

María Havrylenko · Susumu Takamatsu

## Notes on Erysiphales (Ascomycetes) from Patagonia, Argentina

Received: August 23, 2004 / Accepted: October 29, 2004

**Abstract** Fifteen Erysiphaceous taxa found on 20 host plant species in Patagonia are documented. A new species *Oidium maculatae* (type host: *Viola maculata*) is described. *Berberis linearifolia*, *Buddleja globosa*, *Prosopis alpataco* and *Viola maculata*, are new host plants for Erysiphales. Three new combinations on fungi and host plant species were founded: *Erysiphe howeana* – *Fuchsia magellanica*; *E. patagoniaca* – *Nothofagus pumilio* and *N. antarctica*. The genus *Sawadaea* and the species *S. bicornis* on *Acer negundo* and *A. pseudoplatanus*, are new records for South America. New host plants recorded for Argentina: *Consolida ajacis*, *Galega officinalis* and *Plantago lanceolata*. New host plants recorded for Patagonia: *Galium aparine*, *Melilotus albus*, *Petunia* × *hybrida*, *Potentilla anserina*, and *Spiraea* × *bumalda*. *Oidium longipes* is a new record for Argentina and *Golovinomyces riedlianus* is a new record for Patagonia.

**Key words** Distribution · Erysiphaceae · New species · *Oidium maculatae* · Powdery mildew

### Introduction

The Erysiphales cause economic loss on a variety of agricultural and ornamental crops. Basic taxonomic and floristic research on this group of biotrophic fungi should provide new elements for future evaluation on biodiversity and for further studies on biology, epidemiology, genetics, resistance, phylogeny, interaction between crops and native pathosystems, and other applied sciences.

M. Havrylenko  
Departamento de Botánica, Centro Regional Universitario Bariloche, Universidad Nacional del Comahue, San Carlos de Bariloche, Río Negro, Argentina

S. Takamatsu (✉)  
Faculty of Bioresources, Mie University, 1515 Kamihama, Tsu 514-8507, Japan  
Tel. +81-59-231-9497; Fax +81-59-231-9540  
e-mail: takamatu@bio.mie-u.ac.jp

Although many studies have been made on this group of fungi, information on South American Erysiphales is scarce in comparison with Northern Hemisphere continents (Weltzien 1978). Two hypotheses were considered as possible explanation of this fact. One of them propounds that the lack of information is due to the absence of exhaustive explorations in South America. Another hypothesis is that South America has had long periods of geographical isolation and as a possible consequence invasion by the Erysiphales and their respective host plants was delayed. Further research could help to elucidate this question (Delhey and Braun 2001). The taxonomic studies of the Erysiphales in South America began with Spegazzini (1887). Further research was done as well by Spegazzini and other authors, as stated in the main reference bibliography for South America, e.g., Flora Fungosa Chilena (Mujica and Vergara 1980) and Oídios (Stadnik and Rivera 2001). The later work primarily provides data for Argentina and Brazil but only a few references for other South American countries such as Peru, Uruguay, and Venezuela.

There are three areas more intensively explored in Argentina, viz., Northeast, Central East (pampas), and Southwest (Andean Patagonia) (Delhey and Braun 2001). Of these areas, Andean Patagonia is characterized by a high degree of endemism and high generic diversity on vascular plants (Zuloaga et al. 1999). This contribution is a part of the taxonomic and floristic studies of the Erysiphales from Andean Patagonia started in 1993 (Havrylenko 1993).

### Materials and methods

The observations on morphological characters of taxonomic value for anamorphs follow Shin and Zheng (1998) and Shin (2000). Size and shape of dried material were restored in heated lactic acid as described in Shin and La (1993). To delimit *Podosphaera* species, the thin-walled apical portion of the ascus (oculus) was measured according to Braun et al. (2001). The taxonomy and nomenclature of Erysiphales follows Braun (1999), Braun and Takamatsu

(2000), Braun et al. (2001, 2002), and Cook et al. (1997). The taxonomy and geographical distribution of host plants follows Bacigalupo (1999), Burkart (1984), Correa (1984), Grondona (1984), Hoch (1988), Loutreig (1984), Orsi (1984), Parodi (1980), Rahn (1999), Rosow (1984, 1988, 1999), and Zuloaga et al. (1999). All specimens recorded were collected in the phytogeographical area of Argentina named "Provincia Subantartica," except one from "Provincia del Monte" (Cabrera 1971). The specimens studied are located in BCRU and a part of them also in HAL.

## Descriptions and identifications

### 1. *Erysiphe aquilegiae* DC., Fl. Fr. VI, p. 105 (1815) var. *aquilegiae*

Synonym: *Ischnochaeta aquilegiae* (DC.) Sawada, Spec. Publ. Coll. Agric. Nat. Taiwan Univ. 8:17 (1959).

Anamorph: *Oidium* sp. (subgen. *Pseudoidium* R.T.A. Cook et al.).

Hosts: *Consolida ajacis* (L.) Schur (Ranunculaceae), introduced and cultivated plant, *Ranunculus peduncularis* Sm. (Ranunculaceae), common plant from Mendoza to Tierra del Fuego Province (Loutreig 1984).

Material studied: Argentina. Provincia de Río Negro: Dep. Bariloche, Mount Tronador, Pampa Linda, leg. M. Havrylenko, March 7, 2004, on *R. peduncularis*, BCRU 4499, anamorph; San Carlos de Bariloche, in a garden, leg. P. Fierro, April 28, 2002, on *Consolida ajacis* BCRU 4500, teleomorph; Provincia del Chubut: Dep. Futaleufú, Esquel, in Bryn Amlwg garden, leg. D. Ellis, on *C. ajacis*, April 4, 1997, BCRU 4501, teleomorph.

Distribution in Argentina: On Ranunculaceae. In Río Negro Province: on *Aquilegia vulgaris* L. and *Clematis montevidensis* Spreng. (Braun 1987a); on *Aquilegia* sp. (Havrylenko 1995a) and on *Ranunculus chilensis* DC., an endemic plant (Havrylenko 1998). In Buenos Aires Province: cited as *E. polygoni* DC. on *Delphinium ajacis* L. (= *Consolida ajacis*) (Marchionatto 1939), on *Ranunculus repens* L. (Braun et al. 2000), on *D. ajacis*, *D. cheilanthum* Fisch., *D. elatum* L., and *D. grandiflorum* L. (Wolcan et al. 2001), and on *Aquilegia vulgaris* L. and *Aquilegia* sp. (Delhey et al. 2003).

Comments: The teleomorphic stage has been found on introduced cultivated host plants but not on native species. *Ranunculus peduncularis* was cited as host plant to *Oidium fuegianum* Havryl. & U. Braun (Havrylenko and Braun 1998).

### 2. *Erysiphe howeana* U. Braun, Mycotaxon 14(1):373 (1982).

Synonym: *E. communis* (Wallr.) Fr. f. *oenotherae* Jaczewski Karm. Oprod. Grib. II:250 (1927).

Anamorph: *Oidium* sp. (subgen. *Pseudoidium* R.T.A. Cook et al.).

Host: *Fuchsia magellanica* Lam. (Onagraceae). Native shrub from Southern Andean range from Argentina and Chile (Hoch 1988).

Material studied: Argentina. Provincia de Río Negro: Dep. Bariloche, San Carlos de Bariloche, in a garden, leg. M. Gobbi and M. Alonso, May 12, 2004, BCRU 4503, anamorph.

Observations: A remarkable feature observed in this collection is the occurrence of multilobed-stalked appressoria.

Distribution in Argentina: *Erysiphe howeana* was recorded in Patagonia (Neuquén and Río Negro Provinces) on *Oenothera odorata* Jacq. and *O. aff. villaricae* (Onagraceae), both native host plants (Havrylenko 1998). Braun et al. (2000) and Delhey et al. (2003) recorded this species on *O. mollissima* L., in Buenos Aires Province.

Comments to the host plant: According to Amano (1986), *Sphaerotheca* sp. on *F. coccinea* Ait. was reported in Argentina. Probably the host plant was the same species but cited under the synonyms of *F. magellanica*.

### 3. *Erysiphe patagoniaca* Havryl. & S. Takam. Mycoscience 44(2):149 (2003).

Anamorph: *Oidium* sp. (subgen. *Pseudoidium* R.T.A. Cook et al.).

Hosts: *Nothofagus antarctica* (G. Forst.) Oerst. and *N. pumilio* (Poepp. et Endl.) Krasser, (Nothofagaceae), deciduous trees that grow from 37° S and 39° S, respectively, to Tierra del Fuego (Correa 1984).

Material studied: Argentina. Provincia de Río Negro: Dep. Bariloche, Mount Tronador, Trail to Garganta del Diablo, leg. S. Takamatsu and M. Havrylenko, March 7, 2004, on *N. antarctica*, BCRU 4505, BCRU 4507; on *N. pumilio* BCRU 4506, BCRU 4508, teleomorphs.

Distribution in Argentina: *Erysiphe patagoniaca*, an endemic species, was cited on *Nothofagus* × *antarctica* (Havrylenko and Takamatsu 2003). Now it is recorded on *N. antarctica* and *N. pumilio*.

### 4. *Erysiphe pisi* DC., Fl. Fr. II, p. 274 (1805) var. *pisi*

Synonyms: *Ischnochaeta pisi* (DC.) Sawada, Spec. Bull. Coll. Agr. Nat. Taiwan Univ. 8:18 (1959); *Erysiphe macropus* Mart., Fl. Crypt. Erlang., p. 392, Nürnberg 1817. For full synonymy see Braun (1995).

Anamorph: *Oidium* sp. (subgen. *Pseudoidium* R.T.A. Cook et al.).

Host: *Melilotus albus* Desr. (Fabaceae): An adventitious herbaceous plant from European and West Asian origin. In Patagonia it grows from Río Negro to Santa Cruz provinces (Rosow 1984).

Material studied: Argentina. Provincia del Chubut: Dep. Cushamen, Ruta 258, near El Hoyo, leg. M. Havrylenko, April 4, 2004, BCRU 4355, BCRU 4356, anamorph.

Distribution in Argentina: Previously this species was cited for Patagonia (Argentina) on *Pisum sativum* L. (Roivainen 1977) and *Lathyrus magellanicus* Lam. (Havrylenko 1995a).

### 5. *Erysiphe thaxteri* (Havryl. & U. Braun) U. Braun & S. Takam., Schlechtendalia 4:14 (2000).

Synonym: *Microsphaera thaxteri* Havryl. & U. Braun, Nova Hedwigia 66(3–4):515 (1998).

Anamorph: *Oidium* sp. (subgen. *Pseudoidium* R.T.A. Cook et al.).

Host: *Berberis linearifolia* Phil. (Berberidaceae). Evergreen shrub native to Andean area of Argentina and Chile (Orsi 1984).

Material studied: Argentina. Provincia de Río Negro: Dep. Bariloche, Mount Tronador, trail to Saltillo de Nalcas, leg. S. Takamatsu and M. Havrylenko, March 7, 2004, on *Berberis linearifolia*, BCRU 4509, BCRU 4510, BCRU 4511, anamorph.

Distribution in Argentina: The anamorph and teleomorph stages were described on *Berberis darwinii* Hook. and *B. buxifolia* Lam. (Berberidaceae) (Havrylenko and Braun 1998). This is the first record of Erysiphales on *B. linearifolia*.

6. *Erysiphe trifolii* Grev., Fl. Edin.:459 (1824) var. *trifolii*  
Synonym: *Microsphaera trifolii* (Grev.) U. Braun, Nova Hedwigia 34:685 (1981).

Anamorph: *Oidium* sp. (subgen. *Pseudoidium* R.T.A. Cook et al.).

Host: *Galega officinalis* L. (Fabaceae). Herbaceous plant introduced from Europe and Asia, adventitious in Patagonia. It grows in Río Negro and Neuquén Provinces (Burkart 1984).

Material studied: Argentina. Provincia de Río Negro: Dep. Pilcaniyeu, Route 23, near Pichi Leufu, leg. M. Havrylenko, March 12, 2003, BCRU 4512, BCRU 4513, anamorph.

Distribution in Argentina: Braun et al. (2000) recorded *E. trifolii* var. *trifolii* in Prov. Bs. Aires on *Melilotus albus* and *M. officinalis* (L.) Lam. For Patagonia, *E. trifolii* var. *trifolii* was recorded in Río Negro and Chubut Provinces on *Lupinus polyphyllus* Lindl., *Trifolium pratense* L., and *T. repens* L. (Havrylenko 2001). *Galega officinalis* is recorded for the first time in Argentina as host plant for Erysiphales.

7. *Golovinomyces riedlianus* (Speer) V. P. Heluta, Ukr. Bot. Zhurn, 45(5):63 (1988).

Synonyms: *Erysiphe riedliana* Speer, Anz. Öster. Akad. Wiss., math-nat. Kl., 106(1–4):244 (1970); *Erysiphe galii* Blumer var. *riedliana* (Speer) U. Braun, Mycotaxon 18(1):121 (1983).

Anamorph: *Oidium* sp. (subgen. *Reticuloidium* R.T.A. Cook et al.).

Host: *Galium aparine* L. (Rubiaceae). Herbaceous annual plant, adventitious and cosmopolitan naturalized in America, growing from Alaska to Tierra del Fuego (Bacigalupo 1999).

Material studied: Argentina, Provincia de Río Negro: Dep. Bariloche, Parque Nacional Nahuel Huapi, Cerro Challhuaco, leg. S. Takamatsu and M. Havrylenko, April 18, 2001, BCRU 4341, teleomorph.

Distribution in Argentina: The presence of Erysiphales on *Galium* spp. in Argentina was reported previously by Spegazzini (1898) and Roivainen (1977). The former author cited *Oidium erysiphoides* Fr. on *Galium* sp. as a common species in Argentina and Uruguay. Roivainen reported

*Erysiphe* cf. *galii* on *Galium aparine* L. and *G. fuegianum* Hook. f. in Tierra del Fuego (Southern Argentina).

8. *Golovinomyces sordidus* (L. Junell) V.P. Heluta, Ukr. Bot. Zhurn. 45(5), p. 63 (1988).

Synonyms: *Erysiphe sordida* L. Junell. Trans. Brit. Mycol. Soc. 48, p. 544 (1965); *E. artemisiae* var. *sordida* (L. Junell) Ialongo, Mycotaxon 44(1), p. 256 (1992); *E. cichoracearum* DC. f. *plantaginis* DC. (Link) U. Braun, Nova Hedwigia 34, p. 695 (1981); *E. lamprocarpa* var. *plantaginis* Link, in L., Sp. Pl. 6(1), p. 109 (1824); *E. plantaginis* (Link) Fuss, Arch. Ver. Siebenb. Landeskn., N.F. 14(2), p. 460 (1878), nom. illegit. non Castagne (1845); *E. plantaginis* (Link) Sawada, Bull. Dept. Agr. Govt. Res. Inst. Formosa 24, p. 47 (1927), non Castagne (1845); *E. cichoracearum* f. *plantaginis* Potebn., Grib. Paras. Vyss. Rast. Charkov, p. 233 (1916).

Anamorph: *Oidium* sp. (subgen. *Reticuloidium* R.T.A. Cook et al.).

Host plant: *Plantago lanceolata* L. (Plantaginaceae). Introduced species from Europe and Asia. Widely distributed weed in the Andean Patagonian area (Rahn 1999).

Material studied: Argentina. Provincia de Río Negro, Dep. Bariloche. San Carlos de Bariloche, leg. S. Takamatsu March 5, 2004, BCRU 4529, leg. M. Havrylenko May 25, 2004, BCRU 4514, anamorph.

Distribution in Argentina: On Plantaginaceae, *G. sordidus* was cited on *Plantago berroi* and *P. tomentosa* Lam., in Provincia de Buenos Aires. (Delhey et al. 2003) and as *Erysiphe sordida* in a list of fungi in the north eastern provinces of Argentina (Mazzanti et al. 1989). This is the first report of this fungus in Patagonia.

Observations: In our collections, a variety of appressorial shapes such as nipple, lobulated, or hook were observed.

9. *Oidium longipes* Noordel. & Loer., Persoonia 14:35 (1989).

Host plant: *Petunia × hybrida* Vilm. (Solanaceae). Cultivated ornamental plant originated in South America (Parodi 1980).

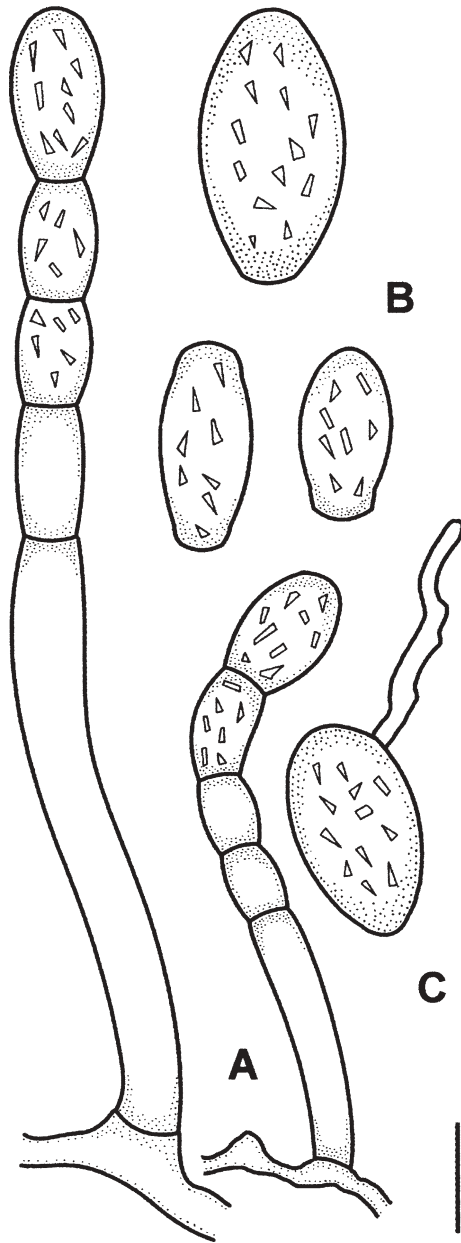
Material studied: Argentina. Provincia de Río Negro, Dep. Bariloche, in gardens: Pampa Linda, leg. M. Havrylenko, March 7, 2004, BCRU 4516. Playa Bonita, leg. M. Havrylenko April 10, 2004, BCRU 4515, anamorph.

Distribution in Argentina: There are no records of *O. longipes* in Argentina.

Comments: Wolcan and Ronco (2002) reported the presence of *Podosphaera fusca* on *Petunia × hybrida* in Buenos Aires Province.

10. *Oidium maculatae* Havrylenko, sp. nov.

Maculae amphigenae. Hyphae hyalinae, 6–8 μm latae. Appressoria mammiformia. Conidioliiformia vel ellipsoidea, catenulata, 32–48(–69) × 12.5–23(–27) μm. Conidiophora erecta, simplicibus, 1–3-cellularia, granulis fibrosinis includentia, ex cellula basilari cylindrica, 48.6–90(–125–160) × 9–12 μm et 0–2 cellulis sequentibus brevioribus composita. Habitat in foliis vivis *Violae maculatae* Cav.



**Fig. 1.** *Oidium maculatae* **A** Conidiophores. **B** Primary (upper one) and secondary (lower two) conidia. **C** Germinated conidium. Bar 20  $\mu\text{m}$

Subgenus *Fibroidium* R.T.A. Cook et al.

Mycelium on leaves, white, amphigenous, mostly epiphyllous, forming irregular patches. Vegetative hyphae 6–8  $\mu\text{m}$  wide. Appressoria nipple-shaped.

Conidiophores erect, single on a hyphal cell, arising from the upper part of mother cells, position variable, central to eccentric. Foot cell cylindrical, 48.6–90(–125–160)  $\times$  9–12  $\mu\text{m}$ , followed by 0–2 shorter cells. Basal septum from 0 to 15  $\mu\text{m}$  away from the branching area of the mycelium. Conidia doliform to ellipsoid, formed in chains, 32–48(–69)  $\times$  12.5–23(–27)  $\mu\text{m}$ . Conspicuous fibrosin bodies present. Immature conidiophores with crenate edges. Germination: germ tube subapical, simple. Primary conidia

apically conical and basally subtruncate, rather smaller than secondary conidia.

Host: *Viola maculata* Cav. (Violaceae). A native perennial herbaceous plant that grows along to the Andean range, from Neuquén to Tierra del Fuego Provinces in Argentina (Rosow 1988).

Holotypus: BCRU 4343. Argentina. Provincia de Río Negro: Departamento Bariloche, Parque Nacional Nahuel Huapi, trail to Cerro Llao Llao, leg. M.G. Alvarez and M. Havrylenko, April 17, 2002, BCRU 4343; isotypus: HAL.

Other specimens examined: Collected at the same place, leg. M. Havrylenko, May 8, 2002, BCRU 4345.

Comments: On *Viola*, two powdery mildew species are known: *Erysiphe orontii* Castagne and *Podosphaera violae* (U. Braun) U. Braun & S. Takam. (= *Sphaerotheca violae* U. Braun) (Braun 1987a, 1995; Braun and Takamatsu 2000). In Argentina and Uruguay, Spegazzini (1898) cited *Oidium erysiphoides* Fr. on *Viola odorata* L. Our specimens belong to *Podosphaera* sect. *Sphaerotheca* but differ from *P. violae* and other species of the genus by having wider hyphae and much larger conidia. This is the first report of Erysiphales on *Viola maculata*.

11. *Pleochaeta prosopidis* (Speg.) U. Braun, Mycotaxon 15:148 (1982).

Synonym: *Uncinula prosopidis* Speg. Anal. Mus. Nac. Buenos Aires, 19:324 (1909).

Anamorph: *Streptopodium* sp. (R.Y. Zheng & G.Q. Chen).

Hosts: On Fabaceae: *Prosopis strombulifera* (Lam.) Benth. Xerofitic, native bush. It grows in Western Argentina from Salta to Río Negro Provinces. *Prosopis alpataco* Phil., endemic species from western part of Argentina and characteristic shrub from the phytogeographical area “Provincia del Monte” (Cabrera 1971; Burkart 1984).

Material studied: Argentina. Provincia de Río Negro: Departamento General Roca, Cinco Saltos, in the campus of Facultad de Ciencias Agrarias, leg. A. Dobra, May 7, 2002, BCRU 4342. Provincia del Neuquén: Dep. Collon Cura. Santo Tomás, provincial route 47, leg. M. Havrylenko May 1, 2003. On *P. strombulifera* BCRU 4517, BCRU 4518, BCRU 4520; on *P. alpataco*, BCRU 4519, BCRU 4521, teleomorph.

Distribution in Argentina: on *Prosopis* spp. (Fabaceae). Buenos Aires Province (Spegazzini 1909), Río Negro Province (Braun 1987a).

Comments: *Pleochaeta prosopidis* (= *Uncinula prosopidis* Speg.) was first studied by Spegazzini (1909) on *Prosopis campestris* Griseb. from Botanical Garden of Buenos Aires. The type material (LPS 28250) was reinvestigated by Braun and the species was transferred to genus *Pleochaeta* (Braun 1982). Further report on *Prosopis strombulifera* was made in Río Negro Province (Braun 1987a). The finding of *Pl. prosopidis* on *P. alpataco* represents the first report of the presence of Eysiphales on this host plant species and extends the geographical range to Neuquen Province (Western Argentina).



12. *Podosphaera aphanis* (Wallr.) U. Braun & S. Takam., Schlechtendalia 4:26 (2000) var. *aphanis*.

Synonyms: *Alphitomorpha aphanis* Wallr., Ann. Wetter. Ges., N.S. 4:242 (1819); *Sphaerotheca aphanis* (Wallr.) U. Braun, Mycotaxon 15:136 (1982).

Anamorph: *Oidium* sp. (subgen. *Fibroidium* R.T.A. Cook et al.).

Host: *Potentilla anserina* L. (Rosaceae), an adventitious plant from the Northern Hemisphere, growing from Neuquén to Santa Cruz Provinces of Argentina (Grondona 1984).

Material studied: Argentina. Provincia del Neuquén: Departamento Lácar, route 63, Casa de Piedra, near Río Collón Cura, leg. S. Takamatsu, April 24, 2001, BCRU 4354. Departamento Huiliches, east shore of Lago Currhue Chico, leg. M. Havrylenko, April 26, 2001, BCRU 4353, anamorph.

Distribution: *Podosphaera aphanis* has been recorded in Argentina on *Fragaria chiloensis* (L.) Duchesne (Havrylenko 1995b), *Acaena ovalifolia* Ruiz & Pav., *Acaena* sp. (Havrylenko 1998), *A. antarctica*, *A. magellanica*, and *A. pinnatifida* (Havrylenko and Lorenzo 1999).

Comments: *Potentilla anserina* is recorded for the first time as host plant of Erysiphales in Argentina. Additionally to *Podosphaera aphanis*, *Erysiphe* sp. was found on the same host plant.

13. *Podosphaera leucotricha* (Ellis & Everh.) E.S. Salmon, Mem. Torrey Bot. Club 9:40 (1900).

Synonyms: *Sphaerotheca leucotricha* Ellis & Everh., J. Mycol. 4:58 (1888); *S. castagnei* Lev. f. *mali* Sorauer, Hedwigia 31:8 (1889); *S. mali* Burrill in Ellis & Everh., North Amer. Pyrenomycetes, p. 6 (1892).

Anamorph: *Oidium* sp. (subgen. *Fibroidium* R.T.A. Cook et al.).

Hosts: *Malus sylvestris* Mill. (Rosaceae). Cultivated tree probably originated in Europe or in West Asia. *Spiraea × bumalda* Burv. (Rosaceae). Exotic ornamental bush (Parodi 1980).

Material studied: On *Malus sylvestris*: Argentina, Provincia de Río Negro, Dep. Bariloche, route to airport Bariloche, leg. S. Havrylenko, March 1995, BCRU 4347, BCRU 4348. On *Spiraea × bumalda* Burv.: national route 237, km 8.6, in a garden, leg. S. Havrylenko, April 2004, BCRU 4346, anamorph.

Distribution in South America and Argentina: *P. leucotricha* was reported in Argentina, Brazil, Chile, Uruguay, Colombia, and Perú (Rossini 2001). In Argentina, the fungus was cited on *Malus* in several provinces from North to South: Jujuy (Alcoba and Liacono 1986), Mendoza and Neuquén (Rossini 2001), Río Negro (Bergna 1959; Havrylenko 1998; Rossini 2001), and Santa Cruz and Tierra del Fuego (Roivainen 1977). Bergna (1959) provided the first description of teleomorphic stage of the fungus on *Malus* in the upper valley of Río Negro, Argentina. The fungus was also reported in Córdoba Province by Hauman and Parodi (1921).

Comments: The finding on *Spiraea × bumalda* extends the knowledge on host range of this species in Argentina.

14. *Podosphaera xanthii* (Castagne) U. Braun & Shishkoff, Schlechtendalia 4:31 (2000).

Synonyms: *Erysiphe xanthii* Castagne, Cat. Pl. Mars.:188 (1845); *Sphaerotheca xanthii* (Castagne) L. Junell, Sv. Bot. Tidskr. 60(3):382 (1966); *Sphaerotheca verbenae* Sävil. & Negru, Bull. Stiint. Acad. R.P.R. V, 3:415 (1953).

Anamorph: *Oidium* sp. (subgen. *Fibroidium* R.T.A. Cook et al.).

Host: *Buddleja globosa* Hope (Buddlejaceae), native shrub from southern Argentina and Chile (Rosow 1999; Zuloaga et al. 1999).

Material studied: Argentina. Provincia de Río Negro, Dep. Bariloche, Parque Nacional Nahuel Huapi trail to Cerro Llao Llao, leg. B. Latorre, April 17, 2004, BCRU 4349, HAL, leg. J. Saura, May 8, 2002, 4350, anamorph.

Distribution: Knowledge about the presence of Erysiphales on Buddlejaceae is relatively scarce. The first report was made by Doidge in 1950 in South Africa (Gorter and Eicker 1985). The anamorph was described as *Oidium buddlejae* G.J.M. Gorter & Eicker on *Buddleja salviifolia* (L.) Lam., an endemic plant to southern Africa that according to the description belongs to *Oidium* subgen. *Pseudoidium* Jacz. The second report was that of Cabrera and Mazzanti (1991) in Corrientes Province, Argentina, recording the anamorph of *Podosphaera fusca* (Fr.) U. Braun & Shishkoff (= *Sphaerotheca fusca*) on *B. brasiliensis* Jacq. & Sprengel.

This finding is a new record of Erysiphales on Buddlejaceae and *B. globosa* is a new host.

Comments: Morphological and biometrical features of *P. xanthii* on *Buddleja globosa* fit the specific characters given by Braun and Takamatsu (2000) and Braun et al. (2001).

15. *Sawadaea bicornis* (Wallr.: Fr.) Miyabe in Homma, J. Fac. Agric. Hokkaido Imp. Univ. 38:371 (1937).

Synonyms: *Alphitomorpha bicornis* Wallr., Verh. Ges. naturf. Freunde Berlin 1(1):38 (1819); *Erysiphe bicornis* (Wallr.: Fr.) Fr., Syst. Mycol. 3:244 (1829); *Uncinula bicornis* (Wallr.: Fr.) Lév., Ann. Sci. Nat., Bot., 3 sér., 15:153 (1851); *Erysiphe aceris* DC., Fl. Fr. 6: 104 (1815); *Uncinula aceris* (DC) Sacc., Syll. Fung. 1:8 (1882); *Sawadaea aceris* (DC.) Miyabe (as "Sawadaia"), in Sawada, Agric. Exp. Sta. Formosa, Spec. Bull. 9:49 (1914); *Sawadaea negundinis* Homma, J. Fac. Agric. Hokkaido Imp. Univ. 38:375 (1937).

Anamorph: *Oidium* sp. (subgen. *Octagoidium* R.T.A. Cook et al.).

Hosts: *Acer negundo* L. and *Acer pseudoplatanus* L. (Aceraceae), cultivated trees of North American and European-Asiatic origin, respectively (Parodi 1980).

Material studied: Argentina. Provincia del Chubut: Departamento Futaleufú, Esquel, in Bryn Amlwg garden, leg. D. Ellis, April 8, 2002, on *Acer negundo*, BCRU 4351, BCRU 4352, BCRU 4522, anamorphs. Provincia de Río Negro: Departamento Bariloche, route 237, km. 8.6, leg. M. Havrylenko April 17, 2003, on *A. pseudoplatanus*, BCRU 4524, BCRU 4525. Llao Llao, leg. M. Havrylenko, May 5, 2003, BCRU 4523, anamorphs.

Comments: *Sawadaea bicornis* has been found in Europe, Asia, New Zealand (Braun 1987b), and Australia (Cunnington et al. 2003). The present Argentinean record extends the distribution area of the genus and species to South America.

**Acknowledgments** For help given through the preparation of this work, the authors thank U. Braun, H. Shin, L. Lorenzo, J. Saura, A. Dobra, B. Latorre, M.G. Alvarez, D. Ellis, C. Brion, J. Puntieri, and C. Ezcurra. Financial support for this research was provided by Universidad Nacional del Comahue to M.H. and by the Japan Society for the Promotion of Science (JSPS) (Nos. 13660047 and 15405021) to S.T.

## References

- Alcoba NJ, Liacono R (1986) Listado de enfermedades determinadas en el laboratorio de la cátedra de Fitopatología. Ciencias Agrarias, serie Didáctica N° 6. Publicación de la Facultad de Ciencias Agrarias de la Universidad Nacional de Jujuy, Jujuy, Argentina
- Amano (Hirata) K (1986) Host range and geographical distribution of the powdery mildew fungi. Japan Scientific Societies, Tokyo
- Bacigalupo NM (1999) Rubiaceae. In: Correa MN (ed) Flora Patagónica, tomo VIII. Colección Científica del INTA, Buenos Aires, pp 423–443
- Bergna DA (1959) Forma peritética del “oídio del manzano” en el valle superior de Río Negro. R Inv Agric 13(3):281–290
- Braun U (1982) Taxonomic notes on some powdery mildews. Mycotaxon 15:138–154
- Braun U (1987a) Beiträge zur Kenntnis der Verbreitung und des Wirtsspektrums phytoparasitischer Pilze. Nova Hedwigia 45:383–388
- Braun U (1987b) A monograph of the Erysiphales (powdery mildews). Beih Nova Hedwigia 89:1–700
- Braun U (1995) The powdery mildews (Erysiphales) of Europe. Fischer, Jena
- Braun U (1999) Some critical notes on the classification and the generic concept of the Erysiphales. Schlechtendalia 3:48–54
- Braun U, Takamatsu S (2000) Phylogeny of *Erysiphe*, *Microsphaera*, *Uncinula* (Erysiphaceae) and *Cystotheca*, *Podosphaera*, *Sphaerotheca* (Cystothecaceae) inferred from rDNA ITS sequences, some taxonomic consequences. Schlechtendalia 4:1–33
- Braun U, Kiehr M, Delhey R (2000) Some new records of powdery mildew fungi from Argentina. Sydowia 53(1):34–43
- Braun U, Shishkoff N, Takamatsu S (2001) Phylogeny of *Podosphaera* sect. *Sphaerotheca* subsect. *Magnicellulatae* (*Sphaerotheca fuliginea* auct. s. lat) inferred from rDNA ITS sequences: a taxonomic interpretation. Schlechtendalia 7:45–52
- Braun U, Cook RTA, Inman AJ, Shin HD (2002) The taxonomy of the powdery mildew fungi. In: Bélanger RR, Bushnell WR, Dik AJ, Carver TLW (eds) The powdery mildews. A comprehensive treatise. American Phytopathological Society, St. Paul, MN, pp 13–55
- Burkart A (1984) Leguminosae. In: Correa MN (ed) Flora Patagónica, tomo VIII. Colección Científica del INTA, Buenos Aires, pp 89–299
- Cabrera AL (1971) Fitogeografía de la República Argentina. Bol Soc Argent Bot 14:1–42
- Cabrera de Álvarez MG, Mazzanti de Castañón MA (1991) El oídio de la caléndula (*Calendula officinalis*) en Argentina. Fitopatología 26(2):74–80
- Cook RTA, Inman AJ, Billings C (1997) Identification and classification of powdery mildews anamorphs using light and scanning electron microscopy and host range data. Mycol Res 101(8):975–1002
- Correa MN (1984) Fagaceae. In: Correa MN (ed) Flora Patagónica, tomo VIII. Colección Científica del INTA, Buenos Aires, pp 4–11
- Cunnington JH, Takamatsu S, Lawrie AC, Oascoe IG (2003) Molecular identification of anamorphic powdery mildews (Erysiphales). Aust Plant Pathol 32:421–428
- Delhey R, Braun U (2001) Sobre el origen de los Oídios en Argentina. In: Stadnik MJ, Rivera MC (eds) Oídios. Embrapa Meio Ambiente, Jaguariúna, Sao Paulo, Brazil, pp 31–58
- Delhey R, Braun U, Kiher M (2003) Some new records of powdery mildew fungi from Argentina (2). Schlechtendalia 10:79–90
- Gorter GMA, Eicker A (1985) Two previously undescribed *Oidium* species from South Africa. Mycotaxon 22:33–42
- Gronzona E (1984) Rosaceae. In: Correa MN (ed) Flora Patagónica, tomo VIII. Colección Científica del INTA, Buenos Aires, pp 48–88.
- Hauman L, Parodi LR (1921) Los parásitos vegetales de las plantas cultivadas en la República Argentina. Rev Fac Agron Vet 3:227–274
- Havrylenko M (1993) Descriptions of new taxa of Erysiphaceae from Argentina. Mycotaxon 49:257–267
- Havrylenko M (1995a) Erysiphaceous species from Nahuel Huapi National Park, Argentina. Part 1. N Z J Bot 33:389–400
- Havrylenko M (1995b) New records of Erysiphaceae from North-Patagonia (Argentina). Nova Hedwigia 61(34):447–455
- Havrylenko M (1998) Erysiphales de la Región Andino-Patagónica. PhD thesis, Universidad Nacional del Comahue, Centro Regional Universitario Bariloche, San Carlos de Bariloche, Río Negro, Argentina
- Havrylenko M (2001) Erysiphales from the Patagonian Andes, Argentina. Nova Hedwigia 72(3–4):409–418
- Havrylenko M, Braun U (1998) Four new species and a new record of Erysiphaceae from Argentina. Nova Hedwigia 66(3–4):513–522
- Havrylenko M, Lorenzo LE (1999) Novedades sobre Erysiphales de Tierra del Fuego (Argentina). Hickenia 3(10):31–36
- Havrylenko M, Takamatsu S (2003) *Erysiphe patagoniaca*: a new species of *Erysiphe* sect. *Uncinula* from Patagonia, Argentina. Mycoscience 44:149–151
- Hoch PC (1988) Onagraceae. In: Correa MN (ed) Flora Patagónica, tomo VIII. Colección Científica del INTA, Buenos Aires, pp 267–298
- Loutreig A (1984) Ranunculaceae. In: Correa MN (ed) Flora Patagónica, tomo VIII. Colección Científica del INTA, Buenos Aires, pp 284–322
- Marchionatto JB (1939) Notas micológicas. Physis 15(47):133–144
- Mazzanti de Castañón MA, Álvarez RE, Cabrera de Álvarez MG (1989) Los oídios (Erysiphaceae) del nordeste de Argentina. IV Congreso y XIV Jornadas Argentinas de Micología, Huerta Grande, p 45
- Mujica F, Vergara C (1980) Flora Fungosa Chilena, 2nd edn. Rev. por Oehrens, E.B. Universidad de Chile, Ed. Universitaria, Santiago de Chile, p 308 (Publicación Científica Ciencias Agrícolas 5)
- Orsi MC (1984) Berberidaceae. In: Correa MN (ed) Flora Patagónica, tomo VIII. Colección Científica del INTA, Buenos Aires, pp 325–348
- Parodi LR (Dir.) (1980) Enciclopedia Argentina de Agricultura y Jardinería, tomo 1, vol 2, 3rd edn. ACME, Buenos Aires
- Rahn K (1999) Plantaginaceae. In: Correa MN (ed) Flora Patagónica, tomo VIII. Colección Científica del INTA, Buenos Aires, pp 404–422
- Roivainen H (1977) Resultados micológicos de la expedición a Argentina y Chile en 1969–1970. Karstenia 17:1–18
- Rossini M (2001) Oídios de frutales de clima templado. In: Stadnik MJ, Rivera MC (eds) Oídios. Embrapa Meio Ambiente, Jaguariúna, Sao Paulo, Brazil, pp 335–360
- Rosow R (1984) *Melilotus* Mill. Leguminosae. In: Correa MN (ed) Flora Patagónica, tomo VIII. Colección Científica del INTA, Buenos Aires, pp 252–256
- Rosow R (1988) Violaceae. In: Correa MN (ed) Flora Patagónica, tomo VIII. Colección Científica del INTA, Buenos Aires, pp 170–189
- Rosow R (1999) Buddlejaceae. In: Correa MN (ed) Flora Patagónica, tomo VIII. Colección Científica del INTA, Buenos Aires, pp 42–45
- Shin HD (2000) Erysiphaceae of Korea. National Institute of Agricultural Science & Technology, Suwon, Korea
- Shin HD, La YJ (1993) Morphology of edge lines of chained immature conidia on conidiophores in powdery mildew fungi and their taxonomic significance. Mycotaxon 45:445–451
- Shin HD, Zheng RY (1998) Anamorphic morphology of *Uncinula* and allied genera (I). Mycotaxon 46:243–266

- Spegazzini C (1887) Fungi Patagonici. Bol Acad Nac Cienc Córdoba 11(1):5-67
- Spegazzini C (1898) Fungi argentini novi v. critici. An Mus Nac Buenos Aires 6:81-367
- Spegazzini C (1909) Mycetes Argentinenses, series IV. An Mus Nac Buenos Aires 12:257-458
- Stadnik MJ, Rivera MC (eds) (2001) Oídios. Embrapa Meio Ambiente, Jaguariúna, Sao Paulo, Brazil
- Weltzien HC (1978) Geographical distribution of powdery mildews. In: Spencer DM (ed) The powdery mildews. Academic, London, pp 39-49
- Wolcan S, Ronco L (2002) Oídios en gerbera, petunia, *Impatiens* tipo "Nueva Guinea" y brincos. 1<sup>er</sup> Congreso Argentino de Floricultura y Plantas Ornamentales y 4<sup>as</sup> Jornadas Nacionales de Floricultura, Buenos Aires, p 13
- Wolcan S, Álvarez RE, Cabrera MG (2001) Oídios de ornamentales. In: Stadnik MJ, Rivera MC (eds) Oídios. Jaguariúna, SP, Embrapa Meio Ambiente, Sao Paulo, Brazil, pp 419-446
- Zuloaga FO, Morrone O, Rodríguez D (1999) Análisis de la biodiversidad en plantas vasculares de la Argentina. Artículo especial. Kurtziana 27(1):17-167