

**BLACK MILDEWS (ASCOMYCETES) FROM SOUTHERN WESTERN GHATS OF PENINSULAR INDIA WITH DESCRIPTION OF 14 NEW SPECIES**

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This paper gives an account of 15 black mildew fungi collected from Kodagu in Karnataka and Kollam in Kerala states. Of these, *Asterina cassiigena*, *A. chrysophylligena*, *A. hemidesmi*, *A. ushae*, *A. thevalakkaraensis*, *A. vitacearum*, *Asterostomella derridicola*, *A. vernoniae*, *Prillieuxina humboldtiae*, *Echinodella mimusopisidis*, *Mahanteshamyces litseae*, *Sarcinella bischofia*, *S. pogostemonis* and *S. securinegae* are new species, while *Asterina antidesmatis* forms a new record for India.

**Description of species**

***Asterina antidesmatis*** Petrak, Sydowia 12: 472, 1959. (Fig. 1)

**Materials examined:** TBGT 5814, 09.i.2010, on leaves of *Antidesma* sp. (Stylagraceae), Hoddur, Kodagu, Karnataka, coll. C. Jagath Thimmaiah.

This species is recorded here for the first time from

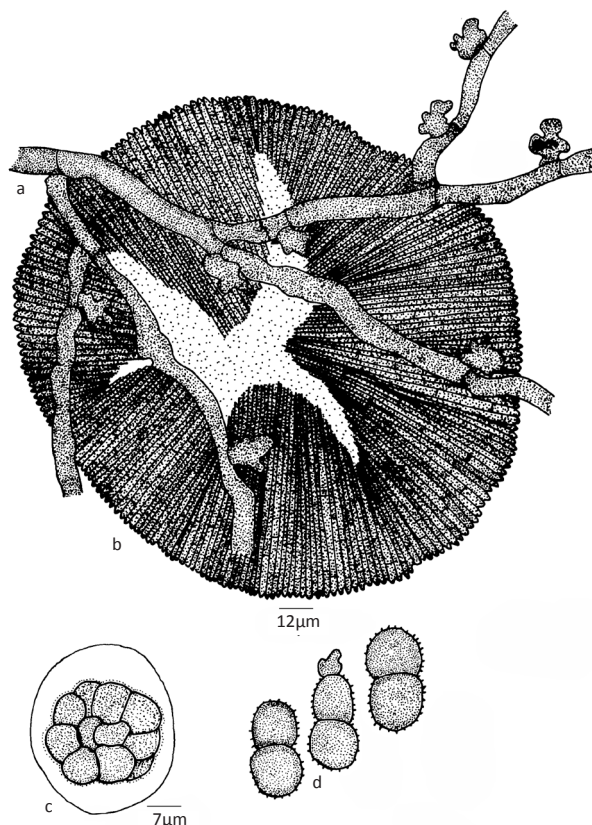
India (Hosagoudar 2012).

Colonies amphigenous, thin, up to 2mm in diameter, confluent. Hyphae substraight to flexuous, branching opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 25–37 x



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**Figure 1. *Asterina antidesmatis***  
a - Appressoriolate mycelium; b - Thyrlothecium; c - Ascus; d - Ascospores

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**Competing Interest:** None.

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5–7  $\mu\text{m}$ . Appressoria alternate to unilateral, antrorse to subantrorse, sublobate to deeply lobate, 5–10 x 5–10  $\mu\text{m}$ ; thyriothecia, scattered, orbicular, up to 160  $\mu\text{m}$  in diameter, stellately dehiscid at the centre; asci globose, octosporous, up to 22  $\mu\text{m}$  in diameter; ascospores, conglobate, uni septate, constricted at the septum, 15–20 x 5–10  $\mu\text{m}$ , wall echinulate at maturity.

***Asterina cassiigena* Hosag., C. Jagath Thimmaiah & A. Sabeena sp. nov.**

(Fig. 2) (Mycobank 803144)

**Materials examined:** Holotype: TBGT 5838, 08.i.2010, on leaves of *Cassia glauca* Lam. (Caesalpiniaceae), Hoddur, Kodagu, Karnataka, coll. C. Jagath Thimmaiah.

*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.

**Etymology:** Specific epithet based on the host genus.

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 15–27 x 2–5  $\mu\text{m}$ . Appressoria alternate, unicellular, distantly placed, antrorse to subantrorse, globose, oblong, entire, 5–7 x 5–10  $\mu\text{m}$ . Thyriothecia, scattered, orbicular, up to 240  $\mu\text{m}$  in diameter, stellately dehiscid at the centre, margin crenate to fimbriate; asci globose, octosporous, up to 25  $\mu\text{m}$  in diameter; ascospores brown, conglobate, uniseptate, constricted at the septum, 20–22 x 7–10  $\mu\text{m}$ , wall smooth.

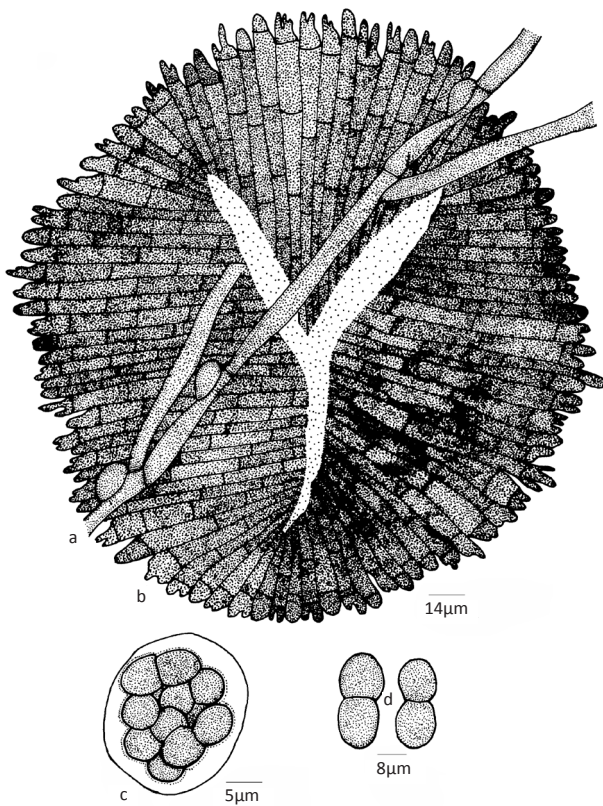
***Asterina chrysophylligena* Hosag., C. Jagath Thimmaiah & A. Sabeena sp. nov.**

(Fig. 3) (Mycobank 803145)

**Material examined:** Holotype: TBGT 5761, 26.i.2011, on leaves of *Chrysophyllum roxburghii* G. Don (Sapotaceae), Madikeri, Kodagu, Karnataka, coll. C. Jagath Thimmaiah.

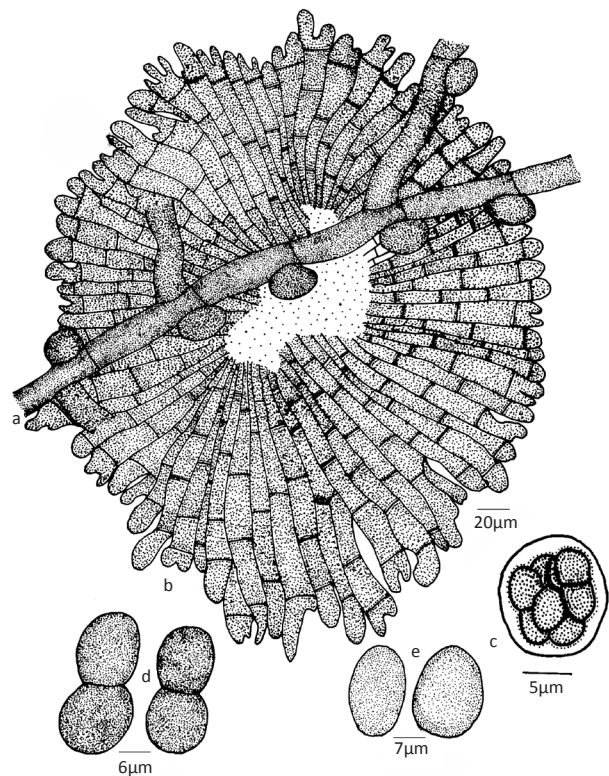
*Asterina chrysophylli* Henn. is known on this host genus and Theissen (1913) has given the detailed description of this species. *A. chrysophylligena* differs from *A. chrysophylli* in having distinctly smaller ascospores (14–16 x 9–4 vs. 28–34 x 12–15  $\mu\text{m}$ ).

**Etymology:** Specific epithet based on the host



**Figure 2.** *Asterina cassiigena* sp. nov.

a - Appressariate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores



**Figure 3.** *Asterina chrysophylligena* sp. nov.

a - Appressariate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores

genus.

Colonies epiphyllous, subdense, up to 4mm in diameter, confluent. Hyphae straight to substraight, branching alternate to irregular at acute to wide angles, loosely to closely reticulate, cells 16–32 x 4–7  $\mu\text{m}$ . Appressoria alternate, unilateral, unicellular, globose, entire, 4–10 x 8–10  $\mu\text{m}$ . Thyriothecia scattered to loosely grouped, orbicular, up to 300 $\mu\text{m}$  in diameter, stellately dehisced at the centre, margin fimbriate, fringed hyphae small; asci few, globose, up to 30 $\mu\text{m}$  in diameter; ascospores brown, conglobate, oblong, uniseptate, constricted at the septum, 24–30 x 11–15  $\mu\text{m}$ , wall smooth. Pycnothyriospores oval to globose, brown, 14–16 x 10–14  $\mu\text{m}$ .

***Asterina hemidesmi* Hosag., C. Jagath Thimmaiah  
& A. Sabeena sp. nov.**

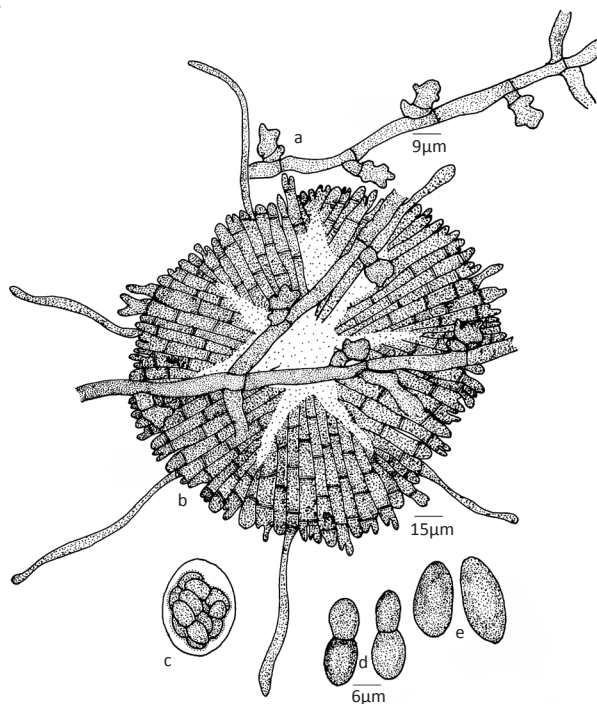
(Fig. 4) (MycoBank 803146)

**Materials examined:** Holotype: TBGT 5829, 13.i.2010, on leaves of *Hemidesmus* sp. (Periplocaceae), Hodur, Kodagu, Karnataka, coll. C. Jagath Thimmaiah.

This forms the first report on this host genus (Doidge 1942; Stevens & Rayan 1939).

**Etymology:** Specific epithet based on the host genus.

Colonies epiphyllous, subdense, up to 4mm in



**Figure 4. *Asterina hemidesmi* sp. nov.**

a - Appressoriate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores

diameter, confluent. Hyphae substraight to flexuous, branching opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 15–27 x 3–5  $\mu\text{m}$ . Appressoria alternate, opposite (10%) to unilateral, two celled, antrorse to subantrorse, straight to slightly curved, 9–14  $\mu\text{m}$  long; stalk cells cylindrical to cuneate, often gibbous, 3–6  $\mu\text{m}$  long; head cells ovate, globose, oblong, angular to sublobate, 4–10 x 4–8  $\mu\text{m}$ . Thyriothecia grouped in the centre of the colonies, orbicular, up to 180 $\mu\text{m}$  in diameter, stellately dehisced at the centre, margin crenate to fimbriate, fringed hyphae flexuous; asci ovate, globose, octosporous, 16–22  $\mu\text{m}$  in diameter; ascospores, conglobate, uniseptate, constricted at the septum, 14–18 x 6–8  $\mu\text{m}$ , wall smooth. Pycnothyriospores ovate, pyriform, 12–16 x 8–10  $\mu\text{m}$ .

***Asterina ushae* Hosag., C. Jagath Thimmaiah  
& G.R. Archana sp. nov.**

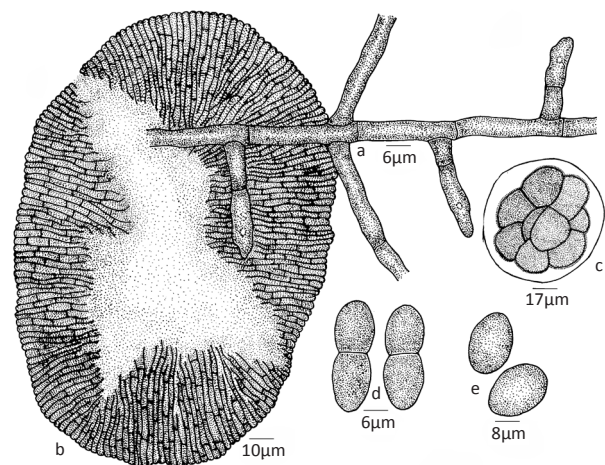
(Fig. 5) (MycoBank 803148)

**Material examined:** Holotype: TBGT 5756, 27.viii.2010, on leaves of *Glochidion bourdillonii* Gamble (Euphorbiaceae), Hoddur, Kodagu, Karnataka, coll. C. Jagath Thimmaiah.

Oblong, narrowly cylindrical, entire, angular to sublobate head cells of the appressoria distinguishes this species from rest of the *Asterina* species known on the members of Euphorbiaceae (Hosagoudar 2012).

**Etymology:** Species named in honour of Mrs. Dr. Usha Mane (Machale), for her selfless service to mankind.

Colonies epiphyllous, thin, up to 2mm in diameter, confluent. Hyphae straight to substraight, branching opposite, alternate to irregular at acute to wide angles, loosely reticulate, cells 19–37 x 3–5  $\mu\text{m}$ . Appressoria



**Figure 5. *Asterina ushae* sp. nov.**

a - Appressoriate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores

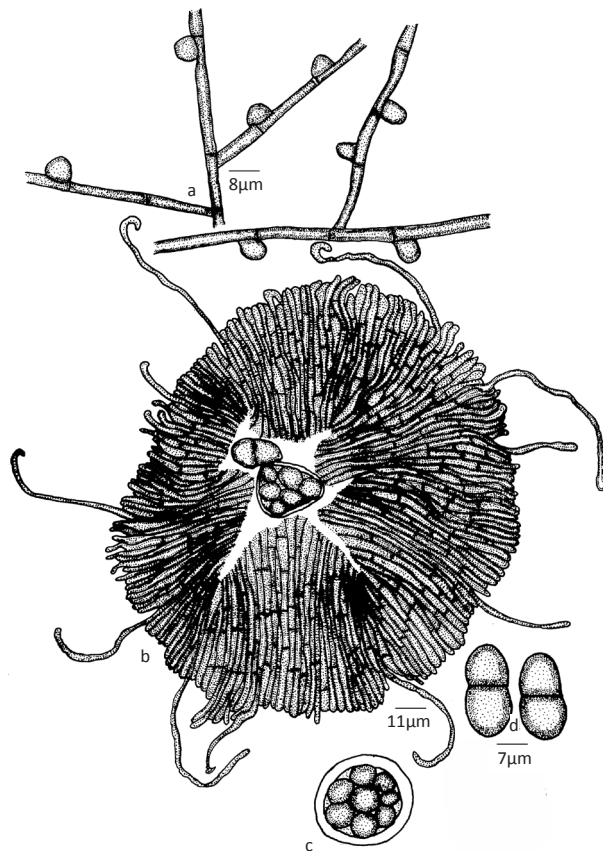
alternate, unilateral, two celled, antrorse, subantrorse, straight to slightly curved, 10–22  $\mu\text{m}$  long; stalk cells cylindrical to cuneate, 3–8  $\mu\text{m}$  long; head cells ovate, oblong, entire to angular, 6–15  $\times$  3–6  $\mu\text{m}$ . Thyriothecia scattered, orbicular, stellately dehiscid at the centre, up to 120  $\mu\text{m}$  in diameter, margin crenate; asci oval to globose, octosporous, up to 32  $\mu\text{m}$  in diameter; ascospores conglobate, oblong to cylindrical, uniseptate, constricted at the septum, 16–23  $\times$  7–11  $\mu\text{m}$ , wall smooth. Pycnothyriospores brown, oval, entire, 15–24  $\times$  10–15  $\mu\text{m}$ .

***Asterina thevalakkaraensis* Hosag. & R. Bindu sp. nov.**

(Fig.6) (MycoBank 803149)

**Material examined:** Holotype: TBGT 6123, 15.i.2012, on leaves of *Hydnocarpus* sp. (Flacourtiaceae), Thevalakkara, Karunagappally, Kollam, coll. R. Bindu.

Based on the unicellular appressoria, this species can be compared with *A. granulose* (Hansf. ) Hosag. et al. (Hosagoudar et al. 1996) but differs from it in distantly arranged, mostly alternately placed appressoria with entire margin in contrast to sublobate ones.



**Figure 6. *Asterina thevalakkaraensis* sp. nov.**  
a - Appressoriate mycelium; b - Thyriothecium; c - Ascus;  
d - Ascospores

**Etymology:** Specific epithet based on the collection locality.

Colonies amphigenous, mostly epiphyllous, about 2mm in diameter. Hyphae straight, branching opposite to irregular at acute to wide angles, loosely reticulate, cells 12–16  $\times$  3–4  $\mu\text{m}$ . Appressoria unicellular, distantly placed, alternate, unilateral, rarely opposite, oval to globose, entire, 6–17  $\times$  7–10  $\mu\text{m}$ . Thyriothecia scattered, orbicular, stellately dehiscid at the centre, up to 110  $\mu\text{m}$  in diameter, margin fimbriate, fringed hyphae few; asci globose, up to 29  $\mu\text{m}$  in diameter; ascospores conglobate, oblong to cylindrical, brown, uniseptate, constricted at the septum, 12–17  $\times$  5–7  $\mu\text{m}$ .

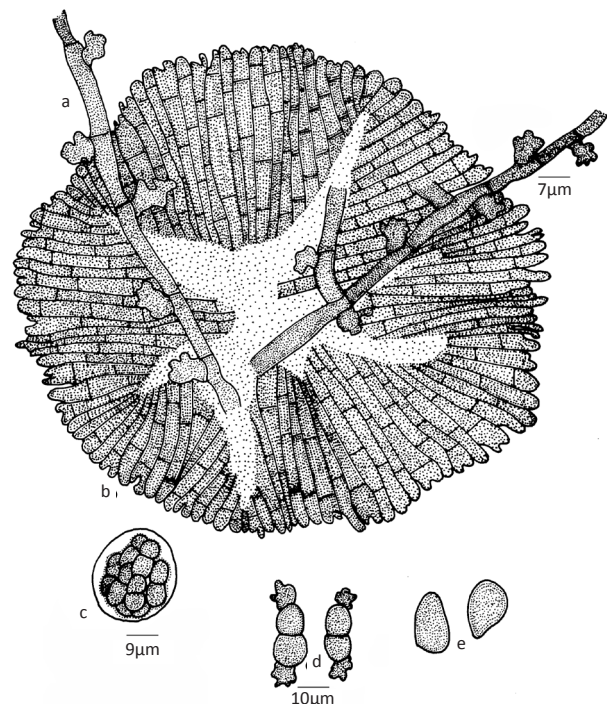
***Asterina vitacearum* Hosag., C. Jagath Thimmiah & A. Sabeena sp. nov.**

(Fig.7) (MycoBank 803155)

**Materials examined:** Holotype: TBGT 5800, 01.i.2010, on leaves of *Cissus repens* Lam. (Vitaceae), Hodur, Kodagu, Karnataka, coll. C. Jagath Thimmiah.

This species has slightly shorter ascospores but distinctly narrow ascospores. Usually thyriothecium develops on the mycelium or slightly lateral to the hyphae but in the present species, thyriothecia developed in the 1–3 celled stalk.

**Etymology:** Specific epithet based on the host



**Figure 7. *Asterina vitacearum* sp. nov.**  
a - Appressoriate mycelium; b - Thyriothecium; c - Ascus;  
d - Ascospores

family.

Colonies epiphyllous, thin, up to 1mm in diameter, confluent. Hyphae substraight to flexuous, branching opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 12–20 x 2–5  $\mu\text{m}$ . Appressoria alternate to unilateral, unicellular, antrorse to subantrorse, sublobate to deeply lobate, 5–7 x 5–10  $\mu\text{m}$ . Thyriothecia scattered to grouped in the centre of the colony, orbicular, up to 100 $\mu\text{m}$  in diameter, stellately dehisced at the centre, margin crenate to fimbriate, fringed hyphae flexuous; asci globose, octosporous, up to 18 $\mu\text{m}$  in diameter; ascospores conglobate, brown, uniseptate, constricted at the septum, 12–20 x 5–7  $\mu\text{m}$ , wall smooth.

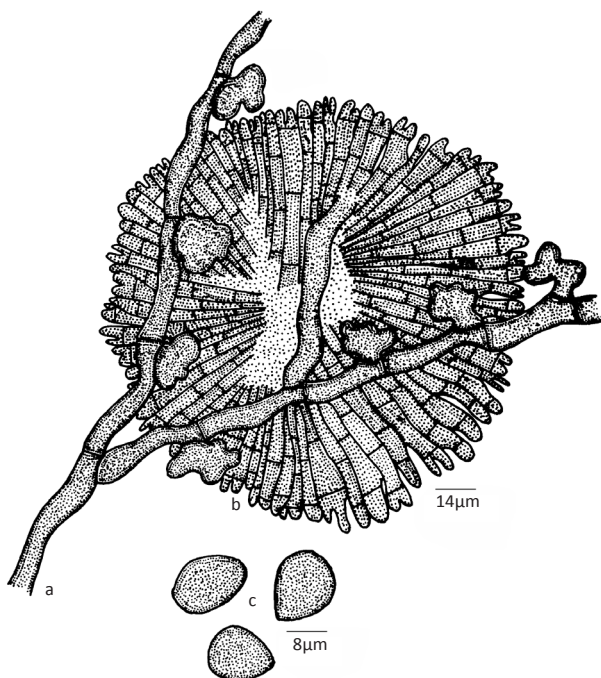
***Asterostomella derridicola* Hosag., C. Jagath  
Thimmaiah & A. Sabeena sp. nov.**

(Fig. 8) (MycoBank 803156)

**Materials examined:** Holotype: TBGT 5811, 06.ii.2010, on leaves of *Derris canarensis* (Dalz.) Baker (Fabaceae), Hodur, Kodagu, Karnataka, coll. C. Jagath Thimmaiah.

*Asterina derridis* Henn., *A. trachycarpa* Syd. & *A. singaporensis* Syd. are known on this host genus from Philippines and Singapore (Theissen 1913; Stevens & Ryan 1939). But the present species differs from all these teleomorphs in having sublobate to lobate appressoria.

**Etymology:** Specific epithet based on the host genus.



**Figure 8. *Asterostomella derridicola* sp. nov.**  
a - Appressariate mycelium; b - Pycnothyrium; c - Pycnothyriospores

Colonies epiphyllous, very thin, spreading, up to 2mm in diameter, confluent. Hyphae substraight to flexuous, branching opposite to irregular at acute to wide angles, loosely reticulate, cells 12–25 x 3–4  $\mu\text{m}$ . Appressoria alternate to unilateral, antrorse to subantrorse, straight to curved, globose to clavate, sublobate to lobate, 5–12 x 5–12  $\mu\text{m}$ . Pycnothyria scattered, orbicular, up to 140 $\mu\text{m}$  in diameter, stellately dehisced at the centre; pycnothyriospores ovate, globose, unicellular, 12–15 x 7–12  $\mu\text{m}$ , wall smooth.

***Asterostomella vernoniae* Hosag., C. Jagath  
Thimmaiah & G.R. Archana sp. nov.**

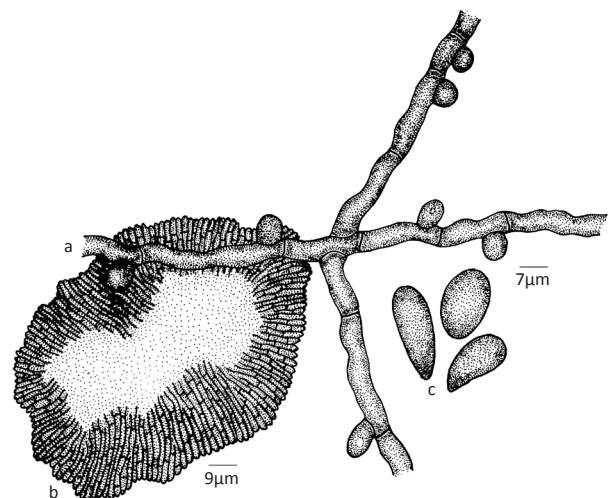
(Fig. 9) (MycoBank 803157)

**Material examined:** Holotype: TBGT 5813, 09.i.2010, on leaves of *Vernonia monosis* Benth. ex C.B. Clarke (Asteraceae), Tadiyandamol, Kodagu, Karnataka, coll. C. Jagath Thimmaiah.

This is the first asterinaceous fungus on this host genus (Stevens & Ryan 1939; Doidge 1942).

**Etymology:** Specific epithet based on the host genus.

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 11–29 x 3–5  $\mu\text{m}$ . Appressoria alternate to unilateral, sessile to slightly stipitate, globose, ovate, entire, 4–8 x 4–9  $\mu\text{m}$ . Pycnothyria scattered, orbicular, up to 75 $\mu\text{m}$  in diameter; stellately dehisced at the centre, margin fimbriate; pycnothyriospores brown, unicellular, ovate, pyriform, 16–24 x 8–13  $\mu\text{m}$ .



**Figure 9. *Asterostomella vernoniae* sp. nov.**  
a - Appressariate mycelium; b - Pycnothyrium; c - Pycnothyriospores

***Prillieuxina humboldtiae* Hosag., C. Jagath Thimmaiah  
& G.R. Archana sp. nov.**

(Fig. 10) (MycoBank 503150)

**Material examined:** Holotype: TBGT5791, 01.viii.2010, on leaves of *Humboldtia* sp. (Fabaceae), Sampaje Ghats, Kodagu, Karnataka, coll. C. Jagath Thimmaiah.

The genus *Humboldtia* is known to have three *Lembosia* 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.

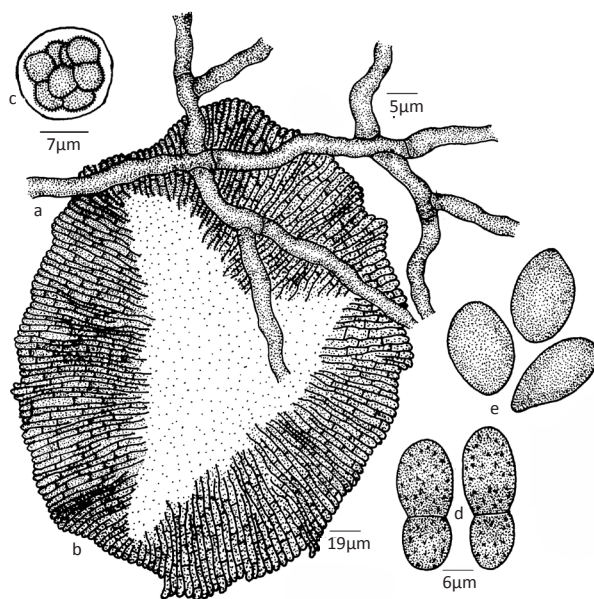
**Etymology:** Specific epithet based on the host genus.

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 8–32 x 3–5  $\mu\text{m}$ . Thyriothecia scattered to loosely grouped, orbicular, up to 245 $\mu\text{m}$  in diameter, stellately dehiscid at the centre, margin fimbriate, fringed hyphae small; asci globose, octosporous, up to 28 $\mu\text{m}$  in diameter; ascospores conglobate, uniseptate, constricted at the septum, 20–24 x 9–12  $\mu\text{m}$ . Pycnothyriospores oval, pyriform, unicellular, 16–24 x 9–13  $\mu\text{m}$ .

***Echinodella mimosopsidis* Hosag., C. Jagath Thimmaiah  
& A. Sabeena sp. nov.**

(Fig. 11) (MycoBank 803158)

**Materials examined:** Holotype: TBGT 5855, 31.i.2010, on leaves of *Mimosops elengi* L. (Sapotaceae), Hodur,



**Figure 10. *Prillieuxina humboldtiae* sp. nov.**  
a - Mycelium; b - Thyriothecium; c - Ascus; d - Ascospores;  
e - Pycnothyriospores

Kodagu, Karnataka, coll. C. Jagath Thimmaiah.

*Prillieuxina mimosopsidis* (Doidge) Ryan is known on this host genus (Steven & Ryan 1939) but differs from it in having elongated thyriothecia with a centrally dissolved suture.

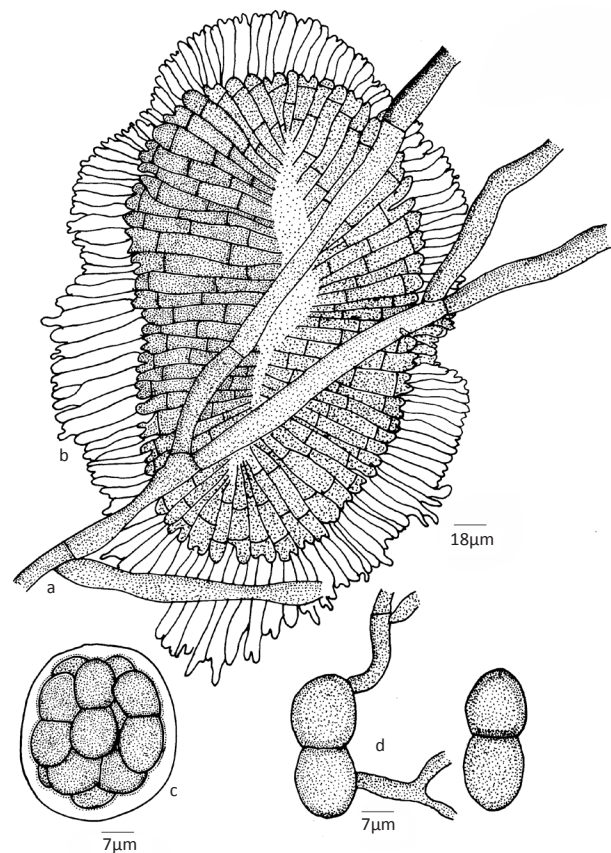
**Etymology:** Specific epithet based on the host genus.

Colonies hypophyllous, subdense, up to 6mm in diameter, confluent. Hyphae substraight to flexuous, branching opposite to irregular at acute to wide angles, loosely reticulate, cells 20–27 x 3–5  $\mu\text{m}$ . Appressoria absent. Thyriothecia scattered, oval to elongated, 350–1100 x 200–300  $\mu\text{m}$  in diameter, longitudinally dehiscid at the centre, margin crenate; asci ovate, globose, octosporous, up to 27 $\mu\text{m}$  in diameter; ascospores conglobate, uniseptate, constricted at the septum, 27–30 x 10–12  $\mu\text{m}$ , wall smooth.

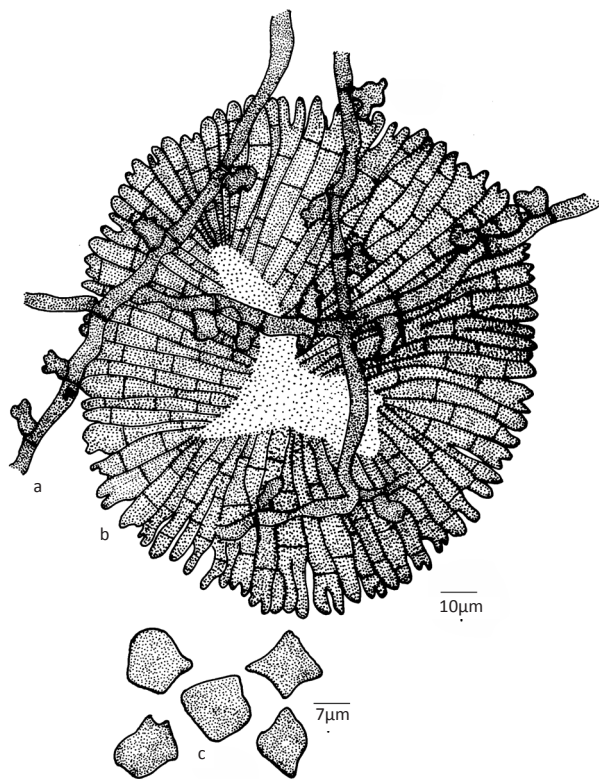
***Mahanteshamyces litseae* Hosag., C. Jagath  
Thimmaiah & A. Sabeena sp. nov.**

(Fig. 12) (MycoBank 803159)

**Materials examined:** TBGT 5815, 09.i.2010, on leaves of *Litsea* sp. (Lauraceae), Hodur, Kodagu, Karnataka, coll.



**Figure 11. *Echinodella mimosopsidis* sp. nov.**  
a - Mycelium; b - Thyriothecium; c - Ascus; d - Ascospores



**Figure 12. *Mahanteshamyces litseae* sp. nov.**  
a - Appressariate mycelium; b - Pycnothyrium; c - Pycnothyriospores

C. Jagath Thimmiah.

This collection persisted only in its anamorph state with angular pycnothyriospores, belonging to the genus *Mahanteshamyces*. This forms the first report of the genus *Mahanteshamyces* on the members of the family Lauraceae (Hosagoudar et al. 2004).

**Etymology:** Specific epithet based on the host genus.

Colonies amphigenous, thin, spreading, up to 5mm in diameter, confluent. Hyphae substraight to flexuous, branching opposite to irregular at acute to wide angles, loosely to closely reticulate, cells 12–25 x 2–4 µm. Appressoria unicellular, alternate, rarely opposite to unilateral, ovate, entire to sublobate, 5–7 x 2–7 µm. Pycnothyria scattered, orbicular, up to 120µm in diameter, stellately dehiscent at the centre, margin crenate; pycnothyriospores unicellular, angular with 1–5 rounded marginal projections, 10–12 x 7–12 µm, wall smooth.

***Sarcinella bischofia* Hosag., C. Jagath Thimmiah  
& A. Sabeena sp. nov.**

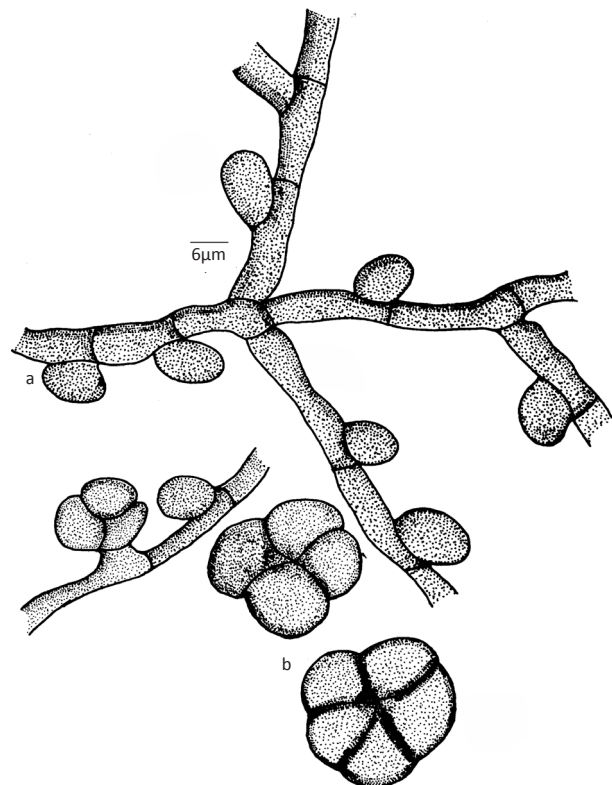
(Fig. 13) (MycoBank 803160)

**Material examined:** Holotype: TBGT5805, 30.xi.2010, on leaves of *Bischofia javanica* Blume (Euphorbiaceae), Madikeri, Kodagu, Karnataka, coll. C. Jagath Thimmiah.

This collection persisted in its *Sarcinella* state. *Sarcinella indica* Chandra et al. known on *Sapium insigne* from Uttar Pradesh, but the present collection accommodated in a new species based on its host specificity (Hosagoudar 2011).

**Etymology:** Specific epithet based on the host genus.

Colonies amphigenous, thin, confluent and cover most of the leaf surface. Hyphae substraight to flexuous, branching opposite to unilateral at acute to wide angles, loosely reticulate, cells 22–28 x 5–8 µm. Appressoria scattered, alternate to unilateral, unicellular, globose, ovate, entire, 7–13 x 9–11 µm. *Sarcinella* conidiophores produced laterally from the hyphae, single, straight, mononematous, 22–25 x 5–8 µm; conidiogenous cells terminal, monoblastic, integrated, cylindrical; conidia charcoal black, blastic, terminal, solitary, ovate to globose, sarciniform, 2–5 celled, constricted at the



**Figure 13. *Sarcinella bischofia* sp. nov.**  
a - Appressariate mycelium; b - Conidia of *Sarcinella*

septa, 17–25 µm in diameter, wall smooth.

***Sarcinella pogostemonis* Hosag., C. Jagath Thimmiah  
& A. Sabeena sp. nov.**

(Fig. 14) (MycoBank 803161)

**Materials examined:** Holotype: TBGT5784, 16.xi.2010, on leaves of *Pogostemon benghalensis* (Brurm.f.) Kuntze (Lamiaceae), Madikeri, Kodagu, Karnataka, coll. C. Jagath Thimmiah.

*Sarcinella colebrookiana* Kamal & Singh is known on *Colebrookia oppositifolia* from Uttar Pradesh (Hosagoudar 2011) but *Sarcinella pogostemonis* differs from it in having distinctly smaller spores (22–33 vs 30–50 µm).

**Etymology:** Specific epithet based on the host genus.

Colonies epiphyllous, thin, spread all over the leaf, confluent. Hyphae substraight to flexuous, branching opposite to irregular at acute to wide angles, closely reticulate, cells 25–30 x 5–8 µm. Appressoria scattered, alternate, very rarely opposite, unicellular, globose, entire, 10–13 x 8–10 µm. Conidia of *Questieriella* scattered, slightly curved, 3-septate, constricted at the septa, 32–42 x 7–10 µm. *Sarcinella* conidiophores produced laterally from the hyphae, single, straight, mononematous, one septate; conidiogenous cells terminal, monoblastic, integrated, cylindrical. *Sarcinella*

conidia blastic, terminal, mostly sessile, solitary, subspherical to spherical, sarciniform, 2–7 celled, constricted at the septa, 22–33 µm in diameter, wall smooth.

***Sarcinella securinegae* Hosag., C. Jagath Thimmiah  
& A. Sabeena sp. nov.**

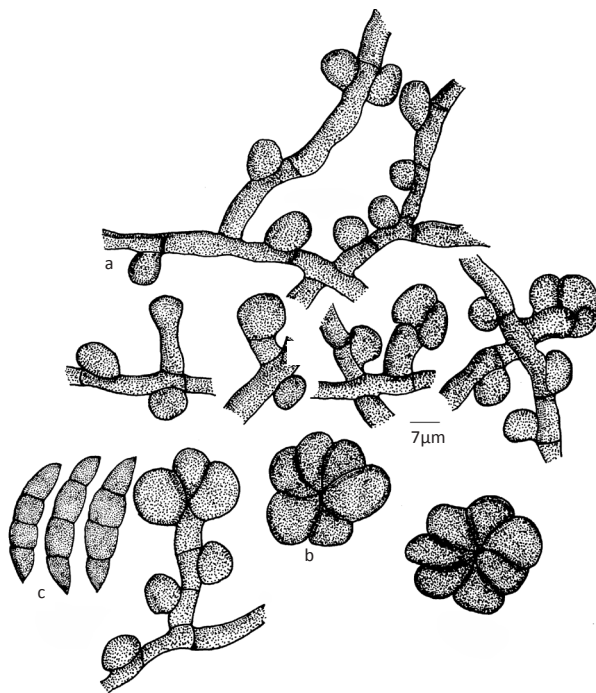
(Fig. 15) (MycoBank 803162)

**Materials examined:** TBGT 5757, 25.xi.2010, on leaves of *Securingea leucopyrus* (Willd.) Muell. (Euphorbiaceae), Hodur, Kodagu, Karnataka, coll. C. Jagath Thimmiah.

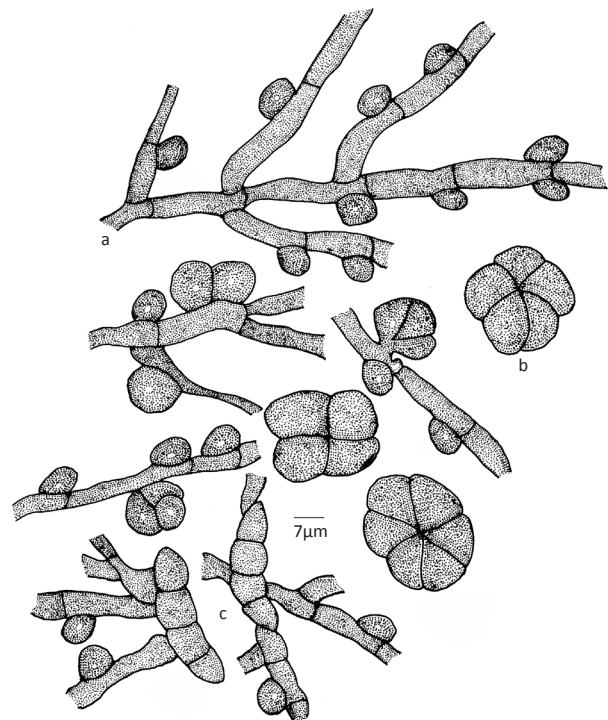
Based on the host specificity and presence of *Questieriella* state distinguishes this species.

**Etymology:** Specific epithet based on the host genus.

Colonies amphigenous, epiphyllous, thin, up to 2mm in diameter, confluent. Hyphae brown, straight to substraight, branching opposite to irregular at acute to wide angles, closely reticulate, cells 18–27 x 3–5 µm. Appressoria alternate to unilateral, unicellular, globose, entire, 5–7 x 5–10 µm. Conidia of *Questieriella* few, scattered, slightly curved, 3-septate, constricted at the septa, germinate to form colonies, 30–35 x 7–10 µm. *Sarcinella* conidiophores produced lateral to the hyphae,



**Figure 14. *Sarcinella pogostemonis* sp. nov.**  
a - Appressoriolate mycelium; b - Conidia of *Sarcinella*; c - Conidia of *Questieriella*



**Figure 15. *Sarcinella securinegae* sp. nov.**  
a - Appressoriolate mycelium; b - Conidia of *Sarcinella*; c - Germinating conidia of *Questieriella*



single, straight, mononematous; conidiogenous cells terminal, monoblastic, integrated, cylindrical. *Sarcinella* conidia blastic, terminal, mostly sessile, solitary, ovate to globose, sarciniform, 2–8 celled, constricted at the septa, 18–30 µm in diameter, wall smooth.

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