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Miscellaneous reports of lichenicolous fungi from Argentina including the new species *Didymellopsis nephromatis*

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ABSTRACT. – Two lichenicolous fungi are newly reported from Argentina: *Myxophora leptogiophila* (on *Leptogium* sp.) and *Nectriopsis lecanodes* (on *Peltigera* sp.). *Didymellopsis nephromatis*, found growing on *Nephroma cellulosum*, is described as new to science. A list of 60 lichenicolous fungi formerly known from the country is provided.

KEYWORDS. – lichen parasites, cyanolichens, South America.

INTRODUCTION

To date 60 species of lichenicolous fungi have been reported from Argentina (see the appendix herein), which is many fewer than the number of species known from neighboring Chile (Etayo & Sancho 2008). To promote studies of this insufficiently known group of fungi we summarize here their former records in Argentina and present new data obtained from the revision of a small collection of cyanolichens made by the third author in *Nothofagus* forests in Río Negro Province of Argentina, which revealed one undescribed and six noteworthy species documented in further detail below.

MATERIALS AND METHODS

Material was examined with Zeiss microscopes Stemi 2000−CS and Axio Imager A1 equipped with Nomarski differential interference contrast optics in water, 10% KOH (K) or Lugol's iodine, directly (I) or after a KOH pre-treatment (K/I). The length, breadth, and length/breadth ratio (l/b) of the asci and ascospores are given as: (min−){X −SD}−{X +SD}(−max), where min and max are the extreme values, X the arithmetic mean, and SD the corresponding standard deviation. The examined specimens are housed in LE and UPS.

THE SPECIES

***Abrothallus secedens* Wedin & R. Sant.**

NOTE. – This species is known from scattered finds in Argentina, Chile, Colombia, the U.S.A. and Kenya (Etayo 2002, Etayo & Sancho 2008, Spribille et al. 2010, Wedin 1994).

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Specimen examined. – **ARGENTINA. RÍO NEGRO PROV.:** San Carlos de Bariloche, *Nothofagus dombeyi* forest, 41°04′S, 71°33'W, elev. approx. 800 m, on epiphytic *Pseudocyphellaria* sp. (upper lobe sides, associated with bleached areas) growing on *N. dombeyi*, 18.x.2009, *K. Fedrowitz AR-1810413* (LE 261156, UPS).

***Corticifraga* cf. *fuckelii* (Rehm) D. Hawksw. & R. Sant.**

NOTE. – The ascospores in the specimen cited here are somewhat wider than reported for the species by Hawksworth & Santesson (1990), viz. (13.0−)14.1−17.9(−20.6) × (5.3−)6.1−7.5(−8.1) µm, l/b = (1.9−)2.2−2.6(−2.7) (n = 21, in water) vs. (12−)13−17(−19) × (4−)4.5−6 µm.

Specimen examined. – **ARGENTINA. RÍO NEGRO PROV.:** San Carlos de Bariloche, path to mountain hut Refugio Frey, burned forest with *Nothofagus* and bamboo, 41°12′34.596″S, 71°26′54.599″W, 1166 m, on *Peltigera* sp. (upper lobe sides, pathogenicity not seen) growing on rock/soil, 16.x.2009, *K. Fedrowitz AR-1610323* (LE 261186, UPS).

***Didymellopsis nephromatis* Zhurb. & Etayo sp. nov.**

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FIGURES 1 AND 2.

DIAGNOSIS. – Differs from *Didymellopsis collematum* in its longer ascospores, (22.8−)25.4−30.0(−33.5) × (5.8−)7.2−9.2(−10.5) µm vs. 20−26 × 5−10 µm long, production of dark brown zoned patches on the host thallus, distinct pathogenicity and host selection.

TYPE: **ARGENTINA. RÍO NEGRO PROV.:** San Carlos de Bariloche, road towards Mount Tronador (Nahuel Huapi National Park), *Nothofagus* forest, 41°S, 71°W, on *Nephroma cellulosum* (upper lobe surface) growing on tree branch, 21.x.2009, *K. Fedrowitz AR-2110111a* (LE 261343!, holotype).

DESCRIPTION. – *Infection* produces dark brown circular patches on the host lobes up to at least 2 mm in diameter composed of dark brown tissue ca. 100 µm thick. *Ascomata* perithecioid, aggregated, centered on the patches, black, at first immersed then erumpent, subglobose to pyriform, 150−250(−400) µm diam., dispersed to concentric, merged above with the dark host tissue. *Ascoma wall* not layered, dark brown, with pigmentation that appears rather evenly amorphous and is probably associated with the hyphal walls, K+ olive brown, ca. 30−60 µm thick, composed of ca. 5 layers of angular rounded to tangentially flattened cells. *Hamathecium* of well developed, persistent, hyaline, long, branched and occasionally anastomosing, septate, apically not swollen interascal filaments, 1.5−3(−4) µm thick and hyaline, branched, septate, apically somewhat swollen, short filaments, 3−5.5 µm thick, radially growing in the upper part of the ascomata near the ostiolar region. *Asci* fissitunicate, subcylindrical to slightly wider in the central part, with long foot, sometimes with a small ocular chamber ca. 2 × 1.5 µm, (90−)100−110(−130) × (12−)14−18 µm (n = 19, in water or K/I), 4−6(−8)-spored, I and K/I− except plasma staining orange. *Ascospores* diagonally uni- to biseriately arranged in the asci, hyaline, narrowly obovate (with wider upper cell) to narrowly ellipsoid, sometimes with rather acute ends, smooth-walled, without halo, 1-septate, sometimes the upper cell up to 1.5 times longer than the lower one, often somewhat constricted at the septa, (20.0−)24.9−30.1(−33.5) × (5.8−)7.2−9.2(−10.5) µm, l/b = (2.2−)3.0−3.8(−4.6) (n = 130, in water or K/I), with 1−2 large guttules in each cell.

ECOLOGY AND DISTRIBUTION. – *Didymellopsis nephromatis* is only known from the type locality in *Nothofagus* forest where it was found growing on *Nephroma cellulosum*. The fungus is clearly pathogenic, as the infected host tissues evidently die. *Nothofagus* forests are the climax forest community in southern South America supporting rich lichen diversity.

DISCUSSION. – The new species seems to match the genera *Didymellopsis* (Sacc.) Clem. & Shear and *Zwackhiomyces* Grube & Hafellner (diagnostic characters of both genera are presented in Table 1). Its ascomatal wall pigmentation type, hyaline, non-ornamented ascospores and cyanobacterial host lichen fit better the concept of *Didymellopsis*. However, the pyriform ascomata, which match those found in *Zwackhiomyces*, have not been previously observed in *Didymellopsis*. Within *Didymellopsis*, *D. nephromatis* is most similar to *D. collematum* (J. Steiner) Grube & Hafellner, which has shorter ascospores, measuring 20−26 × 5−10 µm (Grube & Hafellner 1990), and is known from Eurasia where it grows on *Collema* species.

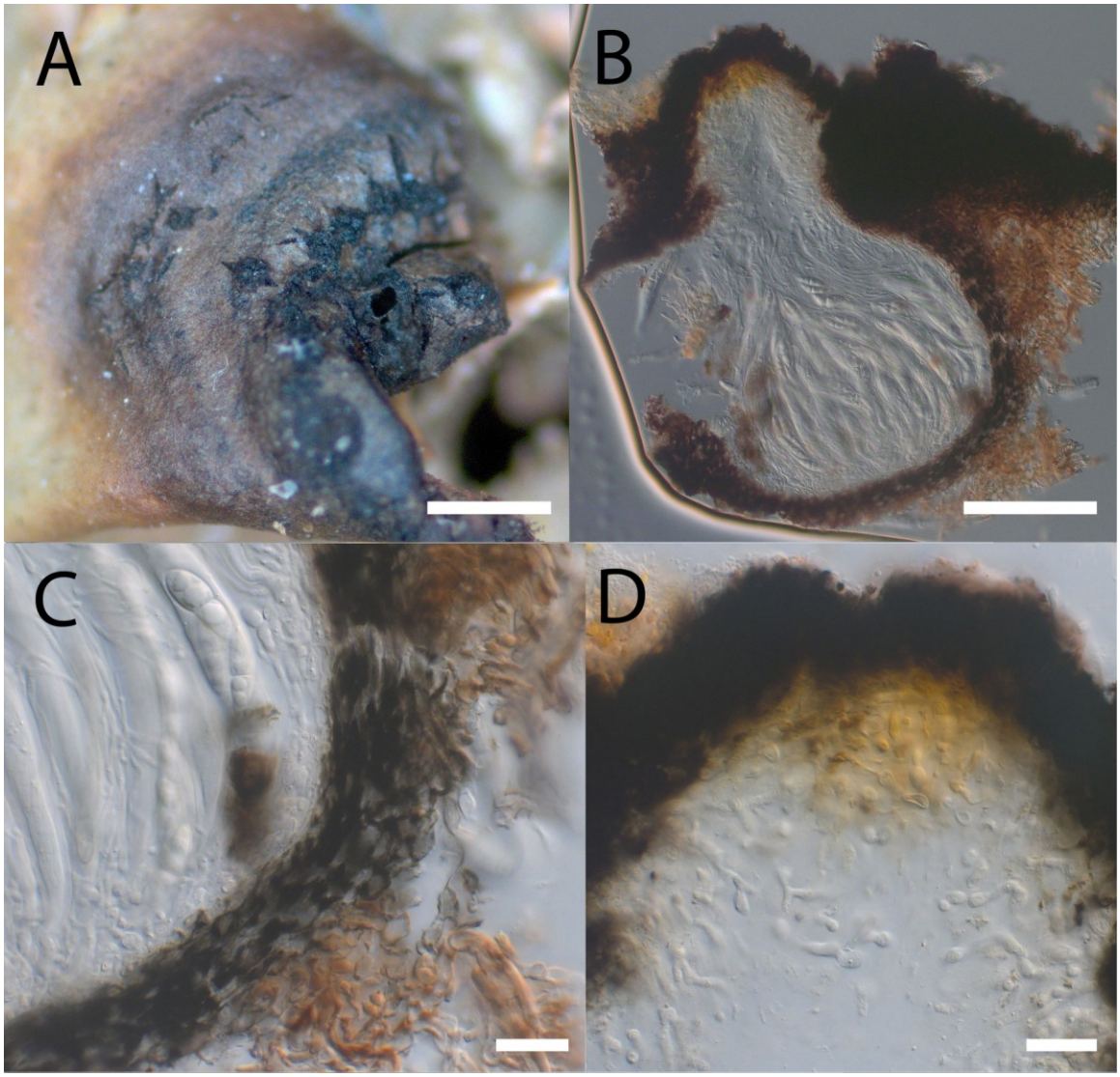

Figure 1. *Didymellopsis nephromatis* (holotype). A, infection habitus of *Nephroma cellulosum* lobe. B, ascomata section in water. C, ascoma wall section in K. D, filaments near the ostiolar region in K. Scale bars: A = 0.5 mm; B = 100 µm; C, D = 20 µm.

The new species can be easily recognized in the field by its concentrically zoned brown infection patches around the ascomata, a feature otherwise unknown in both *Didymellopsis* and *Zwackhiomyces*. The patches are reminiscent of the Neotropical lichenicolous fungus *Chloroepilichen rolfii* Etayo, which also grows on macrolichens of the order Peltigerales (species of *Yoshimuriella*; Etayo 2010). However, the ascomata of *C. rolfii* are apothecia and the zonation is typically green.

Endococcus pseudocyphellariae **Etayo**

Notes. – The ascospores in the specimens cited below are (9.3−)11.6−14.6(−16.4) × (3.5−)4.3−5.3(−5.9) µm, l/b = (2.1−)2.4−3.0(−3.6) (n = 91, in water or I), which differs slightly from the former reports, viz. (1.5−)13−15(−16) × 4−5 µm (Etayo & Sancho 2008) or (8.5−)10−12.5(−15) × (3−)3.5−4(−5) µm, l/b = (2.1−)2.5−3.5(−4.9) (Zhurbenko & Tugi 2013). Formerly known from Chile (many records) and from single finds in Russia (Khabarovsk Territory) and Argentina (El Turbio) (Etayo & Sancho 2008, Zhurbenko & Tugi 2013).

	Didymellopsis (previously known species)	*Zwackhiomyces*	*Didymellopsis nephromatis*
ascomata shape	never pyriform	globose to pyriform	subglobose to pyriform
ascomatal wall pigmentation	evenly amorphous, associated with the hyphal walls	cloudy granulate, associated with the interhyphal spaces	appearing rather evenly amorphous, probably associated with the hyphal walls
ascospore pigmentation and ornamentation	hyaline, non-ornamented	hyaline or occasionally brown, often distinctly ornamented	hyaline, non-ornamented
photobiont of the host lichens	cyanobacteria (including the type species of the genus), occasionally green algae	green algae, occasionally cyanobacteria	cyanobacteria

Table 1. Main distinguishing characteristics of *Didymellopsis* and *Zwackhiomyces* compiled from Calatayud et al. (2007), Grube & Hafellner (1990), Lawrey & Diederich (2015) and J. Hafellner (pers. comm.), contrasted with the characteristics of the new taxon.

Specimens examined. – **ARGENTINA. RÍO NEGRO PROV.:** San Carlos de Bariloche, *Nothofagus dombeyi* forest, 41°2′44.988″S, 71°33′16.307″W, elev. 1020 m, on epiphytic *Pseudocyphellaria* sp. (upper lobe surface) growing on *Nothofagus*, 19.x.2009, *K. Fedrowitz AR-1910412* (LE 261303); San Carlos de Bariloche, road towards Mount Tronador, *Nothofagus* forest, 41°S, 71°W, on epiphytic *Nephroma* sp. (upper lobe surface) growing on tree branch, 21.x.2009, *K. Fedrowitz AR-2110111b* (LE 261453).

***Hemigrapha asteriscus* (Müll. Arg.) D. Hawksw.**

NOTE. – This is a rarely reported species in Argentina (Diederich & Wedin 2000).

Specimen examined. – **ARGENTINA. RÍO NEGRO PROV.:** San Carlos de Bariloche, Puerto Blest, *Nothofagus* forest, 41°2′S, 71°48′W, elev. approx. 800 m, on epiphytic *Peltigera* sp. (upper sides of lobes), 3.xi.2009, *K. Fedrowitz AR-0311911* (LE 261056, UPS).

***Myxophora leptogiophila* (G. Winter) Nik. Hoffm. & Hafellner**

NOTE. – Formerly known in South America only from Chile (Tierra del Fuego region), this species is here reported new to Argentina (Etayo & Sancho 2008).

Specimen examined. – **ARGENTINA. RÍO NEGRO PROV.:** San Carlos de Bariloche, Mount Tronador, *Nothofagus* forest, 41°S, 71°W, on epiphytic *Leptogium* sp. (thallus), 21.x.2009, *K. Fedrowitz AR-2110111* (LE 261283).

***Nectriopsis lecanodes* (Ces.) Diederich & Schroers**

NOTE. – The species is common and widespread in the Northern Hemisphere, but was so far known in South America only from a single find in Peru (Etayo 2010). This is the first report forom Argentina.

Specimen examined. – **ARGENTINA. Río Negro PROV.:** San Carlos de Bariloche, path to mountain hut Refugio Frey, burned forest, 41°12′34.02″S, 71°26′44.016″W, elev. 1167 m, on *Peltigera* sp. (decaying basal lobe portions) on rock/soil, 16.x.2009, *K. Fedrowitz AR-1610231* (UPS).

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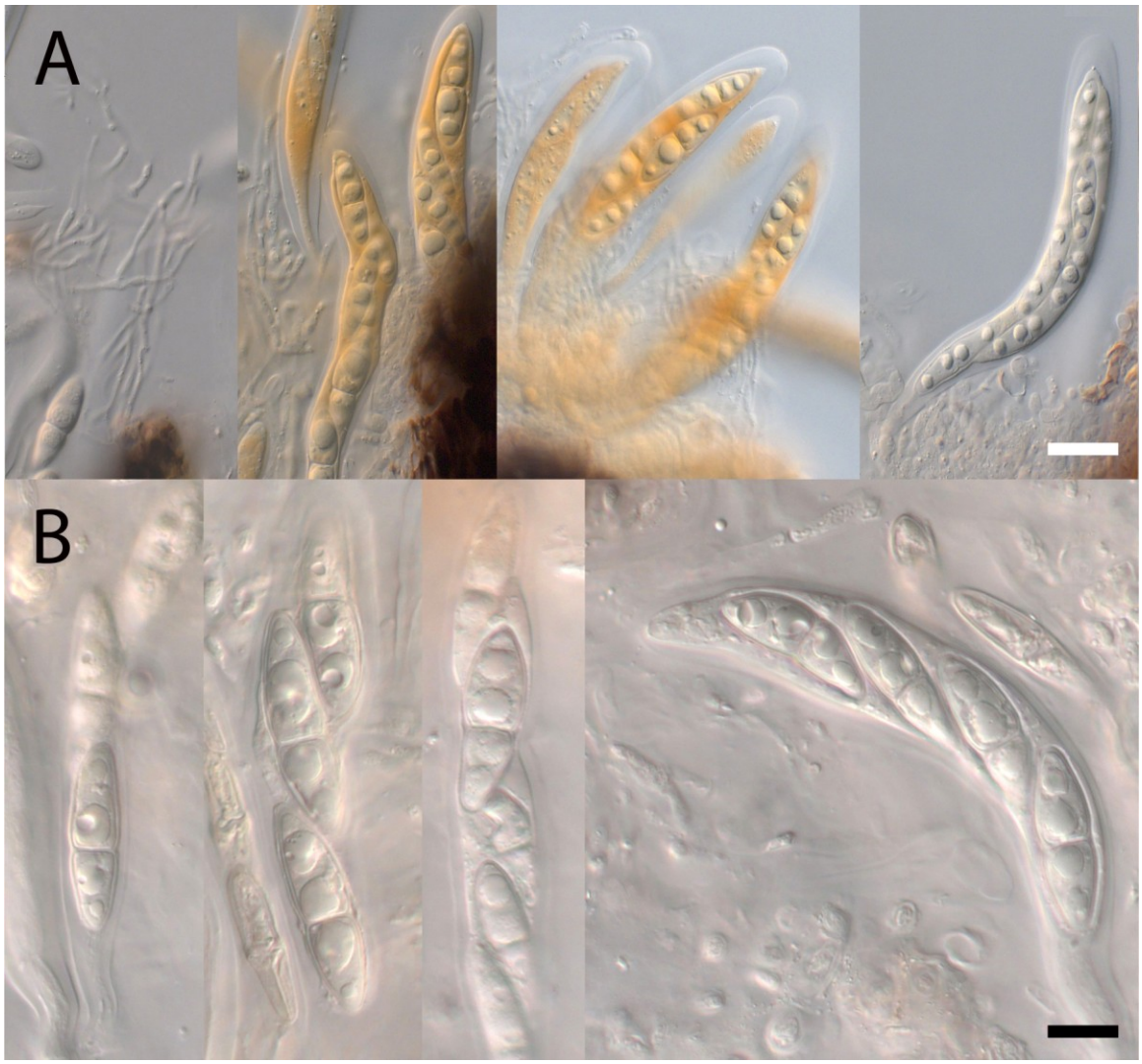

Figure 2. *Didymellopsis nephromatis* (holotype). A, interascal filaments and asci in K/I. B, ascospores in water. Scale bars: A = 20 µm; B = 10 µm.

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APPENDIX: LICHENICOLOUS FUNGI FORMERLY RECORDED FROM ARGENTINA

Abrothallus granulatae Wedin (syn. *Vouauxiomyces granulatae* Wedin) – References: Suija et al. 2015, Wedin 1994
Abrothallus secedens Wedin & R. Sant. – References: Suija et al. 2015, Wedin 1994
Abrothallus parmeliarum (Sommerf.) Arnold – Reference: Bernasconi et al. 2002. As the fungus was collected on a species of *Menegazzia* it likely does not belong to that species and perhaps refers to *A. stroblii* Hafellner, a species growing on that host.
Amandinea deminuta Hafellner (syn. *Buellia uruguayensis* Etayo & Osorio) – References: Etayo & Osorio 2004, Hafellner 2004a. The two names were created in the same year for the same fungus growing on the same host.
Arthonia badia Wedin & Hafellner (syn. *Subhysteropycnis maculiformans* Wedin & Hafellner) – Reference: Wedin & Hafellner 1998
Arthonia cinnabarinula Müll. Arg. (syn. *Helicobolomyces lichenicola* Matzer) – Reference: Lücking et al. 2003.
Arthonia coriifoliae Wedin & Hafellner – Reference: Wedin & Hafellner 1998
Arthonia epiphyscia Nyl. – Reference: Santesson 1960
Arthonia flavicantis Wedin & Hafellner – References: Santesson 2001, Wedin & Hafellner 1998
Arthonia microsticta Vain. – Reference: Lücking et al. 2003
Arthonia muscigena Th. Fr. (syn. *A. minuta* Wedin & Hafellner) – Reference: Wedin & Hafellner 1998
Arthonia peltigerina (Almqu.) Oliv. – Reference: Etayo & Sancho 2008
Arthonia santessoniana Wedin & Hafellner – Reference: Wedin & Hafellner 1998
'Arthonia' semi-immersa Wedin & Hafellner – Reference: Wedin & Hafellner 1998
Arthonia subaggregata Wedin & Hafellner – Reference: Wedin & Hafellner 1998
Arthonia sytnikii S.Y. Kondr. – Reference: Kondratyuk 1996
Biatoropsis usnearum Räsänen – Reference: Diederich & Christiansen 1994
Chaenothecopsis arthoniae Tibell – Reference: Tibell 1998
Chaenothecopsis australis Tibell – Reference: Tibell 1998
Chaenothecopsis cinerea Tibell – Reference: Tibell 1998
Chaenothecopsis lecanactidis Tibell – Reference: Tibell 1998
Chionosphaera cf. *apobasidialis* D.E. Cox – Reference: Etayo & Breuss 1998
Corticifraga fuckelii (Rehm) D. Hawksw. & R. Sant. – References: Etayo & Sancho 2008, Hawksworth & Santesson 1990
Cosmospora marelliana (Speg.) Etayo – References: Etayo 2003, Etayo & Rosato 2008
Dacampia rufescentis (Vouaux) D. Hawksw. – Reference: Wedin 1994
Dacampia xanthomendozae Etayo & Halici – Reference: Halici et al. 2009
Dactylospora australis Triebel & Hertel – Reference: Triebel 1989
Dactylospora frigida Hafellner – Reference: Hafellner 1985
Endococcus pseudocyphellariae Etayo – Reference: Etayo & Sancho 2008
Endococcus propinquus (Körb.) D. Hawksw. – Reference: Triebel 1989
Hemigrapha asteriscus (Müll. Arg.) D. Hawksw. – Reference: Diederich & Wedin 2000
Lasiosphaeriopsis stereocaulicola (Linds.) O.E. Erikss. & R. Sant. – Reference: Eriksson & Santesson 1986
Lichenodiplis lecanorae (Vouaux) Dyko & D. Hawksw. – Reference: Etayo & Breuss 1998
Lichenosticta alcicorniaria (Linds.) D. Hawksw. – Reference: Diederich 2003
Lichenostigma alpinum (R. Sant., Alstrup & D. Hawksw.) Ertz & Diederich – Reference: Wedin 1994
Lichenostigma maureri Hafellner (syn. *Phaeosporobolus usneae* D. Hawksw. & Hafellner) – References: Santesson 1994, Thor 1985

Microcalicium disseminatum (Ach.) Vain. (syn. *Microcalicium conversum* Tibell) – Reference: Tibell 1978
Nesolechia oxyspora (Tul.) A. Massal. – Reference: Etayo & Osorio 2004
Opegrapha sipmanii Matzer – Reference: Lücking et al. 2003
Phacopsis thallicola (A. Massal.) Triebel & Rambold – References: Clauzade et al. 1989, Etayo 2003, Etayo & Rosato 2008
Phacopsis usneae C.W. Dodge – Reference: Etayo & Sancho 2006
Plectocarpon latisporum Ertz, Diederich & Wedin – Reference: Ertz et al. 2005
Plectocarpon pseudoleuckertii Diederich, Ertz & Wedin – Reference: Ertz et al. 2005
Plectocarpon violaceum Ertz, R. Sant., Diederich & Wedin – Reference: Ertz et al. 2005
Polycoccum crassum Vězda – Reference: Etayo & Sancho 2008
Polycoccum infestans (Speg.) Etayo – Reference: Etayo & Rosato 2008
Polycoccum rugulosarium (Linds.) D. Hawksw. ex Pegler, Spooner & R.I. Lewis Sm. – Reference: Hafellner 2004a
Polycoccum vermicularium (Lindsay) D. Hawksw. – Reference: Hawksworth 1985
Pronectria subimperspicua (Speg.) Lowen – Reference: Santesson 1984
Rosellinula kalbii (Hafellner) Hafellner & R.W. Rogers – References: Hafellner 2004b, Kalb et al. 1995
Scutula nephromatis (Speg.) Etayo – Reference: Etayo & Rosato 2008
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