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## Four new *Asterina* species from Yunnan, China

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*Asterina flacourtiaceicola* parasitic on *Flacourtiaceae* indet., *Asterina horsfieldiicola* parasitic on *Horsfieldia glabra* (*Myristicaceae*), *Asterina phoebicola* parasitic on *Phoeba lanceolata* (*Lauraceae*), and *Asterina stixis* parasitic on *Stixis suaveolens* (*Capparidaceae*) are described and illustrated as new species.

**Key words:** *Asterinaceae*, leaf molds, pathogens

### Introduction

The genus *Asterina* was proposed by Léviellé (1845) and its type being *A. melastomatis* Lév. (Müller and Arx, 1962). *Asterina* is the type genus of the family *Asterinaceae*, and its species are the most diverse in the family. In the *Asterinaceae* species have orbicular or hemispherical ascomata and dehisce stellately at the centre. There are at least 19 genera, but *Asterina* species differ from other genera in having lateral appressoria on the mycelium, lack of setae on the ascomata or hyphae, and ascospores which are 2-celled (Hansford, 1946a; Hosagoudar *et al.*, 2001). The morphological characters of *Asterina* are similar to species of *Trichasterina*, but in *Asterina*, species lack setae on the ascomata or hyphae (Song *et al.*, 2002).

Eight species of *Asterina* have been reported from Yunnan Province, China (Ouyang *et al.*, 1996). Recently, a critical study of these specimens deposited in the Herbarium of Guangdong Institute of Microbiology (HMIGD) shows that there are at least four separate taxa of this group occurring in Yunnan.

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## Taxonomy

*Asterina flacourtiaceicola* B. Song, T.H. Li & Hosag., **sp. nov.** (Figs 1-3)

*Etymology*: in reference to the host species, *Flacourtiaceae* indet.

*Coloniae* epiphyllae, atrae, tenues, arachnoideae vel subvelutinae, ad 3 mm diam. *Hyphae* brunneae, subrectae vel sinuatae, oppositae vel irregulariter acuteque vel wideque ramosae, laxae vel dense reticulatae, cellulis 12.5-45 × 3.5-4.5 µm. *Appressoria* unicellularia, alternata vel unilatera, ad 1% opposita, antrorsa, recta vel curvula, ampullacea vel conoidea, acuta et apice, integra, 7.5-12.5 × 3.5-4.5 µm. *Ascomata* dispersa, atra, orbicularia vel hemisphaerica, ad 90 µm diam., nulla cava vel stellate dehiscentia ad centrum, irregulariter margina crenata vel fimbriata, cells 2-3 µm lata. *Ascospores* oblongae vel ellipsoideae, brunneae, 1-septatae, obtusae, constrictae, laeves, 12.5-15 × 5-6 µm.

*Colonies* epiphyllous, black, thin, arachnoid or nearly velvety, up to 3 mm in diam. *Hyphae* brown, nearly straight or sinuous, opposite or irregular branching acutely or obtusely, loosely to closely reticulate, cells 12.5-45 × 3.5-4.5 µm. *Appressoria* unicellular, alternate or unilateral, less 1% opposite, spreading, straight or bent, ampulliform or conoid, acute at apex, entire, 7.5-12.5 × 3.5-4.5 µm. *Ascomata* scattered, black, orbicular or hemispherical, up to 90 µm in diam.; no apical pore or stellately dehiscent at the centre, irregularly crenate to shortly tasseled at the periphery, surface cells 2-3 µm wide. *Ascospores* oblong or ellipsoid, brown, 1-septate, obtuse, constricted at septum, surface smooth, 12.5-15 × 5-6 µm.

*Material examined*: CHINA, Menglun, Yunnan Province, on leaves of *Flacourtiaceae* indet, August 1985, Y.X. Hu (HMIGD 34163; **holotype**).

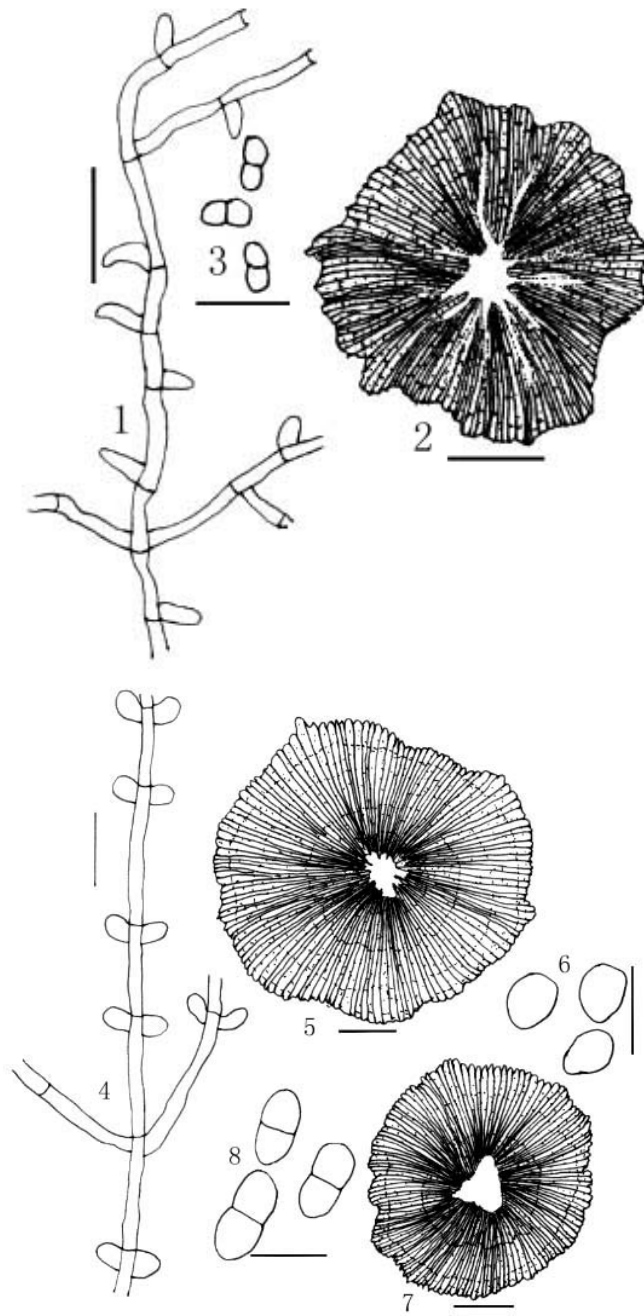
The species is similar to *Asterina delicata* Doidge, *A. granulosa* (Hansf.) Hosag. *et al.* and *A. grewiae* Cooke as their appressoria are 1-celled. *Asterina flacourtiaceicola* however differs as the ascospores are smaller (20-22 × 10-12 µm for *A. delicata* and *A. grewiae*; 20-31 × 12-15.5 µm for *A. granulosa*) (Cooke, 1882; Doidge, 1942; Hansford, 1943; Hosagoudar *et al.*, 1996).

*Asterina horsfieldicola* B. Song, T.H. Li & Hosag., **sp. nov.** (Figs 4-8)

*Asterina horsfieldiae* auct. non Hansf.: Ouyang, Song & Hu, Acta Mycol. Sin. 15: 89. 1996.

*Etymology*: in reference to the host species, *Horsfieldia glabra*.

*Coloniae* epiphyllae, atrae, tenues, arachnoideae vel subvelutinae, ad 8 mm diam. *Hyphae* brunneae, subrecta, oppositae acuteque vel wideque ramosae, laxae vel dense reticulatae, cellulis 25-40 × 4-5.5 µm. *Appressoria* unicellularia, opposita, antrorsa, ovata vel ellipsoid, integra, 7-10 × 6-8.5 µm. *Ascomata* dispersa vel laxae aggregata, atra, orbicularia vel hemisphaerica, ad 150 µm diam., stellate dehiscentia ad centrum, irregulariter margina crenata vel fimbriata, cells 3-5 µm lata. *Ascospores* oblongae, brunneae, 1-septatae, obtusae, constrictae, laeves, 25-31 × 10.5-15 µm. *Pycnidia* pauca, dispersa, hemisphaerica, stellate dehiscentia ad centrum, irregulariter crenata ad peripherica, ad 100 µm diam. *Conidia* unicellularia, globosa vel ellipsoidea, brunnea, 12.5-18 × 13-15 µm.



**Figs 1-3** *Asterina flacourtiaceicola*. **1.** Hyphae with appressoria. **2.** Ascoma. **3.** Ascospores. **Figs 4-8** *Asterina horsfieldiicola*. **4.** Hyphae with appressoria. **5.** Ascoma. **6.** Conidia. **7.** Pycnidium. **8.** Ascospores. Bars = 25 µm.

*Colonies* epiphyllous, black, thin, arachnoid or nearly velvety, up to 8 mm in diam. *Hyphae* brown, nearly straight, opposite branching acutely or obtusely, loosely to closely reticulate, cells 25-40 × 4-5.5 µm. *Appressoria* unicellular, opposite, spreading, ovate or ellipsoid, entire, 7-10 × 6-8.5 µm. *Ascomata* scattered or loosely aggregate, black, orbicular or hemispherical, up to 150 µm diam., stellately dehiscent at centre, irregular margin crenate to fimbriate, surface cells 3-5 µm wide. *Ascospores* oblong, brown, 1-septate, obtuse, constricted at septum, surface smooth, 25-31 × 10.5-15 µm. *Pycnidia* few, scattered, hemispherical, stellately dehiscent at the centre, irregularly crenate at periphery, up to 100 µm in diam. *Conidia* unicellular, globose to ellipsoid, brown, 12.5-18 × 13-15 µm.

*Material examined*: CHINA, Menglun, Yunnan Province, on leaves of *Horsfieldia glabra* (Bl.) Warb. (*Myristicaceae*), August 1985, Y.X. Hu (HMIGD 34140; **holotype**).

This species is similar to *Asterina horsfieldiae* Hansf. and *A. pycnanthi* Hansf. on members of *Myristicaceae* occurring in Java and Uganda. The distinguishing character of *A. horsfieldiae* are that the appressoria and ascospores are larger (10-14 × 7-9 µm for appressoria; 35-40 × 18-20 µm for ascospores) and the ascospore surface is echinulate (Hansford, 1954). The distinguishing character of *A. pycnanthis* are that the appressoria are rarely opposite and ascospores are rough and larger (32-35 × 18-20 µm) (Sydow, 1938).

***Asterina phoebicola* B. Song, T.H. Li & Hosag., sp. nov.** (Figs 9-13)

*Asterina machili* auct. non Katumoto: Ouyang, Song et Hu, Acta Mycol. Sinica 15: 89. 1996.

*Etymology*: in reference to the host species, *Phoeba lanceolata*.

*Coloniae* hypophyllae, atrae, tenues, arachnoideae vel subvelutinae, ad 3 mm diam. raro confluentes. *Hyphae* brunneae, sinuatae vel curvulae, alternatae et oppositae acuteque vel wideque ramosae, laxae vel dense reticulatae, cellulis plerumque 15-35 × 3-3.5 µm. *Appressoria* unicellularia, alternata vel 5-10% opposita, antrorsa, sinuata vel leniter recta, conoidea, rotundata vel subacuta et apice, integra, 7.5-10 × 3-4 µm. *Ascomata* dispersa vel laxae aggregata, atra, orbiculata vel hemisphaerica, ad 100 µm diam., nulla cava vel stellatae dehiscentia ad centrum, irregulariter margina crenata vel fimbriata, cells 3-5 µm lata. *Ascospores* oblongae, brunneae, 1-septatae, obtusae, constrictae, laeves, 11-12.5 × 4-5.5 µm. *Pycnidia* pauca, dispersa, hemisphaerica, stellatae dehiscentia ad centrum, irregulariter crenata ad peripherica, ad 80 µm diam. *Conidia* unicellularia, subovata, brunnea, 7-8 × 3.8-5 µm.

*Colonies* hypophyllous, black, thin, arachnoid or nearly velvety, up to 3 mm diam., rarely confluent. *Hyphae* brown, sinuate or curved, alternate or opposite branching acutely or obtusely, loosely to closely reticulate, cells mostly 15-35 × 3-3.5 µm. *Appressoria* unicellular, alternate or 5-10% opposite, spreading, sinuate or slightly straight, conoid, rounded or nearly acute at apex, entire, 7.5-10 × 3-4 µm. *Ascomata* scattered to loosely aggregate, black, orbicular or hemispherical, up to 100 µm diam., no apical pore or stellately

dehiscent at central, irregularly crenate to shortly tasseled at periphery, surface cells 3-5  $\mu\text{m}$  wide. *Ascospores* oblong, brown, 1-septate, obtuse, constricted at septum, surface smooth, 11-12.5  $\times$  4-5.5  $\mu\text{m}$ . *Pycnidia* few, scattered, hemispherical, stellately dehiscent at the centre, irregularly crenate at periphery, up to 80  $\mu\text{m}$  diam. *Conidia* unicellular, nearly ovate, brown, 7-8  $\times$  3.8-5  $\mu\text{m}$ .

*Material examined*: CHINA, Mengla, Yunnan Province, on leaves of *Phoeba lanceolata* (Wall. ex Nees) Nees (*Lauraceae*), August 1985, Y.X. Hu (HMIGD 34113, **holotype**).

This species is similar to *Asterina cinnamomicola* Hansf., *A. hamata* Syd., *A. machili* Katum. and *Asterina phoebes* Syd. It differs from *A. cinnamomicola* in that the ascospores are larger (13-16  $\times$  6-7  $\mu\text{m}$ ) and verruculose. The other species all have larger ascospores (20-23  $\times$  8-10  $\mu\text{m}$  for *A. hamata*; 15-18  $\times$  7-8  $\mu\text{m}$  for *A. machili*; 18-24  $\times$  7.5-9  $\mu\text{m}$  for *A. phoebes*). In *A. machili* the appressoria are also not opposite (Sydow, 1927; Hansford, 1946b; Katumoto, 1979).

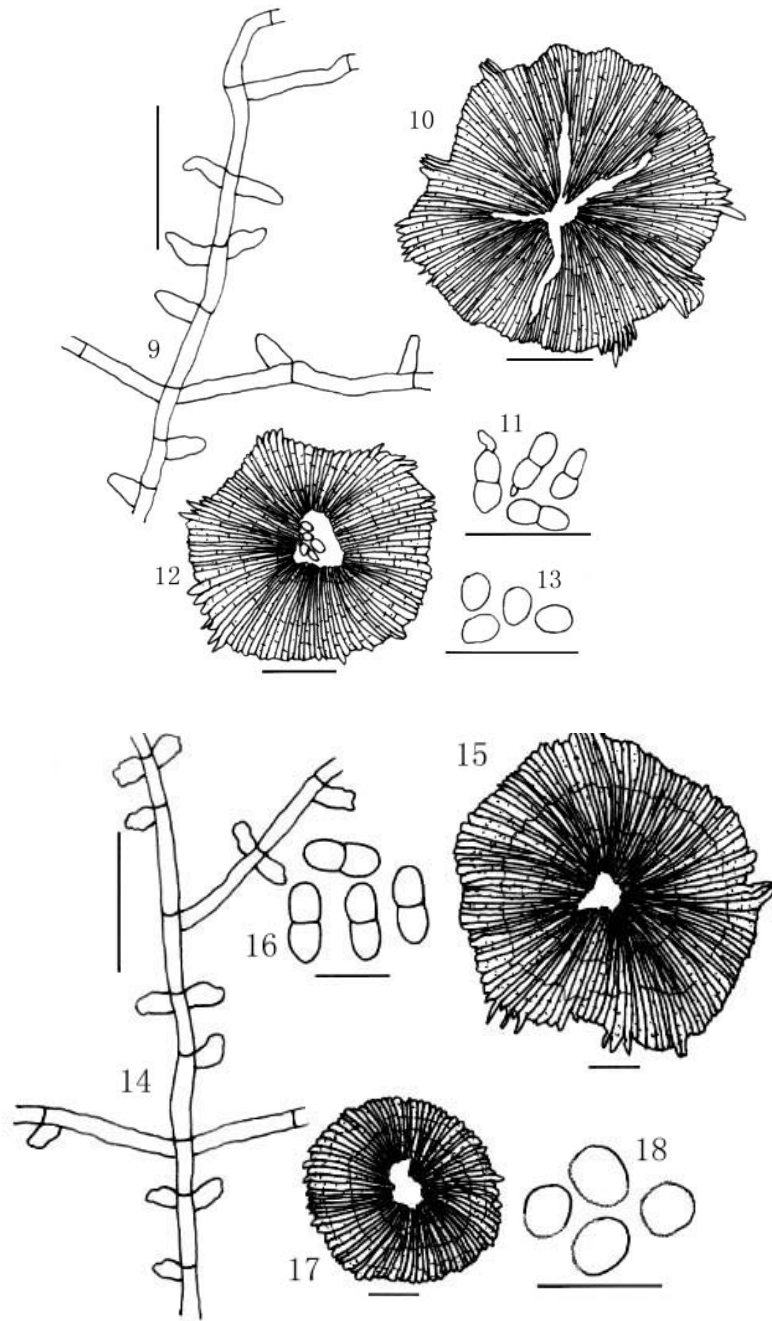
***Asterina stixis* B. Song, T.H. Li, & Hosag., sp. nov.** (Figs 14-18)

*Etymology*: in reference to the host species, *Stixis suaveolens*.

*Coloniae* epiphyllae, atrae, tenues, arachnoideae vel subvelutinae, ad 3 mm diam. *Hyphae* brunneae, subrectae, opposite acuteque vel wideque ramosae, laxae vel dense reticulatae, cellulis 17.5-35  $\times$  3-4  $\mu\text{m}$ . *Appressoria* unicellularia, alternata vel opposita, antrorsa, recta vel sinuata, subovata vel conoidea, integra vel 1-2-lobata, 6.5-7.5  $\times$  3.6-5  $\mu\text{m}$ . *Ascomata* dispersa vel laxae aggregata, atra, orbiculata vel hemisphaeria, ad 160  $\mu\text{m}$  diam., nulla cava vel stellate dehiscentia ad centrum, irregulariter margina crenata vel fimbriata, cells 1-2  $\mu\text{m}$  lata. *Ascosporae* oblongae, brunneae, 1-septatae, obtusae, constrictae, echinulatae, 20-27.5  $\times$  7.5-14  $\mu\text{m}$ . *Pycnidia* pauca, dispersa, hemisphaeria, stellate dehiscentia ad centrum, irregulariter crenata ad peripherica, ad 100  $\mu\text{m}$  diam. *Conidia* unicellularia, subglobosa vel ovata, brunnea, 10-11  $\times$  9.5-10.5  $\mu\text{m}$ .

*Colonies* epiphyllous, black, thin, arachnoid or nearly velvety, up to 3 mm diam. *Hyphae* brown, nearly straight, opposite or alternate branching acutely or obtusely, loosely to closely reticulate, cells 17.5-35  $\times$  3-4  $\mu\text{m}$ . *Appressoria* unicellular, alternate or opposite, spreading, straight or sinuous, nearly ovate or conoid, entire or 1-2-lobate, 6.5-7.5  $\times$  3.6-5  $\mu\text{m}$ . *Ascomata* scattered to loosely aggregate, black, orbicular or hemispherical, up to 160  $\mu\text{m}$  diam., no apical pore or stellately dehiscent at central, irregularly crenate to shortly tasseled at periphery, surface cells 1-2  $\mu\text{m}$  wide. *Ascospores* oblong, brown, 1-septate, obtuse, constricted at septum, surface echinulate, 20-27.5  $\times$  7.5-14  $\mu\text{m}$ . *Pycnidia* few, scattered, hemispherical, stellately dehiscent at the centre, irregularly crenate at periphery, up to 100  $\mu\text{m}$  diam. *Conidia* unicellular, nearly globose or ovate, brown, 10-11  $\times$  9.5-10.5  $\mu\text{m}$ .

*Material examined*: CHINA, Menglun, Yunnan Province, on leaves of *Stixis suaveolens* (Roxb.) Pierre (*Capparidaceae*), August 1985, Y.X. Hu (HMIGD 34149, **holotype**).



**Figs 9-13.** *Asterina phoebicola*. 9. Hyphae with appressoria. 10. Ascoma. 11. Ascospores. 12. Pycnidium. 13. Conidia. **Figs 14-18.** *Asterina stixis*. 14. Hyphae with appressoria. 15. Ascoma. 16. Ascospores. 17. Pycnidium. 18. Conidia. Bars = 25  $\mu$ m.

This species is similar to *Asterina boedijniana* Hansf., *A. cambodiana* Patrick, *A. capparidis* Syd. & Bult. and *A. elgans* Doidge, but differs as the appressoria in these species are 2-celled. In *A. capparidis* ascospores are smaller ( $17-18.5 \times 6-7 \mu\text{m}$ ) and the surface is smooth (Sydow *et al.*, 1911; Doidge, 1942; Hansford, 1954; Patrick, 1965). This is first record of the genus *Asterina* on *Stixis*.

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