The nomenclature of *Arthrocladiella* (*Erysiphaceae*)

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Abstract: Braun, U. & Kirk, P.M. 2023: The nomenclature of *Arthrocladiella* (*Erysiphaceae*). Schlechtendalia **40**: 269–271.

The complex nomenclature of *Arthrocladiella* is discussed in detail. This name and the combination *A. mougeotii* are valid, but need to be clarified. A separate 'genus name' for the *Lycium* powdery mildew was originally introduced as *Arthrocladia*. However, this designation is invalid (Art. 39.1) and illegitimate (Art. 53.1). Later, the name *Arthrocladiella* gen. nov. was introduced, together with an added Latin description and *Erysiphe lycii*, nom. inval. (Art. 38.1, a) [*Arthrocladiella lycii*] as type. The designation of an invalid species name (designation) as 'type' would, actually, render this genus name invalid as well (Art. 40.1). Fortunately, the name *Arthrocladiella* was published with a single (type) species, which fulfilled all conditions for the application of Art. 38.5 (description generic-specifica), so that the well-established name *Arthrocladiella* can be maintained. Comments on the nomenclature of *Microsphaera mougeotii* as well as *Calocladia* and *Microsphaera* are added.

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Die komplizierte Nomenklatur von *Arthrocladiella* wird im Detail diskutiert. Dieser Name und die Kombination *A. mougeotii* sind gültig, müssen aber erläutert werden. Ein eigener ‚Gattungsname' für den *Lycium*-Mehltau wurde ursprünglich als *Arthrocladia* eingeführt. Diese Bezeichnung ist aber ungültig (Art. 39.1) und illegitim (Art. 53.1). Später wurde dafür der Name *Arthrocladiella* gen. nov. eingeführt, zusammen mit einer Lateinischen Beschreibung und *Erysiphe lycii* nom. inval. (Art. 38.1, a) [*Arthrocladiella lycii*] als Typus. Die Angabe eines ungültigen Artnamens (Bezeichnung) als ‚Typus' würde diesen Gattungsnamen eigentlich auch ungültig machen (Art. 40.1). Glücklicher Weise wurde der Name *Arthrocladiella* mit einer einzigen (Typus-)Art publiziert, was alle Bedingungen für die Anwendung von Art. 38.5 (description generic-specifica) erfüllt, sodass der gut etablierte Name *Arthrocladiella* beibehalten werden kann. Anmerkungen zur Nomenklatur von *Microsphaera mougeotii* als auch *Calocladia* und *Microsphaera* werden angefügt.

Key words: *Helotiales*, powdery mildew, *Arthrocladia*, *Graciloidium*.

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Golovin (1956) introduced the genus 'name' *Arthrocladia* for the powdery mildew on *Lycium*, currently known as *Arthrocladiella mougeotii*. When introduced, this designation was invalid and illegitimate. A Latin description, obligatory since 1935, was not provided (Art. 39.1), and *Arthrocladia* Golovin is a homonym of *Arthrocladia* Duby, 1830 (Algae). *Erysiphe lycii* Lasch, in Rabenhorst, Klotzschii Herb. Viv. Mycol., Cent. 10: no. 950 (1846) [nom. inval., Art. 38.1(a)], was cited as type. Vassilkov (1960) realized the homonymy and invalidity of Golovin's designation and introduced *Arthrocladiella* for this powdery mildew, added a Latin description and cited '*Arthrocladiella lycii* (Lasch) Vassilkov', based on the invalid name *Erysiphe lycii*, as type, which would, actually, render *Arthrocladiella* invalid (Art. 40.1). However, fortunately, Vassilkov (1960) published *Arthrocladiella* with a Latin description and a single species name. Therefore, all conditions for the application of Art. 38.5 (description generico-specifica) were fulfilled, i.e., the genus name *Arthrocladiella* Vassilkov and the species name *A. lycii* Vassilkov [as '(Lasch) Vassilkov'] have been simultaneously validly published.

Later, Vassilkov (1963) discussed the nomenclature of this powdery mildew at species level and introduced the valid combination *Arthrocladiella mougeotii*.

The designation *Erysiphe lycii* has never been validated. Saccardo and Roumeguère (in Saccardo 1881) listed '*Microsphaera lycii* (Lasch) Sacc. & Roum.', cited the older name '*M. mougeotii* Lév.' (referring to *Calocladia mougeotii* Lév.) as synonym, but failed to add a description, so that *M. lycii* is also invalid (Art. 39.1). Furthermore, even with an added description, *M. lycii* would have been an illegitimate (superfluous) name (Art. 52.1). However, this is exactly what happened in Saccardo (1882). Saccardo (l.c.) added a description to *M. lycii*, but also cited *M. mougeotii* (referring to *Calocladia mougeotii* Lév.) as synonym. Most subsequent authors followed this treatment, although a few of the early authors recognized *M. mougeotii* as the valid name for this powdery mildew, such as Cooke (1865, 1871) and Salmon (1900). *Microsphaera mougeotii* (Lév.) Cooke (Cooke 1865) is the first valid combination of *Calocladia mougeotii* in *Microsphaera* (see comments below).

Since the beginning of the 1980s (Speer 1980), *Arthrocladiella* has been generally recognized as a distinct genus (see survey in Braun & Cook 2012: 349). Mori et al. (2000) and Matsuda & Takamatsu

(2003) confirmed this status and clarified the phylogenetic position of this genus, which belongs in tribe *Golovinomyceteae*, i.e., the powdery mildew of *Lycium* is closely allied to *Golovinomyces*. This species is common and widespread on *Lycium barbarum* and additional species of *Lycium* in Asia (Central Asia, China, Israel, Japan, Korea, Russia, Siberia, Turkey), Caucasus (Armenia, Azerbaijan), throughout Europe, but also in Africa (Canary Islands), and has been introduced in North America, South America (Argentina) and New Zealand (Braun & Cook 2012). Therefore, the clarification of the nomenclature of this powdery mildew is relevant, and it is desirable to maintain *Arthrocladiella* as the correct generic name:

Arthrocladiella Vassilkov, Bot. Zhurn. **45**: 1368, 1960.
Type: *Arthrocladiella lycii* Vassilkov.
≡ *Microsphaera* sect. *Arthrocladiella* (Vassilkov) U. Braun, Feddes Repert. **88**: 663, 1978.
= *Oidium* subgen. *Graciloidium* R.T.A. Cook, A.J. Inman & C. Billings, Mycol. Res. **101**: 998, 1997.
Type: *Microsphaera mougeotii* Lév., Ann. Sci. Nat., Bot., Sér. 3, **15**: 158, 381, 1851.
≡ *Graciloidium* (R.T.A. Cook, A.J. Inman & C. Billings) R.T.A. Cook & U. Braun, in Braun & Cook, Taxonomic Manual of the *Erysiphales* (Powdery Mildews): 349, 2012.
[*Arthrocladia* Golovin, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 2, Sporov. Rast. **10:** 309, 1956, nom. inval. (Art. 39.1) and nom. illegit. (53.1), non Duby, 1830 (Algae).
[*Microsphaera* sect. *Arthrocladia* (Golovin) S. Blumer, Echte Mehltaupilze: 239, Jena 1967, nom. inval. (Art. 35.1)].

Arthrocladiella mougeotii (Lév.) Vassilkov, Bot. Mater. Otd. Sporov. Rast. Bot. Inst. Komarova Akad. Nauk S.S.S.R. **16**: 112, 1963.
≡ *Calocladia mougeotii* Lév., Ann. Sci. Nat., Bot., Sér. 3, **15**: 158, 1851.
Lectotype (designated by Braun 1987: 439): France, Vaugirard, on *Lycium europaeum*, ex herb. Léveillé (PC). Isolectotype: K.
≡ *Microsphaera mougeotii* (Lév.) Cooke, Rust, smut, mildew, & mould: an introduction to the study of microscopic fungi: 219, London 1865.
≡ *Erysiphe mougeotii* (Lév.) de Bary, Abh. Senkenb. Naturf. Ges. **7**: 412, 1870 [also Beitr. Morph. Physiol. Pilze **1**(3): 52, 1870 and Hedwigia **10**: 69, 1870].
≡ *Podosphaera mougeotii* (Lév.) Quél., Champ. Jura Vosges **3**: 106, 1875.
= *Arthrocladiella lycii* Vasilkov [as '(Lasch) Vasilkov'], Bot. Zhurn. **45**: 1368, 1960.
= *Arthrocladiella mougeotii* var. *polysporae* Z.Y. Zhao, Acta Microbiol. Sin. **21**(4): 444, 1981.
[*Erysiphe lycii* Lasch, in Klotzsch, Herb. Viv. Mycol. 950, 1846, nom. inval. (Art. 38.1(a)).]
[*Microsphaera lycii*, Sacc. & Roum. [as '(Lasch) Sacc. & Roum.'], Michelia **2**: 310, 1881, nom. inval. (Art. 38.1(a)).]
[*Arthrocladia lycii* Golovin [as '(Lasch) Golovin'], Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 2, Sporov. Rast. **10**: 310, 1956, nom. inval. (Art. 38.1(a)).]

Comments to the names *Calocladia*, *Microsphaera*, and *M. mougeotii*

Léveillé (1851) introduced the new genus name *Calocladia* Lév. for powdery mildews ascomycota adorned with dichotomously branched appendages and numerous asci. Later, he realized the existence of an older homonymic name, *Calocladia* Grev., 1836 (Algae), and introduced under 'Errata' (Léveillé 1851: 381) the replacement name *Microsphaera* Lév. Influenced by publications of authors of the 19th century, such as Cooke (1865, 1871) and Saccardo (1881), but also Salmon (1900), new species names, introduced by Léveillé (1851) under *Calocladia*, were generally regarded as published under *Microsphaera* by Léveillé (1851). According to Art. 55.1, Léveillé's (1851) new species name published under *Calocladia* are legitimate. However, Léveillé (1851: 381) published the valid genus (replacement) name *Microsphaera*, but he failed to definitely associate the final epithets with the later genus name (Art. 35.2). The introduction of the replacement name *Microsphaera* did not automatically constitute reallocations of the corresponding *Calocladia* names. The combinations concerned have been introduced by other authors:

Microsphaera berberidis (DC.) Cooke, Rust, smut, mildew, & mould. An introduction to the study of microscopic fungi: 219, London 1865.

Microsphaera divaricata (Wallr.) Sacc., Syll. fung. (Abellini) **1**: 11, 1882.

Microsphaera ehrenbergii (Lév.) Sacc., Syll. fung. (Abellini) **1**: 14, 1882.

Microsphaera friesii (Lév.) Sacc., Syll. fung. (Abellini) **1**: 13, 1882.

Microsphaera grossulariae (DC.) Cooke, Rust, smut, mildew, & mould. An introduction to the study of microscopic fungi: 220, London 1865.

Microsphaera hedwigii (Lév.) Cooke, Rust, smut, mildew, & mould. An introduction to the study of microscopic fungi: 219, London 1865.

Microsphaera mougeotii (Lév.) Cooke, Rust, smut, mildew, & mould. An introduction to the study of microscopic fungi: 219, London 1865.

Microsphaera penicillata (Wallr.) Cooke, Rust, smut, mildew, & mould. An introduction to the study of microscopic fungi: 219, London 1865.

On the other hand, the combination *Arthrocladiella mougeotii* (Vassilkov 1963) is valid, although '*Microsphaera mougeotii* Lév.' was cited as basionym. Vassilkov (1963) cited page 158 (description of *Calocladia mougeotii*) and page 381 of Léveillé's (1851) publication. The citation of the genus name as '*Microsphaera*' can be considered an error in the citation, according to Art. 41.6, which does not preclude valid publication. The latter article can also be applied to the combinations *Erysiphe ehrenbergii* (Lév.) U. Braun, M. Bradshaw & S. Takam. [*Microsphaera lonicerae* var. *ehrenbergii* (Lév.) U. Braun, *Erysiphe lonicerae* var. *ehrenbergii* (Lév.) U. Braun & S. Takam.], *E. friesii* (Lév.) U. Braun & S. Takam., and *E. hedwigii* (Lév.) U. Braun & S. Takam.].

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