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Abstract

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Eighty-five lichens and lichenicolous fungi are recorded from Gran Canaria for the first time. Eighteen species are also new to the Canary Islands, including *Buelliella heppiae, Polycoccum rinodinae, Sphaerellothecium giraltiae, Zwackhiomyces heppiae* and *Z. solenopsorae,* which are described as species new to science.

Additional key words: *Ascomycotina,* biodiversity, taxonomy, ecology, Macaronesia

Introduction

The checklist of the Canary Islands by Hernández Padrón (2004) includes 301 species of lichens and lichenicolous fungi from Gran Canaria. Compared with the two semidesert islands Lanzarote and Fuerteventura and the two smaller islands Gomera and El Hierro, it has much more habitat diversity and seems to be one of the richest islands for lichens and lichenicolous fungi in the archipelago, comparable only to Tenerife or La Palma. A notable recent publication dealing with the island is Schultz & Boom (2007), presenting 23 taxa of *Lichinaceae* for Gran Canaria, including *Psorula rufonigra* (Tuck.) Gotth. and the rare *Heppia arenacea* M. Schultz. The latter species was previously known only from Yemen. In a paper on *Rinodina* in the Canary Islands, Boom & al. (2009) newly reported several species from Gran Canaria. A paper on *Buellia* s.l., including several records from Gran Canaria, is currently in press (Giralt & Boom 2010). Additional recent information regarding new records for the Canary Islands can be found in Boom (2010).

A one week field trip in 2005 by the author and his wife resulted in many interesting records. In the present paper, 85 species are reported as new for Gran Canaria, including eighteen species that are also new records for the Canary Islands, among them *Buelliella heppiae, Polycoccum rinodinae, Sphaerellothecium giraltiae, Zwackhiomyces heppiae* and *Z. solenopsorae,* which are described as new to science.

Material and methods

Lichens and lichenicolous fungi were collected in 18 localities all over the island of Gran Canaria (Fig. 1). Unless otherwise stated, the specimens are kept in the herbarium of the author.

Measurements of ascospores and pycnospores were made in water at a magnification of ×400 or ×1000. Amyloid reactions were tested using Lugol without preapplication of KOH solution.

Collecting localities in Gran Canaria

1 = S of Las Palmas, S of Tafira Alta, small mountain 'Bandama', mixed trees, shrubs and outcrops on slopes along road, 28°2.3'N, 15°27.5'W, 570 m, 6.2. 2005.

2 = NNW of Maspalomas, N of Los Palmitos Park, trail from hotel to the north, valley with W exposed, strong sloping volcanic outcrops, 27°50.4'N, 15°36.9'W, 530 m, 7.2.2005.

3 = NNW of Maspalomas, along road GC-503, near mirador (SE), N slope of mountain between Los Palmi-

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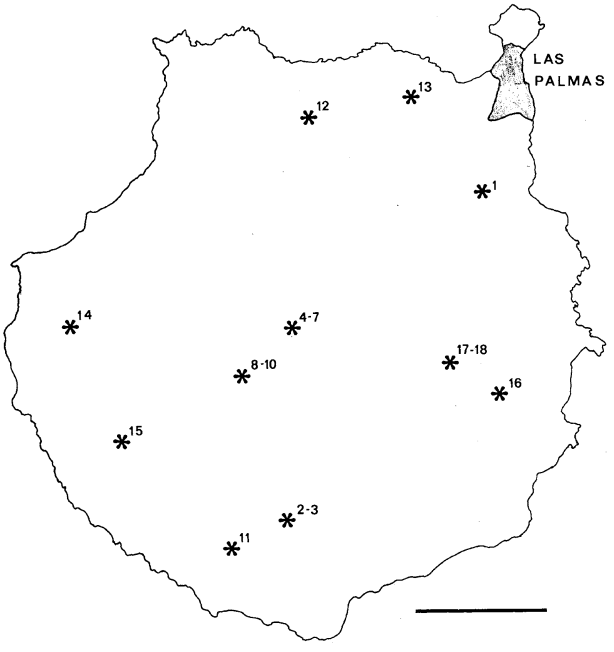

Fig. 1. Main collecting sites on Gran Canaria. – Scale = 10 km.

tos park and Ayaguares, steep N exposed outcrops, terricolous on shaded and weakly sloping soil, 27°50.1'N, 15°36.8'W, 570 m, 7.2.2005.

4 = N of Maspalomas, along road GC-60, N of San Bartolomé de Tirajana, halfway to Ayacata, boulders and outcrops along stream, in *Prunus* orchard, near restaurant, 27°56.8'N, 15°36.7'W, 1255 m, 8.2.2005.

5 = N of Maspalomas, N of San Bartolomé de Tirajana, E of Ayacata, ESE of Roque Nublo, along road to Llanos del Garanón, *Pinus* forest, 27°57.9'N, 15°35.3'W, 1260 m, 8.2.2005.

6 = N of Maspalomas, N of San Bartolomé de Tirajana, NE of Ayacata, ESE of Roque Nublo, along road to Llanos del Garanón, second mirador, outcrops in open *Pinus* forest, 27°58.0'N, 15°35.9'W, 1599 m, 8.2.2005.

7 = NNW of Maspalomas, W of San Bartolomé de Tirajana, SW of Ayacata, along road GC-605, W of Los Pinos, N exposed outcrops, 27°55.6'N, 15°39.1'W, 1560 m, 8.2.2005.

8 = NNW of Maspalomas, W of San Bartolomé de Tirajana, along road GC-605, near Cruz de San Antonio, NW exposed outcrops, including terricolous communities, 27°54.7'N, 15°41.4'W, 915 m, 8.2.2005.

9 = NNW of Maspalomas, Soria, N side of village, along road at E side of Montaña Vista de Soria, boulder and outcrops in *Prunus* orchard, 27°54.7'N, 15°40.1'W, 650 m, 9.2.2005.

10 = NNW of Maspalomas, W of Soria, along road GC-505, at W side of Montaña Vista de Soria, S rim of Fuente del Durazno, E exposed outcrops, 27°54.3'N, 15°41.2'W, 945 m, 9.2.2005.

11 = NNW of Maspalomas, along road GC-505, S of Cercados de Espinos, W side of mountain 'Mesa de las Pardeas', E exposed outcrops, 27°52.6'N, 15°40.5'W, 360 m, 9.2.2005.

12 = W of Las Palmas, SSW of Moya, Los Tilos, small Laurisilva forest with boulders and steep outcrops, 28°05.2'N, 15°35.7'W, 550 m, 10.2.2005.

13 = W of Las Palmas, NW of Arucas, Montaña de Arucas, on top of wall (white painted), 28°07.4'N, 15°31.4'W, 350 m, 10.2.2005.

14 = SE of San Nicolas de Tolentino, 0.5 km W of Mirador de Tasártico, along road GC-204, strong sloping N exposed outcrops, 27°56.3'N, 15°45.8'W, 680 m, 11.2.2005.

15 = W of Mogán, halfway road Las Casas de Veneguéra to the coast village 'Veneguéra', along unpaved road, weakly and strongly sloping outcrops and stones, on NW exposed slope, 27°53.2'N, 15°44.6'W, 235 m, 11.2.2005.

16 = NW of Agüimes, Barranco de Guayadeque, 2 km W of crossing of road to Ingenio, NE exposed steep and sloping outcrops, 27°56.0'N, 15°28.4'W, 490 m, 12.2.2005.

17 = WNW of Agüimes, Barranco de Guayadeque, end of the main road (GC-103), S rim of area La Veruga, path along fields with outcrops, 27°56.3'N, 15°30.8'W, 1015 m, 12.2.2005.

18 = NW of Agüimes, Barranco de Guayadeque, halfway the main road (GC-103), N exposed steep outcrops with Guanchen 'red cavehouses' and old walls, 27°56.2'N, 15°30.3'W, 975 m, 12.2.2005.

Results

1. New species and new records for the Canary Islands

The annotated list includes, in alphabetical order, species new to the Canary Islands and species new to science.

Aspicilia circummunita (Nyl.) Flagey
Loc. 2, on steep N exposed volcanic outcrops, *P. & B. van den Boom 34188;* loc. 10, on E exposed overhanging outcrops, *P. & B. van den Boom 34396*.

This is a rarely recorded species known from the Iberian Peninsula (Llimona & Hladun 2001) and northern Africa (Egea 1996). New to the Canary Islands.

Aspicilia cupreoglauca B. de Lesd.
Loc. 4, N side of boulder, *P. & B. van den Boom 34629;* loc. 17, on volcanic outcrops, *P. & B. van den Boom 34612*.

Aspicilia cupreoglauca is distributed in the Mediterranean area but was not previously recorded for the Canary Islands.

Buelliella heppiae Van den Boom, **sp. nov.**
Holotype: Spain, Canary Islands, Gran Canaria, NNW of Maspalomas, W of San Bartolomé de Tirajana, SW of

Ayacata, along road GC-605, W of Los Pinos, on S exposed sloping outcrops, on *Heppia arenacea,* 27°55.6'N, 15°39.1'W, 1560 m, 8.2.2005, *P. & B. van den Boom 34626* (B; isotype: herb. van den Boom).

In thallo *Heppiae arenaceae* vigens, ascomatibus nigris ad 0.5 mm diam., excipulo proprio paraplectenchymatico, epithecio fusco, hypothecio hyalino, paraphysibus ramosis, 1.5–2 µm diam., ascis 4–8-sporis, ascosporis uniseptatis, septo constrictis, nonnumquam pseudoseptis duobus, hyalinis, vetustis pallide fuscis, 23–28 × 10–12 µm.

Thallus absent; *ascomata* lichenicolous, apothecioid, roundish to slightly elongate, sometimes angular, solitary, rarely grouped, semi-immersed to sessile, 0.2–0.5 mm wide, black; *apothecial margin* thin, inconspicuous to excluded, concolorous with the disc; *disc* black, plane to somewhat concave; *proper exciple* paraplectenchymatic, dark brown, continuous below, c. 10 µm high, K-; *hymenium* 80–100 µm high, hyaline, I-; epithecium brown; hypothecium hyaline; *hamathecial filaments* thin, up to 1.5–2 µm wide, apically not widened and not pigmented, branched and anastomosing; *asci* subcylindrical to clavate, I-, 45–55 × 16–19 µm, 4–8-spored, fissitunicate; *ascospores* 1-septate, constricted at septum, sometimes with one or two pseudosepta, hyaline, when old, pale brownish, without ornamentation or perispore, with one or two oil droplets in each cell, 23–28 × 10–12 µm; *conidiomata* not observed. – Fig. 2A–C.

Host. — On the thallus of saxicolous *Heppia arenacea;* it does not damage the host.

Etymology. — The epithet refers to the host genus.

Ecology and distribution. — The host species, *Heppia arenacea,* is a very rare species in the Canary Islands and is known so far only from two localities on Gran Canaria. *Buelliella heppiae* is known only from the higher altitude locality (at 1560 m), where it grows on volcanic rock. Accompanying species on the same substrate are *Amandinea punctata* (Hoffm.) Coppins & Scheid. s.l., *Leptogium teretiusculum* (Wallr.) Arnold, *Parmelina tiliacea* (Hoffm.) Hale, *Polysporina subfuscescens* (Nyl.) K. Knudsen & Kocourk. and *Rinodina beccariana* Bagl.

Discussion. — Twelve species of *Buelliella* were described so far and they are all listed in Pérez-Ortega & Etayo (2010). Only one species, *B. physciicola* Poelt & Hafellner, is known from the Canary Islands. It has a hyaline epithecium, much smaller ascospores (13–17 × 6–9 µm) and is known from *Physcia* and *Phaeophyscia*. Four species have a (reddish) brown epithecium and can be compared to *B. heppiae: B. lecanorae* Suija & Alstrup, *B. inops* (Triebel & Rambold) Hafellner, *B. protoparmeliopsis* Etayo & Pérez-Ortega and *B. trypethelii* (Tuck.) Fink. The ascospores of these species are all smaller, 17–19 × 7.5–9.5 µm, 16–17 × 6–8 µm, c. 18 × 6 µm and 16–19 × 8–12 µm, respectively. The host genera are also different, viz. *Lecanora, Caloplaca, Protoparmeliopsis* and *Trypethelium,* respectively.

Cryptolechia carneolutea (Turner) A. Massal.
= *Gyalecta canariensis* Van den Boom & Vězda.
Loc. 12, on *Laurus azoricum, P. & B. van den Boom 34476*.

The specimen is similar to *van den Boom 22435,* described as *Gyalecta canariensis* Van den Boom & Vězda (Boom & Vězda 2005), which actually seems to be a synonym of *Cryptolechia carneolutea* (K. Kalb, pers. comm.).

Immersaria athroocarpa (Ach.) Rambold & Pietschm.
Loc. 4, on N exposed surface of boulder, *P. & B. van den Boom 34258*.

Kainz (2004) regarded the species as cosmopolitan, known from all continents. Recorded for the first time from the Canary Islands.

Lecanora flowersiana H. Magn.
Loc. 4, on N exposed vertical volcanic outcrops, *P. & B. van den Boom 34257*.

This is the first record outside the USA. According to Śliwa (2007), this species was known exclusively from central and western North America, where it is common and represents a western temperate element.

Leptogium biatorinum (Nyl.) Leight.
Loc. 8, terricolous on sloping soil, *P. & B. van den Boom 34334;* Loc. 17, on soil over stones along a trail, *P. & B. van den Boom 34606*.

According to Smith & al. (2009), *Leptogium biatorinum* is a widespread species known from North and Central America and Europe, including the British Isles. New to the Canary Islands.

Leptogium pulvinatum (Hoffm.) Otálora
Loc. 6, on a steep rock face, over moss, *P. & B. van den Boom 34279*.

The study of Otálora & al. (2008) maintained *Leptogium pulvinatum*, which was considered as a synonym of *L. lichenoides* (L.) Zahlbr. by Hernández Padrón (2004).

Llimonaea sorediata Van den Boom & al.
Loc. 12, on a mature *Laurus* s.l., *P. & B. van den Boom 34463, 34504*.

This species was found growing close to *Schismatomma decolorans* (Turner & Borrer ex Sm.) Clauzade & Vězda. Usually it is saxicolous, but in the original de-

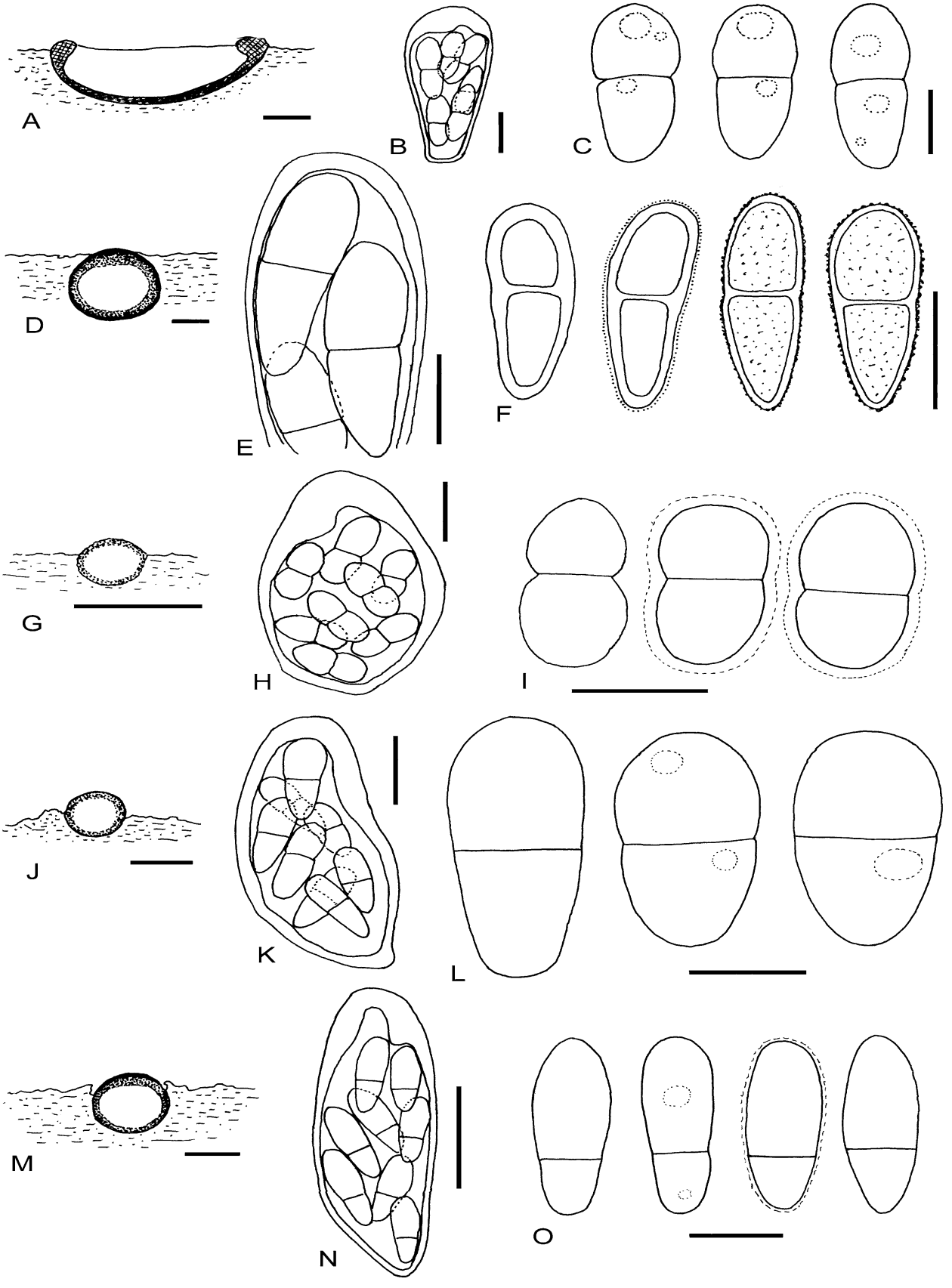

Fig. 2. A–C: *Buelliella heppiae,* apothecium (A), ascus (B), ascospores (C). – D–F: *Polycoccum rinodinae,* perithecium (D), ascus (E), ascospores (F). – G–I: *Sphaerellothecium giraltiae,* perithecium (G), ascus (H), ascospores (I). – J–L: *Zwackhiomyces heppiae,* perithecium (J), ascus (K), ascospores (L). – M–O: *Z. solenopsorae,* perithecium (M), ascus (N), ascospores (O). – Scale bars: J = 200 µm; A, M = 100 µm; D, G = 50 µm; N = 20 µm; B, C, E, F, K, O = 10 µm; H, I, L = 5 µm.

scription it was recorded once from a mature *Quercus* in western France (Boom & Brand 2007).

Muellerella triseptata Diederich
All specimens on *Solenopsora holophaea* (Mont.) Samp.: Loc. 7, on volcanic outcrops, *P. & B. van den Boom s.n.*; loc. 10, on W exposed top of volcanic outcrop, *P. & B. van den Boom 34394;* loc. 11, on NE side of exposed volcanic outcrop, *P. & B. van den Boom 34406*.

La Palma: 2.7 km NNE of Fuencaliente, Pino de la Virgin, to Zona recreativa Fuente de los Roques, E exposed very steep basalt in *Pinus* forest, 28°31.1'N, 17°50.0'W, 1020 m, 1.5.1999, *P. van den Boom 22605*.

Muellerella triseptata was originally described from the host *Buellia griseovirens* (Turner & Borrer ex Sm.) Almb. (Diederich 1986). Here it is reported from a new host.

Petractis thelotremella (Bagl.) Vězda
Loc. 11, on E exposed steep volcanic rock, *P. & B. van den Boom 34415*.

This rare species was previously known only from the Mediterranean area. New to the Canary Islands.

Placidium tuckermanii (Rav. ex Mont.) Breuss
Loc. 12, on a boulder, *P. & B. van den Boom 34502*.

This species was known from North and Central America (Breuss 2002) only. This is the first record outside the American continent.

Polycoccum rinodinae Van den Boom, **sp. nov.**
Holotype: Spain, Canary Islands, Gran Canaria, WNW of Agüimes, Barranco de Guayadeque, end of the main road (GC-103), S rim of area La Veruga, path along fields with outcrops, on *Rinodina beccariana,* 1015 m, 12.2.2005, *P. & B. van den Boom 34609* (B; isotype: herb. van den Boom).

Polycocco pulvinato similis, sed differt in ascomatibus 40–125 µm diam., ascosporis ovoideis ad clavatis, 16–20 ×5–6.5(–7) µm, in thallis specierum variarum generis *Rinodinae* crescens.

Ascomata lichenicolous, perithecioid, subglobose, immersed, ostiole and surrounding visible, in sections up to 125 µm diam.; *ascomatal wall* pale to medium brown, c. 4–8 µm thick, composed of 3–5 layers of elongate cells, cells 2.5–3×4–7 µm; *hamathecial filaments* present at maturity, abundantly branched and anastomosing, 1.5–2.5 µm thick, I-; *asci* cylindrical, 8-spored, 50–80 × 12–17 µm, I- in all parts; *ascospores* distichously arranged in the asci, ovoid to clavate, not or slightly constricted at septum, hyaline to pale brown with a perispore when young, dark brown and coarsely verrucose when mature, 1-septate, 16–20×5–6.5(–7) µm; *conidiomata* pycnidial, rarely found, 30–70 µm diam., brown in upper part, pale below; *conidia* hyaline, bacilliform 4–5×0.8–1 µm. – Fig. 2D–F.

Host. — Saxicolous *Rinodina* species. It does not damage the host; however, the colour of the host turns slightly paler.

Etymology. — The epithet refers to the host genus.

Ecology and distribution. — In the Canary Islands, the new species is known from four islands, occurring in maritime and upland areas up to c. 1000 m altitude on volcanic rock. Accompanying lichens are *Caloplaca* sp., *Neofuscelia* sp., *Physcia* sp. and *Physconia* sp.

Discussion. — Many species of the genus *Polycoccum* are host-specific or at least confined to a group of related species (Atienza & al. 2003). This is reflected also in the present study, where *P. rinodinae* has been found on different *Rinodina* species, e.g. *R. beccariana* Bagl. s.str., *R. beccariana* var. *lavicola* (M. Steiner) Matzer & H. Mayrhofer and *R. etayoi* Giralt & Van den Boom. While *R. beccariana* Bagl. s.str. is very common in both the Canary Islands and the Iberian Peninsula, and *R. beccariana* var. *lavicola* is very common in the Canary Islands but rare in southwestern Europe, *R. etayoi* is known only in the Canary Islands, where it is rare. The only other known *Polycoccum* species on *Physciaceae* is *P. pulvinatum* (Eitner) R. Sant., which has been observed on several *Physcia* species. It has larger perithecia (150–200 µm) and ellipsoid ascospores of 18–21×7.5–8.5 µm, different in shape. Similar *Polycoccum* species with ascomata <150 µm and 8-spored asci are *P. decolorans* Calatayud & Triebel, *P. microsticticum* (Leight.) Arnold and *P. rubellianae* Calatayud & V. Atienza. These species have differently sized ascospores: 18–22×6–8 µm, 14–18×7–8 µm and 11–14×6–7 µm, respectively, and they are all known from different host genera, viz. *Immersaria, Acarospora* and *Caloplaca,* respectively.

Additional specimens studied. — Fuerteventura: 3 km NNW of La Oliva, along road to Lajares, W slope of volcano 'Arena', open field with lava blocks, 150 m, 26.2.2001, *P. & B. van den Boom 25703*. — Lanzarote: ENE of Arrieta, 3 km N of Sitio de interés científico de los Jameos, open area with volcanic cinder outcrops and boulders, 35 m, 7.3.2003, *P. & B. van den Boom 30575*. — El Hierro: WNW of Frontera, N of Los Llanillos, Punta las Morras, coastal area with steep N facing volcanic cliffs along trail, 40 m, 27.3.2009, *P. & B. van den Boom 42135*.

Schismatomma physconiicola Ertz & Diederich
Loc. 10, on the west side of top of volcanic outcrops, on *Physconia*, *P. & B. van den Boom 34391*.

Previously, this species was known only from the type locality on Guadalupe Island, Baja California peninsula, western Mexico (Ertz & Diederich 2006).

Sphaerellothecium giraltiae Van den Boom, **sp. nov.**
Holotype: Spain, Canary Islands, Gran Canaria, NNW of Maspalomas, along road GC-503, SE side of mirador, N slope of mountain between Los Palmitos park and Ayaguares, on steep N exposed outcrops, on *Rinodina santorinensis* J. Steiner, 27°50.1'N, 15°36.8'W, 570 m, 7.2. 2005, *P. & B. van den Boom 34201* (B; isotype: herb. van den Boom).

Sphaerellothecium in thallis specierum variarum generis *Rinodinae* crescens, hyphis vegetativis paulo immersis, 3–5 µm latis, ascomatibus nigris 20–40 µm latis, ascis 15–17×10–12 µm, 8-sporis, ascosporis uniseptatis, ovoideis, hyalinis, 6–8×2.5–3 µm.

Vegetative hyphae slightly immersed, forming a slightly immersed net, 3–5 µm wide, cell wall dark brown, smooth; *ascomata* perithecioid, globose, dark brown to blackish, 20–40 µm diam.; *perithecial wall* dark brown, K+ olivaceous brown, cells in surface view roundish to angular or somewhat elongate, up to 5×8 µm; *hamathecial filaments* not observed; *asci* shortly and widely ellipsoid to obpyriform, wall apically thickened, with an ocular chamber, I-, 15–17×10–12 µm, 8-spored; *ascospores* 1-septate, broadly ellipsoid to ovoid, hyaline, (5.5–)6–8×2.5–3 µm, perispore sometimes present, to 1.5 µm thick, one oil droplet per cell (in KOH); *conidiomata* not observed. – Fig. 2G–I.

Hosts. — On the thallus of saxicolous *Rinodina* species, *R. beccariana, R. canariensis* Matzer & al. and *R. santorinensis*. It does not damage the hosts.

Etymology. — The epithet in *Sphaerellothecium giraltiae* is chosen in honour of Dr Mireia Giralt for identifying the host species of the type and for her important work in lichenology, especially on *Buellia* and *Rinodina*.

Ecology and distribution. — The species is known from two Canary Islands, Gran Canaria and Lanzarote. It grows on different *Rinodina* species on volcanic rocks. It has been found in altitudes between 475 and 570 m, in all cases on N exposed rock faces, poor in accompanying species, apart from a *Lecanora* species.

Discussion. — The new species is closely related to *Sphaerellothecium gallowayi* Diederich, a species known from Australia and Papua New Guinea and growing on *Heterodermia* (Diederich 2007). The ascospores in *S. gallowayi* are larger than in the new species (7.5–10× (2.5–)3–4 µm); moreover, the guttules in the ascospores in *S. gallowayi* have not been observed in the new species. According to Diederich (2007), all known species of *Sphaerellothecium* appear to be host-specific, confined to a genus or to a part of a genus. So far, no species were known from the host genus *Rinodina.*

Additional specimens studied. — Lanzarote: SSW of Haría, road with hairpin bends and N exposed slope along road with shrubs, *Pinus* trees and volcanic outcrops, 535 m, 7.3.2003, *P. & B. van den Boom 30432;* El Risco de Famara, SSW of Haría, Barranco de la Poceta, valley with WNW slope with volcanic outcrops and shrubs, 475 m, 8.3.2003, *P. & B. van den Boom 30542*.

Stigmidium squamarinicola Calat. & Triebel
Both specimens on *Squamarina cartilaginea* (With.) P. James: Loc. 3, on sloping soil, *P. & B. van den Boom 34232;* loc. 16, on N exposed volcanic outcrop, *P. & B. van den Boom 34557*.

Stigmidium squamarinicola has recently been described by Calatayud & Triebel (2003) from central and southwestern Europe as well as Israel. New to the Canary Islands.

Zwackhiomyces heppiae Van den Boom, **sp. nov.**
Holotype: Spain, Canary Islands, Gran Canaria, W of Mogán, halfway road Las Casas de Veneguéra to the coast village 'Veneguéra', along unpaved road, weakly and strongly sloping outcrops and stones, on NW exposed slope, on gently sloping volcanic outcrops, on *Heppia arenacea*, 27°53.2'N, 15°44.6'W, 235 m, 11.2.2005, *P. & B. van den Boom 34521* (B; isotype: herb. van den Boom).

In thallo et apotheciis *Heppiae arenaceae* vigens, ascomatibus nigris, globosis, 100–250 µm latis, ascis cylindricis, 8-sporis, ascosporis uniseptatis, ovoideis ad paulo clavatis, hyalinis, 12–15×5–6 µm, cellulis 1–2-guttulatis oleosis solitariis vel binis in cellulis sporarum, ovoideis ad paulo clavatis.

Ascomata perithecioid, black, globose, semi-immersed in the thallus, 100–250 µm diam., scattered; *perithecial wall* pseudoparaplectenchymatous, in sections up to 35 µm wide, with granular, dark brown to black intracellular pigments; *hamathecial filaments* abundant, branched and anastomosing, embedded in a gel, 1–1.5 µm wide, I-; *asci* cylindrical, with a small ocular chamber, I-, 35–55×15–18 µm, 8-spored; *ascospores* 1-septate, hyaline, with a smooth surface, ovoid to slightly clavate, 12–15×5–6 µm, sometimes one or two oil droplets in each cell, not or rarely slightly constricted at the septum, a perispore not observed; *conidiomata* also not observed. – Fig. 2J–L.

Host. — On the thallus and apothecia of saxicolous *Heppia arenacea*. It does not damage the host.

Etymology. — The epithet refers to the host genus.

Ecology and distribution. — The new species is known only from the type locality, growing abundantly on the rare host species *Heppia arenacea,* in a wide open valley

on outcrops just above the soil. It was abundantly present on some parts of the host. The following accompanying lichens were observed: *Caloplaca interfulgens* (Nyl.) J. Steiner, *Heppia lutosa* (Ach.) Nyl., *Gloeoheppia erosa* (J. Steiner) Marton, *G. turgida* (Ach.) Gyeln., *Lichinella cribellifera* (Nyl.) P. Moreno & Egea, *L. robusta* Henssen, *Peccania fontqueriana* P. Morena & Egea, *Placopyrenium bucekii* (Nádv. & Servit) Breuss, *Psorotichia hassei* Fink, *Pterygiopsis hassei* Fink, *P. canariensis* Henssen, *Toninia aromatica* (Sm.) A. Massal. and *T. cinereovirens* (Schaer.) A. Massal.

Discussion. — Nearly all known species of *Zwackhiomyces* are supposed to be host-specific, as is made clear in the recent key by Calatayud & al. (2007). However, when comparing the new species with hitherto known *Zwackhiomyces* species, several characters must be considered. The internal filaments are relatively thin in the new species. In other *Zwackhiomyces* species, they vary from c. 1.5 to 3.5 µm in width (Brackel 2008; Calatayud & al. 2007; Diederich & Zhurbenko 2009). The shape and measurement of the ascospores are comparable to those of *Z. sipmanii* Diederich & Zhurb., which measure 12.5–16×4–5.5 µm. However, the perithecia in that species are smaller, up to 150 µm, the asci are 4(–6)-spored, and the host species is *Phaeorrhiza sareptana* var. *sphaerocarpa* (Th. Fr.) H. Mayrhofer & Poelt, known from northeastern Russia (Diederich & Zhurbenko 2009). *Z. lithoiceae* (B. de Lesd.) Hafellner & V. John has slightly larger ascospores (15–20 × 5–7.5 µm), but the pseudothecia are smaller (100–140 µm), the asci are (2–)4–6-spored and it grows on *Verrucaria nigrescens* coll. *Z. inconspicuus* Grube & Hafellner and *Z. calcariae* (Flagey) Hafellner & Nik. Hoffm. have pseudothecia of 170–270 µm, their ascospores measurements are slightly larger, different in shape (ellipsoid to ovoid), and the internal filaments are wider (up to 2.5 µm diam.). Their hosts are *Lecanora dispersa* (L.) Sommerf. and *Aspicilia calcarea* (L.) Körb., respectively. *Z. argentinae* D. Hawksw. & V. Atienza has slightly longer ascospores (14–16×5–6 µm) but smaller pseudothecia (50–150 µm) and it grows on *Acarospora* species. When comparing the new species with species on macrolichens, only two species have 8-spored asci and pseudothecia between 170 and 240 µm in diameter: *Z. kiszkianus* has much larger ascospores (19.5–25.5× 8.5–13 µm) and *Z. peltigerae* has longer and smaller asci (60–70×11.5–13.5 µm). Both are known from the host genus *Peltigera*.

Zwackhiomyces solenopsorae Van den Boom, **sp. nov.**
Holotype: Spain, Canary Islands, Gran Canaria, NNW of Maspalomas, along road GC-503, SE side of mirador, N slope of mountain between Los Palmitos park and Ayaguares, steep N exposed outcrops, terricolous on shaded and weakly sloping soil, on *Solenopsora holophaea,* 27°50.1'N, 15°36.8'W, 570 m, 7.2.2005, *P. & B. van den Boom 34320* (B; isotype: herb. van den Boom).

In thallo et apotheciis *Solenopsorae holopheae* vigens, ascomatibus ad 150 µm diam., 8-sporis, ascosporis uniseptatis, verruculosis, hyalinis, 15–20×8–9 µm, cellulis cum 0–2 guttulis oleosis, nonnumquam in septo constrictis.

Ascomata perithecioid, black, globose, immersed in the thallus, 70–150 µm diam., scattered; *perithecial wall* pseudoparaplectenchymatous, in sections up to 20–30 µm wide, with granular dark brown to black intracellular pigment; *hamathecial filaments* abundant, branched and anastomosing, embedded in a gel, I-, 1.5–2 µm wide; *asci* cylindrical, with a small ocular chamber, I-, 50–75 × 17–20 µm, 8-spored; *ascospores* 1-septate, septum formed towards the lower end, 1–2-seriate, hyaline, pale brownish when overmature, with a smooth surface, ovoid to sole form, (15–)20–25×7–8.5 µm, with 0–2 oil droplets in each cell, not or rarely slightly constricted at the septum, sometimes a thin perispore present, 1–2 µm wide; *conidiomata* up to 100 µm, dark brown above, pale brown below; *conidia* bacilliform, 3–4×0.8–1 µm. – Fig. 2M–O.

Host. — On thallus and apothecia of terricolous *Solenopsora holophaea;* it does not damage the host.

Etymology. — The epithet refers to the host genus.

Ecology and distribution. — *Zwackhiomyces solenopsorae* has been found in only three localities in the Canary Islands on Gran Canaria and Lanzarote.

Discussion. — According to Calatayud & al. (2007), all species of *Zwackhiomyces* are host-specific, confined to a genus or to a part of a genus. In the recent key of the genus, no species were known from the host genus *Solenopsora* (Calatayud & al. 2007) so far. When comparing the new species *Z. solenopsorae* to the known species on crustose lichens, the following species have 8-spored asci with ascospores longer than 20 µm. *Z. lacustris* (Arnold) Orange has much wider ascospores (9–12 µm) and grows on *Ionaspis lacustris* (With) Lutzoni. *Z. dispersus* (J. Lahm ex Körb.) Triebel & Grube has smaller asci, the septum is formed in the centre of the ascospore, and it grows on *Protoblastenia rupestris* (Scop.) J. Steiner. *Z. berengerianus* (Arnold) Grube & Triebel has much smaller asci (11–14 µm), the ascospores are narrower and it grows on *Mycobilimbia berengeriana* (A. Massal.) Hafellner & V. Wirth. When comparing *Z. solenopsorae* to the known species living on macrolichens, two species, *Z. eupoclinus* Hafellner & al. and *Z. diederichii* D. Hawksw. & Iturr., have 8-spored asci and pseudothecia <170 µm. However, the ascospores are much smaller (14–17×4–6 µm and 10–12.5×3.5–4 µm), as known from *Speerschneidera euploca* (Tuck.) Trevis. and *Cladonia* sp., respectively. Two other recently described *Zwackhiomyces* species, *Z. echinulatus* Brackel (Brackel 2008) and *Z. sipmanii* (Diederich & Zhurbenko 2009), have several different characters (ascospores 24–27×

Table 1. Sixty-seven species known from the Canary Islands but first recorded from Gran Canaria. – The numbers refer to the collection localities listed in Material and methods and mapped in Fig. 1; abbreviation of the substrate: La = *Larix;* Lr = *Laurus;* Pt = *Pistacea;* c = calcareous rock; t = terricolous; ush = unidentified shrub; vr = volcanic rock; wfb = wood of fallen branch; f = fertile.

Acarospora badiofusca – 17vr
Acarospora umbilicata – 3vr, 8vr
Acarospora veronensis – 4vr
Agonimia opuntiella – 1vr, 11vr
Anisomeridium biforme – 12La
Anomalographis madeirensis – 12vr
Bacidia laurocerasi – 12La
Belonia lumbrispora – 12La
Botryolepraria lesdainii – 12vr
Caloplaca aegatica – 12La
Caloplaca congrediens – 4vr, 16vr
Caloplaca crenularia – 17vr
Caloplaca interfulgens – 15vr
Caloplaca irrubescens – 17vr
Caloplaca pelodella – 8vr, 9vr
Catillaria chalybeia – 16vr
Cercidospora rinodinae – 16vr (on *Rinodina intermedia*)
Chrysothrix xanthia – 12ush
Chrysotrix chlorina – 12vr
Collema ryssoleum – 6vr
Endocarpon loscosii – 15vr
Endocarpon pusillum – 3t
Enterographa crassa – 12La
Graphis scripta – 12Lr
Gyalecta schisticola – 12vr
Heppia despreauxii – 3t
Heppia lutosa – 15vr
Heterodermia obscurata – 12vr, Lr
Heteroplacidium contumescens – 2vr
Hyperphyscia adglutinata – 12Lr, La
Labrocarpon canariensis – 14vr (on *Pertusaria*)
Lecania naegelii – 1Pt
Lecania rabenhorstii – 13c
Lecanora galactiniza – 2vr, 3vr, 8t, 10t, 15vr, 16vr, 17vr
Lecidella asema – 16vr, 17vr
Leptochidium albociliatum – 6vr, 17vr
Leptogium teretiusculum – 7t, 10vr
Lichenoconium erodens – 12ush (on *Lecanora* and on *Ramalina*)
Lichenostigma diploiciae – 15vr (on *Diploicia*)
Llimoniella heppiae – 3t
Minutoexcipula mariana – 12ush (on *Pertusaria*)
Opegrapha subelevata – 12vr
Parmotrema austrosinense – 12wfb, 12vr
Parmotrema stuppeum – 16vr
Pertusaria heterochroa – 1 (on *Opuntia*)
Phacopsis oxyspora s.l. – 10vr (on *Neofuscelia*)
Phaeophyscia hirsuta – 16vr
Physcia subalbinea – 17vr
Physcia tribacia – 16vr (f)
Physconia enteroxantha – 4vr, 6vr, 16vr, 17vr
Physconia venusta – 16vr
Placidium pilosellum – 8t
Placidium semaforonense – 2t, 10t, 15t
Placopyrenium bucekii – 2vr, 3vr, 11vr, 15vr
Polysporina subfuscenscens – 7vr, 16vr
Porina aenea – 12La
Porina chlorotica – 12vr
Schismatomma dirinellum – 1ush
Solenopsora vulturiensis – 1vr, 10vr (f)
Sphinctrina tubiformis – 12ush (on *Pertusaria*)
Thyrea plicatissima – 2vr
Toninia cinereovirens – 2vr, 15vr
Toninia squalida – 4vr
Trapelia glebulosa – 1t, 8t
Trapeliopsis wallrothii – 3t, 7vr, 8t, 17vr
Verrucaria geophila – 7t
Verrucaria viridula – 16vr, 18c (on wall)

9.3–11 µm and 12.5–16×4–5.5 µm, respectively) and are known from the hosts *Physconia distorta* (With.) J. R. Laundon and *Phaeorrhiza sareptana* var. *sphaerocarpa,* respectively.

Additional specimens examined. — La Palma: 1 km N of Tijarafe, near El Pinillo, path in cleft at E side of road, N exposed slope with lava outcrops, 28°43.0'N, 17°57.1'W, 700 m, 2.2.1999, *P. van den Boom 22606* (herb. van den Boom). — Gran Canaria: NNW of Maspalomas, W of San Bartolomé de Tirajana, SW of Ayacata, along road GC-605, W of Los Pinos, N exposed outcrops, 27°55.6'N, 15°39.1'W, 1560 m, 8.2.2005, *P. & B. van den Boom 34317* (herb. van den Boom).

2. New records for Gran Canaria

Sixty-seven species of lichens and lichenicolous fungi were identified to represent new records for Gran Canaria, but are known from other islands of the archipelago. They are given in Table 1. The taxonomic authors of the species listed in Table 1 can be found in Hernández Padrón (2004) and Hafellner (2002, 2005, 2008), except for a few recent records published elsewhere.

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References

Atienza V., Calatayud V. & Hawksworth D. L. 2003: Notes on the genus *Polycoccum (Ascomycota, Dacampiace-*

ae) in Spain, with a key to the species. – Lichenologist **35:** 125–135. [CrossRef]

Boom P. P. G. van den 2010: Lichens and lichenicolous fungi from Lanzarote (Canary Islands), with the descriptions of two new species. – Cryptog. Mycol. **31:** 183–199.

Boom P. P. G. van den & Brand A. M. 2007: *Llimonaea sorediata,* a new lichen *(Ascomycota)*, widely distributed in western Europe. – Lichenologist **39:** 309–314. [CrossRef]

Boom P. P. G. van den & Vězda A. 2005: *Gyalecta canariensis* sp. nov., a new lichen *(Ascomycota)* from La Palma (Canary Islands). – Mycotaxon **92:** 255–258.

Boom P. P. G. van den, Giralt M. & Etayo J. 2009: Notes on the lichen genus *Rinodina* from the Canary Islands. – Nova Hedwigia **88:** 423–440. [CrossRef]

Brackel W. von 2008: *Zwackhiomyces echinulatus* sp. nov. and other lichenicolous fungi from Sicily, Italy. – Herzogia **21:** 181–198.

Breuss O. 2002: *Placidium.* – Pp. 384–393 in: Nash T. H., Ryan B. D., Gries C. & Bungartz F. (ed.), Lichen flora of the Greater Sonoran Desert Region 1. – Tempe, Ariz.: Lichens unlimited, Arizona State University.

Calatayud V. & Triebel D. 2003: Three new species of *Stigmidium* s.l. (lichenicolous *Ascomycetes*) on *Acarospora* and *Squamarina*. – Lichenologist **35:** 103–116. [CrossRef]

Calatayud V., Triebel D. & Pérez-Ortega S. 2007: *Zwackhiomyces cervinae,* a new lichenicolous fungus *(Xanthopyreniaceae)* on *Acarospora,* with a key to the known species in the genus. – Lichenologist **39:** 129–134. [CrossRef]

Diederich P. 1986: Lichenicolous fungi from the Grand Duchy of Luxembourg and surrounding areas. – Lejeunia **119:** 1–26.

Diederich P. 2007: *Sphaerellothecium gallowayi* sp. nov., a new lichenicolous ascomycete on *Heterodermia* from Australia and Papua New Guinea. – Bibl. Lichenol. **95:** 165–169.

Diederich P. & Zhurbenko M. P. 2009: *Sphaerellothecium phaeorrhizae* and *Zwackhiomyces sipmanii* spp. nov. on *Phaeorrhiza sareptana* from north-eastern Asia, with a key to the species of *Sphaerellothecium.* – Bibl. Lichenol. **99:** 113–121.

Egea J. M. 1996: Catalogue of lichenized and lichenicolous fungi of Morocco. – Bocconea **6:** 19–114.

Ertz D. & Diederich P. 2006: The first lichenicolous species of *Schismatomma (Roccellaceae)*, *S. physconiicola* sp. nov., from Mexico. – Bryologist **109:** 415–420. [CrossRef]

Giralt M. & Boom P. P. G. van den [in press]: The lichen genus *Buellia* s.l. and some additional crustose genera of the *Physciaceae* in the Canary Islands. – Nova Hedwigia.

Hafellner J. 2002: Additions and corrections to the checklist and bibliography of lichens and lichenicolous fungi of Insular Laurimacaronesia II. – Fritschiana **36:** 1–10.

Hafellner J. 2005: Additions and corrections to the checklist and bibliography of lichens and lichenicolous fungi of Insular Laurimacaronesia III. – Fritschiana **49:** 1–13.

Hafellner J. 2008: Additions and corrections to the checklist and bibliography of lichens and lichenicolous fungi of Insular Laurimacaronesia IV. – Fritschiana **64:** 1–28.

Hernández-Padrón C. E. 2004: División lichenes y lichenicolous fungi. – Pp. 58–84 in: Izquierdo I., Martin J. L., Zurita N. & Arechavaleta M. (ed.), Lista de especies silvestres de Canarias (hongos, plantas y animales terrestres). – La Laguna: Consejería de Medio Ambiente y Ordenación Territorial Gobierno de Canarias.

Llimona X. & Hladun N. L. 2001: Checklist of the lichens and lichenicolous fungi of the Iberian Peninsula and Balearic Islands. – Bocconea **14.**

Kainz C. 2004: *Immersaria.* – Pp. 135–136 in: Nash T. H., Ryan B. D., Diederich P., Gries C. & Bungartz F. (ed.), Lichen flora of the Greater Sonoran Desert Region 2. – Tempe, Ariz.: Lichens Unlimited, Arizona State University.

Otálora M. A. G., Martínez I., Molina M. C., Aragón G. & Lutzoni F. 2008: Phylogenetic relationships and taxonomy of the *Leptogium lichenoides* group *(Collemataceae, Ascomycota)* in Europe. – Taxon **57:** 907–921.

Pérez-Ortega S. & Etayo J. 2010: *Labrocarpon* gen. nov. for *Melaspilea canariensis,* with the description of *Buelliella protoparmeliopsis* sp. nov. from South America. – Lichenologist **41:** 271–276. [CrossRef]

Schultz M. & Boom P. P. G. van den 2007: Notes on cyanobacterial lichens (mostly *Lichinales, Ascomycota*) of the Canary Islands. – Nova Hedwigia **84:** 113–133. [CrossRef]

Śliwa L. 2007: A revision of the *Lecanora dispersa* complex in North America. – Polish Bot. J. **52:** 1–70.

Smith C. W., Aptroot A., Coppins B. J., Fletcher A., Gilbert O. L., James P. W. & Wolseley P. A. (ed.) 2009: The Lichens of Great Britain and Ireland. – London: British Lichen Society.