Taxonomic notes on some powdery mildews from Inner Mongolia

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Abstract—The new combination *Erysiphe atraphaxis* var. *pluriappendicis* is introduced; and the taxonomy of four powdery mildew species is reassessed. *Erysiphe rabdosiae* is reduced to synonym with *E. bunkiniana*, and *E. shinii* is considered to be identical with *E. thermopsidis*.

Key words—Erysiphaceae, China

Introduction

Based on results of rDNA sequence analyses, scanning electron microscopic examinations of conidia and a reassessment of anamorphs and teleomorphs, Braun (1999) and Braun & Takamatsu (2000) proposed a fundamental phylogenetic revision of generic circumscription within the *Erysiphaceae*. The new classification of the powdery mildew fungi, discussed and outlined in detail by Braun et al. (2002), has recently been recognized and applied in connection with a comprehensive taxonomic exploration of the powdery mildew fungi of Inner Mongolia in China (Liu & Braun 2006, Liu et al. 2006, 2007; Liu 2007, Liu & Shang 2008). Results of these studies have been summarized by Liu (2007). Taxonomic novelties in the latter unpublished thesis are, however, not effectively published. Therefore, the new combination *Erysiphe atraphaxis* var. *pluriappendicis* is here validated. Furthermore, rich, new collections of powdery mildew on *Rabdosia japonica* var. *glaucocalyx* and *Thermopsis lanceolata* from Inner Mongolia allowed taxonomic reassessments of *Erysiphe bunkiniana/* *E. rabdosiae* and *E. shinii* (= *Microsphaera thermopsidis*)/*E. thermopsidis*, respectively.
Materials and methods

Material was mounted in distilled water and examined using 100× oil immersion objectives (bright field and phase contrast), but without any staining, using standard light microscopy. For each collection, 30 measurements (× 1000 magnification) of conidia and other structures were made in water, with the extremes given in parentheses. Collections were deposited in the Mycological Herbarium of the Chifeng College, Inner Mongolia, China (“CFSZ”), the Mycological Herbarium of the Institute of Microbiology, Academia Sinica, Beijing, China (HMAS) and the Herbarium of Martin-Luther-University, Halle (Saale), Germany (HAL).

Taxonomy

(1) Reassessment of Microsphaera atraphaxis var. pluriappendicis

_Erysiphe atraphaxis_ var. _pluriappendicis_ (T.Z. Liu) T.Z. Liu & U. Braun, _comb. nov._

_MYCOBANK MB 513090._


Comments: Based on current genus-level taxonomy of the Erysiphaceae (Braun et al. 2002), Microsphaera atraphaxis var. pluriappendicis must be transferred to the genus Erysiphe DC. Since the anamorph of E. atraphaxis var. pluriappendicis was not previously described in detail, the following supplementary description is given:


(2) Taxonomy of Erysiphe bunkiniana and E. rabdosiae


Comments: The anamorph of this species has been insufficiently known. The following supplementary description can be given:

Mycelium amphigenous, also cauligenous, forming distinct white patches, often occupying the whole leaf surface, persistent or subpersistent. Hyphae 3–7 μm wide, hyaline or yellowish, smooth, thin-walled. Appressoria lobed. Conidiophores erect, (65–)90–176 μm long, foot-cells cylindrical, straight, (16.5–)38–64 × 6.5–11 μm, followed by 1–3(–4) shorter cells. Conidia formed singly, doliiform-cylindrical or subcylindrical, 20–36(–42) × 10–18(–20) μm.

1989, Shin 2000, Liu et al. 2007). *Erysiphe bunkiniana* and *E. rabdosiae*, two species characterized by forming chasmothecial appendages with somewhat pointed tips, previously were differentiated by the length of the appendages and number of ascospores. *Erysiphe bunkiniana* was described as forming relatively long appendages, (0.5–)2–3 times as long as the chasmothecial diameter, and asci with (5–)6–8 spores, whereas *E. rabdosiae* was discriminated by somewhat shorter appendages, not exceeding a relative length of 0.5–2 times the chasmothecial diameter, and (3–)4–6(–7)–spored asci. Within the six specimens collected in Inner Mongolia, several collections [incl. CFSZ 95076, 05023 (= HAL 1937 F)] are fully intermediate between *E. bunkiniana* and *E. rabdosiae*, i.e. young, short appendages fully agree with *E. rabdosiae* and older, longer ones rather coincide with those of *E. bunkiniana*. The whole range of the number of ascospores per ascus is also fully overlapping. Based on the
morphological continuum between powdery mildew collections on *Rabdosia* spp. previously referred to as *E. bunkiniana* and *E. rabdosiae*, it became evident that only different developmental stages of a single species have been involved. It is proposed to reduce *E. rabdosiae* to synonym with *E. bunkiniana*.

![Fig. 3. Erysiphe thermopsidis. A. Conidiophores. B. Conidia. C. Hyphae with appressoria. Scale bar = 10 µm. T.Z. Liu del.](image)

(3) Taxonomy of *Erysiphe thermopsidis* and *E. shinii*


**Comments:** The following supplementary description of the insufficiently known anamorph of this species is given:

Mycelium amphigenous, forming irregular white patches, eventually occupying the whole leaf surface, persistent. Hyphae 3–8 μm wide, hyaline. Appressoria lobed. Conidiophores erect, foot-cells cylindrical, straight or slightly flexuous at the base, 23–50 × 7–10 μm, followed by 1–3 shorter cells. Conidia formed singly, doliiform, doliiform-cylindrical or cylindrical, surface rugose, (16.5–)23–33(–40) × 9–17 μm.

Zheng & Chen (Chen et al. 1987) discussed the differences between *Erysiphe thermopsidis* and *E. shinii* (= *Microsphaera thermopsidis*) in detail. Differentiation of the two species was based mainly on the length and morphology of the appendages. 13 powdery mildew specimens on *Thermopsis lanceolata* have been collected from different localities of Inner Mongolia. Most collections represent the *Erysiphe shinii* (= *Microsphaera thermopsidis*) type, i.e. they are characterized by having relatively long, often terminally branched chasmothecial appendages. However, even in these specimens long and branched appendages are mixed with short, unbranched ones, agreeing with those described for *Erysiphe thermopsidis*. Only three collections, viz. CFSZ 05038, 05059 and 06033 (= HAL 2288 F), represent the *E. thermopsidis* type, although some longer, 1–2(–3) times dichotomously branched, *E. shinii*-like appendages have also been observed. Furthermore, there are no distinct differences in the anamorphs of *E. shinii* and *E. thermopsidis*-like collections. Therefore, it can be concluded that *E. thermopsidis* was based on immature, not yet fully developed, samples. The two morphological types represent two extremes of a morphological continuum within the variation of a single species. Therefore, it is proposed to merge the two species under the older valid name *E. thermopsidis*.

**Acknowledgements**

We are much obliged to D.A. Glawe, Washington State University and University of Washington, USA and H.D. Shin, Korea University, College of Life Sciences and Biotechnology, Division of Environmental Science and Ecological Engineering, Seoul, Korea, for their pre-submission reviews. This study was supported by the Natural Science Foundation of the Inner Mongolia Autonomous Region of China (No 20080404Zd11).
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