

Miscellaneous notes on some powdery mildew fungi

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Abstract: BRAUN, U. et al. 2003: Miscellaneous notes on some powdery mildew fungi. *Schlechtendalia* **10**: 91–95.

The taxonomy and nomenclature of *Microsphaera americana*, *M. hypophylla* and *M. sinensis* are discussed, the new name *Erysiphe castanei* (\equiv *Microsphaera americana*) and the new combinations *E. hypophylla* and *E. sinensis* are introduced. The first collection of ascomata on *Erica gracilis* is recorded, proving that *Oidium ericinum* is the anamorph of *Erysiphe (Microsphaera) azaleae*. Furthermore, collections of *Oidium kalanchoë*s on *Crassula ovata*, *Erysiphe necator* on *Cissus rhombifolius* and *Erysiphe (Microsphaera)* species on *Acer* are recorded and discussed. *Microsphaera aceris* proved to be based on ascomata of *Erysiphe (Microsphaera) syringae-japonicae* blown onto the host leaves, and other collections of *Erysiphe (Microsphaera)* species from *Acer* were shown to be *Erysiphe (Microsphaera) alphitoides*.

Zusammenfassung: BRAUN, U. et al. 2003: Vermischte Anmerkungen zu einigen Mehltaupilzen. *Schlechtendalia* **10**: 91–95.

Taxonomie und Nomenklatur von *Microsphaera americana*, *M. hypophylla* und *M. sinensis* werden diskutiert und der neue Name *Erysiphe castanei* (\equiv *Microsphaera americana*) und die neuen Kombinationen *E. hypophylla* und *E. sinensis* werden eingeführt. Der erste Fund von Fruchtkörpern auf *Erica gracilis* wird beschrieben, der beweist, dass *Oidium ericinum* als Anamorphe von *Erysiphe (Microsphaera) azaleae* betrachtet werden muss. Weiterhin werden Funde von *Oidium kalanchoë*s auf *Crassula ovata*, *Erysiphe necator* auf *Cissus rhombifolius* und *Erysiphe (Microsphaera)* -Arten auf *Acer* berichtet und diskutiert. Es hat sich herausgestellt, dass *Microsphaera aceris* auf Fruchtkörper von *Erysiphe (Microsphaera) syringae-japonicae* basierte, die auf die Wirtsblätter aufgeweht waren. Andere Funde auf *Acer* gehen auf *Erysiphe (Microsphaera) alphitoides* zurück.

1. Taxonomy and nomenclature of *Microsphaera americana*, *M. hypophylla* and *M. sinensis*

Based on molecular results and a reassessment of morphological features, BRAUN & TAKAMATSU (2000) reduced *Microsphaera* Lév. to synonymy with *Erysiphe* DC. emend. and transferred most *Microsphaera* species to the latter genus. However, *M. hypophylla* Nevod. and *M. sinensis* Y.N. Yu have not yet been placed in *Erysiphe* emend. because the taxonomy of these species was not quite clear to these authors. BRAUN & TAKAMATSU (2000) only cited and discussed these names under *E. alphitoides* (Griffon & Maubl.) U. Braun & S. Takam. The ascomata of the species concerned are little differentiated and detailed examinations of the anamorphs as well as molecular data were lacking. Recently, *Erysiphe alphitoides*, *Microsphaera hypophylla* and *M. sinensis* have been included in molecular examinations (rDNA ITS) of various powdery mildew fungi (CUNNINGTON 2002, CUNNINGTON et al. 2003), in which these taxa proved to represent three different species. *M. hypophylla* and *M. sinensis* can now be transferred to *Erysiphe* emend.

Microsphaera americana U. Braun, a North American powdery mildew on leaves of *Castanea* spp., is another species which has not yet been placed in *Erysiphe*. The epithet “*americana*” is already preoccupied in *Erysiphe* by *E. americana* U. Braun (\equiv *Golovinomyces americanus* (U. Braun) V.P. Heluta), so that a new name has to be proposed for *M. americana* in *Erysiphe* emend.

***Erysiphe castaneae* U. Braun nom. nov.**

\equiv *Microsphaera americana* U. Braun, Mycotaxon 14: 371 (1982), non *Erysiphe americana* U. Braun, 1983.

***Erysiphe hypophylla* (Nevod.) U. Braun & J.H. Cunnington comb. nov.**

\equiv *Microsphaera hypophylla* Nevod., Griby SSSR 1: 4 (1952).

***Erysiphe sinensis* (Y.N. Yu) U. Braun & J.H. Cunnington comb. nov.**

\equiv *Microsphaera sinensis* Y.N. Yu, in Yu & Lai, J. NorthE. Forest. Inst. (Harbin) 4: 32 (1982).

2. *Oidium ericinum*, the anamorph of *Erysiphe azaleae*

First detailed examinations of *Oidium ericinum* Erikss. date back to BLUMER (1951), who demonstrated that this powdery mildew may infect *Erica gracilis* as well as *Calluna vulgaris*. WATLING (1985) reported a pseudoidium on a wide range of Ericaceae in glasshouses of the Royal Botanic Garden Edinburgh in 1973, including host species of the genera *Agauria*, *Rhododendron* and *Vaccinium*. All records from these hosts were referred to *Oidium ericinum* by BRAUN (1987, 1995). The first record of the teleomorph of the European *Rhododendron* powdery mildew was published by BRAUN (1997), who showed that this fungus was identical with the North American *Microsphaera azaleae* U. Braun (\equiv *Erysiphe azaleae* (U. Braun) U. Braun & S. Takam.). Detailed examinations of European powdery mildews on hosts of the Ericaceae were published by INMAN et al. (2000), including SEM micrographs of conidiophores, conidia and ascomata. In the latter paper, the identity of *Oidium ericinum* as the European *Rhododendron* powdery mildew was called into question. In cross-inoculation studies the *Rhododendron* *Oidium* failed to infect *Vaccinium* species. Also, an *Oidium* from *Erica gracilis* could not be transferred to *Rhododendron* species, but *Rhododendron* could be infected with a powdery mildew from *Agapetes speciosa*. Although these results were somewhat confusing, the occurrence of a powdery mildew on hosts of the Ericaceae with pseudoidium anamorph and wide host range could be supposed. Molecular data based on powdery mildews from various hosts of the Ericaceae would be helpful to prove the affinities of these powdery mildews, but they are not yet available.

However, a first collection of ascomata in connection with the anamorph of *Oidium ericinum* on *Erica gracilis* has been made in Germany (Niedersachsen, Braunschweig, Nov. 2002, U. Brielmaier-Liebetanz, HAL). Mycelium, conidiophores and conidia agreed perfectly with *Oidium ericinum* and the anamorph of the European powdery mildew on *Rhododendron* (BRAUN 1997, INMAN et al. 2000): Appressoria nipple-shaped to moderately lobed, foot-cells of the conidiophores curved to twisted and conidia cylindrical, 30–45 \times 10–16 μ m. Ascomata were mainly found on flowers. Most of them were immature, but a few mature fruit bodies, well agreeing with those of *Erysiphe azaleae*, have been observed.

The results of these observations can be summarised as follows. *Oidium ericinum* from *Erica gracilis* agrees perfectly with the European pseudoidium on *Rhododendron* and some other hosts of the Ericaceae, and the teleomorph formed on *Erica* agrees with that of *Erysiphe azaleae*, so that *O. ericinum* has to be considered the anamorph of the latter species. Type material of *O. ericinum* could not be traced (no material at S) and is very probably not preserved.

3. *Erysiphe necator* on *Cissus rhombifolius*

On *Cissus rhombifolius* (Vitaceae), Germany, Sachsen-Anhalt, Halle (Saale), Botanical Garden, 5 Mar. 2003, U. Braun & A.-K. Wittig (HAL), anamorph only.

This is the first European record of this species on *Cissus rhombifolius* (AMANO, 1986, listed *E. necator* on this host from the USA). This host was grown as ornamental plant in a flowerpot. Conidiophores and conidia agreed well with collections from *Vitis vinifera*, the type host, except for the foot-cells, which were straight or only somewhat curved.

4. *Oidium kalanchoës* on *Crassula ovata*

On *Crassula ovata* (Crassulaceae), Germany, Niedersachsen, Braunschweig, Jan. 2003, U. Brielmaier-Liebetanz (HAL) and Hessen, Wiesbaden, 12 May 2003, S. Krause [from "Regierungsbezirk Gießen, Pflanzenschutzdienst, Wetzlar"] (HAL).

This is the first record of *Oidium kalanchoës* from a host of the genus *Crassula*. The powdery mildew from *Crassula ovata* agreed perfectly with *Oidium kalanchoës*, which was re-described and illustrated by BRAUN (1998: 32–33, Fig. 1). The cultivated *Crassula ovata* plants from Braunschweig were growing next to a flowerpot containing *Kalanchoë tubiflora* infected by *Oidium kalanchoës*. BRAUN (1987) validated the invalid name "*Oidium calanchoeae* Lüstner", but maintained the wrong original spelling, which must be considered to be an orthographic error that can be corrected to *Oidium kalanchoës* U. Braun. Recently a collection of this species on *Kalanchoë* sp. from the Netherlands (Plant Protection Service, Wageningen) has been examined. This specimen agreed well with German samples (BRAUN 1989), but the conidia were somewhat larger, up to $80 \times 25 \mu\text{m}$, the width of the hyphae ranged from 2 to $10 \mu\text{m}$, and some conidiophores were characterised by having short foot-cells followed by a much longer second cell, up to $90 \mu\text{m}$. The combined length of foot-cell of following cells is up to $200 \mu\text{m}$.

5. *Erysiphe (Microsphaera) species* on *Acer*

Acer macrophyllum was recorded as host of *Microsphaera penicillata* s.lat. (= *M. alni* auct.) from the USA, Oregon and Washington (AMANO 1986, FARR et al. 1989). *Microsphaera aceris* was described by BUNKINA (1974) from the Far East of Russia on *Acer barbinerve*. BRAUN (1987) did not see any material of *Microsphaera* species on *Acer*, but simply published a description of *M. aceris* based on BUNKINA's (1974) original description, since type material of this species was not available for re-examination.

Recently, ascomata of *Erysiphe (Microsphaera)* sp. on *Acer campestre* (Germany, Nordrhein-Westfalen, Essen, Wald Burgaltendorf, 2002, N. Ale-Agha, ESS, HAL) have been found: Ascomata 90–125 µm diam., peridial cells 15–25 µm diam., appendages 6–10, more or less equatorially inserted, 0.75–1.5 times as long as the diam. of the ascomata, 6–9 µm wide, thick-walled below, thin-walled towards the apex, smooth to rough-walled, with a single basal septum, hyaline, but brown at the very base, apex 4–6 times closely branched, tips recurved, asci 4–8 per ascoma, 45–70 × 35–45 µm, 6–8-spored, ascospores 14–23.5 × 8–12 µm. The ascomata on *Acer campestre* have been found on leaves heavily infected by *Sawadaea bicornis* (Wallr.: Fr.) Homma, with abundant mycelial patches, conidiophores and conidia of the latter species, but without any trace of an anamorph belonging to *Oidium* subgen. *Pseudoidium* (pseudoidium type). It is not clear if these ascomata originated from the leaves of *Acer campestre* or if they have been blown on, but as the anamorph was not present, it can be supposed that they did not develop on this host. Morphologically, they agree well with those of *Erysiphe (Microsphaera) alphitoides*. It is noteworthy that ascomata probably belonging to the latter species had also been collected on *Acer* sp. by V.P. Heluta in the Ukraine about 20 years ago.

Type material of *Microsphaera aceris*, deposited at VLA, has been re-examined by V.P. Heluta and shown to be identical with *Erysiphe (Microsphaera) syringae-japonicae* (U. Braun) U. Braun & S. Takam. (ascomata blown onto leaves of *Acer barbinerve*). The correct name of this fungus in the genus *Erysiphe* is:

Erysiphe syringae-japonicae (U. Braun) U. Braun & S. Takam., *Schlechtendalia* 4: 14 (2000).

- ≡ *Microsphaera syringae-japonicae* U. Braun, *Mycotaxon* 15: 121 (1982).
- = *Microsphaera aceris* Bunkina, *Komarovskie Chteniya* 21: 82 (1974), non *Erysiphe aceris* DC., 1815.
- ≡ *Erysiphe acerina* U. Braun & S. Takam., *Schlechtendalia* 4: 5 (2000).

There is no evidence for a genuine species of *Erysiphe (Microsphaera)* on *Acer*. All collections examined were based on ascomata that were not grown on *Acer* leaves.

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