

## Re-examinations of the *Hypomyces* specimens on deposit in HMAS

LUO Jing\* ZHUANG Wen-Ying\*

State Key Laboratory of Mycology, Institute of Microbiology, Chinese Academy of Sciences, Beijing 100101, China

**Abstract:** Specimens of the genus *Hypomyces* deposited in the Herbarium Mycologicum Academiae Sinicae were re-examined. Nine species were identified. Among them, *H. marcrosporus*, *H. subiculosus* and *H. tegillum* are new records for China.

**Key words:** morphology, taxonomy

## 中国科学院微生物研究所菌物标本馆馆藏菌寄生属 *Hypomyces* 标本的分类研究

罗晶\* 庄文颖\*

中国科学院微生物研究所 真菌学国家重点实验室 北京 100101

**摘要:** 对中国科学院微生物研究所菌物标本馆保存的菌寄生属标本进行了分类学方面的清理和订正, 鉴定出 9 个种, 其中大孢菌寄生 *H. marcrosporus*、丝层菌寄生 *H. subiculosus* 和侧毛斑菌寄生 *H. tegillum* 为中国新记录种。

**关键词:** 形态学, 分类

### INTRODUCTION

*Hypomyces* (Fr.) Tul. & C. Tul., a genus in Hypocreaceae, was established in 1860 and typified by *H. lactifluorum* (Schwein.) Tul. & C. Tul. *Hypomyces* species are characterized by presence of a thin layer of subiculum on which ascomata are seated, semi-immersed, obpyriform and smooth perithecia with one-layered perithecial wall,

cylindrical asci with a pore at the thickened apex, and fusiform to naviculate ascospores bearing an apiculus at both ends. Their anamorphs contain several genera, such as *Acremonium* Link, *Cladobotryum* Nees, *Blastotrichum* Corda, *Mycogone* Link, *Papulaspora* Preuss, *Sepedonium* Link, *Stephanoma* Wallr. and *Verticillium* Nees. Most *Hypomyces* are parasitic on diverse groups of

Supported by the National Natural Science Foundation of China (Nos. 31000009, 31070015) and the Knowledge Innovation Program of the Chinese Academy of Sciences (No. KSCX2-EW-J-6).

\*Corresponding author. E-mail: luojing999@hotmail.com, zhuangwy@im.ac.cn

Received: 13-11-2011, accepted: 06-12-2011

fungi, and the others are saprobes on wood, bark or plant debris. They distribute mainly in tropical and temperate regions (Rossman *et al.* 1999; <http://nt.ars-grin.gov/taxadescriptions/keys/HypomycesIndex.cfm>). Extensive studies on the genus have been done according to their host range, such as *Hypomyces* on agarics (Rogerson & Samuels 1994), aphylophores (Rogerson & Samuels 1993; Pöldmaa & Samuels 1999, 2003; Pöldmaa 2003; Tokiwa & Okuda 2005), boletes (Rogerson & Samuels 1989), and discomycetes (Rogerson & Samuels 1985). The genus has 198 recorded names (<http://www.indexfungorum.org/Names/Names.asp>), of which 63 species are currently accepted (Kirk *et al.* 2008; Pöldmaa 2011).

Forty-three specimens of *Hypomyces* are currently on deposit in the Mycological Herbarium, Institute of Mycology, Chinese Academy of Sciences (HMAS), of which 24 are well-preserved and with mature perithecia. Re-examinations of these collections were carried out. Nine *Hypomyces* species were identified. Among them, *H. marcosporus*, *H. subiculosus* and *H. tegillum* are new Chinese records.

## 1 MATERIALS AND METHODS

The taxonomic treatments by Rogerson & Samuels (1985, 1989, 1993, 1994) were generally followed. For morphological characterization, the methods by Rogerson & Samuels (1989, 1994) were used. All Chinese and foreign materials under the genus *Hypomyces* on deposit in HMAS were re-examined.

## 2 RESULTS AND DISCUSSION

**2.1 *Hypomyces aurantius* (Pers.) Fuckel**, *Annls Sci. Nat., Bot.*, sér. 4(15): 12, 1860.

Anamorph: *Cladobotryum varium* Nees.

Specimens examined: United States. Louisiana,

Alexandria, on *Polyporus sulphureus* (Bull.) Fr., 7 III 1936, B. Shrimck, HMAS 9197; Tennessee, on *Polyporus picipes* Fr., 13 IV 1979, R.H. Petersen, HMAS 40497. New Zealand. Buller, on polypore, G.J. Samuels, L.M. Johnston & L.M. Kohn, 7 V 1985, HMAS 62866.

**2.2 *Hypomyces chrysospermus* Tul. & C. Tul.**, *Annls Sci. Nat., Bot.*, sér. 4(13): 16, 1860.

Anamorph: *Sepedonium chrysospermum* (Bull.) Fr.

Specimen examined: China. Fujian, Nanjing, on *Boletus* sp., 10 VI 1958, S.Q. Teng, HMAS 23276.

Notes: Compared with the morphology of the fungus described by Rogerson & Samuels (1989), the Chinese collection differs slightly in smaller asci  $80-110 \times 5-6 \mu\text{m}$  vs.  $100-120(-140) \times 5-8(-10) \mu\text{m}$ , and shorter ascospores  $15-20.5 \mu\text{m}$  vs.  $(15-20-25(-30) \mu\text{m}$  in length. These are treated as infraspecific variations.

**2.3 *Hypomyces dactylarioides* G.R.W. Arnold**, *Z. Pilzk.* 37(1-4): 188, 1972.

Anamorph: *Cladobotryum* sp.

Specimen examined: New Zealand. Buller, on polypore, 7 V 1985, G.J. Samuels, HMAS 71933.

**2.4 *Hypomyces hyalinus* (Schwein.) Tul. & C. Tul.**, *Annls Sci. Nat., Bot.*, sér. 4(13): 11, 1860.

Anamorph: Unknown.

Specimen examined: United States. Maine, on *Amanita rubescens* Pers., 12 VIII 1922, R. Thaxter 923, HMAS 43663.

Notes: It is assumed to be an obligate parasite on *Amanita* species (Rogerson & Samuels 1994).

**2.5 *Hypomyces lateritius* (Fr.) Tul. & C. Tul.**, *Annls Sci. Nat., Bot.*, sér. 4(13): 11, 1860.

Anamorph: Unknown.

Specimens examined: China. Xizang, Bomi, on *Lactarius* sp., Y.C. Zong & Y.Z. Liao, 26 VII 1976,

HMAS 38027 (filed as *H. lithuanicus*); Xizang, Bomi, on *Lactarius* sp., Y.C. Zong & Y.Z. Liao, 30 VII 1976, HMAS 37529 (filed as *H. lithuanicus*). Japan. Tottori, on *Lactarius laeticolor* (S. Imai) Imazeki ex Hongo, 27 X 1981, J.Z. Ying 127, HMAS 42542 (filed as *H. lithuanicus*). Germany. Bayern, on *Lactarius deliciosus* (L.) Gray, 22 X 1994, L. Beonken, HMAS 67771.

Notes: *Hypomyces lateritius* is a common fungus on *Lactarius* and world-wide distributed. Among the known species of the genus, it is most similar to *H. lithuanicus* in obpyriform perithecia, thickness of the perithecial wall, ascus shape, size and apical apparatus, ascospore shape, size and septation, and on *Lactarius*. *H. lateritius* differs mainly from *H. lithuanicus* in yellow brown to reddish brown perithecia which are tuning light yellow or colorless in 3% KOH aqueous solution, whereas, those of the latter fungus are ochraceous to brown and tuning pale red to purple in the KOH solution. The materials examined fit well the description of *H. lateritius* by Rogerson & Samuels (1994).

**2.6 *Hypomyces lithuanicus*** Heinr.-Norm., Eesti NSV Tead. Akad. Toim., Biol. seer 18: 72, 1969.

Anamorph: Unknown.

Specimens examined: Germany. Bayern, on *Lactarius pubescens* (Fr.) Fr., 29 IX 1995, L. Beonken 268b, HMAS 76272; Bayern, on *Lactarius pubescens*, 5 X 1995, L. Beonken 334a, HMAS 76239 (all filed as *H. torminosus*).

Notes: The German collections should be *H. lithuanicus* according to the taxonomic treatments by Rogerson & Samuels (1994).

**2.7 *Hypomyces macrosporus*** Seaver, Mycologia 2(2): 80, 1910.

Anamorph: Unknown.

Subiculum well developed, dense, pale

yellowish buff when dry, not changing color in KOH aqueous solution, surface hyphae 4–8 $\mu$ m wide. Perithecia gregarious, partially immersed in subiculum, obpyriform, with an obtuse apex, yellow to amber when dry, not changing color in KOH aqueous solution, 140–230 $\mu$ m in diam., 225–355 $\mu$ m high; perithecial wall one-layered, ca. 25–38 $\mu$ m thick. Asci inoperculate, subcylindrical, 8-spored, 165–220 $\times$ 5.5–8.5 $\mu$ m. Ascospores fusiform, apiculate, medianly 1-septate, surface prominently warted, uniseriate, 33–38.5 $\times$ 5.5–8.5 $\mu$ m; warts mostly 0.6–1.2 $\mu$ m in diam.; apiculi 2.5–6 $\mu$ m high, with a pointed tip.

Specimens examined: China. Hubei, Shennongjia, on Russulaceae, 9 VI 2002, Z.G. Chen, HMAS 86177; Hubei, Shennongjia, on Russulaceae, 9 VIII 2002, Z.G. Chen, HMAS 86168, 86174.

Notes: This is a new record for China. It is most similar to *H. lactiflorum* (Schwein.) Tul. & C. Tul. However, the color and KOH reaction of subiculum and perithecia make it distinguishable. *H. macrosporus* has orange to reddish and KOH+ subiculum and perithecia, while those of *H. lactiflorum* are white and KOH– (Rogerson & Samuels 1994). Except for the smaller asci, 165–220 $\times$ 5.5–8.5 $\mu$ m vs. 210–265 $\times$ 7.5–10 $\mu$ m, the Chinese collections agree well with the description by Rogerson & Samuels (1994).

**2.8 *Hypomyces subiculosus*** (Berk. & M.A. Curtis) Höhn., Annl. Mycol. 8(3): 468, 1910.

Anamorph: *Cladobotryum* sp.

Subiculum very thin to dense, light orange to orange when dry, turning purple in KOH aqueous solution, hyphae 2–5 $\mu$ m wide. Perithecia gregarious, partially immersed to immersed in subiculum, orange to brownish orange when dry, apical portion turning purple in KOH aqueous solution, subglobose to obpyriform, with an obtuse apex, light yellow to

orange-yellow when dry, 152–255 μm in diam., 200–255(–340) μm high; perithecial wall one-layered, 13–23 μm thick. Asci inoperculate, subcylindrical, 8-spored, 87–120×4.5–6 μm. Ascospores fusiform, apiculate, medianly 1-septate, surface finely warted, uniseriate, 13.5–20×4–5.5 μm; warts and crests 0.4–0.6 μm wide; apiculi very low to low, 0.5–2.5 μm high, with a blunt or somewhat pointed tip.

Specimens examined: China. Beijing, Xishan, Tanzhesi, on *Polyporus versicolor* (L.) Fr., 27 IX 1955, S.C. Teng, HMAS 17254 (filed as *H. aurantius*); Anhui, Huangshan, on *Polyporus versicolor*, 24 VIII 1957, S.C. Teng 5022, HMAS 20168 (filed as *H. aurantius*); Guangxi, Lingle, Qingwangshan, 2,000m, on polypore, 13 XII 1957, L.W. Xu 1174, HMAS 20991 (filed as *H. aurantius*); Guangxi, Lingle, Laoshan, 1,900m, on polypore, 17 XII 1957, L.W. Xu 1312, HMAS 23275 (filed as *H. aureonitens*); Guangxi, Longlin, on *Polyporus luteus* Blume & T. Nees, L.W. Xu 500, HMAS 23570 (filed as *H. aureonitens*); Zhejiang, Tianmushan, on *Polyporus versicolor*, 9 IX 1957, S.C. Teng 5411, HMAS 20169 (filed as *H. aurantius*). Japan. Tottori, on *Microporus affinis* (Blume & T. Nees) Kuntze, 29 X 1981, N. Hiratsuka 36, HMAS 42619 (filed as *H. aureonitens*).

Notes: *Hypomyces subiculosus* and *H. aurantius* are common in color of subiculum and perithecium which are KOH+, size of semi-immersed perithecia, ascus size and apical apparatus, two-celled ascospores with a verrucose surface, and aphyllophore habit. The main distinction between them is the shape and size of ascospores. The spores are smaller [(12–)14–16(–17)×4–6 μm] and lanceolate with obtuse apiculi in *H. subiculosus*, but larger [(13–)20–25(–27)×(3–)4–6(–7.5) μm] and fusiform with acute apiculi in *H. aurantius*

(Rogerson & Samuels 1993; Põldmaa & Samuels 2003). The collections from Guangxi Province and Beijing possess slightly longer ascospores than typical *H. subiculosus* [13.5–20 μm vs. (12–)14–16(–17) μm], which was treated as infraspecific variation.

The name *H. aureonitens* (Tul. & C. Tul.) Seifert was previously applied to two of the Chinese collections. According to current taxonomic treatments, this fungus is a member of *Sphaerostilbella* (Seifert 1985).

**2.9 *Hypomyces tegillum* Berk. & M.A. Curtis, Grevillea 4(no. 29): 15, 1875.**

Anamorph: *Cladobotryum* sp.

Subiculum well developed, pale buff to yellowish when dry, not changing color in KOH aqueous solution, hyphae 4–8 μm wide. Perithecia gregarious, superficial to immersed in subiculum, obpyriform to subglobose, with an obtuse apex, buff, light amber to brownish when dry, yellow when rehydrated, becoming somewhat darker and warm brown in KOH aqueous solution, 255–355 μm in diam., 278–318 μm high; perithecial wall one-layered, 18–33 μm thick. Asci inoperculate, subcylindrical, 8-spored, 155–200×6.5–10 μm. Ascospores fusiform, apiculate, with 0–1 septum, surface prominently warted, uniseriate, 30–41×5.5–9 μm; warts up to 2.5 μm wide; apiculi 2.5–6.5 μm high, with a blunt to slightly pointed tip.

Specimens examined: China. Guangxi, Tianlin, Laoshan, on Aphyllophorales, 27 XI 1957, Xu L.W. 924, HMAS 31842 (filed as *H. ochraceus*); Yunnan, Kunming, Xishan, on Aphyllophorales, 9 X 1958, B.N. Jiang & X.R. Liu, HMAS 30491 (filed as *H. ochraceus*).

Notes: This species is characterized by its parchment-like pale buff to yellowish (dry) subiculum and yellow to red brown perithecia, large

ascospores (more than 30 $\mu\text{m}$  in length) with 0–1 septum and coarsely warted surface, and on polypores or rotten wood (Rogerson & Samuels 1993). The asci of HMAS 31842 are larger (180–200 $\times$ 8.5–10 $\mu\text{m}$  vs. 130–140 $\times$ 5–6 $\mu\text{m}$ ), and the ascospore surface of HMAS 30491 is not coarsely ornamented but with somewhat smaller warts. The above distinctions are temporarily treated as infraspecific variations.

#### [REFERENCES]

- Kirk PM, Canon PF, Minter DW, Stalpers JA, 2008. Dictionary of the fungi. 10th edition. CAB International, Wallingford. 1-771
- Pöldmaa K, 2003. Three species of *Hypomyces* growing on basidiomata of Stereaceae. *Mycologia*, 95: 921-933
- Pöldmaa K, 2011. Tropical species of *Cladobotryum* and *Hypomyces* producing red pigments. *Studies in Mycology*, 68: 1-34
- Pöldmaa K, Samuels GJ, 1999. Aphyllorphicolous species of *Hypomyces* with KOH-negative perithecia. *Mycologia*, 91: 177-199
- Pöldmaa K, Samuels GJ, 2003. Fungicolous Hypocreaceae (Ascomycota: Hypocreales) from KhaoYai National Park, Thailand. *Sydowia*, 56: 79-130
- Rogerson CT, Samuels GJ, 1985. Species of *Hypomyces* and *Nectria* occurring on Discomycetes. *Mycologia*, 77: 763-783
- Rogerson CT, Samuels GJ, 1989. Boleticolous species of *Hypomyces*. *Mycologia*, 81: 413-432
- Rogerson CT, Samuels GJ, 1993. Polyporicolous species of *Hypomyces*. *Mycologia*, 85: 231-272
- Rogerson CT, Samuels GJ, 1994. Agaricolous species of *Hypomyces*. *Mycologia*, 86: 839-866
- Rossmann AY, Samuels GJ, Rogerson CT, Lowen R, 1999. Genera of Bionectriaceae, Hypocreaceae and Nectriaceae (Hypocreales, Ascomycetes). *Studies in Mycology*, 42: 1-260
- Seifert KA, 1985. A monograph of *Stilbella* and some allied Hyphomycetes. *Studies in Mycology*, 27: 1-235
- Tokiwa T, Okuda T, 2005. Japanese species of *Hypomyces* and its anamorph III. *Mycoscience*, 46: 295-302