialides mixed with appressoria	*Asteridiella viticis-negundoi*
3101.4220	Colonies epiphyllous, dense; hyphae flexuous to crooked, appressoria alternate, antrorse, subantrorse, retrorse, straight to variously curved, head cells ovate, oblong, globose, angular to variously sublobate; phialides mixed with appressoria	*Asteridiella madikeriensis*
Meliola 3113.3222	Colonies epiphyllous, dense; hyphae straight to slightly flexuous; appressoria alternate, antrorse, straight to curved; head cells ovate, globose, entire; phialides mixed with appressoria; mycelial setae mostly grouped around perithecia, simple, straight, obtuse at the tip	*Meliola altissimae*
3111.3121	Colonies amphigenous; hyphae substraight to flexuous; appressoria alternate, straight, antrorse; head cells ovate to globose, entire; phialides many, mixed with appressoria; mycelial setae numerous, simple, straight, acute at the tip	*Meliola clerodendricola*
3111.3222	Colonies epiphyllous, subdense; hyphae straight, substraight to undulate; appressoria mostly alternate to unilateral (10%), antrorse to subantrorse, straight; head cells ovate to globose, entire, broadly rounded at the apex, few angulose; phialides numerous, mixed with appressoria; mycelial setae many, scattered, few setae grouped around perithecia, simple, acute to obtuse at the tip	*Meliola clerodendricola* var. *micromera*
3111.3222	Colonies amphigenous, dense; hyphae substraight to flexuous; appressoria alternate to unilateral, antrorse; head cells ovate, few angulose, entire; phialides few, mixed with appressoria; mycelial setae many, simple, straight to curved, tip acute to obtuse	*Meliola premnicola*
	VITACEAE	
3123.3223	Colonies epiphyllous, dense, scattered; hyphae straight; appressoria mostly opposite, few alternate, antrorse; head cells ovate, globose, entire to lobate; phialides few, mixed with appressoria; mycelial setae numerous, simple, scattered, acute at the tip	*Meliola bakeri*

Table 2. Host family and host plant of black mildews

Host family	Host plant	Fungus
Acanthaceae	*Asystasia chelanoide* Nees	*Asterina tertia* Racib.
Acanthaceae	*Adhatoda zeylanica* Medikus (*A. vasica* Nees)	*Asterina tertia* Racib.
Acanthaceae	*Justicia betonica* L.	*Asterina tertia* Racib.
Acanthaceae	*Crossandra* sp. (Acanthaceae),	*Asterina tertia* Racib.
Acanthaceae	*Justicia wyanadensis* (Nees) T. Andres.	*Asterina tertia* Racib.
Acanthaceae	*Strobilanthus* sp.	*Asterina tertia* Racib.
Acanthaceae	*Justicia betonica* L. (Acanthaceae),	*Asterina tertia* Racib.
Acanthaceae	*Crossandra* sp. (Acanthaceae),	*Asterina tertia* Racib.
Acanthaceae	*Justicia wyanadensis* (Nees) T. Andres.	*Asterina tertia* Racib.
Acanthaceae	*Strobilanthus* sp.	*Asterina tertia* Racib.
Acanthaceae	Acanthaceae member	*Asteridiella acanthacearum* Hosag.
Acanthaceae	*Lepidagathis* sp.	*Asteridiella acanthacearum* Hosag
Acanthaceae	Acanthaceae member	*Meliola acanthacearum* Hansf. var. *occidentalis* Hansf.
Anacardiaceae	*Nothopegia racemosa* (Dalz.) Ramam.	*Asterina nothopegiae* Ryan
Anacardiaceae	*Mangifera indica* L.	*Asterolibertia mangiferae* Hansf.&Thirum
Anacardiaceae	*Lannea coromandelica* (Houtt.) Merr. (*Odina wodier* Roxb.)	*Meliola geniculata* Sydow & Butler
Anacardiaceae	*Holigarna* sp.	*Meliola holigarnae* Stev.
Anacardiaceae	*Mangifera indica* L.	*Meliola mangiferae* Earle
Anacardiaceae	*Nothopegia racemosa* (Dalz.) Ramam.	*Meliola nothopegiae* Hansf.
Angiopteridaceae	*Angiopteris evecta* (Forst.) Hoff.	*Meliola angiopteridis* Hansf. var. *indica* Hosag.
Annonaceae	*Goniothalamus cardiopetalus* (Dalz.) Hook. f. & Thomson	*Meliola goniothalamigena* Hosag. & Jagath.
Apocyanaceae	*Wrightia* sp.	*Asterina wrightiae* Sydow
Apocyanaceae	*Alstonia scholaris* (L.) R. Br.	*Meliola alstoniae* Koord.
Apocyanaceae	*Carissa carandas* L.	*Meliola carissae* Doidge var. *indica* Hansf.
Apocyanaceae	*Tabernaemontana heyneana* Wall.	*Meliola ervatamiae* Hosag.
Apocynaceae	*Parsonsia alboflavescens* (Dennst.) Mabberley	*Asterina parsonsiae* Hosag.
Araliaceae	*Schefflera venulosa* (Wight &Arn.) Harms	*Meliola dichotoma* Berk. & Curt. var. *kusanoi* (Henn.) Hansf.
Aristolochiaceae	*Thottea* sp.	*Asterina thotteae* Hosag. & Hanlin
Aristolochiaceae	*Aristolochia tagala* Cham.	*Schiffnerula aristolochiae* Hosag., Jagath. & Jayashankara
Asclepiadaceae	*Gymnema* sp.	*Asterina gymnemae* Hosag. & Jacob-Thomas
Asclepiadaceae	*Gymnema sylvestre* (Retz.) R.Br. ex Schult.	*Meliola gymnemae* Jana, Ghosh & Das
Asclepiadaceae	*Toxocarpus* sp.	*Meliola toxocarpi* Hosag. & Antony
Asclepiadaceae	*Tylophora* sp.	*Meliola tylophorae-indicae* Hosag. & Manoj.
Asteraceae	*Vernonia monosis* Benth. ex C.B. Clarke	*Asterostomella vernoniae* Hosag., C. Jagath Thimmaiah & G.R. Archana
Asteraceae	*Vernonia arborea* Buch.-Ham.	*Asteridiella cyclopoda* (Stev.) Hansf.
Asteraceae	*Vernonia monosis* C.B.Clarke	*Asteridiella cyclopoda* (Stev.) Hansf.
Bursaraceae	*Canarium strictum* Roxb.	*Meliola canarii* Sydow
Caesalpiniaceae	*Cassia glauca* Lam.	*Asterina cassiigena* Hosag., Jagath. & Sabeena
Caesalpiniaceae	*Mezoneuron cucullatum* (Roxb.) Wight & Arn.	*Asterina mezonevronis* Hosag. & Jagath.
Caesalpiniaceae	*Humboldtia vahliana* Wight	*Lembosia humboldtiae* Hosag. & Abraham
Capparaceae	Capparaceae member	*Asteridiella capparidigena* Hosag.
Caprifoliaceae	*Viburnum punctatum* Buch.-Ham.	*Meliola goosii* Hosag.
Celastraceae	*Asterina cassinecola* sp. nov.	*Cassine paniculata* (Wight. & Arn.) Lobr.
Celastraceae	*Celastrus paniculatus* Willd.	*Schiffnerula celastri* Hosag., Riju & Sabeena
Clusiaceae	*Garcinia gummigutta* (L.) Robs.	*Asterina clusiacearum* Hosag. & Jagath.
Clusiaceae	*Garcinia gummigutta* (L.) Robs.	*Lembosia garciniae* Hosag. & Jagath.
Clusiaceae	*Garcinia gummigutta* (L.) Robs.	*Meliola garciniae* Yates
Combretaceae	*Quisqualis indica* L.	*Asterina escharoides* Sydow
Combretaceae	*Calycopteris florubunda* Lam.	*Asteridiella combreti* (Stev.) Hansf. var. *leonensis* Hansf.
Convolvulaceae	*Ipomea palmata* Forsk.	*Meliola clavulata* Wint.

Host family	Host plant	Fungus
Convolvulaceae	*Ipomea* sp.	*Meliola clavulata* Wint.
Convolvulaceae	*Argyreia* sp.	*Meliola malacotricha* Speg. var. *major* Beeli
Dipterocarpaceae	*Vateria indica* L. (),	*Asterolibertia vateriae* Hosag.,
Dipterocarpaceae	*Hopea ponga* (Dennst.) Mabb,	*Cirsosia hopeae* Hosag. & Jacob Thomas
Dipterocarpaceae	*Valeria indica* L.	*Cirsosia vateriae* Hosag.
Dipterocarpaceae	*Vateria indica* L.	*Echidnodella vateriae* Hosag. & kumar
Ebenaceae	*Diospyros bourdillonii* Brandis	*Meliola diospyri* Sydow & Sydow
Elaeagnaceae	*Elaeagnus kologa* Schlecht.	*Prillieuxina elaeagni* Hosag. & C. K. Biju
Elaeagnaceae	*Elaeagnus latifolia* L.	*Meliola elaeagni* Hansf. & Thirum.
Elaeocarpacea	*Elaeocarpus munronii* (Wight)	*Asterina elaeocarpicola* Hansf
Elaeocarpaceae	*Elaeocarpus* sp.	*Asterina elaeocarpicola* Hansf.
Elaeocarpaceae	*Elaeocarpus tuberculatus* Roxb.	*Asterina elaeocarpi* Sydow var. *ovalis* Kar. & Ghosh
Elaeocarpaceae	*Elaeocarpus serratus* L.	*Asterostomella elaeocarpi-serrati* Hosag.
Elaeocarpaceae	*Elaeocarpus tuberculatus* Roxb.	*Asteridiella elaeocarpi-tuberculati* Hosag.
Erythropalaceae	*Erythropalum populifolium* (Arn),	*Asterina erythropalicola* Hosag. & Goos
Erythropalaceae	*Erythropalum poppulifolium* (Arn.) Mast.	*Meliola erythropali* Hosag.
Euphorbiaceae	*Agrostistachys indica* Dalz.	*Asterina agrostistichydis* sp.nov.
Euphorbiaceae	*Antidesma montanum* Blume	*Asterina antidesmatis* Petrak
Euphorbiaceae	*Aporusa bourdillonii* Stapf.	*Asterina aporusae* Hansf.
Euphorbiaceae	*Glochidion zeylanicum* var. *tomentosum* Trim.	*Asterina lobulifera* Sydow var. *indica* Hosag. & Chandra
Euphorbiaceae	*Tragia* sp.	*Asterina tragiae* Hosag. & Jagath
Euphorbiaceae	*Glochidion bourdillonii* Gamble	*Asterina ushae* Hosag., C. Jagath Thimmaiah & G.R. Archana
Euphorbiaceae	*Aporusa lindleyana* (Wight) Baill.	*Meliolaster aporusae* Hosag., Harish & Archana
Euphorbiaceae	*Euphorbia pulcherrima* Willd. ex Klotz. (*Poinsettia pulcherima* Graham)	*Asteridiella chowrirae* Hosag., Jagath. & Jayashankara
Euphorbiaceae	*Mallotus* sp.	*Asteridiella kodavae* Hosag. & Divya
Euphorbiaceae	*Mallotus philippensis* (Lam.) Muel.-Arg.	*Asteridiella malloti* (Hansf. & Thirum.) Hansf.

Host family	Host plant	Fungus
Euphorbiaceae	*Tragia* sp.	*Asteridiella tragiae* Hosag. & Jagath.
Euphorbiaceae	*Tragia* sp.	*Meliola tragiae* Hosag. & Jagath.
Euphorbiaceae	*Bischofia javanica* Blume	*Sarcinella bischofiae* Hosag., Jagath. & Sabeena
Euphorbiaceae	*Securinega leucopyrus* (Willd.) Muell.-Arg.	*Sarcinella securinegae* Hosag.
Euphorbiaceae	*Glochidion* sp.	*Schiffnerula glochidii* Hosag.
Euphorbiaceae	*Glochidion ellipticum* Wight	*Schiffnerula glochidii* Hosag.
Euphorbiaceae	*Ricinus communis* L.	*Schiffnerula ricini* Hansf.
Fabaceae	*Humboltia* sp.	*Prillieuxina humboltiae* Hosag., C. Jagath Thimmaiah & G.R. Archana
Fabaceae	*Derris conarensis* (Dalz.)	*Asterostomella derridicola* Hosag., Jagath. & Sabeena
Fabaceae	*Derris* sp.	*Meliola abrupta* Sydow
Fabaceae	*Atylosia lineata* Wight & Arn.	*Meliola atylosiae* Hosag.
Fabaceae	*Butea monosperma* (Lam.) Taub.	*Meliola buteae* Hafiz, Azmatulla & Kafi
Fabaceae	*Gliricidia sepium* (Jacq.) Walp.	*Meliola gliricidiicola* Hosag. & Agarwal
Fabaceae	*Kingiodendron pinnatum* (Roxb.ex DC.)	*Meliola kingiodendri* Hosag., Dayal & Goos
Flacourtiaceae	*Scolopia crenata* (Wgiht & Arn.) D. Clox.	*Asterina flacourtiacearum* Hosag. & Ravikumar
Flacourtiaceae	*Homalium zeylanica* (Gardner) Benth.	*Asterina homaligena* Hosag. & Jagath.
Flacourtiaceae	*Hydnocarpus pentandra* (Buch.-Ham.) Oken	*Asterina hydnocarpi* Hosag. & Abraham
Flacourtiaceae	*Scolopia* sp. *Scolopia crenata* (Wight & Arn.) D. Clos	*Asterina talacauveriana* Hosag.,
Flacourtiaceae	*Flacourtia montana* Graham, Cat.	*Ishwaramyces flacourtiae* Hosag., Kumar & Sabu
Flacourtiaceae	*Scolopia crenata* (Wight & Arn.) Clos	*Asterostomella scolopiae-crenatae* Hosag. & Abraham
Flacourtiaceae	*Scolopia crenata* Wight & Arn.) Clos	*Amazonia flacourtiae* Hosag., Siddappa & Udaiyan
Flacourtiaceae	*Homalium zeylanicum* Benth.	*Asteridiella homaligena* Hosag., Jagath. & Jayashankara
Flacourtiaceae	*Hydnocarpus pentendra* (Ham.) Oken	*Asterdiella hydnocarpigena* Hosag. & Jagath.
Flacourtiaceae	*Scolopia crenata* (Wight & Arn.) Clos	*Asteridiella scolopiae* Hosag.

Host family	Host plant	Fungus
Flacourtiaceae	*Scolopia* sp.	*Asteridiella scolopiae* Hosag.
Flacourtiaceae	*Scolopia* sp.	*Meliola scolopiae* Doidge var. *indica* Hosag.
Flacourtiaceae	*Scolopia crenata* (Wight & Arn.) D. Clox.	*Meliola scolopiae* Doidge var. *indica* Hosag.
Gnetaceae	*Gnetum ula* Brongn.	*Meliola gneti* Hansf.
Icacinaceae	*Nothopodytes nimmoniana* (Graham) Mabberley	*Meliola chandrashekaranii* Hosag.
Icacinaceae	*Apodytes* sp.	*Meliola chandrashekaranii* Hosag.
Lamiaceae	*Hyptis sauveolense* (L.) Poit.	*Asterina hyptidicola* Hosag.
Lamiaceae	*Leucas* sp.	*Asterina leucadis* Hosag. & Robin
Lamiaceae	*Pogostemon* sp.	*Sarcinella pogostemonis* Hosag., Jagath. & Sabeena
Lauraceae	*Litsea* sp.	*Asterina cryptocariicola* Hosag., C.K. Biju & Abraham
Lauraceae	*Litsea* sp.	*Mahanteshamyces litseae* Hosag., Jagath. & Sabeena
Lauraceae	*Cinnamomum* sp.	*Armatella actinodaphnes* Hosag., C.K. Biju & Abraham
Lauraceae	*Cinnamomum* sp.	*Armatella cinnamomi* Hansf. & Thirum.
Lauraceae	*Litsea* sp.	*Armatella cryptocariae* Hosag.
Lauraceae	*Cinnamomum* sp.	*Armatella katumotoi* Hosag.
Lauraceae	*Litsea* sp.	*Meliola litseae* Sydow & Sydow var. *rotundipoda* Hansf.
Lauraceae	*Litsea* sp.	*Meliola mannavanensis* Hosag., C.K. Biju, Abraham & Crane
Lecythidaceae	*Careya arborea* Roxb.	*Meliola careyae* (Stev.) Hosag. var. *indica* Hosag.
Leeaceae	*Leea indica* (Burm.f.) Merr.	*Irenopsis leeae* Hansf. var. *indica* Hosag.
Loganiaceae	*Strychnos colubrina* L.	*Meliola kodaguensis* Hosag. & Divya
Loganiaceae	*Strychnos nux-vomica* L.	*Meliola spigeliae* Hansf.
Loranthaceae	*Dendrophthoe falcata* (L. f.) Etting.	*Asterina deightonii* Sydow
Loranthaceae	*Dendrophthoe trigona* (Wight & Arn.)	*Asterina loranthigena* Hosag., Agarwal, H. Biju & Archana
Lythraceae	*Lawsonia inermis* L.	*Asterina lawsoniae* Henn. & Nyn

Host family	Host plant	Fungus
Lythraceae	*Lagerstroemia* sp.	*Schiffnerula lagerstroemiae* Hosag. & Riju
Magnoliaceae	*Michelia champaka* L.	*Asterostomella micheliae* Hosag. & Goos
Magnoliaceae	*Michelia champaca* L.	*Meliola cariappae* Hosag., Jagath. & Archana
Malvaceae	*Hibiscus rosa-sinensis* L. var. *schizopetalus* Dyer	*Asterina hibisci* (Doidge) Hosag.
Malvaceae	*Kydia calycina* Roxb.	*Irenopsis madumalaiensis* Hosag.
Malvaceae	*Urena lobata* L. ssp. *sinuata* (L.)	*Irenopsis molleriana* (Wint.) Stev.
Melastomataceae	*Memecylon* sp.	*Asterina madikeriensis* Hosag.
Melastomataceae	*Memecylon* sp.	*Asterina memecylonis* Ryan
Melastomataceae	*Memecylon gracile* Bedd.	*Meliola memecyli* Sydow & Sydow
Melastomataceae	*Memecylon* sp.	*Meliola memecyli* Sydow var. *microspora* Hansf.
Meliaceae	*Aglaia* sp.	*Asterina aglaiae* Hosag.
Meliaceae	*Chukrasia tabularis* A. Juss.	*Asterina chukrasiae* Hosag.
Meliaceae	*Cipadessa baccifera* (Roth.) Miq.	*Asterina cipadessae* Yates
Meliaceae	*Trichilia connaroides* (Wight & Arn.) Benth.	*Asterina trichiliae* Doidge
Meliaceae	*Aphanamixis polystachya* (Wall.) Parker (*Amoora rohituka* (Roxb.) Wight & Arn.)	*Irenopsis indica* (Anahosur) Hosag.
Meliaceae	*Trichilia connaroides* (Wight & Arn.) Benth.	*Irenopsis trichiliae* Hosag. & Riju
Meliaceae	*Chukrasia tabularis* A. Juss.	*Meliola chukrasiae* Hosag.
Meliaceae	*Toona ciliata* Roem.	*Meliola toonae* Hosag. & Sabu
Menispermaceae	*Lepianthes umbellata* (L.) Raf.	*Asterina lepianthis* (Hosag., Balakr. & Goos) Hosag.
Menispermaceae	*Cyclea peltata* Cooke	*Meliola cycleae* Hosag.
Mimosaceae	*Acacia mangium* Willd.	*Meliola melanoxylonis* Hosag. & Pillai
Mimosaceae	*Acacia auriculiformis* A. Cunn. ex Benth.	*Meliola melanoxylonis* Hosag. & Pillai
Moraceae	*Ficus* sp.	*Irenopsis benguetensis* Stev. & Rold. ex Hansf.
Moraceae	*Artocarpus* sp.	*Meliola artocarpi* Yates
Moraceae	*Artocarpus integrifolius sensu* Gamble	*Meliola artocarpi* Yates
Myrsinaceae	*Maesa indica* (Roxb.) DC.	*Amazonia peregrina* Sydow & Sydow

Host family	Host plant	Fungus
Myrsinaceae	*Ardisia solanacea* Roxb.	*Meliola ardisiicola* Hosag., Rajkumar & Jose
Myrsinaceae	*Maesa indica* (Roxb.) DC.	*Meliola groteana* Sydow & Sydow
Myrsinaceae	*Maesa indica* (Roxb.)	*Meliola groteana* Sydow var. *maesae* Hosag., C.K. Biju & Abraham
Myrsinaceae	*Ardesia solanacea* Roxb.	*Questieriella ardisiae* Hosag. & Vijay.
Myrtaceae	*Syzygium* sp.	*Asterina claviflori* Kar & Maity
Myrtaceae	*Syzygium zeylanicum* (L.) DC.	*Asterina claviflori* Kar & Maity
Myrtaceae	*Syzygium* sp.	*Asterina jambolana* Kar & Maity
Myrtaceae	*Syzygium montanum* Gamble	*Asterina jambolana* Kar & Maity
Myrtaceae	*Syzygium* sp.	*Lembosia hosagoudarii* Sivanesan & Shivas
Myrtaceae	*Syzygium* sp.	*Amazonia syzygii* Hosag.
Myrtaceae	*Syzygium* sp.	*Asteridiella brahmagiriensis* Hosag., Archana. & Agarwal
Myrtaceae	*Syzygium mundagam*	*Meliola cauveriana* Hosag. & Divya
Oleaceae	*Jasminum* sp.	*Asterina erysiphoides* Kalch. & Cooke
Oleaceae	*Jasminum* sp.	*Asterina jasmini* Hansf. var. *indica* Hosag.
Oleaceae	*Olea dioica* Roxb.	*Eupelte amicta* Sydow
Oleaceae	*Jasminum* sp.	*Meliola gemellipoda* Doidge
Oleaceae	*J. malabaricum* Wight	*Meliola gemellipoda* Doidge
Oleaceae	*Jasminum* sp.	*Meliola jasmini* Hansf. & Stev.
Oleaceae	*Jasminum angustifloium* (L.) Willd. var. *angustifolium* Hook.	*Meliola jasminicola* Henn. var. *indica* Kapoor
Oleaceae	*Ligustrum* sp.	*Meliola ligustri* Hosag.
Oleaceae	*Chionanthus mala-elengi* (Dennst.)	
Oleaceae	*Olea dioica* Roxb.	*Meliola malabarensis* Hansf. & Thirum.
Oleaceae	*Ligusrtum perrottetti* DC.	*Meliola mayapeae* Stev.
Oleaceae	*Linociera intermedia* Wight	*Meliola mayapeae* Stev.
Oleaceae	*Linoceira malabarica*	*Meliola mayapicola* Stev. var. *indica* Hosag.
Oleaceae	*Ligustrum* sp.	*Meliola mayapicola* Stev. var. *indica* Hosag
Oleaceae	*Olea dioica* Roxb.	*Meliola oleacearum* Hosag.

Host family	Host plant	Fungus
Oleaceae	*Ligustrum* sp.	*Schiffnerula pulchra* (Sacc.) Petrak
Pandanaceae	*Pandanus sp.*	*Lembosia pandanacearum* Hosag. & Jagath.,
Pandanaceae	*Pandanus thwaitesii* Bull.	*Meliola kapoorii* Hosag. & Raghu
Passifloraceae	*Passiflora foetida*	*Schiffnerula mirabilis* Hohn.
Periplocaceae	*Hemidesmus indicus* (L) R.Br.	*Asterina hemidesmi* Hosag., Jagath. & Sabeena
Piperaceae	*Piper* sp.	*Asterina piperina* Sydow
Piperaceae	*Piper* sp.	*Meliola stenospora* Wint.
Piperaceae	*Piper nigrum* L.	*Meliola stenospora* Wint
Rananculaceae	*Naravelia zeylanica* (L.)	*Asterina naraveliae* Hosag., Biju & Agarwal
Ranunculaceae	*Clematis gouriana* Roxb. ex DC.	*Meliola knowltoniae* Doidge
Rhamnaceae	*Scutia myrtina* Kurz.	*Asteridiella emciciana* Hosag., Robin & Archana
Rhamnaceae	*Gouania microcarpa* DC.	*Irenopsis tenuissima* (Stev.) Stev. var. *major* Kar & Maity
Rhamnaceae	*Gouania microcarpa* DC.	*Meliola gouaniicola* Hosag. & Robin
Rhamnaceae	*Ziziphus* sp.	*Meliola ziziphi* Hansf. & Thirum.
Rhamnaceae	*Ziziphus rugosa* Lam.	*Meliola ziziphi* Hansf. & Thirum.
Rhamnaceae	*Ziziphus oenoplia* (L.) Mill.	*Meliola ziziphi* Hansf. & Thirum.
Rhizophoraceae	*Carallia brachiata* (Lour.) Merr.	*Sarcinella caralliae* Hosag., Jagath. & Jayashankara
Rosaceae	*Rubus glomeratus* Bl.	*Appendiculella calostroma* (Desm.) Hohnel
Rubiaceae	*Canthium dicoccum* (Gaertn.) Teijsm. & Binn.	*Asterina canthii-dicocci* Hosag.
Rubiaceae	*Canthium* sp.	*Asterina canthiigena* Hosag., Archana & Agarwal
Rubiaceae	*Canthium dicoccum* (Garertn) Teijsm. & Binn.	*Meliola canthii* Hansf.
Rubiaceae	*Canthium* sp.	*Meliola canthii* Hansf.
Rubiaceae	*Canthium coromandelicum* (Burm. f.)	*Meliola canthii-angustifolii* Hosag.
Rubiaceae	Rubiaceae member	*Meliola coorgiana* Hosag. & Divya

Host family	Host plant	Fungus
Rubiaceae	*Knoxia sumatrensis* (Retz.) DC.	*Meliola kanniyakumariana* Hosag. var. *brahmagiriense* Hosag., Agarwal, H. Biju & Archana
Rubiaceae	*Wendlandia thyrsoidea* (Schult.) Steud	*Meliola wendlandiae* Hosag.
Rubiaceae	*Ophiorrhiza* sp.	*Questieriella ophiorhizae* Hosag., Jagath. & Jayashankara
Rutacea	*Atalantia monophylla* (L.) DC.	*Meliola atalantiae* Hosag.
Rutaceae	*Acronychia pedunculata* (L.) Miq.	*Asterina acronychiae* Hosag. & Goos
Rutaceae	*Acronychia* sp.	*Asterina acronychiae* Hosag. & Goos
Rutaceae	*Glycosmis pentaphylla* (Retz.) DC., Prod.	*Asterina glycosmidigena* Hosag. & Jacob
Rutaceae	*Melicope lunuankenda* (Gaertn.) T.G. Hartley	*Asterina melicopecola* Hosag. & Abraham
Rutaceae	*Toddalia* sp.	*Asterina toddaliicola* Hosag., Agarwal, H. Biju & Archana
Rutaceae	*Zanthoxylum rhetsa* (Roxb.) DC. Prodr.	*Asterina zanthoxyli* Yamam.
Rutaceae	*Acronychia longipedunculata* (L.) Miq.	*Amazonia acronychiae* Hosag. & Goos
Rutaceae	*Citrus* sp.	*Meliola butleri* Sydow
Rutaceae	*Citrus limon* (L.) Burm. f.	*Meliola butleri* Sydow
Rutaceae	*Citrus* sp.	*Meliola citricola* Sydow & Sydow
Rutaceae	*Citrus maxima* (Burm.f.) Merr.	*Meliola citricola* Sydow & Sydow
Rutaceae	*Toddalia asiatica* (L. Lam.)	*Meliola tecleae* Hansf. var. *toddaliae-asiaticae* Hansf.
Rutaceae	*Murayya paniculata* (L.)	*Meliola tenella* Pat.
Rutaceae	*Zanthoxylum* sp.	*Meliola zanthoxyli* Hansf.
Rutaceae	*Zanthoxylum* sp.	*Questieriella zanthoxyli* Hosag., Jacob & Robin
Sabiaceae	*Meliosma simplicifolia* (Roxb.) Walp.	*Asterina meliosmae-simplicifoliae* Hosag., C.K. Biju & Abraham
Santalaceae	*Santalum album* L.	*Asterina congesta* Cooke
Santalaceae	*Scleropyrum pentandrum* (Dennst.) Mabb.	*Meliola scleropyri* Hosag
Sapindaceae	*Nephelium longan* (Lam.) Camb.	*Meliola capensis* (Kalch. & Cooke) Theiss. var. *malayensis* Hansf.
Sapindaceae	*Nephelium* sp.	*Meliola capensis* (Kalch. & Cooke) Theiss. var. *malayensis* Hansf.
Sapindaceae	*Dimocarpus longan* Lour.	*Meliola capensis* (Kalch. & Cooke) Theiss. var. *malayensis* Hansf.
Sapindaceae	*Schleichera oleosa* (Lour.) Oken	*Meliola capensis* (Kalch. & Cooke) Theiss.var. *schleicherae* Hosag. & Pillai
Sapindaceae	*Sapindus emarginatus* Vahl	*Meliola otophorae* Yates var. *indica* Hosag. & Ravikumar
Sapindaceae	*Sapindus emarginatus* Vahl.	*Meliola serjaniae* Stev. var. *major* Hansf.
Sapindaceae	*Allophylus cobbe* (L.) Raensch.	*Sarcinella allophyli* Hosag.
Sapotaceae	*Chrysophyllum roxburghii* G. Don, Gen.	*Asterina chrysophylligena* Hosag., Jagath. & Sabeena
Sapotaceae	*Mimusops elengi* L.	*Echidnodella mimusopsidis* Hosag., Jagath. & Sabeena
Sapotaceae	*Madhuca lonqifolia* (L.) Macbr. var. *latifolia* (Roxb.) A. Chev.	*Asteridiella sapotacearum* Hansf.
Sapotaceae	*Madhuca nerifolia*	*Meliola madhucae* Hosag. & Divya
Smilacaceae	*Smilax zeylanica* L.	*Meliola salleana* Hansf. var. *smilacis* Hosag.
Symplocaceae	*Symplocos* sp.	*Asterina indica* Sydow
Tiliaceae	*Triumfetta rhomboidea* L.	*Asterina triumfetticola* Yamam
Tiliaceae	*Grewia* sp.	*Asterina wingfieldii* Hosag. Balakr. & Goos
Tiliaceae	*Grewia* sp.	*Asteridiella grewiae* Patil ex Hosag.
Tiliaceae	*Grewia serrulata* DC.	*Irenopsis coimbatorica* Hosag, Pillai & Raghu
Tiliaceae	*Grewia* sp.	*Irenopsis coimbatorica* Hosag, Pillai & Raghu
Tiliaceae	*Triumfetta* sp.	*Irenopsis triumfettae* (Stev.) Hansf. & Deight. var. *indica* Hosag. & Abraham
Tiliaceae	*Triumfetta rhomboidea* L.	*Irenopsis triumfettae* (Stev.) Hansf. & Deight. var. *indica* Hosag. & Abraham
Urticaceae	*Pouzolzia* sp.	*Sarcinella pouzolziae* Hosag.
Urticaceae	*Pouzolzia zeylanica* (L.) Bennett	*Sarcinella pouzolziae* Hosag.
Verbancaeae	*Callicarpa* sp.	*Asteridiella formosensis* (Yamam.) Hansf.
Verbancaeae	*Callicarpa tomentosa* (L.) Murray	*Asteridiella formosensis* (Yamam.) Hansf.
Verbenaceae	*Premna* sp.	*Asterina pusilla* Sydow
Verbenaceae	*Stachytarpheta jamaicensis* (L.) Vahl	*Asteridiella callista* (Rehm) Hansf.

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Verbenaceae	*Vitex negundo* L.	*Asteridiella depokensis* Hansf.
Verbenaceae	*Premna* sp.	*Asteridiella madikeriensis* Hosag., Jagath. & Jayashankara
Verbenaceae	*Vitex negundo* L.	*Asteridiella viticis-negundoi* Hosag., Jagath. & Jayashankara
Verbenaceae	*Vitex altissima* L.	*Meliola altissimae* Hoasg.
Verbenaceae Verbenaceae	*Clerodendrun viscosum* Vent *Gmelina aroborea* Roxb.	*Meliola clerodendricola* Henn. *Meliola clerodendricola* Henn. var. *micromera* (Sydow & Sydow) Hansf.
Verbenaceae	*Vitex negundo* L.	*Schiffnerula hoddurensis* Hosag., Jagath. & Jayashankara
Verbenaceae	*Tectona grandis*	*Schiffnerula tectonae* (Thite & Patil) Hosag.
Vitaceae	*Cissus repens* Lam.	*Asterina vitacearum* Hosag., Jagath. & Sabeena
Vitaceae	Vitaceae member	*Asterina viticola* Kar & Ghosh
Vitaceae	Vitaceae member	*Meliola bakeri* Sydow
Vitaceae	*Cissus repens* Lam.	*Meliola bakeri* Sydow