

# FURTHER CONTRIBUTIONS TO THE FLORA OF LICHENS AND LICHENICOLOUS FUNGI OF THE AZORES

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Several lichens are reported new to the flora of the Azores. *Mycoporum sparsellum*, and the lichenicolous coelomycete *Laeviomycetes fallaciosus* are reported for the first time in Europe. *Arthothelium crozalsianum*, *Bacidia friesiana*, *Belonia incarnata*, *Julella sericea*, *Micarea assimilata*, *Mycomicrothelia confusa* and *Roselliniopsis ventosa* are recorded for the first time in Laurimacaronesia. New for the Azores are *Acarospora umbilicata*, *Buellia aethalea*, *B. subdisciformis*, *Byssoloma marginatum*, *Canoparmelia texana*, *Catillaria atomarioides*, *Chaenotheca jurfuracea*, *Chromatochlamys muscorum*, *Cladonia cyathomorpha*, *C. pocillum*, *C. rangiformis* var. *gracillima*, *Cliostomom griffithii*, *Endocarpon pusillum*, *Hypotrachyna taylorensis*, *Opegrapha ochrocheila*, *O. vermicellifera*, *O. vulgata*, *Parmotrema mellissii*, *Peltula euploca*, *Pertusaria hymenea*, *Phaeophyscia hispidula*, *Porina aenea*, *P. borneri*, *Pyrenula acutispora*, *Ramalina lacera*, *R. subpusilla*, *Rinodina anomala*, *R. intermedia*, *Scoliciosporum umbrinum*, *Strigula taylorii*, *Toninia mesoidea*, *Xanthoria candelaria* and *X. fallax*. Fourteen additional lichenicolous fungi double the list of species from the Azores.

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## INTRODUCTION

The Azores is a group of nine geologically young volcanic Atlantic islands one third of the way from Europe to North America. Only parts of their extraordinary lichen flora have been recorded (e.g. DEGELIUS 1941, ARVIDSSON & WALL 1985, ARVIDSSON 1990, APTROOT 1989, PURVIS & JAMES 1993, PURVIS et al. 1994, 1995) perhaps due to their remoteness, a rather scanty list in comparison to the other island groups of Laurimacaronesia. A comprehensive list of references is (PURVIS & JAMES 1993) preceded the checklist by HAFELLNER (1999) to which he added some additional records.

Because of the isolation of these relatively young islands the relative number of endemic species is high (PURVIS et al. 1994). Influenced by the Gulf Stream the oceanic, moist climate with well-balanced precipitation and temperature (SJÖGREN 1984) results in very favourable

conditions for lichens. The mountain peaks are shrouded in cloud almost daily. The annual precipitation at sea-level is 1000 mm, increasing about 25% for every 100 m, and exceeds 3000 mm at 500 m (HAGGAR 1988).

The Azorean lichen flora (HAFELLNER 1995a, 1999), in comparison to mainland Portugal and also the rest of Laurimacaronesia, contains a considerable number of sub-/neotropical foliose lichens not found elsewhere in Europe. There are close relationships to the lichen flora of tropical America. The flora (HAFELLNER 1995a, 1999) with approximately 440 species [506 according to SMITH (2002), including additional still unpublished records (Smith pers. com.)] contains about 20%, and therefore only a minor part, of the Laurimacaronesian species. This may be partly due to under-collecting of important ecological niches, as no local botanist has worked on lichens. Astonishing gaps of lichens, widespread elsewhere, are obvious. No *Alectoria*, *Bryoria*,

yellow *Rhizocarpon*, *Umbilicaria*, or *Lasallia* sp. have been recorded. The littoral, amphibious fresh water and terricolous lichen communities are comparably poor in species. In contrast to the southern shores of Madeira and Canary Islands the Azores lack a xerothermic belt (piso infrocanaria) with its characteristic species. Important ecological niches have not been investigated yet because of difficulty in access. In addition vast areas of the indigenous laurisilva and bush-vegetation have been transformed into pastures for cattle grazing and are lost for lichen colonisation. These areas, if abandoned, are dominated mostly by *Hedychium gardnerianum*, *Crocasmia* sp., *Rubus* sp., *Hydrangium macrophyllum*, *Pteridium aquilinum* and others, all inhibiting recolonization by indigenous plants.

Similar under-sampling of lichenicolous fungi is thought to explain why only 14 species have been recorded. Much more collecting has to be done to get a better impression of the true spectrum of species.

During a recent trip, the lichen flora on the northern slopes of São Jorge turned out to be of special interest. To our knowledge the lichen flora of this region has not previously recorded. In the fog-enshrouded belt between 300 and 650 m E of Norte Grande a bush vegetation dominated by *Juniperus brevifolia* and *Erica scoparia* ssp. *azorica* (= *E. azorica*) is thriving, interrupted partly by pastures. The old gnarled stems are covered with foliose macrolichens such as *Pseudocyphellaria*, *Sticta*, *Nephroma*, *Lobaria*, *Parmotrema*, *Hypotrachyna*, *Rimelia* and *Usnea*. Vividly red crowned podetia of *Cladonia didyma* are abundant on rotten wood of *Erica azorica*. The lichen flora is similar to that on the floor of the Caldeira do Faial, as reported by PURVIS & JAMES (1993).

## MATERIALS AND METHODS

Most specimens mentioned below were collected by the first author during a two-weeks hiking tour on São Miguel, São Jorge, Faial and Pico. Intensive collecting was possible only at a few sites on São Jorge. More interesting sites have been noted for future visits. The material has been examined using an Olympus stereoscope and an

Olympus BH-2 microscope with a measuring eyepiece. Sections were cut by hand using a razor blade. Spot tests were carried out in the usual manner. Many specialists kindly provided assistance.

All material is deposited in the private herbarium of the first author with duplicates in public herbaria as indicated in the species list.

\* indicates new records for the Azores, \*\* new for Laurimacaronesia, \*\*\* new for Europe.

## SPECIES LIST

\**Acarospora umbilicata* Bagl.

The very small, scattered areoles on the rough basaltic lava are inconspicuous and therefore easily overlooked. The thallus surface is more glossy than that of Central European specimens.

*Loc.*: São Jorge, Velas, supralittoral basalt-cliffs below Hotel São Jorge, 38°40,8'N, 28°12,7'W; alt. 10 m, on sun-exposed rocks, 2.viii.2001, B 15716.

\*\* *Arthothelium crozalsianum* (de Lesd.) de Lesd.

*Loc.*: São Miguel, Lagoa das Furnas, road along northern shore, 37°45'N, 25°19'W; alt. 285 m, on smooth bark of unknown tree, 31.vii.2001, B 15731. - São Jorge, Lournal I, garden hedge, alt. 550 m, on *Buxus sempervivens*, 4.viii.2001, B 15948.

\*\* *Bacidia friesiana* (Hepp) Koerb.

*Loc.*: São Miguel, Lagoa das Furnas, wayside trees along northern shore, 37°45'N, 25°19'W; alt. 285 m, *Laurus azorica*, 31.vii.2001, B 15730.

\*\* *Belonia incarnata* (Th. Fr.) Graeve ex Th. Fr.

The Azorean area exceeding 2000 m is small and limited to the summit of the volcano of Pico. In comparison with the other regions of Laurimacaronesia of similar altitude (Cañadas on Teide, Tenerife; peaks surrounding the Caldeira de Taburiente, La Palma) the flora of the upper part of Pico is very poor (PURVIS et al. 1994).

Isolated and situated above the main cloud layer, the local climate of the summit (2351 m) is harsh, cold, windswept, exposed to the sun and very dry (TUTIN 1953). Ecological habitats are rather uniform. Virtually no lichens can be observed on the summit itself. Interesting sites are concentrated at the old crater rim at 2200 m. The rocks on the outside are covered with species similar to acid mine spoil heaps (*Placopsis gelida*, *Porpidia platycarpoides*, *P. crustulata*, *Amygdalaria pelobotryon*, *Lecanora polytropa*, *Stereocaulon macaronesicum*, *S. azoreum*). The surface of the main-winds protected NE to SE exposed inner side, a sickle-shaped, steep, 10 to 40 m high brittle wall of pumice and lava debris is richly structured with small caves and niches. A carpet of mosses, predominantly *Racomitrium lanuginosum* (Hedw.) Brid. covers the loose ground. On its decaying tufts, on small earth accumulations and roughly structured rocks PURVIS et al. (1994) have already encountered the only site of arctic-alpine lichens on the Azores. *Belonia incarnata* and *Micarea assimidata* are additions to their species list of this location.

*Loc.*: Pico, Pico mountain, inner side of west crater rim, alt. 2200 m, 7.viii.2001, on detritus of *Racomitrium lanuginosum*, B 15975.

\* *Buellia aethalea* (Ach.) Th. Fr.

*Loc.*: São Jorge, Velas, supralittoral basalt-cliffs below Hotel São Jorge, 38°40,8'N, 28°12,7'W; alt. 10 m, on sun-exposed rocks, 2.viii.2001, B 15724, on basalt.

\* *Buellia subdisciformis* (Leight.) Vain.

On sun-exposed supralittoral basalt in association with *Acarospora umbilicata*, *Buellia aethalea*, *Lecanora gangaleoides*, *Pyxine cocoes*, *Phaeophyscia hirsuta*, *Pterygiopsis* sp., *Xanthoria parietina* incl. var. *ectanea*, *Caloplaca* sp., *Catillaria atomarioides*, *Ramalina lacera*, *Toninia mesoidea* and some others.

Already known from some fog touched, coastal-near lava outcrops around 500 m alt. on the Canary Islands (Tenerife [Topham & Walker

1982], and from La Gomera [ETAYO & BERGER, *in prep.*]).

*Loc.*: São Jorge, Velhas, supralittoral basalt-cliffs below hotel "São Jorge", 38°40,8'N, 28°12,7'W; alt. 10 m, on sun-exposed rocks, 2.viii.2001, B 15981.

\* *Byssoloma marginatum* (Arnold) Sérusiaux

Reported from the Canary Islands by Purvis *et al.* (1992) and from Madeira by KALB & HAFELLNER (1992).

*Loc.*: São Miguel, Lagoa das Furnas, road along northern shore, 37°45'N, 25°19'W; alt. 285 m, on basal trunk of unknown tree, 31.vii.2001, B 15733, det. E. Sérusiaux, with *B. leucoblepharum* (Nyl.) Vainio.

*Calicium hyperelloides* Nyl.

The spectrum of calicioid lichens on the Azores is extremely small. The warm and very moist climate causes a rapid destruction of decorticated wood and favours the overgrowing of all fitting substrata by bryophytes. This is the only *Calicium* on the Azores, as has been previously mentioned by TIBELL (1981) and ARVIDSSON (1990). *C. hyperelloides* is a widely distributed sub-tropical species and the only one with the combination of an excipulum with faint white pruina and a KC + orange thallus.

*Loc.*: São Miguel, Sete Cidades, avenue to church, 37°51,8'N, 25°48'W; alt. 255 m, on *Cupressus* sp., 29.vii.2001, B 15738.

\* *Canoparmelia texana* (Tuck.) Elix & Hale

Beside *C. caroliniana* (Nyl.) Elix & Hale, recorded by TAVARES (1952), this is the second species of *Canoparmelia* in the Azores. *C. texana* has been reported from the Canary Islands by ØSTHAGEN & KROG (1976).

*Loc.*: São Miguel, Ponta Delgada, Parque José do Canto, alt. 80 m, on *Camellia sinensis*, 29.vii.2001, B 15794, det. H. Sipman.

\* *Catillaria atomarioides* (Müller Arg.) Kilius

Reported from various locations in Madeira (KALB & HAFELLNER 1992), nearly all above 1000 m alt.

*Loc.*: São Jorge, Velas, supralittoral basalt-cliffs below Hotel São Jorge, 38°40,8'N, 28°12,7'W; alt. 10 m, on sun-exposed rocks, 2.viii.2001, B 15739, 15748.

*Cetraria aculeata* (Schreber) Fr.

A very scanty specimen, growing not in species-typical tufts, but intermingled with *Cladonia diversa*, *Asperges* and therefore collected by incident. Previously reported from the same and only Azorean location by APTROOT (1989).

*Loc.*: Pico, Pico mountain, inner side of west crater rim, alt. 2200 m, 7.viii.2001, on decaying *Racomitrium lanuginosum*, B 15764.

\* *Chaenotheca furfuracea* (L.) Tibell

*Loc.*: São Jorge, Fajã do Alem, alt. 250 m, on shaded rotting roots of *Hedychium gardnerianum*, 4.viii.2001, B 15749.

\* *Chromatochlamys muscorum* (Fr.) H. Mayrh. & Poelt

Reported from the Canary Islands by TAVARES (1952), and known from La Palma & Tenerife (HERNÁNDEZ-PADRÓN 2001).

*Loc.*: São Jorge, path from Piquinho da Urze to Fajã do Cubre, 38°36'N, 27°5,3'W; alt. 350 m, on base of *Erica azorica*, 3.viii.2001, B 15713.

\* *Cladonia cyathomorpha* Stirt. ex W. Watson

Morphologically similar to *C. pyxidata* (L.) Hoffm., but of bluish grey-brown colour and in all much smaller (diameter of dry cups only 3 mm). According to Ahti (in lit.) a member of the *C. humilis* complex. Recorded in HERNÁNDEZ-PADRÓN (2001) from the Canary Islands without locality.

*Loc.*: São Jorge, Velhas, E slope of Morro Grande, 38°40,8'N, 28°12,8'W; alt. 80 m, over bryophytes on compressed, full sun-exposed volcanic sediments, 1.viii.2001, B 15754, dupl. H, det. T. Ahti. (KOH+ reddish, C-, KC+ reddish, UV-).

*Cladonia didyma* (Fée) Vainio

A widespread South, Central and - to a much lesser extent - North American species with various chemotypes, known also from East Asia, Australia and South Africa. Already reported as *C. vulcanica* Zollinger by APTROOT (1989).

New island record.

The small, hardly 5 mm tall, densely arranged mats of podetia are very conspicuous because of their attractive vividly red coloured apothecia. On São Jorge it has been observed only in the fog-swept bush vegetation of the northern slope between 300 and 550 m.

This specimen contains thamnolic acid (= var. *vulcanica* (Zoll. & Moritzi) Vain.).

*Loc.*: São Jorge, path from Piquinho da Urze to Fajã do Cubre, 38°36'N, 27°5,3'W; alt. 350 m, on rotten wood of *Erica azorica*, 3.viii.2001, B 15759, dupl. H, det. T. Ahti.

*Cladonia floerkeana* (Fr.) Flörke

Contains thamnolic acid and corresponds well with material from mainland Portugal (Ahti pers. com.), while the barbatic and didymic acid strain is much more common in other European countries. Known already from the Azores (TAVARES 1952), but not from other Laurimacaronesian groups.

*Loc.*: São Jorge, path from Piquinho da Urze to Fajã do Cubre, 38°36'N, 27°5,3'W; alt. 350 m, on *Erica azorica*, 3.viii.2001, B 15762, det. T. Ahti.

*Cladonia nana* Vain.

This sterile specimen is similar to a *Leproloma* sp. It is composed of an inconspicuous primary thallus on a closed cottony basal layer. Previously reported by APTROOT (1989) and ARVIDSSON (1990). The Azores is the only area in Europe

where this American species, known from Paraguay to Florida (AHTI 2000), has been encountered.

*Loc.*: São Miguel, Sete Cidades, 37°52'N, 25°48'W, alt. 250 m, in earthy crevice on a roadside wall, 29.vii.2001, B 15758, dupl. H, det. T. Ahti.

\* *Cladonia pocillum* (Ach.) Grogn.

Cosmopolitan on xeric basic soils, but evidently very rare on the Azores.

*Loc.*: Pico, Pico mountain, inner side of crater rim, alt. 2200 m, on soil and over *Racomitrium lanuginosum*, 7.viii.2001, B 15817.

\* *Cladonia rangiformis* Hoffm. var *gracillima* (Mont.) Ahti

This is a distinct variation with round-shaped, dense, max. 1-2 cm high, round tufts of very delicate, brittle podetia on xeric, hard compressed volcanic ash. Growing also as a decumbent primary thallus with few podetia.

*Loc.*: São Miguel, main road crossing the western crater rim W of Sete Cidades, alt. 400 m, richly abundant on SE exposed road embankment, 29.vii.2001, B 15750, dupl. H, det. T. Ahti; with *Stereocaulon azoricum*, *Porpidia platycarpoides*, *Bacidia scopulicola* and *Trapelia coarctata*.

\* *Cliostomom griffithii* (Sm.) Coppins

Richly fertile material.

*Loc.*: São Miguel, Sete Cidades, avenue to church, 37°51,8'N, 25°48'W; alt. 255 m, on overhanging wood of *Ilex* sp., 29.vii.2001, B 15769.

\* *Endocarpon pusillum* Hedwig

Unlike the lichen floras of Madeira and the Canary Islands, xeric terrestrial lichen communities ("Bunte Erdflechtengesellschaft") with cyanobacterial photobionts are rather scarce in the Azores. No species of *Peltula*, *Heppia*,

*Endocarpon* or *Catapyrenium* have been recorded previously.

*Loc.*: São Jorge, Velas, supralittoral basalt-cliffs below Hotel São Jorge, 38°40,8'N, 28°12,7'W; alt. 10 m, on sun-exposed rocks, 2.viii.2001, B 15862; - Path from Loural to Fajã do Alem, alt. 350 m, on sun-exposed rhyolite with *Peltula euploca* and *Phaeophyscia hirsuta*, 4.viii.2001, det. O. Breuss, B 15739, 15748.

\* *Hypotrachyna taylorensis* (M. E. Mitch.) Hale

*Loc.*: São Jorge, path from Piquinho da Urze to Fajã do Cubre, 38°36'N, 27°5,3'W; alt. 350 m, 3.viii.2001, B 15836, det. H. Sipman.

\*\* *Julella sericea* (A. Massal.) Coppins

*Loc.*: São Jorge, Fajã de São João, 38°34'N, 27°57'W; alt. 20 m, on *Dracaena draco* near the church, 4.viii.2001, B 15822; det. A. Aptroot; with *Pyrenula acutalis* and *Mycocomrothelia confusa*.

\*\* *Micarea assimilata* (Nyl.) Coppins

*Loc.*: Pico, Pico mountain, inner side of west crater rim, alt. 2200 m, on decaying *Racomitrium lanuginosum* in sheltered niche, 7.viii.2001, B 15764.

\*\* *Mycocomrothelia confusa* D. Hawksw.

*Loc.*: São Jorge, Fajã de S. João, 38°34'N, 27°57'W; alt. 20 m, on *Dracaena draco* near the church, 4.viii.2001, B 15822. - São Miguel, Lagoa do Fogo, laurel relict forest 2 km S along path descending to Praia, alt. 320 m, on bark of *Ocotea foetens*, 30.vii.2001, B 15887, B 15979; with *Pyrenula laevigata*, det. A. Aptroot.

*Mycoporum antecellens* (Nyl.) R.C. Harris in Harris

Reported by PURVIS & JAMES (1993) from Caldeira do Faial.

*Loc.*: São Miguel, Lagoa das Furnas, road along northern shore, 37°45'N, 25°19'W; alt. 285 m, on

bark of unknown tree, 31.vii.2001, B 15969.

\*\*\* *Mycoporum sparsellum* Nyl.

A neotropic-subtropical lichen (Florida, Colombia) with a white spotted thallus and 2-celled, brownish spores, at first glance similar to *Melaspilea* sp.

*Loc.*: São Miguel, Lagoa do Fogo, relict laurisilva along path to Praia, 37°45,6'N, 25°28'W; alt. 320-350 m, on smooth bark of *Laurus azorica*, 30.vii.2001; B 15717, det. J. Etayo, (with *Pyrenula* spp.).

*Nephroma hensseniae* P. James & F.J. White

This endemic species was described from Pico and Terceira (JAMES & WHITE 1987) and also found in Faial (PURVIS & JAMES 1993). All locations are situated in the central group of the Azorean islands. New island record.

*Loc.*: São Jorge, path from Piquinho da Urze to Fajã do Cubre, 38°36'N, 27°5,3'W; alt. 350 m, on *Erica azorica*, 3.viii.2001, B 15963.

\* *Opegrapha ochrocheila* Nyl.

*Loc.*: São Miguel, tourist path 1 km N of Sete Cidades, alt. 350 m, on *Hydrangea macrophylla*, 29.vii.2001, B 15719.

\* *Opegrapha vermicellifera* (Kunze) Laundon

*Loc.*: São Miguel, Sete Cidades, avenue to church, 37°51,8'N, 25°48'W; alt. 255 m, on decorticated trunc of *Ilex* sp., 29.vii.2001, B 15769, 15819. - road cut on the way from Praia to Lagoa do Fogo, alt. 100 m, on dead stems of *Hydrangea macrophylla*, 30.viii.2001; B 15954.

\* *Opegrapha vulgata* Ach.

*Loc.*: São Jorge, Manadas, churchyard of S. Barbara, alt. 20 m, on stubs of palm-fronds, 3.viii.2001, B 15823.

*Parmelinopsis minarum* (Vain.) Hale & Elix

Formally reported for "Laurimacaronesia" by PURVIS et al. (1992) without giving further details as to the location. ETAYO (1998) recorded it from La Gomera. New island record.

*Loc.*: São Jorge, path from Piquinho da Urze to Fajã do Cubre, below the bridge crossing the creek, 38°36,7'N, 27°55,35'W, alt. 120-180 m, on north-facing basalt below trees, 3.viii.2001, B 15854.

*Parmotrema mellisii* (C.W. Dodge) Hale

*Loc.*: São Jorge, 1 km E of Pico de Esperança, 38°39'N, 28°05'W, open scrub-vegetation with *Erica azorica* and *Juniperus brevifolia*, alt. 650 m, 2.viii.2001, B 15703.

\* *Peltula euploca* (Ach.) Poelt

*Loc.*: São Jorge, path from Loural to Fajã do Alem, alt. 350 m, on sun-exposed rhyolithe, 4.viii.2001, B 15856, with *Endocarpon pusillum* and *Phaeophyscia hirsuta*.

\* *Pertusaria hymenea* (Ach.) Schaerer

In contrast to the frequent abundance of this lichen on the western group of the Canary Islands this species has not been reported before from the Azores.

*Loc.*: São Jorge, Manadas, churchyard of Santa Barbara, alt. 20 m, on *Salix* sp., 3.viii.2001, B 15725.

\* *Phaeophyscia hispidula* (Ach.) Moberg

*Loc.*: São Jorge, path from Piquinho da Urze to Fajã do Cubre, bridge crossing the creek, 38°36,7'N, 27°55,35'W, alt. 180 m, on soil-encrusted basalt, 3.viii.2001, B 15864; with *Phaeophyscia endococcina* and *Heterodermia japonica*. - São Miguel, Lagoa do Fogo, path to Praia, alt. 380 m, inside a "levada" on concrete above waterlevel, 30.7.2001, B 15866, 15867, all specimens det. R. Moberg.

*Phyiscia tribacioides* Nyl.

Reported from the Azores by APTROOT (1989) and from Madeira by ARVIDSSON & WALL (1985). New island record.

*Loc.*: São Miguel, western rim of Caldeira de Sete Cidades, NW of Vista do Rei, 37°50,3'N, 25°47,7'W; alt. 400 m, on wood of *Cryptomeria japonica*, 29.vii.2001, B 15839, det. H. Sipman. - São Jorge, Ribeira do Cedro, 37°43'N, 25°28'W; alt. 500 m, on *Hydrangea macrophylla* in garden-hedge, 4.viii.2001, B 15880,

\* *Porina aenea* (Wallr.) Zahlb.

Frequent on shaded roots in road-cuts near the coast.

*Loc.*: São Miguel, tourist path 1 km N of Sete Cidades, alt. 320-350 m, on dead stems of *Hydrangea macrophylla* and roots of *Laurus azorica*, 29.vii.2001, B 15719, 15875.

\* *Porina borrieri* (Trevisan) D. Hawksw.

*Loc.*: São Miguel, Lagoa das Furnas, road along northern shore, 37°45'N, 25°19'W; alt. 285 m, on bark, 31.vii.2001, B 15879, - ibidem, on *Alnus glutinosa*, B 15974, with *Phaeographis dendritica*.

\* *Porina chlorotica* (Ach.) Müller Arg.

*Loc.*: São Jorge, Velas, basalt-cliffs below Hotel São Jorge, 38°40,8'N, 28°12,7'W; alt. 10 m, supralittoral on basalt, 2.viii.2001, B 15930.

*Pseudopyrenula diluta* (Fée) Müller Arg.

TAVARES (1952) reported this species from the Azores without giving further information.

*Loc.*: São Miguel, Lagoa do Fogo, relict laurel forest 2 km S on descendent path to Praia, alt. 330 m, on smooth bark of *Laurus azorica*, 30.vii.2001, B 15889, det. A. Aptroot; with *Graphis insidiosa* and *Thelotrema lepadinum*.

\* *Pyrenula acutispora* Kalb & Hafellner

The most frequent *Pyrenula* sp. on smooth bark of various trees.

*Loc.*: São Jorge, path from Ribeira do Cedro to Loural, alt. 550 m, on *Buxus sempervivens* in a garden hedge, B 15885. - Fajã de S. João, 38°34'N, 27°57'W; alt. 20 m, on *Dracaena draco* near the church, 4.viii.2001, B 15822. - São Miguel, Lagoa Sete Cidades, along the road on the northwest crater rim, alt. 450 m, 29.vii.2001, B 15785. - Lagoa das Furnas, road along northern shore, 37°45'N, 25°19'W; alt. 285 m, on *Alnus glutinosa*, 31.vii.2001, B 15891, 15974, det. A. Aptroot; with *Porina borrieri* and *Pertusaria hymenea*.

\* *Ramalina lacera* (With.) J. Laundon

*Loc.*: São Miguel, Lagoa das Furnas, road along northern shore, 37°45'N, 25°19'W; alt. 285 m, on unknown bark, 31.vii.2001, B 15894.

\* *Ramalina subpusilla* (Nyl.) Krog & Swinscow

Thriving along the south coast of São Jorge and Faial as mass-vegetation in closed *Erica* bushland on dusty needleless twigs. This distinct but undescribed lichen community has not been recognized before on the Azores and all the abundant species (*Rinodina anomala*, *Scoliciosporum umbrinum*, *Opegrapha* sp.) are new records.

*Loc.*: São Jorge, Velas, E slope of Morro Grande, 38°40,8'N, 28°12,8'W; alt. 80 m, 1.viii.2001, B 15895. - Faial, c. 500 m W of Varodouro, road along the south coast, alt. 20 m, 8.viii.2001, B 15704.

\* *Rinodina anomala* (Zahlb.) H. Mayrh. & Giralte

A mediterranean-atlantic species growing with *Ramalina subpusilla* and *Scoliciosporum umbrinum* (see above). Known also from La Palma, Canary Islands (GIRALTE & MAYRHOFER 1994). HAFELLNER's report (1995a) - linked to

TOPHAM & WALKER (1982) - correctly belongs to *R. madeirensis*, as the authors described a dark-brown hypothecium, whereas that of *R. anomala* is definitely colourless.

*Loc.*: São Jorge, Velas, E slope of Morro Grande, 38°40,8'N, 28°12,8'W; alt. 80 m, on dusty twigs of *Erica azorica*, 1.viii.2001, B 15988.

\* *Rinodina intermedia* Bagl.

A ground dwelling species with spores containing four deformed *Physcia*-type loculi. Previously mentioned in Laurimacaronesia by BERGER & ETAYO (1998) and MAYRHOFER et al. (2001) from the Canary Islands. A worldwide distribution map was published by the latter.

*Loc.*: São Jorge, Velas, supralittoral basalt-cliffs below Hotel São Jorge, 38°40,8'N, 28°12,7'W; alt. 10 m, on sun-exposed rocks, 2.viii.2001, B 15740.

\* *Scoliciosporum umbrinum* (Ach.) Arn.

This newly recorded species is especially frequent on dusty dead twigs of *Erica azorica* near the coast, but can also be found on moist, acid substrates from coast to peak.

*Loc.*: São Jorge, Velas, supralittoral basalt-cliffs below Hotel São Jorge, 38°40,8'N, 28°12,7'W; alt. 10 m, on basalt, 2.viii.2001, B 15723. - Velhas, E slope of Morro Grande, 38°40,8'N, 28°12,8'W; alt. 80 m, on dead twigs of *Erica azorica*, 1.viii.2001, B 15907. - Faial, Cabeço Gordo, road 100 m N of the television transmitter, alt. 1020 m, on road gravel, 5.viii.2001, B 15906, with *Placopsis gelida*, *Stereocaulon* sp.

\* *Strigula taylorii* (Carroll ex Nyl.) R.C. Harris

The dimensions of spores, 30-40 x 6-7 µm, are larger than given by PURVIS et al. (1992). Known also from the Canary Islands (ETAYO 1998).

*Loc.*: São Miguel, Lagoa das Furnas, trees along road on northern shore, 37°45'N, 25°19'W; alt.

285 m, on *Alnus glutinosa*, 31.vii.2001, B 15877, with *Graphis elegans*.

*Thelotrema isidioides* (Borrer) R. Sant.

Previously reported by PURVIS & JAMES (1993) from Faial. New island record.

*Loc.*: São Jorge, descending road from Pico de Esperança to Norte Grande, *Erica azorica*-*Juniperus brevifolia* belt, alt. 600 m, on decorticated twigs of *Erica azorica*, 2.viii.2001, B 15893.

\* *Toninia mesoidea* (Nyl.) Zahlb.

A rare species on maritime rocks (TIMDAL 1991) previously reported by KALB & HAFELLNER (1992) from Madeira.

*Loc.*: São Jorge, Velhas, supralittoral basalt-cliffs below hotel "São Jorge", 38°40,8'N, 28°12,7'W; alt. 10 m, on sun-exposed basalt, 2.viii.2001, B 15862.

\* *Xanthoria candelaria* (L.) Th. Fr.

Formerly reported by ARVIDSSON (1990) on rock from Madalena (Pico). This species was not listed by HAFELLNER (1995a, 1999).

*Loc.*: São Jorge, Fajã do Alem, path from Ribeira Funda to Fajã de São João, Loural, 300 m, on the base of a basalt wall with the next and with *Phaeophyscia orbicularis*, 4.viii.2001, B15937.

\* *Xanthoria fallax* (Hepp) Arnold

*Loc.*: São Jorge, Fajã do Alem, path from Ribeira Funda to Fajã do S. João, Loural, 300 m, 300 m, 4.viii.2001, B 15937.

#### LICHENICOLOUS FUNGI

\* *Abrothallus parmotrematis* Diederich ined.

*A. parmotrematis* is known from Madeira (KALB & HAFELLNER 1992) and from the Canary Islands (CALATAYUD & BARRENO 1995).



*Loc.*: São Jorge, 1 km E of Pico de Esperança, 38°39'N, 28°05'W, open scrub-vegetation with *Erica azorica* and *Juniperus brevifolia*, alt. 650 m, on *Parmotrema mellisii*, 2.viii.2001, B 15703.

\* *Biatoropsis usnearum* Räsänen

DIEDERICH & CHRISTIANSEN (1994) did not record this common cosmopolitan heterobasidiomycete from the Azores.

*Loc.*: São Miguel, Lagoa das Furnas, wayside trees along northern shore, 37°45'N, 25°19'W; alt. alt. 285 m, 31.vii.2001, on *Usnea* sp., B 15729.

\*\*\* *Laeviomyces fallaciosus* Haf. & Kalb

It is with some hesitation that this very inconspicuous parasite is reported here, as it was described before only on *Buellia multispora* (KALB 1990) from Hawaii. Our specimen is congruent in all details. A second *Laeviomyces*, *L. pertusariicola* (Nyl.) D. Hawksw., reported by HAWKSWORTH (1981) on *Hafellia disciformis*, has conidia of almost the same size, but the conidiomata of the latter are much bigger (100 µm in diam.) against 45-60 x 30-45 µm in our specimen.

*Loc.*: São Miguel, Ponta Delgada, Parque José do Canto, 80 m, on *Buellia erubescens* on dead twigs of *Camellia sinensis*, 29.vii.2001, B 15722.

\*\* *Lichenocodium lecanorae* (Jaap) D. Hawksw.

*Loc.*: São Miguel, Sete Cidades, avenue to church with predominately *Cryptomeria japonica* cult., 37°51,8'N, 25°48'W; alt. 255 m, on *Lecanora* sp., 29.vii.2001, B 15804.

\* *Lichenodiplis* aff. *lecanorae* (Vouaux) Dyko & D. Hawksw.

This lichenicolous coelomycete has been found on Madeira and the Canary Islands exclusively on *Caloplaca* sp. (HAFELLNER 1995a) whereas a wide spectrum of hosts is known from elsewhere. Infections of *Lichenodiplis* aff. *lecanorae* on *Pertusaria* sp. may encompass several still

undescribed species, from which e.g. *L. hawksworthii* on *Pertusaria pustulata* has been segregated already (BERGER & DIEDERICH 1996).

*Loc.*: São Jorge, São Jorge, Fajã de S. João, 38°34'N, 27°57'W; alt. 20 m, on *Dracaena draco* near the church, 4.viii.2001, on *Pertusaria hymenea*, B 15822.

\*\* *Opegrapha lamyi* (O.J. Rich ex Nyl.) Triebel

This specimen matches perfectly the features of the description, although the ascospores are somewhat shorter and the host is another species of a badly deformed *Lecanora*.

*Loc.*: São Miguel, gravel road from Praia up to Lagoa do Fogo, alt. 300 m, on *Lecanora* sp. on bark of *Eucalyptus globulus*, 30.vii.2001, B 15706 (associated lichens: *Graphis elegans*, *Opegrapha atra*, *Pertusaria pustulata*, *Arthonia* sp.).

\* *Opegrapha thelotrematis* Coppins

Known also from Madeira (KALB & HAFELLNER 1992) and the Canary Islands (HAFELLNER 1995b).

*Loc.*: São Miguel, gravel road from Praia to Lagoa do Fogo, alt. 400 m, on *Thelotrema lepadinum* on *Erica azorica*, 30.vii.2001, B 15707.

*Plectocarpon macaronesiae* Diederich, Etayo & Sèrus.

New island record.

*Loc.*: São Jorge, path from Piquinho da Urze to Fajã do Cubre, alt. 600 m, on *Lobaria pulmonaria*, 3.viii.2001, B 15701.

\* *Roselliniella cladoniae* (Anzi) Matzer & Hafellner

Previously known in Laurimacaronesia only from the Canary Islands (HAFELLNER 1996).

*Loc.*: São Jorge, gravel road SE of Pico de Esperança, alt. 950 m, on *Cladonia furcata* on

exposed road embankment (with *Stereocaulon azoricum*), 2.viii.2001, B 15703.

**\*\* *Roselliniopsis ventosa* (Rostrup) Alstrup**

Well developed material with asci containing 8 aseptate spores, which are not stuck together. Despite this unique feature of *Roselliniopsis*, *R. ventosa* doubtlessly belongs to this genus. The perithecia are predominantly in the interstices but also emerge in groups of 3-8 perithecia through the otherwise unaltered areoles of the host. They vary from being fully immersed to fully exposed, conglutinated by a scarce subiculum. In addition to the comment of ALSTRUP et al. (1994) our specimen has rather uniform ascospores, which are generally slightly smaller, 10-10,5 µm diameter with a few up to 14x10,5 µm, and well visible germ-pores. The hamathecium consists of typically branched paraphysoides.

The host lichen was found on sun-exposed basalt gravel on the fog-swept crest of volcanoes in the centre of São Jorge. The arctic-boreal host is widely abundant also on other islands of the Azores, but only above 900 m.

*Loc.*: São Jorge, road SE of Pico de Esperança, alt. 900 m, on *Placopsis gelida*, 2.viii.2001, B 15705.

**\*\* *Sphaerellothecium araneosum* (Rehm ex Arnold) Zopf**

*Loc.*: São Jorge, gravel road SE of Pico de Esperança, alt. 900 m, on rocks in road embankment, on *Stereocaulon macaronesicum*, 2.viii.2001, B 15705.

*Sphinctrina tubiformis* A. Massal.

A cosmopolitan lichenicolous fungus on *Pertusaria*, here on *P. hymenea*, which to our knowledge is a new host. It has been reported previously from the Azores by APTROOT (1989). New island record.

*Loc.*: São Miguel, Lagoa das Furnas, roadside trees along northern shore, 37°45'N, 25°19'W; alt. 285 m, on *Alnus glutinosa*, 31.vii.2001, B 15974.

**\* *Stigmidium epiramalinae* (Vouaux) Hafellner**

Frequent in blackened parts of *Ramalina* sp. PITARD & HARMAND (1911) recorded this species from the Canary Islands.

*Loc.*: Faial, W Varodouro, road along the cliffs, alt. 30 m, on *Ramalina subpusilla* on *Erica azorica*, 8.viii.2001, B 15704. - São Jorge, Velhas, supralittoral basalt-cliffs below hotel "São Jorge", 38°40,8'N, 28°12,7'W; alt. 10 m, on *Ramalina requeenii* on north facing basalt, 2.viii.2001, B 15709.

**\* *Syzygospora bachmannii* Diederich & M.S. Christ.**

Already known from the high oceanic NW slope of Madeira (DIEDERICH 1996).

*Loc.*: São Miguel, Caldeira Lagoa Sete Cidades, westside, fog-swept rim, alt. 450 m, on *Cladonia* sp. in cushions of bryophytes on road embankment, 29.vii.2001, B 15702.

**\*\* *Taeniolella punctata* M.S. Christ. & D. Hawksw.**

The first record of this genus of lichenicolous hyphomycetes in Laurimacaronesia.

*Loc.*: São Jorge, path from Piquinho da Urze to Fajã do Cubre, 38°36'N, 27°5,3'W; alt. 350 m, on *Graphis* sp., 3.viii.2001, B 15714, det. J. Etayo.

**\* *Tremella lobariacearum* Diederich & M.S. Christ.**

This fungus on *Lobaria pulmonaria* is widespread and frequently accompanied by *Plectocarpon macaronesicum*. It has been reported from various locations on the Canary Islands and Madeira (DIEDERICH 1996).

*Loc.*: São Jorge, path from Piquinho da Urze to Fajã do Cubre, alt. 600 m, on *Lobaria pulmonaria*, 3.viii.2001, B 15700.

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