

The genus *Asterina* (Asterinaceae) on the members of Myristicaceae in Kerala State, India

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Members of the family Myristicaceae are distributed from South East Asia to northern Australia and the Pacific Islands and the family represents three genera, namely, *Gymnacranthera*, *Knema* and *Myristica* in Kerala State (Nayar et al. 2006). Of these, *Knema attenuata* and *Myristica malabarica* are endemic to Western Ghats and another unidentified species of the genus *Myristica* were found infected with black mildew fungus. Microscopic examination of these fungi revealed that they belong to the genus *Asterina*. Hence, a detailed study of these fungal species was carried out to facilitate their identification.

The genus *Asterina* is represented by about 700 species, characterised by having brown appressoriolate mycelium, stellately dehiscing thyriotheceum with globose asci and brown uniseptate ascospores.

Asterina knemae attenuatae

Hosag., Abraham & T.S. Nayar, Mycotaxon 67: 487, 1998; Hosag., *Zoos' Print J.* 18: 1283, 2003; 21: 2328, 2006. (Fig. 1)

Material examined: 14.ii.1997, on leaves of *Knema attenuata* (Wallich ex Hook. f. & Thomson) Warb. (Myristicaceae), TBGRI Campus, Palode, Thiruvananthapuram, Kerala, India, T.S. Nayar HCIO 42462 (type), TBGT 483 (isotype); 10.ii.1997, Peppara Wildlife Sanctuary, Thiruvananthapuram, V.B. Hosagoudar HCIO 4429, TBGT 719.

Colonies epiphyllous, dense, crustose, up to 5mm in diameter. Hyphae straight to rarely crooked, branching irregular at acute to wide angles, loosely reticulate, cells 25–30 x 4–6 µm. Appressoria alternate, about 1% opposite, distantly placed, unicellular, broad based to stipitate, mammiform to cylindrical, ovate, entire to 1–4 times sublobate, 7–20 x 10–12 µm. Thyriothece scattered to 1–3 connate, orbicular to slightly ovate, 150–250µm in diameter, margin crenate, irregularly opened at the centre; asci very few, globose to slightly

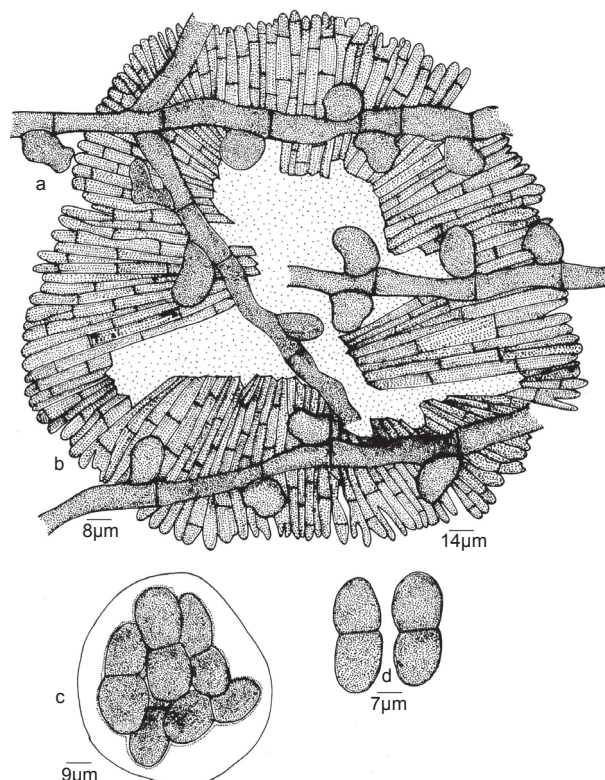


Figure 1. *Asterina knemae attenuatae* Hosag. a - Appressoriolate mycelium; b - Thyriotheceum; c - Ascus; d - Ascospores

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ovate, bitunicate, octosporous, 54–58 x 45–50 μm ; ascospores conglobate, brown, uniseptate, slightly constricted at the septum, 25–27 x 11–13 μm , wall glabrous.

Appressoria scattered and about 1% opposite. Kerala is the type locality for this species (Hosagoudar et al. 1998).

Asterina myristicae sp. nov.

(Fig. 2)

Material examined: 07.i.2008, on leaves of *Myristica* sp. (Myristicaceae), Arboretum, TBGRI Campus, Palode, Thiruvananthapuram, Kerala, India, K. Anilkumar TBGT (holotype) (MycoBank 563496). Part of the collection has been deposited in HCIO, New Delhi.

Coloniae hypophyllae, tenues, crustosae, ad 3mm diam., confluentes. Hyphae subrectae, flexuosae vel

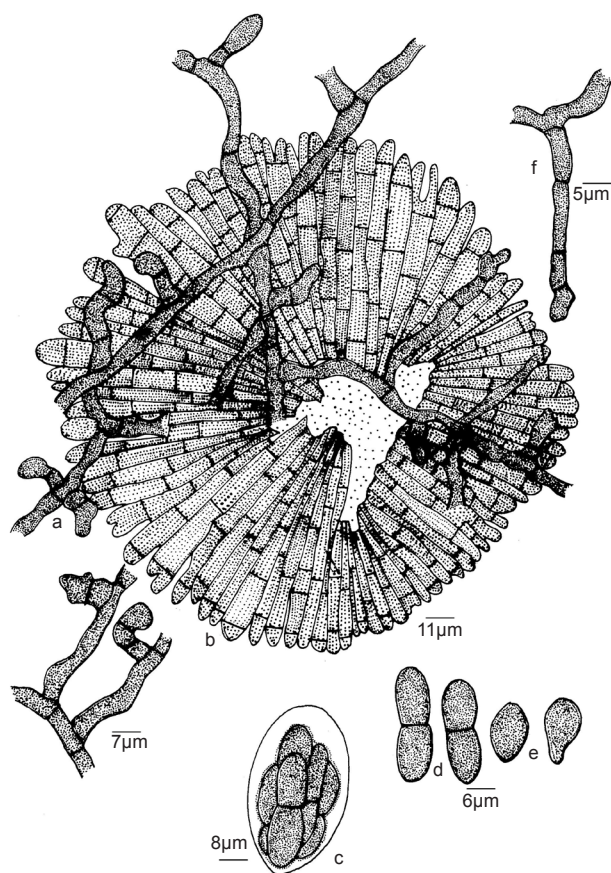


Figure 2. *Asterina myristicae* sp. nov. a - Appressoriolate mycelium; b - Thyriothecium; c - Ascus; d - Ascospores; e - Pycnothyriospores

leniter anfractuae, opposite, alternate vel irregulariter acuteque vel laxe ramosae, laxe vel arte reticulatae, cellulae 12–29 x 3–5 μm . Appressoria alternata, opposita, unilateralis, antrorsa, subantrorsa vel retrorsa, 1–3 cellula, recta, curvula, flexuosa vel anfractua, 9–35 μm longa; cellulae basiales unicellularis vel 1–2 septatis, rectae, flexuosae vel anfractuae, 3–27 μm longae; cellulae apicales ovatae, oblongae, rectae vel curvulae, integrae vel sublobatae, 4–11 x 3–8 μm . Thyriothechia dispersa vel aggregata, orbicularis vel leniter ovata, ad 160 μm diam., margine crenatae, stellatim dehiscentes ad centre; asci numerosi, globosi vel ovati, octospori, 19–40 x 16–25 μm ; ascosporae brunneae, oblongae, conglobatae, uniseptatae, 16–21 x 8–10 μm , parietus glabrus. Pycnothyriosporae brunneae, pyriformes, unicellularis, 12–15 x 6–10 μm .

Colonies hypophyllous, thin, crustose, up to 3mm in diameter, confluent. Hyphae substraight, flexuous to slightly crooked, branching opposite, alternate to irregular at acute to wide angles, loosely to closely reticulate, cells 12–29 x 3–5 μm . Appressoria alternate, opposite, unilateral, antrorse, subantrorse to retrorse, 1–3 celled, straight, curved, flexuous to crooked, 9–35 μm long; stalk cells unicellular to 1–2 septate, straight, flexuous to crooked, 3–27 μm long; head cells ovate, oblong, straight to curved, entire to sublobate, 4–11 x 3–8 μm . Thyriothechia scattered to grouped, orbicular to slightly ovate, up to 160 μm in diameter, margin crenate, stellately dehisced at the centre; asci many, globose to ovate, octosporous, 19–40 x 16–25 μm ; ascospores brown, oblong, conglobate, uniseptate, 16–21 x 8–10 μm , wall smooth. Pycnothyriospores brown, pyriform, unicellular, 12–15 x 6–10 μm .

Note: This species stands distinct from all other *Asterina* species known on the members of Myristicaceae in having 1-3-celled appressoria.

Asterina myristicacearum sp. nov.

(Fig. 3)

Material examined: 30.iv.2008, on leaves of *Myristica malabarica* Lam. (Myristicaceae), TBGRI Campus, Palode, Thiruvananthapuram, Kerala, India, A. Sabeena & M.C. Riju TBGT 4979 (holotype) (MycoBank 563497). Part of the collection has been deposited in HCIO, New Delhi.

Coloniae epiphyllae, subdensae, ad 3mm diam.

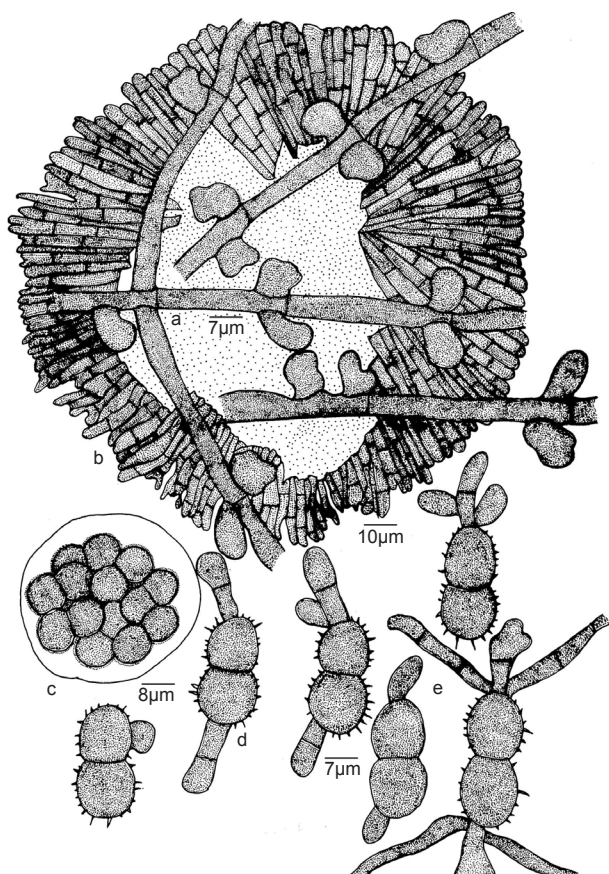


Figure 3. *Asterina myristicacearum* sp. nov.
a - Appressariate mycelium; b - Thyriothecium; c - Ascus;
d - Germinating ascospores

Hyphae rectae vel subrectae, opposite vel unilateralis acuteque vel laxe ramosae, laxe reticulatae, cellulae 17–47 x 2–5 µm. Appressoria saepe dense posita,

alternata, opposita vel subopposita, unicellularis, saepe crassa posita, ovata, globosa, integra, angularis vel sublobata, 7–15 x 7–10 µm. Thyriothechia dispersa vel connata, ovata, ad 170µm diam., margine crenatae, stellatim dehiscences ad centre et portio ad centralis dissolutus; asci globosi, octospori, 37–50 µm diam.; ascospores conglobatae, brunneae, uniseptatae, constrictus ad septatae, 25–32 x 12–17 µm, parietus echinulatus.

Colonies epiphyllous, subdense, up to 3mm in diameter. Hyphae straight to substraight, branching opposite to unilateral at acute to wide angles, loosely reticulate, cells 17–47 x 2–5 µm. Appressoria often crowded, alternate, opposite to subopposite, unicellular, often broad based, ovate, globose, entire, angular to sublobate, 7–15 x 7–10 µm. Thyriothechia scattered to connate, ovate, up to 170µm in diam., margin crenate, stellately dehiscid at the centre or the central portion dissolved by exposing asci; asci globose, octosporous, 37–50 µm in diam.; ascospores conglobate, brown, uniseptate, constricted at the septum, 25–32 x 12–17 µm, wall echinulate.

Note: Crowded appressoria on this host distinguishes from *Asterina knemae-attenuatae* Hosag. et al. (Hosagoudar & Abraham 2000). By adding these three taxa, the number of *Asterina* species known on Myristicaceae in the world is raised to eight and the key is provided here to facilitate their rapid identification.

Key to the *Asterina* species from Kerala

- 1. Appressoria two celled *Asterina myristicae* sp. nov.
- 1. Appressoria unicellular 2
- 2. On *Knema* *Asterina knemae attenuatae*
- 2. On *Myristica* *Asterina myristicacearum* sp. nov.

Key to the *Asterina* species known on Myristicaceae members

- 1. On *Coelocarya* *coelocaryi*
- 1. On other genera 2
- 2. Appressoria bicellular *myristicae* sp. nov.
- 2. Appressoria unicellular 3
- 3. Appressoria opposite 5
- 3. Appressoria not so 4
- 4. Appressoria ampulliform *componeurae*
- 4. Appressoria not so 6
- 5. Ascospores more than 35µm long *horsfieldiae*
- 5. Ascospores less than 35µm long *horsfieldicola*
- 6. Appressoria opposite, subopposite to alternate *myristicacearum* sp. nov.
- 6. Appressoria not so 7
- 7. Ascospores more than 30µm long *pycnanthi*
- 7. Ascospores less than 30µm long *knemae attenuatae*

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