

Meliolaceae of Nagaland (India) - III

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Five new Meliolaceous fungi viz. *Irenopsis boehmeriae* sp. nov., *I. dysoxyli* sp. nov., *Asteridiella wrightiae* sp. nov., *A. micheliae* sp. nov., and *Meliola picrasmae* Hansf. var. *nagalandis* var. nov. have been collected and illustrated from Nagaland (India).

Key words : *Irenopsis*, *Asteridiella*, *Meliola*, new species, Nagaland

INTRODUCTION

Leaf inhabiting fungi are the most fascinating fungi which attracted attention of many workers all over the world for a long time. They cover wide range of fungi whose occurrence is wide spread. A review of literature reveals that this group of fungi have not been worked out by any worker in Nagaland hitherto and as such there is ample scope to work on this group of fungi particularly of Nagaland.

A large number of workers have done their work on this fascinating group of fungi viz. Hansford (1961), Kapoor (1967), Kar and Maity (1970), Sarbhoy *et al.* (1996), Jiang (1989), Hu and Lu (1989), Bilgrami *et al.* (1991), Sanchez and Carrion (1992), Patil and Thite (1997), Mibey and Hawksworth (1997), Brayford (1999), Hosagoudar and Abraham (1996), Hosagoudar (1996, 1998, 2003).

MATERIALS AND METHODS

These fungi were collected from different localities (both from plains and foot hills) of Nagaland throughout the year from 2000 to 2004. They were worked out from fresh and preserved materials and preparations were stained in

lactophenol-cotton blue.

Holotypes have been deposited in the Department of Botany, Presidency College, Kolkata, as Presidency College Collection (PCC) and isotypes are preserved in Indian Agricultural Research Institute (IARI), New Delhi, India.

RESULTS AND DISCUSSION

The fungal specimens viz. *Irenopsis boehmeriae*, *Asteridiella wrightiae*, *Meliola picrasmae* var. *nagalandis* were sent to Indian Agricultural Research Institute (IARI), New Delhi, India and *Irenopsis dysoxyli* and *Asteridiella micheliae* were identified in the Mycological Research Laboratory, Department of Botany, Presidency College, Kolkata consulting different literatures for confirmed identification.

In course of a survey of leaf inhabiting fungi of Nagaland (India), the authors encountered two new species of *Irenopsis* Stev., two new species of *Asteridiella* McAlpine, one new variety of *Meliola picrasmae* Hansf., growing parasitically on living leaves of *Boehmeria platyphylla* D. Don., *Dysoxylum arborescens* Miq., *Wrightia coccinea* Sims., *Michelia velutina* DC. and *Picrasma javonica* Blume respectively.

Irenopsis boehmeriae S. N. Ghosh et T. K. Jana,
A. K. Das sp. nov.

Coloniae epiphyllae, nigrae, dispersae, globosae, tenuis, ad 6 mm diam. et confluentes. Hyphae subrectae vel undulatae, brunneae oppositae vel irregulariter laxe ramosae, laxe reticulatae, cellulae plerumque $25-45 \times 6-10 \mu\text{m}$. Appressoria alternata, antrorsa, subantrorsa vel reflexa, brunnea, bicellularia, recta vel leniter curvula, $18-22 \mu\text{m}$ longa; cellula basali cylindracea vel cuneata, recta, $4-8 \mu\text{m}$ longa; cellula apicali ovata, globosa, integra, $12-18 \times 10-17 \mu\text{m}$. Phialides producentes in ramus sparatam myceliales, opposita vel alternata, conoidea vel ampullacea, unicellularia, brunnea, $16-25 \times 7-10 \mu\text{m}$. Perithecia dispersa, verrucosa, nigra, globosa, ad $125 \mu\text{m}$ diam; setae peritheciales $8-12$, rectae, simplices, septatae, obtusae ad apicem, ad $130 \mu\text{m}$ logae. Asci ovaes vel elliptici, sessiles,

4 spori; ascosporae cylindraceae vel rectae, 4 septatae, brunneae, septis constrictae, $36-41 \times 14-18 \mu\text{m}$.

Colonies epiphyllous, black, scattered, orbicular, thin, upto 6 mm in diameter and confluent. Hyphae substraight to undulate, brown, branching opposite to irregular at wide angles, loosely reticulate, cells mostly $25-45 \times 6-10 \mu\text{m}$. Appressoria alternate, antrorse subantrorse to reflexed, brown, 2-celled, straight to slightly curved, $18-22 \mu\text{m}$ long; stalk cells cylindrical to cuneate, $4-8 \mu\text{m}$ long; head cells ovate, globose, entire, $12-18 \times 10-17 \mu\text{m}$. Phialides borne on a separate mycelical branch, opposite to alternate, conoid to ampulliform, unicellular, brown, $16-25 \times 7-10 \mu\text{m}$. Perithecia scattered, globose, verrucose, black, globose, up to $125 \mu\text{m}$ in diameter; perithical setae $8-12$, straight simple, septate, obtuse at the tip, brown, up to $130 \mu\text{m}$ long. Ascospores broad, cylindrical, straight, 4 septate, brown, constricted at the septa, $36-41 \times 14-18 \mu\text{m}$.

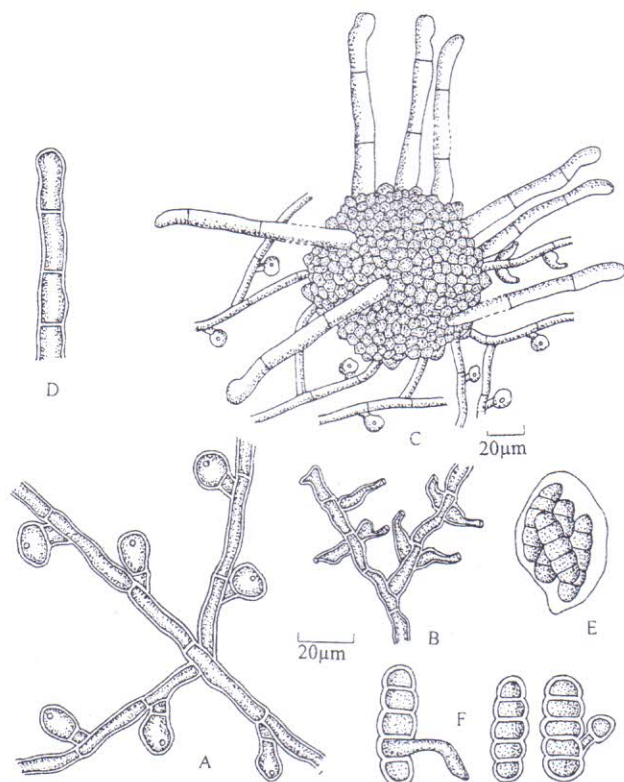


Fig. 1 : *Irenopsis boehmeriae*

- A. Hyphae with appressoria
- B. Hyphae with phialides
- C. Perithecium associated with mycelium and perithecial setae
- D. Perithecial setae
- E. Ascus bearing ascospores
- F. Ascospores

Specimen studied

On leaves of *Boehmeria platyphylla* D. Don (Family-Urticaceae), near Agriculture University, Medziphema, Dimapur, Nagaland, India, T. K. Jana, August 20, 2000, ITCC 4434.01, PCC 5143.

Etymology

From the name of the host.

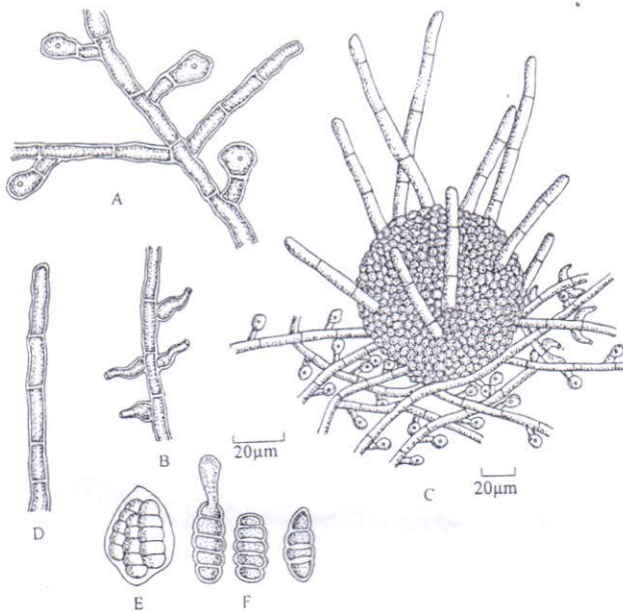
Based on the Beeli formula 3401.4220, the present species *Irenopsis boehmeriae* is close to *I. oreocnidae* Hansf. described on *Oreocnida* sp. from Philippines (Hansford 1961) but differs from it in having smaller apressoria with entire head cells, smaller perithecia, longer septate perithecial setae and smaller cylindrical ascospores.

A review of literature (Kar and Maity 1970; Hosagoudar 1996, 1998, 2003; Hansford 1961; Patil and Mahamulkar 1999; Bilgrami *et al.* 1991; Sarbhoy *et al.* 1996; Crane and Jones 2001) shows that no species of *Irenopsis* has yet been reported on host *Boehmeria platyphylla* D. Don. Hence new species of *Irenopsis* is suggested. This species was mixed with *Meliola* sp. (Table 1).

Table 1 : Comparative account of *Irenopsis oreocnidae* Hansf. and *I. boeheriae* sp. nov.

Name of species	Appressoria	Perithecia	Perithecial setae	Ascospores
<i>I. oreocnidae</i>	Alternate, subantrorse, 22-23 μm long; head cells ovate to clavate, entire or angulose, 15-21 \times 11-15 μm	Slightly verrucose, upto 160 μm diam.	4-12, straight or slightly bent, continuous, obtuse, upto 110 μm long.	Oblong, 39-45 \times 15-17 μm
<i>I. boeheriae</i>	Alternate, antrorse, subantrorse to reflexed, 18-22 μm long; head cells ovate, globose, entire, 12-18 \times 10-17 μm	Verrucose, upto 125 μm in diam.	8-12, straight, simple septate, obtuse at the tip, upto 130 μm long	Broad, cylindrical, 36-41 \times 14-18 μm

***Irenopsis dysoxyli* T. K. Jana, S. N. Ghosh et A. K. Das sp. nov.**

**Fig. 2** : *Irenopsis dysoxyli*

- A. Hyphae with appressoria
- B. Hyphae with phialides
- C. Perithecium associated with mycelium and perithecial setae
- D. Perithecial setae
- E. Ascus bearing ascospores
- F. Ascospores

Coloniae epiphyllae, atrobrunneae vel nigrae, globosae, tenuis vel subdensae, ad 6 mm diam., et confluentes. Hyphae rectae vel subrectae, atrobrunneae, septatae, plerumque oppositae, laxe ramosae, laxe vel dense reticulatae, cellulae plerumque 20-32 \times 6-10 μm . Appressoria alternata vel curvula, antrorsa vel patentia, atrobrunnea, bicellularia, 20-28 μm longa; cellula basali cylindracea vel cuneata, 8-13 μm longa; cellula apicali subglobosa, ovata, integra, 14-18 \times 10-17 μm . Phialides producentes in ramis separatam

myceliales, alternata vel opposita, ampullacea vel conoidea, unicellularia, brunnea, 15-20 \times 6-9 μm . Perithecia dispersa, globosa, verrucosa, nigra, ad 190 μm diam.; setae peritheciales 7-10, erectae, rectae, simplices, septatae, atrobrunneae, obtusae ad apicem, ad 130 μm longae; ascosporae cylindracea vel subcylindracea, utrinque rotundatae vel leniter conicae, 3-4 septatae, septis constrictae, atrobrunneae, 20-32 \times 12-16 μm .

Colonies epiphyllous, dark brown to black, globose, thin to subdense, upto 6 mm in diameter and confluent. Hyphae straight to substraight, dark brown, septate, branching mostly opposite at wide angles, loosely to closely reticulate, cells mostly 20-32 \times 6-10 μm . Appressoria alternate, straight to curved, antrorse to spreading, dark brown, 2 celled, 20-28 μm long; stalk cells cylindrical to cuneate, 8-13 μm long; head cells subglobose, ovate, entire 14-18 \times 10-17 μm . Phialides borne on a separate mycelial branch, alternate to opposite, ampulliform or conoid, unicellular brown, 15-20 \times 6-9 μm . Perithecia scattered, globose, verrucose, black, upto 190 μm in diameter; perithecial setae 7-10, erect, straight, simple, septate, dark brown, obtuse at the tip, upto 130 μm long. Ascospores cylindrical to subcylindrical, rounded to slightly conical at ends, 3-4 septate, constricted at the septa, dark brown, 20-32 \times 12-16 μm .

Specimen studied

On leaves of *Dysoxylum arborescens* Miq. (Family-Meliaceae), Intanki forest, peren, Nagaland, India, T. K. Jana, 29, 2003, PCC 5189.

Etymology

From the name of the host.

Based on the Beeli formula 3401.3220, *Irenopsis*

Table 2 : Comparative account of *Irenopsis dysoxyl* sp. nov. with other species

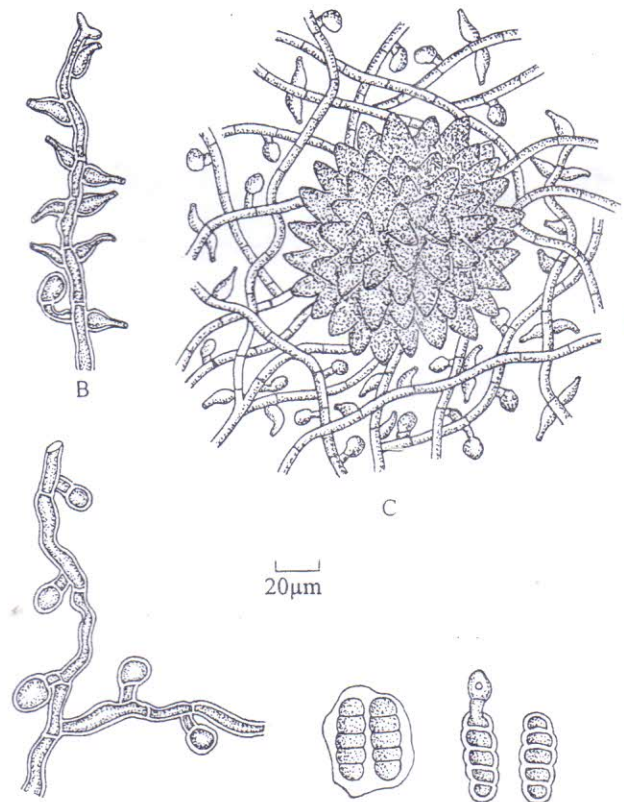
Name of species	Colonies	Appressoria	Phialides	Perithecia	Ascospores
<i>I. chukrasiae</i>	Hypophyllous	15-25 μ m long; stalk cells cylindrical to cuneate, straight to flexuous, 1-3 celled, 6-34 long; head cells ovate, globose, angular to sublobate to deeply lobate, 9-15.5 \times 12-18.5 μ m	Borne on a separate mycelial branch	Scattered, verrucose, upto 210 μ m in diam.	Oblong, obovate, 4 septate, 40-46.5 \times 15-18.5 μ m
<i>I. indica</i>	Hypophyllous	15-18.5 μ m long; stalk cells cuneate to cylindrical, 3-6.5 μ m long; head cells ovate, entire to angular, 9.5-12.5 \times 12.5-15.5 μ m	Mixed with appressoria	Mostly grouped, upto 233 μ m in diam.	Oblong, 4 septate, 40-43.5 \times 18.5-22 μ m.
<i>I. dysoxyl</i>	Epiphyllous	20-28 μ m long; stalk cells cuneate to cylindrical, 8-13 μ m long; head cells subglobose, ovate, entire, 14-18 \times 10-17 μ m	Borne on a separate mycelial branch	Scattered, verrucose, globose, upto 190 μ m in diam.	Cylindric to subcylindric, 3-4 septate, rounded to slightly conic at ends, 20-32 \times 12-16 μ m.

dysoxyl is close to *I. chukrasiae* Hosag. (Hosagoudar 1996) but differs from it in having epiphyllous colonies, smaller appressoria with entire head cells, smaller phialides, 3-4 septate and smaller ascospores. It also differs from *I. indica* (Anahosur) Hosag. (Hosagoudar 1996) in having epiphyllous colonies, longer appressoria, phialides borne on a separate mycelial branch, smaller perithecia and ascospores. Review of literature (Hosagoudar 1996; Hansford 1961; Brayford 1999); Bilgrami *et al.* 1991; Patil and Thite 1997) shows that no species of *Irenopsis* has yet been reported on host *Dysoxylum* sp. Hence new Species of *Irenopsis* is suggested. (Table 2).

Asteridiella wrightiae T. K. Jana, S. N. Ghosh et A. K. Das sp. nov.

Coloniae epiphyllae, nigrae, dispersae, orbiculares, tenuis, ad 5 μ m diam. Hyphae subrectae vel flexuosae, brunneae, septatae, alernatae vel irregulariter, acuteque ramosae, laxe vel dense reticulatae, cellulae plerumque 20-45 \times 6-10 μ m. Appressoria dense vel remotus, alternata vel unilateralia, brunnea, bicellularia, recta vel curvula, antrorsa vel patentia, 18-26 μ m longa, cellula basali cylindracea vel cuneata, recta vel curvula, 5-13 μ m longa; cellula apicali globosa vel subglobosa, integra, 12-17 \times 10-16 μ m. Phialides appressoriis intermixta, brunnea, opposita vel alternata, conoidea vel ampullacea, unicellularia, 16.5-25 \times 8-14 μ m. Perithecia dispersa, atrobrunnea, globosa, verrucosa ad 160 μ m diam; cellulae peritheciales conoideae, subacutae vel obtusae ad apicem, 10-16 μ m longae. Asci ovaes, sessiles, 2 spori;

ascosporae rectae, cylindracea, 4 septatae, septis constrictae, brunneae, 35-40 \times 15-17 μ m.

**Fig. 3** : *Asteridiella wrightiae*

- A. Hyphae with appressoria
- B. Hyphae with phialides
- C. Perithecium associated with mycelium and perithecial setae
- D. Ascus bearing ascospores
- E. Ascospores

Colonies epiphyllous, black, scattered, orbicular, thin, upto 5 μ m in diameter. Hyphae substraight to

flexuous, brown, septate, branching alternate to irregular at acute angle, loosely to closely reticulate, cells mostly $20-45 \times 6-10 \mu\text{m}$. Appressoria closely to distantly placed, alternate to unilateral, brown, 2 celled, straight to curved, antrorse to spreading, $18-26 \mu\text{m}$ long; stalk cells cylindrical to cuneate, straight to curved, $5-13 \mu\text{m}$ long; head cells globose to subglobose, entire, $12-17 \times 10-16 \mu\text{m}$. Phialides mixed with appressoria, brown, opposite to alternate, conoid to ampulliform, unicellular, $16.5-21 \times 8-14 \mu\text{m}$. Perithecia scattered, dark brown to black, globose, upto $160 \mu\text{m}$ in diam; perithecial cells conoid, subacute to obtuse at the apex, $10-16 \mu\text{m}$ in long. Asci oval, sessile, 2 spored; ascospores straight, cylindrical, 4 septate, constricted at the septa, brown, $35-40 \times 15-17 \mu\text{m}$.

Specimen studied

On leaves of *Wrightia coccinea* Sims. (Family-Apocynaceae), AO-Kashiram, Dimapur, Nagaland, India, T. K. Jana, September 28, 2000, ITCC 4638.0, PCC 5154.

Etymology

Form the name of the host.

Based on the Beeli formula 3101.3220, *Asteridiella wrightiae* is close to *A. plumeriae* (Hansf. & Deight.) Hansf. (Hansford 1961) but differs from it in having smaller appressoria with globose to subglobose head cells, phialides mixed with appressoria, smaller perithecia, surface cells and smaller cylindrical ascospores. It also differs from *A. voacangae* Deight. (Hansford 1961) in having longer appressoria, and phialides mixed with appressoria, smaller perithecia and smaller

cylindrical ascospores.

Review of literature (Hansford 1961; Sarbhoy *et al.* 1986; Jiang 1989; Bilgrami *et al.* 1991; Hosagoudar 1996, 2003) shows that no species of *Asteridiella* has yet been recorded on host *Wrightia coccinea* Sims. Hence new species of *Asteridiella* is suggested. (Table 3).

Asteridiella micheliae T. K. Jana, S. N. Ghosh et A. K. Das sp. nov.

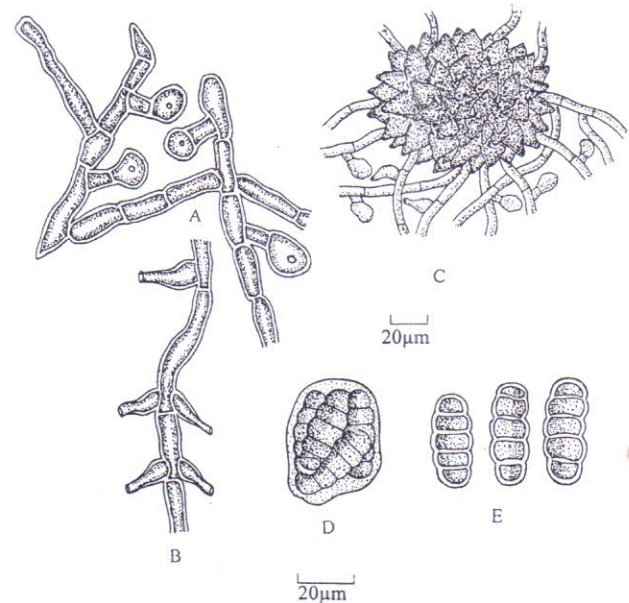


Fig. 4 : *Asteridiella micheliae*

- A. Hyphae with appressoria
- B. Hyphae with phialides
- C. Perithecium associated with mycelium
- D. Ascus bearing ascospores
- E. Ascospores

Coloniae epiphyllae, nigrae, dispersae, orbiculares, subdensae, leniter velutinae, ad 4 mm diam. et confluentes. Hyphae rectae vel undulatae, brunneae, septatae, oppositae vel irregulariter, acuteque vel

Table 3 : Comparative account of *Asteridiella wrightiae* sp. nov. with other species

Name of species	Appressoria	Phialides	Perithecia	Ascospores
<i>A. plumeriae</i>	Alternate, 25-35 μm long; head cells irregularly clavate, often bent, angulose to sinuous-lobate, 15-23 \times 10-17 μm	Borne on a separate mycelial branch	Upto 170 μm diam., surface cells obtusely conoid, upto 25 μm long	Oblong, 40-44 \times 18-19 μm
<i>A. voacangae</i>	Alternate, 14-20 μm long; head cells subglobose to ovate, entire, straight, 10-16 \times 10-12 μm	Borne on a separate mycelial branch	Upto 170 μm diam., surface cells obtusely conoid, upto 15 μm long	Oblong, 36-42 \times 12-17 μm
<i>A. wrightiae</i>	Alternate to unilateral, closely to distantly placed, 18-26 μm long; head cells globose to subglobose, entire, 12-17 \times 10-16 μm	Mixed with appressoria	Upto 160 μm diam., perithecial cells subacute to obtuse at the apex, 10-18 μm long	Cylindrical, 35-40 \times 15-17 μm

laxe ramosae, laxe reticulatae, cellulae plerumque 16-40 × 7-10 µm. Appressoria alternata vel unilateralia, antrorsa vel patentia, brunnea, bicellularia, recta vel curvula, 20-26 µm longa; cellula basali cylindracea, vel cuneata, 6-11 µm longa; cellula apicali globosa vel ovata, integra 11-18 × 13-17 µm. Phialides producentes in ramis separatam myceliales, pallide brunnea, opposita vel alternata, ampullacea, unicellularia, 16-21 × 7-10 µm. Perithecia dispersa, atrobrunnea vel nigra, globosa, ad 202 µm diam.; cellulae peritheciales conoideae, rectae vel curvulae, acutae vel obtusae ad apicem, ad 20 µm longae. Asci, ovals, sessiles, 4 spori; ascospores oblongae, rectae, 4 septatae, utrinque rotundatae, septis constrictae, brunneae, 32-36 × 15-18 µm.

Colonies epiphyllous, black scattered, orbicular, subdense, slightly velvety, upto 4 µm in diameter and confluent. Hyphae slightly to undulate, brown, septate, branching opposite to irregular at acute to wide angles, loosely reticulate, cells mostly 16-40 × 7-10 µm. Appressoria alternate to unilateral, antrorse to spreading, brown, 2 celled, straight to curved, 20-26 µm long; stalk cells cylindric to cuneate, 6-11 µm long; head cells globose to ovate, entire 11-18 × 13-17 µm. Phialides borne on a separate mycelial branch, pale brown opposite to alternate, ampulliform, unicellular, 16-21 × 7-10 µm. Perithecia scattered, dark brown to black, globose, upto 202 µm in diam; perithecial cells conoid, straight to curved, acute to obtuse at the apex, upto 20 µm long. Asci oval, sessile, 4 spored; ascospores oblong, straight, broad, 4 septate, rounded at ends, constricted at the septa, brown, 32-36 × 15-18 µm.

Specimen studied

On leaves of *Michelia velutina* DC. (Family-Magnoliaceae), Intanki forest, Peren, Nagaland, India, T. K. Jana, February 20, 2003, PCC 5186.

Etymology

From the name of the host.

According to the Beeli formula 3101.3230, *Asteridiella micheliae* is close to *A. crustacea* (Speg.) Hansf. but differs from it in having smaller appressoria with globose to ovate and entire head cells, phialides borne on a separate mycelial branch, smaller perithecia with longer surface cells and smaller ascospores. It also differs from *A. werdermannii* Hansf. in having epiphyllous colonies, smaller appressoria and perithecia with longer surface cells, smaller ascospores. Review of literature (Hansford 1961; Hosagaudar 1996; Sarbhoy *et al.* 1996; Bilgrami *et al.* 1991; Crane and Jones 2001) shows that no species of *Asteridiella* has yet been recorded on host *Michelia velutina* DC. Hence new species of *Asteridiella* is suggested. (Table 4)

Meliola picrasmae Hansf. var. *nagalandis* var. nov.
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Differt a typo coloniae epiphyllae, hyphae rectae, appressoriis 20% alternatae, setae myceliales brevioribus et acutae, ascospores oblongae vel ellipsoideae et brevioribus.

Colonies epiphyllous, thin, black, scattered, upto 3 mm in diameter or confluent. Hyphae straight to

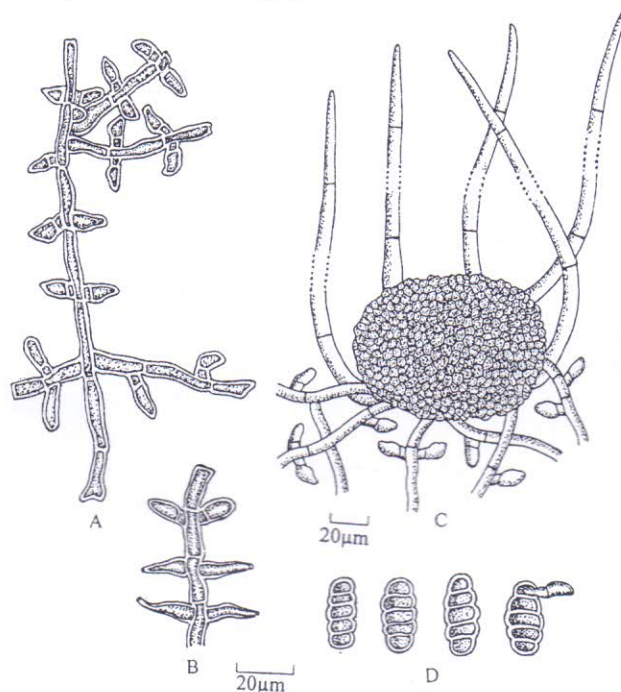
Table 4 : Comparative account of *Asteridiella micheliae* sp. nov. with other species

Name of species	Colonies	Appressoria	Phialides	Perithecia	Ascospores
<i>A. crustacea</i>	Epiphyllous	30-35 µm long; head cells clavate with cuneate to sublobate margin, 20-25 × 12-18 µm	Mixed with appressoria 22-30 × 8-10 µm	290 µm diam., surface cells rounded to obtusely conoid upto 15 µm long	60-70 × 30-34 µm
<i>A. werdermannii</i>	Hypophyllous	25-43 µm long; head cells globose to pyriform and entire or bent cylindric to rounded-angulose, 19-29 × 12-20 µm	Borne on a separate mycelial branch, 17-25 × 8-10 µm	350 µm diam., surface cells about 40 µm diam. and to 12 µm high, bluntly or acutely conoidmammillate	50-57 × 22-26 µm
<i>A. Micheliae</i>	Epiphyllous	20-26 µm long; head cells globose to ovate, entire, 11-18 × 13-17 µm	Borne on a separate mycelial branch, 16-21 × 7-10 µm	202 µm diam., surface cells conoid, straight to curved, acute to obtuse at the apex, upto 20 µm long	32-36 × 15-18 µm

Table 5 : Comparative account of *Meliola picrasmae* Hansf. and *M. picrasmae* var. *nagalandis*

Name of species	colonies	Hyphae	Appressoria	Mycelial setae	Ascospores
<i>M. picrasmae</i>	Hypophyllous	Substraight to undulate	Alternate or to 20% opposite	Straight, simple, 2-4 dentate or furcate, upto 450 μ m long	Cylindric, 4 septate, 40-46 \times 12-16 μ m
<i>M. picrasmae</i> var. <i>nagalandis</i>	Epiphyllous	Straight to substraight	Opposite, about 20% alternate	Straight or slightly bent, simple, acute at the apex, upto 390 μ m long	Oblong to ellipsoidal, 4 septate, constricted at each septum, 24-34 \times 10-16 μ m

substraight, brown, branching opposite to irregular at acute to wide angles, loosely reticulate, cells mostly 23-30 \times 6-8 μ m. Appressoria opposite, about 20% alternate, rarely solitary, subantrorse, straight to curved, 13-20 μ m long; stalk cells cuneate to cylindrical, 3-6 μ m long; head cells ovate, oblong, slightly attenuated at the apex, round, entire to slightly angular, 10-16 \times 6-8 μ m. Phialides mixed with appressoria, opposite, unicellular, ampulliform, 14-24 \times 6-9 μ m. Mycelial setae thinly scattered and grouped around perithecia, straight or slightly bent, simple, acute at the apex, upto 390 μ m long. Perithecia scattered, verrucose, black, upto 150 μ m in diam. Asci not seen. Ascospores oblong to ellipsoidal, 4 septate, dark brown, constricted at each septum, rounded at ends, 24-34 \times 10-16 μ m.

**Fig. 5** : *Meliola picrasmae* var. *nagalandis*

- Hyphae with appressoria
- Hyphae with phialides
- Perithecium associated with mycelium
- Ascospores

Specimen studied

On leaves on *Picrasma javonica* Blume. (Family-Simarobiaceae), Longla village, Wokha, Nagaland, India, T. K. Jana, February 19, 2000, ITCC 4436.01, PCC 5145.

Etymology

From the name of the host.

Meliola picrasmae Hansf. has been reported on the *Picrasma javonica* Blume. from Philippines (Hansford 1961). The Present collection differs from *M. picrasmae* Hansf. in having epiphyllous colonies, straight hyphae, 20% alternate appressoria, smaller and acute mycelial setae, smaller and oblong to ellipsoidal ascospores. As such new variety of *Meliola picrasmae* Hansf. is suggested. (Table 5).

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