New records of lichens and lichenicolous fungi from La Gomera (Canary Islands, Spain), including the new species: Usnea boomiana P. Clerc

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Abstract

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Lichens and lichenicolous fungi are very diverse in the Canary Islands but the flora is still poorly known despite numerous recent publications. For this reason, two field trips were undertaken in 2011 in order to study the lichen flora of La Gomera (western Canary Islands). About 1000 specimens were collected in the different habitats of the island. In addition, c. 200 specimens collected in 1986, and c. 60 specimens from the Oslo herbarium (O) were studied. As a result, an annotated list of 107 newly recorded lichens and lichenicolous fungi from La Gomera is presented. Terricolous, saxicolous, as well as corticolous species are included. Further notes are given for 17 taxa that are new for the Canary Islands. Hypotrachyna meyeri (Zahlbr.) Streim. is new to Macaronesia. In addition, one species is newly described in the genus Usnea Dill. ex Adans., Usnea boomiana P. Clerc characterized notably by large and convex soralia and by the presence of caperatic acid in the medulla.

Keywords

Ascomycetes – Usnea – Mycoflora of Macaronesia – La Gomera – Canary Islands – Taxonomy – Ecology
Introduction

La Gomera is, after El Hierro, the smallest of the seven main islands of the Canary Islands, with an area of about 378 km² (Fig. 1) (Pitard & Proust, 1908). This mid-Atlantic island has a volcanic origin and a circular shape of about 24 km in diameter. The central plateau with a gentle relief and the highest point of the island (1487 m) is surrounded by deeply eroded valleys and ravines. It is densely covered with some of the best preserved laurel forests of the Canary Islands, i.e. by evergreen forests dominated by species of Lauraceae. They are included in the protected Garajonay National Park that covers 40 km² and is recognized as a World Natural Heritage by UNESCO. Lichens and lichenicolous fungi recorded from the island are compiled in Hernandez-Padrón & Pérez-Vargas (2010)’s checklist. Those results were mainly based on previous studies by Etayo (1996, 1998) and Sicilia et al. (2009).

Fig. 1.— Schematic map of the Canary Islands with the situation of Gomera (G). The other islands are: Gran Canaria (C), Fuerteventura (F), El Hierro (H), Lanzarote (L), La Palma (P) and Tenerife (T).

Subsequent lichens and lichenicolous fungi studies for the Canary Islands have been either focusing on species: Rinodina lindingeri Erichsen and R. hallii Tuck. (Giralt et al., 2010a), R. flavosoralifera Tønsberg (Giralt et al., 2010b) and three new lichenicolous fungi (Pérez Vargas et al., 2013); on genera: Buellia De Not. s.l. and some related genera (Giralt & van den Boom, 2011), Dirina Fr. (Tehler et al., 2013), Endothyalina Marbach (Giralt et al., 2010c), Trapelia M. Choisy and Trapeliopsis Hertel & Gotth. Schneid. (Aptroot & Schumm, 2012), and Vahliella P. M. Jørg. (Pérez Vargas et al., 2014); or on diversity of other Canary Islands: El Hierro (van den Boom & Ertz, 2012), Gran Canaria (van den Boom, 2010a), Lanzarote (van den Boom, 2010b), and Tenerife (van den Boom, 2013).

Following the checklist of Hernandez-Padrón & Pérez-Vargas (2010), very few records have been published on La Gomera, i.e. Trapelia gymnidiata Aptroot & Schumm (Aptroot & Schumm, 2012), Lichenodiplis anomalus Etayo & Pérez-Vargas (Pérez-Vargas et al., 2013) and Vahliella isidioidea Pérez-Vargas et al. (Pérez-Vargas et al., 2014). Based on the latter three publications, 675 species were currently recorded to La Gomera.

In the aim of completing our knowledge of the lichens and lichenicolous fungi flora for La Gomera, the authors gathered c. 1200 specimens for the present study. Specimens were collected all over the island, from coastal areas to the highest laurisilva forests up to elevations of c. 1400 m. During a one-week fieldtrip to La Gomera by two of the authors: Pieter van den Boom (PvdB) in summer 2011 and Damien Ertz (DE) in spring 2011, altogether c. 1000 collections of lichens and lichenicolous fungi were gathered. About 200 specimens were also previously collected by Philippe Clerc (PhC) in 1986. 675 species were already known from La Gomera, the study of our material revealed 107 additional new taxa for the island (Table 1), raising the total number to 782. Detailed comments are provided for the 17 taxa newly recognized taxa for the Canary Islands. A new species of Usnea Dill. ex Adans., U. boomiana P. Clerc has been found and is here described as new. A further detailed study of the genus Usnea on La Gomera was done by PhC, based on our specimens with the addition of c. 60 specimens deposited at O. The taxonomy of many groups are still in a state of flux, therefore several of our specimens are still unidentified so far, and are thus not included in this study. Our study highlights the importance of conserving natural habitats such as the laurel forests and rock outcrops, since they are very diverse in rare lichen species.

Material and methods

About 1260 specimens of lichens and lichenicolous fungi were investigated with a light-microscope or binocular microscope. About 65 of these specimens were also studied by TLC according to Culberson & Ammann (1979) or Orange et al. (2001). Anatomical measurements of the cortex, medulla and central axis (%C/%M/%A) in the genus Usnea were established according the method given in Clerc (1987). The checklists of Hernandez-Padrón & Pérez-Vargas (2010), Hafellner (2002, 2005, 2008) and the recent papers mentioned in the introduction were consulted for comparison. Voucher specimens studied are deposited in Bruxelles (BR) for DE (Ertz), in the private herbarium of PvdB (Boom) and in G for PhC (P. Clerc). Localities of material examined are presented in Appendix 1 by collectors for PvdB and DE and by herbaria for G and O for the remaining collectors (including PhC) in a numbering order. Substrate abbreviations are as follow:
Some specimens of various genera were determined by specialists: Mireia Giralt (Amandinea Choisy ex Scheid. & H. Mayrhofer, Buellia De Not., Rinodina (Ach.) Gray), Didier Masson (Hyphophryna (Vain.) Hale), Per Jørgensen (Vahliella P. M. Jørg.) and Emmanuël Sérusiaux (Ramalina Ach.).

**Results**

Table 1 presents the 107 taxa newly recorded from La Gomera and further includes 17 taxa newly recorded from the Canary Islands. This raises the total of taxa of lichens and lichenicolous fungi known from La Gomera to 782.

The results section is divided in two parts: the first one focuses on the genus Usnea with *U. boomiana* described as new and a second one provides notes on the new records for the Canary Islands. All new records for La Gomera are provided in Table 1 with their respective distribution among the other islands of the Canary Archipelago. *Vahliella atlantica* P. M. Jørg. is known from the Canary Islands but its accurate distribution is unknown (Perez-Vargas et al., 2014).

**Notes on the genus Usnea on La Gomera**

*Usnea boomiana* P. Clerc, *spec. nova* (Fig. 2).

MycoBank No.: MB 807125

**Typus: Spain. Canary Islands. El Hierro.** SSE of Frontera, near mountain top, S or road HI–1, N and W side of Montana de la Fuente, along trail in “fayal brezal” forest, 27°44.15’N 17°59.50’W, 1300 m, on *Erica* sp., 31.III.2009, P. van den Boom & B. van den Boom 42838 (holo- : G [G00262105] !; iso- : hb. PvdB!), %C/%M/%A: 7/33/19. Chemistry: usnic and caperatic acids.

Thallus shrubby, to 5 cm long; lateral branches very slightly to distinctly narrowed at attachment point; mature soralia as large or even broader than branch’s diameter, convex with numerous isidiomorphs; cortex shiny and thin; medulla dense and thick containing caperatic acids.

**Table 1.** Species of lichens and lichenicolous fungi, recorded as new from La Gomera, with distribution in the Canary Islands and notes on localities and substrata. All new records for the Canary Islands are in bold. Locality numbers after the species name correspond to the list of localities in Appendix 1. Substrate abbreviations are presented in the Material and Methods section. [Abbreviations: C: Gran Canaria; F: Fuerteventura; G: La Gomera; H: El Hierro; L: Lanzarote; P: La Palma and T: Tenerife].

| Taxa                      | Islands | Collections studied |
|---------------------------|---------|---------------------|
| *Abrothallus chrysanthus* Stein | H P T C F L | 11, Ju, Boom 46078; 27, Ci, Boom 46423 [all on Usnea] |
| *Acarospora heufleriana* Körb. | P T C | L 5, vr, Boom 45973 |
| *Acarospora impressula* Th. Fr. | P | 20, vr, Boom 46472 |
| *Agonimia opuntiella* (Buschardt & Poelt) Vězda | P C | L 41, t, Ertz 16242 |
| *Anomalographis madeirensis* (Tav.) Kalb | P T C | 41, vr, Ertz 16244 |
| *Arthonia dispersa* (Schrad.) Nyl. | | 37, Ertz 16226; 40, Ertz 16233 [all on ut] |
| *Bacidia paramedialis* M. Brand, Coppins, van den Boom & Sérus | P | 6, Lr, Boom 45989; 9, Mr, Boom 46053 |
| *Bacidia sipmanii* M. Brand, Coppins, van den Boom & Sérus | P T | 6, sts, Boom 46006 |
| *Bactrospora thyrsodes* (Stirt.) Llop & van den Boom | H T C F | 51, vr, Ertz 16342 |
| *Baeomyces rufus* (Huds.) Rebent. | P T | 44, vr, Ertz 16269 |
| *Buellia dispersa* A. Massal. | H P T C F | 20, Boom 46240; 22, Boom 46325; 53, P. Clerc P11665-11666 [all on vr] |
| *Buellia griseovires* (Turner & Borrer ex. Sm.) Almb. | H P T C | 2, Er, Boom 45909 |
| *Buellia saxorum* A. Massal. | H P T C | 3, vr, Boom 45910 |
| *Buellia stellulata* (Taylor) Mudd | H T C F | 22, vr, Boom 46324 |
| Taxa                        | Islands | Collections studied |
|----------------------------|---------|---------------------|
| **Buellia tesserata** Körb. | H       | 28, vr, Boom 46460  |
| **Caloplaca canariensis** (Follmann & Poelt) Breuss | P       | 10, sw, Boom 46060  |
| **Caloplaca congadiens** (Nyl.) Zahlbr. | H       | 22, vr, Boom 46307  |
| **Caloplaca flavocitrina** (Nyl.) A. E. Wade | P       | 22, vr, Boom 46312  |
| **Caloplaca pelodella** (Nyl.) Hasse | P       | 12, Lr, Boom 46143  |
| **Catillaria nigroclavata** (Nyl.) Th. Fr. | T       | 3, Sek, Boom 45939; 23, vr, Boom 46355 |
| **Cercidospora macrospora** (Uloth) Hafellner & Nav.-Ros | T       | 48, vr, Ertz 16294, on Lecanora muralis |
| **Cladonia polydactyla** (Fröhrke) Spreng. | T       | 25, st, Boom 46377  |
| **Cladonia ramulosa** (With.) J. R. Laundon | H       | 12, Boom 46412; 27, Boom 46144 [all on st] |
| **Cladonia subulata** (L.) Weber ex F. H. Wigg. | H       | 27, t, Boom 46415   |
| **Cornutispora ciliata** Kalb | T       | 28, vr, Boom 46458A, on an isidiate crust |
| **Dactylospora parasitica** (Fröhrke) Zopf | T       | 23, vr, Boom 46487, on Pertusaria flavicans |
| **Diploschistes caesioplumbeus** (Nyl.) Vain. | P       | 3, sw, Boom 45933   |
| **Endococcus exerrans** Nyl. | 3, s, Boom 45911, on Rhizocarpon sp. |
| **Endococcus propinquus** (Körb.) D. Hawksw. | P       | 22, vr, Boom 46293, on a crust |
| **Endothyalina brandii** Giralt, van den Boom & Elix | H       | 22, vr, Boom 46323  |
| **Enterographa elaborata** (Lyell ex Leight.) Coppins & P. James | P       | 45, ut, Ertz 16272  |
| **Enterographa pitardii** (de Lesd.) Redinger | H       | 47, vr, Ertz 16291  |
| **Fulgensia fulgens** (Sw.) Elenkin | P       | 43, t, Ertz 16260   |
| **Halecania viridescens** Coppins & P. James | P       | 2, Er, Boom 45908   |
| **Hypotrachyna afrorevoluta** (Krog & Swinscow) Krog & Swinscow | 7, Boom 46016;12, Boom 46134; 25, Boom 46394 [all on Er] |
| **Hypotrachyna meyeri** (Zahlbr.) Streim. | 52, Pn, P. Clerc P11628-11630 |
| **Lecania hutchinsiae** (Ach.) A. L. Smith | H       | 6, sts, Boom 46005  |
| **Lecania nigra** van den Boom & Ertz | H       | 23, vr, Boom 46346  |
| **Lecanora flowersiana** H. Magn. | C       | 11, Mr, Boom 46089  |
| **Lecanora sulphurea** (Hoffm.) Ach. | P       | 3, s, Boom 45924; 5, s, Boom 45971; 53, vr, P. Clerc P11655-11658 |
| **Lecidea fuliginosa** Taylor | 3, s, Boom 45929   |
| **Lecidella elaeochroma** f. *soralifera* (Erichsen) D. Hawksw. | P       | 3, Er, Boom 45942   |
| **Lecidella stigmatea** (Ach.) Hertel & Leuckert | P       | 10, sw, Boom 46061  |
| **Lepraria nivalis** J. R. Laundon | H       | 23, vr, Boom 46356  |
| **Lepraria umbricola** Tønsberg | 16, Er, Boom 46185 |
| **Lichenothelia rugosa** (G. Thor) Ertz & Diederich | H       | 48, vr, Ertz 16298, on Diploschistes |
| **Micarea doliformis** (Coppins & P. James) Coppins & Sèrus. | H       | 1, Er, Boom 45890; 27, st, Boom 46414; 54, Lr, P. Clerc P11725-11728 |
| **Micarea micrococcus** (Körb.) Gams ex Coppins | H       | 9, Mr, Boom 46058   |
| **Muellelarea lichenicola** (Sommerf.) D. Hawksw. | H       | 23, vr, Boom 46348a, on Lecania; 43, Pn, Ertz 16261, on Caloplaca |
| **Paralecanographa grumulosa** (Dufour) Ertz & Tehler | H       | 43, vr, Ertz 16256  |
| **Parmotrema tinctorum** (Nyl.) Hale | H       | 21, vr, Boom 46268  |
| **Peccania fontqueriana** P. Moreno & Egea | T       | 23, vr, Boom 46347   |
Lichens and lichenicolous fungi from La Gomera (Canary Islands)

| Taxa                          | Islands | Collections studied |
|-------------------------------|---------|---------------------|
| **Peltula farinosa Büdel**    | H P     | 22, vr, Boom 46329  |
| **Peltula patellata** (Bagl.) Swinscow & Krog | P      | 22, vr, Boom 46301  |
| **Pertusaria flavicans Lamy** | H P     | 23, vr, Boom 46352  |
| **Pertusaria leucosora Nyl.** | F       | 3, s, Boom 45928    |
| **Phaeophyscia hirsuta** (Merensch.) Essl. | P      | 22, vr, Boom 46281  |
| **Phaeophyscia orbicularis** (Neck.) Moberg | H P    | 22, vr, Boom 46308  |
| **Physcia adscendens** (Fr.) H. Oliver | H P T C F L | 23, ush, Boom 46363 |
| **Physconia muscigena** (Ach.) Poelt | P      | 23, vr, Boom 46353  |
| **Placopyrenium bucekiii** (Nádv. & Servít) Breuss | P      | 22, Boom 46309; 41, Ertz 16246; 51, Ertz 16334 [all on vr] |
| **Placynthiella dasoea** (Stirt.) Tønsberg | H P    | 11, w, Boom 46093   |
| **Polycoccum microsticticum** (Leight.) Arnold | P      | 28, vr, Boom 46463, on Dimelaena radiata |
| **Porpidia contrapenenda** (Arnold) Knoph & Hertel | H P T F L | 23, vr, Boom 45912, 45947 |
| **Protoparmelia hierrensis** van den Boom & Ertz | H      | 3, Boom 45919; 28, Boom 46455; 33, Ertz 16195 [all on vr, on Pertusaria sp.] |
| **Rinodina beccarianna var. lavicola** (M. Steiner) Matzer & H. Mayrhofer | H P T F L | 21, vr, Boom 46270 |
| **Rinodina disjuncta** Sheard & Tønsberg | H      | 27, Mr, Boom 46408  |
| **Rinodina gennarii** Bagl.   | T       | 10, vr, Boom 46066  |
| **Rinodina intermedia** Bagl. | P T C   | 21, Boom 46271; 22, Boom 46275 [all on vr] |
| **Rinodina trachytica** (A. Massal.) Bagl. & Carestia | H P T C F L | 28, vr, Boom 46292a |
| **Roccella fuciformis** (L.) DC. | H P T C F L | 19, Pm, Boom 46232; 29, vr, Ertz 16097 |
| **Schenziella physциacearum** (Taylor) Ertz & Tehler | H T     | 33, vr, Ertz 16190  |
| **Schenziella physциacearum** Ertz & Diederich | C       | 48, vr, Ertz 16293, on Physciona |
| **Skyttea lecanorae** Diederich & Etyao | P       | 2, Er, Boom 45907, on a sorediate cf. Lecanora; 29, Pn, Ertz 16099, on Lecanora sp. |
| **Skyttea nitschkei** (Körb.) Sherwood, D. Hawksw. & Coppins | T       | 41, ut, Ertz 16239, on Thelotrema lepadinum |
| **Solenopsis vulturicornis** Bagl. | H P T C | 19, Boom 46220; 23, Boom 46357 [all on vr] |
| **Sparria endlicheri** (Garov.) Ertz & Tehler | H       | 36, vr, Ertz 16221  |
| **Syzygospora physциacearum** Diederich & M. S. Christ. | T       | 49, vr, Ertz 16319, on Physcia tenella |
| **Tephromela deplanata** (J. Steiner) Motyka | H P T F L | 28, vr, Boom 46467 |
| **Tephromela grumosa** (Pers.) Hafellner & Cl. Roux | H P T F L | 28, vr, Boom 46459 |
| **Thelopsis isiaca** Stizenb.  | H P T   | 51, vr, Ertz 16338  |
Thallus shrubby, short, 3–5 cm long, greyish green; branching anisotomic–to-isotomic-dichotomous; trunk short, 1–4 mm long, with a short (1 mm) but distinct jet-black pigmented zone in the basal part. Main branches 0.9 to 1.3 mm large, irregular to fusiform with larger diameter not close to the basal part, usually inconspicuously segmented. Lateral branches very slightly to distinctly narrowed at point of attachment, sometimes fusiform; apices thin with few ramifications; segments terete and cylindrical to slightly fusiform. Foveoles and transverse furrows absent. Pseudocyphellae and maculae absent; papillae numerous, regularly disposed, indistinct to short verrucous. Tubercles spicuously segmented.

Fibrils absent; papillae numerous, regularly disposed, indis- tinctly constricted, but some branches are always ± con- stricted (numerous branches should be checked). The papillae might be almost invisible (indistinct) to well-developed. Soralia might have few to numerous isidiomorphs.

Variability. – The constriction of the lateral branches at attachment points might vary from almost not constricted to distinctly constricted, but some branches are always ± constricted (numerous branches should be checked). The papillae might be almost invisible (indistinct) to well developed. Soralia as well by its particular chemistry (U. esperantiana P. Clerc, U. fragilesens Lyne, U. glabrata (Ach.) Vain., U. glabrescens Vain.) Räsänen, U. lapponica Vain., U. macaronesica P. Clerc and U. substerilis Motyka. Usnea esperantiana has a K+ red medulla (salazinic acid), soralia that are not convex but flat to distinctly convex and efflorescent, often becoming confluent especially towards the tips. Isidiomorphs usually numerous on young and mature soralia; cortex shiny; moderately thin, (6–)7% (–9); medulla thick, dense to lax, (25.5–)30% (–33); axis thin (19–) 25% (–36). Ascomata and conidiomata not observed.

Etymology. – The new species is named after Pieter van den Boom, who collected the type specimen and did a lot of fieldwork on all the Canary Islands since 15 years.

Chemistry. – K-, C-, KC-, P-. Usnic and caperatic acids.

Habitat and distribution. – Usnea bohminiana grows on shrubs and trees of Erica sp. in “fayal brezal” forests or at the edge of laurisilva at around 1300 m of altitude. This species is so far known only from the Canary Islands of La Gomera and El Hierro.
Fig. 2. – *Usnea boomiana* P. Clerc. A. Basal part with blackish pigmentation; B. Main branches; C. Main branch with slightly constricted lateral branches at ramification points; D. Young soralia with isidiomorphs; E. Mature soralia without isidiomorphs; F. Mature soralia a few isidiomorphs; G. Overmature soralia with numerous isidiomorphs; H. Transversal section of a main branch; I. Small verrucous papillae on the cortex.

[A-B: P. van den Boom & B. van den Boom 42838, G; C-E, H: P. Clerc G262116, G; F-G: P. Clerc G262111, G]
are never constricted at point of attachment, a mat cortex and salazinic or psoromic acids in the medulla. *Usnea macarenica* has deeply excavate soralia, strongly constricted lateral branches at point of attachment, a thin and smooth cortex, a broader and very lax medulla with stictic and/or barbatic acids. *Usnea substerilis* has lateral branches that are never constricted at point of attachment, a mat cortex, papillae that are larger and more conspicuous and salazinic and/or barbatic acids in the medulla. Finally, studies of most of the types of North and South American species to find an already published name for this taxon were unsuccessful.

*Paratypes. – Spain, Canary Islands. El Hierro: Frontera, El Golfo, Izique, on *Erica arborea* in Fayal-Brezal, 1200 m, 1.X.1986, P. Clerc G262107 (G); ibid. loc., P. Clerc G262108 (G); SSE of Frontera, Montana de la Fuente, on *Erica* in Fayal-Brezal, 1300 m, 31.III.2009, Boom 42773 (hb. PvdB); ibid. loc., Boom 42771 (hb. PvdB). La Gomera: Garajonay N. P., NE of Igualero, on *Erica arborea* at the edge of laurisilva, 1350 m, 5. IX. 2011, Boom 46370 (hb. PvdB); ibid. loc., Boom 46377 (hb. PvdB); Alajero, Lomo de la Mulata, on *Erica arborea* and *Pinus sp.* in pine plantations, 1320-1340 m, 23-25.IX.1986, P. Clerc G262113 (G); ibid. loc., P. Clerc G262116 (G); ibid. loc., P. Clerc G262117 (G); ibid. loc., P. Clerc G262118 (G); Hermigua, Bosque El Cedro, on *Cassiope salisburiensis* in agricultural landscape, 850-900 m, 5.X.1986, P. Clerc G262110 (G); Hermigua, Las Minheras, on *Laurus sp.* in laurisilva, 1000 m, 27.IX.1986, P. Clerc G262109 (G); Hermigua, Cabezo Alto, on *Erica arborea* on windy ridgeline, 900-1000 m, 27.IX.1986, P. Clerc G262111 (G); Vallehermoso, Montana de la Zarza, on *Ilex* and *Erica arborea* in Fayal-Brezal, 900 m, 26.IX.1986, P. Clerc G262106 (G); ibid. loc., P. Clerc G262111 (G); Valle Grand Rey, Las Cabecillas, on *Erica arborea* in Fayal-Brezal, 1080 m, 23.IX.1986, P. Clerc G262114; ibid. loc., P. Clerc G262115 (G).

### Usnea fragilisens Lyng

**Notes.** – This taxon was mentioned for the first time for the Canary Islands by Tavares (1952) under the name *U. mollis* Stirt., a synonym of *U. fragilisens* (Clerc, 1987). This indication was then taken up again by Champion & Sanchez Pinto (1978), Hafellner (1995) and Hernández Padrón & Pérez-Vargas (2010), “collected on Tenerife”. *Usnea cornuta* Körb. (= *U. inflata* (Duby) Motyka) a frequent and variable species was not mentioned for the Canary Islands in the report of Tavares (1952). There is thus a high probability that the species reported as *U. mollis* by Tavares (1952) was in fact *U. cornuta*. So the report in this paper of *U. fragilisens* on La Gomera is the first credible mention of this species for the Canary Islands. One of the specimens (Hernández & Pérez 56615) out of the two collected by Hernández & Perez on La Gomera corresponds well to the description of *U. fragilisens* given by CLERC (1987) with the stictic acid group as medullary substances. The second specimen (Hernández & Pérez 56616) however differs in the presence of thamnolic acid as medullary substance. This constitutes a new chemotype for *Usnea fragilisens*.

**Material examined.** – 12, Er, Boom 46120; 59, Hernández & Pérez 56615; 60, Hernández & Pérez 56616.

### Usnea glabrescens var. fulvoreagens Räsänen (= *U. fulvoreagens* (Räsänen) Räsänen)

**Notes.** – This tax is a new record for the Canary Islands. CLERC (2011) considered it as a synonym of *U. glabrescens* because there are many intermediate forms, especially in North America. However, in Europe, most of the specimens can be reliably identified to one or the other varieties, justifying their acceptance. *Usnea glabrescens* var. *fulvoreagens* has well delimited circular soralia that are not at all or little excavate whereas *U. glabrescens* var. *fulvoreagens* has distinctly excavate *U. lapponica* like soralia. See CLERC (2007) for a detailed description of this taxon.

**Material examined.** – 12, Er, Boom 46119; 24, Er, Boom 46386/a; 55, Pn, P. Clerc G262086.

### Usnea subflammea P. Clerc

**Notes.** – Described from the Azores (CLERC, 2006), with a paratype collected on Tenerife, this species has been later found to occur in the low montane forests of South America (TRUONG et al., 2013).

**Material examined.** – 4, Er, Boom 45951; 66, Dahl 841/10; 58, Hernández & Pérez 56609; 68, Krog & Østhagen 3428b, 3429b.

### Usnea subgracilis Vain. (= *U. hesperina* Motyka, *U. schadenbergiana* sensu P. Clerc [non Göpp. &Stein.])

**Notes.** – Details on this taxon are given in CLERC (1997), HERRERA CAMPOS et al. (1998) and TRUONG et al. (2013). In the Canary Islands it was known so far from Tenerife and La Palma (Hernández Padrón & Pérez-Vargas, 2010). It is with *U. articulata* (L.) Hoffm. one of the most frequent pendulous *Usnea* species on the western Islands of this archipelago.

**Material examined.** – 1, Er, Boom 45871, 45881, 45887, 45888; 7, Er, Boom 46029; 11, Lx, Boom 46110; 16, Er, Boom 46187, 46193; 24, Er, Boom 46387/a; 27, Er, Boom 46440; 57, Er, P. Clerc G262104; 66, Dahl 841/10b; 67, Dahl 844/13b; 62, Defago Perez & Hainard 298232; 59, Hernández & Pérez 56614; 68, Krog & Østhagen 3428c; 69, Krog & Østhagen 3283d.

### Usnea wosmuthii Räsänen

**Notes.** – In the Canary Islands, this species was known from La Palma. It occurs on Tenerife as well. Details on this taxon are given in CLERC (2011). Both specimens collected on La Gomera have salazinic and barbatic acids in the medulla.

**Material examined.** – 56, Cs, P. Clerc G26119; 63, Eu, P. Clerc G26120.
Notes on the new taxa records for the Canary Islands

*Abrothallus chrysanthus* Stein

*Notes.* – In Macaronesia, this lichenicolous fungus was previously only known from the Azores (van den Boom & Ertz, 2014). It is closely related to *A. usneae* Rabenh., but *A. chrysanthus* has ascospores of 8-10 × 3-4 µm and those of *A. usneae* are 14-18 × 5-7 µm.

*Material examined.* – 11, Ju, Boom 46078; 27, Ci, Boom 46423 [all on *Usnea*].

*Arthonia dispersa* (Schrad.) Nyl.

*Notes.* – *Arthonia dispersa* is a pioneer and a weak competitor. In Europe, it is widely distributed from boreal to Mediterranean areas (Wirth, 1995), but not recorded from the British Islands in Smith et al. (2009). It was only known from Madeira in Macaronesia (Carvalho et al., 2008).

*Material examined.* – 37, Ertz 16226; 40, Ertz 16233 [all on *ut*].

*Buellia saxorum* A. Massal.

*Notes.* – This species was previously not recorded from Macaronesia (Carvalho et al., 2008; Gabriel, 2008; Hernandez-Padron & Pérez-Vargas, 2010; Giralt & van den Boom, 2011).

*Material examined.* – 3, vr, Boom 45910.

*Caloplaca pollinii* (A. Massal.) Jatta

*Notes.* – This species was previously not mentioned from Macaronesia (Carvalho et al., 2008) nor the Azores (Gabriel, 2015). It was however recorded from mainland Portugal, especially in Algarve, where it is a rather common species (van den Boom & Giralt, 2012).

*Material examined.* – 12, Lt, Boom 46143.

*Cladonia polydactyla* (Flörke) Spreng.

*Notes.* – This species was only mentioned from Madeira in Macaronesia (Carvalho et al., 2008) and the Azores (Gabriel, 2015).

*Material examined.* – 25, st, Boom 46377.

*Endococcus exerrans* Nyl.

*Notes.* – Several species of this genus are known from the Canary Islands (Hernandez-Padron & Pérez-Vargas, 2010), with the exception of this taxon. It was neither mentioned from Madeira (Carvalho et al., 2008) nor from the Azores (Gabriel, 2015). This taxon can be easily mistaken for *E. rugulosus* Nyl. which has ascomata of 0.2-0.3 mm and ascospores of 12-22 × 5-8 µm, broadly ellipsoid. Our specimen has ascomata of 0.05-0.1 mm and ascospores of 15-20 × 5-6 µm, fusiform.

*Material examined.* – 3, s, Boom 45911, on *Rhizocarpon* sp.

*Hypotrachyna afrorevoluta* (Krog & Swinscow) Krog & Swinscow

*Notes.* – This species was overlooked for *H. revoluta* (Flörke) Hale (Smith et al., 2009) and not reported for Macaronesia before (Carvalho et al., 2008; Gabriel, 2015; Hernandez-Padron & Pérez-Vargas, 2010).

*Material examined.* – 7, Boom 46016; 12, Boom 46134; 25, Boom 46394 [all on *Er*].

*Hypotrachyna meyeri* (Zahlbr.) Streim.

*Notes.* – We have found usnic acid and salazinic acid by TLC. This species is widely distributed in the tropics and was not reported from Macaronesia before (Carvalho et al., 2008; Gabriel, 2015; Hernandez-Padron & Pérez-Vargas, 2010).

*Material examined.* – 52, Pn, P. Clerc P11628-11630.

*Lecidea fuliginosa* Taylor

*Notes.* – Although this species is widely distributed in Europe where it is not rare, it was previously not reported from Macaronesia (Carvalho et al., 2008; Gabriel, 2015; Hernandez-Padron & Pérez-Vargas, 2010).

*Material examined.* – 3, s, Boom 45929.

*Lecidella elaeochroma f. soralifera* (Erichsen) D. Hawksw.

*Notes.* – This mainly coastal forma (Smith et al., 2009) has been found on small branches and twigs of an *Erica* shrub. It is abundantly covered with apothecia and the thallus has partly yellowish soredia. This forma is not mentioned in Hernandez-Padrón & Pérez-Vargas (2010).

*Material examined.* – 3, Er, Boom 45942.

*Lepraria umbricola* Tønsberg

*Notes.* – This species is widespread in Europe (Smith et al., 2009). In Macaronesia it was already known from the Azores (Gabriel, 2008).

*Material examined.* – 16, Er, Boom 46185.

*Tephromela deplanata* (J. Steiner) Motyka

*Notes.* – This species was found on north exposed vertical rock growing with *Lecanora sulphurella* Hepp. Kalb & Hafellner (1992) treated this species and recorded it from eastern Mediterranean areas. It was previously not mentioned from Macaronesia (Carvalho et al., 2008; Gabriel, 2008; Hernandez-Padron & Pérez-Vargas, 2010).

*Material examined.* – 28, vt, Boom 46467.
Tephromela grumosa (Pers.) Hafellner & Cl. Roux

Notes. – This species was found on a steep, sheltered and shaded rock face, with the characteristic bluish soralia but without apothecia. It was previously not mentioned from Macaronesia (Carvalho et al., 2008; Gabriel, 2008; Hernandez-Padron & Pérez-Vargas, 2010).

Material examined. – 28, vr, Boom 46459.

Verrucaria muralis Ach.

Notes. – This species has often been found on mortar of a wall, but it is easily overlooked. In Macaronesia it was only known from the Azores (Gabriel, 2008).

Material examined. – 10, sw, Boom 46064.

Zwackhia circumducta (Nyl.) Ertz

Notes. – In Macaronesia it was previously recorded from Madeira as Opographa circumducta Nyl. (Carvalho et al., 2008).

Material examined. – 35, vr, Ertz 16203.

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References

Aptroot, A. & F. Schumm (2012). A new terricolous Trapelia and a new Trapeliopsis (Trapeliaceae, Baeomycetales) from Macaronesia. Lichenologist 44: 449-456.

Carvalho, P., R. Figueira & M. P. Jones (2008). Os líquenes e fungos liquênicaos (Fungi) dos arquipélagos da Madeira e das Selvagens. The lichens and lichenicolous fungi (Fungi) of the Madeira and Selvagens archipelagos. In: Borges, P. A. V. et al. (ed.), Lisagem dos Fungos, Flora e Fauna Terrestres dos Arquipélagos da Maderia e Selvagens. A List of the Terrestrial Fungi, Flora and Fauna of Madeira and Selvagens Archipelagos: 95-122. Direccio Regional do Ambiente da Madeira and Universidade dos Acores, Funchal and Angra do Heroísmo.

Champion, C. L. & L. Sánchez Pinto (1978). Catalogo preliminar de los Liquenes de Las Islas Canarias. Instituto de Estudio Canarios, Santa Cruz de Tenerife.

Clerc, P. (1987). Systematics of the Usnea fragilescens aggregate and its distribution in Scandinavia. Nord. J. Bot. 7: 479-495.

Clerc, P. (1997). Notes on the genus Usnea Dill. ex Adans. Lichenologist 29: 209-215.

Clerc, P. (2006). Synopsis of Usnea (lichenized Ascomycetes) from the Azores with additional information on the species in Macaronesia. Lichenologist 38: 191-212.

Clerc, P. (2007). Usnea. In: Nash III, T., C. Gries & F. Bungartz (ed.), Lich. Fl. Gr. Sonoran Desert Region 3: 302-335. Lichens Unlimited, Arizona State University, Tempe.

Clerc, P. (2011). Usnea. In: Thell, A. & R. Moberg (ed.), Nordic Lichen Fl. 4: 107-127. Dexter.

Culberson, C. F. & K. Ammann (1979). Standardemethode zur Dünnenschichtchromatographie von Flechtensubstanzen. Herzogia 5: 1-24.

Etayo, J. (1996). Aportación a la flora liquénica de las Islas Canarias. I. Hongos liquênicaos de Gomera. Bull. Soc. Linn. Provence 47: 93-110.

Etayo, J. (1998). Aportación a la flora liquénica de las Islas Canarias. IV. Líquenes epífitos de La Gomera (Islas Canarias). Trop. Bryol. 14: 85-107.

Gabriel, R. (2015). Base de dados da biodiversidade dos Açores. Líquenes. Universidade dos Açores [http://www.azoresbioportal.uac.pt/pesquisa.php?lang=pt&str=1].

Giralt, M. & P. P. G. van den Boom (2011). The genus Buellia s.l. and some additional genera of Physciaceae in the Canary Islands. Nova Hedwigia 92: 29-55.

Giralt, M., P. P. G. van den Boom & J. A. Elix (2010a). “Buellia” lindingeri and Rinodina hallii (Physciaceae), two closely related species. Bryologist 113: 99-105.

Giralt, M., P. P. G. van den Boom, T. Tønsberg & J. A. Elix (2010b). New data for Rinodina flavosoralifera. Lichenologist 42: 693-696.
Giralt, M., P. P. G. van den Boom & J. A. Elix (2010c). Endohyalina, the genus in the Physciaceae to accommodate the species of the Rinodina ericina-group. Mycol. Progr. 9: 37-48.

Hafellner, J. (1995). A new checklist of lichens and lichenicolous fungi of insular Laurimacaronesia. Mycol. Progr. 9: 37-48.

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 50: 1-14.

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. & I. Pérez-Vargas (2010). Lichenes, lichenicolous fungi. In: Arechavala, M., S. Rodriguez, N. Zúñiga & A. García (ed.), Lista de especies silvestres de Canarias. Hongos, plantas y animales terrestres: 71-102. Gobierno de Canarias.

Herrera Campos, M., P. Clerc & T. H. Nash III (1998). Pendulous species of Usnea from the temperate forests in Mexico. Bryologist 101: 303-329.

Kalb, K. & J. Hafellner (1992). Bemerkenswerte Flechten und lichenicolle Pilze von der Insel Madeira. Herzogia 9: 45-102.

Orange, A., P. W. James & F. J. White (2001). Microchemical Methods for the Identification of Lichens. British Lichen Society, London.

Pérez-Vargas, I. & S. Pérez-Ortega (2014). A new endemic Ramalina species from the Canary Islands (Ascomycota, Lecanorales). Phytotaxa 159: 269-278.

Pérez-Vargas, I., J. Etayo & C. Hernández-Padrón (2013). New species of lichenicolous fungi from the Canary Islands. Phytotaxa 99: 58-64.

Pérez-Vargas, I., C. Hernández-Padrón, P. L. Pérez de Paz, P. P. G. Van den Boom & P. M. Jørgensen (2014). A new species in the lichen genus Vahliella from the Canary Islands, including a key to Vahliellaceae, Parmariaceae, and Coccocarpitaceae in Macaronesia. Phytotaxa 167: 183-188.

Pitard, J. & L. Proust (1908). Les Îles canaries. Flore de l'archipel. Paris.

Sicilia, D., C. Hernández & A. R. Burgaz (2009). The genus Cladonia in Garajonay National Park, La Gomera, Canary Islands. Cryptog. Mycol. 30: 305-316.

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

Tavares, C. N. (1952). Contributions to the lichen flora of Macaronesia. I. Lichens from Madeira. Portugaliae Acta Biol., Sér. B, Sit. 3: 308-391.

Tehler, A., D. Ertz & M. Irestedt (2013). The genus Dirina (Roccellaceae, Arthoniales) revisited. Lichenologist 45: 427-476.

Truong, C., J. M. Rodriguez & P. Clerc (2013). Pendulous Usnea species (Parmeliaceae, lichenized Ascomycota) in tropical South America and the Galapagos. Lichenologist 45: 505-543.

van den Boom, P. P. G. (2010a). New or interesting lichens and lichenicolous fungi of Gran Canaria (Canary Islands, Spain). Willdenowia 40: 359-367.

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

van den Boom, P. P. G. (2013). Further new or interesting lichens and lichenicolous fungi of Tenerife (Canary Islands, Spain). Stapfia 99: 52-60.

van den Boom, P. P. G. & D. Ertz (2012). Lichens and lichenicolous fungi from El Hierro (Canary Islands), a survey, including five new species. Cryptog. Mycol. 33: 59-97.

van den Boom, P. P. G. & D. Ertz (2014). A new species of Micarea (Pilocarpaceae) from Madeira growing on Usnea. Lichenologist 46: 295-301.

van den Boom, P. P. G. & M. Giralt (2012). Checklist and three new species of lichens and lichenicolous fungi of the Algarve (Portugal). Sydowia 64: 149-207.

Wirth, V. (1995). Die Flechten Baden-Württembergs. 2 Vol. Eugen Ulmer GmbH & Co., Stuttgart.
Appendix 1.

Localities of P. van den Boom collections

1 = NE of Valle Gran Rey, E of Arure, N side of Las Hayas, trail to Las Cabecillas, laurisilva, dominated by *Erica arborea*, 28°07.84'N 17°17.41'W, 950 m, 31.VIII.2011.

2 = NE of Valle Gran Rey, E of Arure, SE of Las Hayas, along road to El Cercado (halfway), near crossing with unpaved road to Barranco de las Lagunetas, a group of some small trees, 28°07.61'N 17°7.18'W, 1050 m, 31.VIII.2011.

3 = NE of Valle Gran Rey, SE of Arure, SE of Chipude, Monumento Natural de la Fortaleza, steep acidic outcrops, 28°08.08'N 17°16.58'W, 1220 m, 31.VIII.2011.

4 = NE of Valle Gran Rey, NE of Arure, Garajonay N.P., S of road TF-713, trail from Montaña de los Mamantiales to Raso de Don Pedro, laurisilva, 28°08.88'N 17°17.55'W, 1185 m, 31.VIII.2011.

5 = NE of Valle Gran Rey, NE of Arure, between two tunnels, along restaurant and mirador César Manrique, acidic outcrops on top of hill, 28°07.19'N 17°19.04'W, 710 m, 1.IX.2011.

6 = Edge of Garajonay N.P., SW of Vallehermoso, S of Epina, Chorros de Epina, laurisilva along Ermita San Isidro and a few mature solitary *Myrica faya* trees, 28°09.78'N 17°18.03'W, 820 m, 1.IX.2011.

7 = SW of Vallehermoso, NE of Epina, trail from transmitter mast, to NE, to Vallehermoso, open *Laurus* *Myrica* forest, alongside the trail, 28°10.32'N 17°17.56'W, 835 m, 1.IX.2011.

8 = Garajonay N.P., along road TF-713, La Laguna Grande, parking lot and open area in laurisilva, at the edge of forest, 28°07.60'N 17°15.53'W, 1260 m, 2.IX.2011.

9 = Garajonay N.P., SSW of Hermigua, S of El Cedro, along trail from campsite to Ermita Nuestra Sonora de Lourdes, laurisilva with some mature *Laurus* s.l. trees (> 1 m diam.), 28°07.66'N 17°13.40'W, 1225 m, 2.IX.2011.

10 = Garajonay N.P., c. 5 km SSW of Hermigua, along road TF-711, mirador de el Rejo, wall of acidic stones, horizontal surface, steep N exposed outcrops and a *Myrica faya* tree, 28°07.53'N 17°12.44'W, 1190 m, 2.IX.2011.

11 = Garajonay N.P., c. 5.5 km SSW of Hermigua, along road TF-711, mirador del Bailadero, mixed trees along small trail and E exposed acidic outcrops, 28°07.39'N 17°12.65'W, 1050 m, 2.IX.2011.

12 = Garajonay N.P., N of alto del Garajonay, trail at starting point along road TF-713, just W of Alto de Contadero, trail to the north, to La Laguna Grande, in laurisilva, 28°07.09'N 17°15.15'W, 1030 m, 2.IX.2011.

13 = Garajonay N.P. (N edge), secondary road from TF-713 near La Laguna Grande to visitors centre, mirador de Vallehermoso in laurisilva, 28°09.43'N 17°14.81'W, 1010 m, 3.IX.2011.

14 = SW of Agulo, visitors centre, garden with mixed trees and shrubs (e.g. *Rhamnus glandulosa*, *Teine ignifolia*), 28°10.70'N 17°12.88'W, 875 m, 3.IX.2011.

15 = SW of Agulo, NE of visitors centre, near mirador de Agulo, Erica shrubs, sloping and facing sandstone and soil along small secondary road, 28°10.85'N 17°12.62'W, 705 m, 3.IX.2011.

16 = Garajanoy N.P. (N edge), along secondary road from TF-713 near La Laguna Grande to the north (visitors centre), somewhat in the centre of laurisilva, 28°08.88'N 17°15.22'W, 670 m, 3.IX.2011.

17 = Garajonay N.P., N of alto del Garajonay, trail at starting point along road TF-713, just SE of Alto de Contadero, trail to the south, to the top of Garajonay, 28°06.74'N 17°14.69'W, 1435 m, 3.IX.2011.

18 = Garajonay N.P. (most western edge), NNE of Arure, mirador Alajeró, edge of laurisilva with mainly *Erica arborea* and *Myrica faya*, 28°08.99'N 17°18.56'W, 1035 m, 4.IX.2011.

19 = E of Vallehermoso, along road to Agula, near Tamargada, N exposed steep outcrops along road, *Senecio kleinia* and two Palm trees, 28°09.00'N 17°18.56'W, 1005 m, 4.IX.2011.

20 = E of Vallehermoso, road to Agula, just E of Tamargada, along small paved (asphalt) road to the south, with *Juniperus* and *Erica* shrubs, outcrops and N exposed wall with big acidic stones, 28°11.43'N 17°13.97'W, 670 m, 4.IX.2011.

21 = 0.7 km S of Vallehermoso, small road to Garabato, a valley from N to S, with W exposed steep outcrops, 28°10.47'N 17°15.59'W, 280 m, 4.IX.2011.

22 = N of Alajeró, c. 1 km south of Imada, trail to Drago de Agalá, halfway from parking lot to the Dragon tree, steep N exposed outcrops along unpaved trail, steep W exposed outcrops along paved trail and S exposed sloping outcrops in field, 28°04.56'N 17°14.73'W, 945 m, 5.IX.2011.

23 = c. 1.2 km NNW of Imada, El Paso-Alajeró trail, from the main road (direction Alajeró) to the south, to Imada, trail on strong slope, with steep N exposed acidic outcrops and W exposed slope with shrubs and outcrops, 28°05.35'N 17°15.04'W, 1245 m, 5.IX.2011.

24 = Garajonay N.P., NE of Igualero, near crossing TF-713 with road to the south, to Alajeró, c. 0.5 km to the south, roadside shrubs and trees at the edge of laurisilva, mainly *Erica arborea*, 28°06.16'N 17°14.80'W, 1350 m, 5.IX.2011.

25 = Garajonay N.P., NE of Igualero, crossing TF-713 with road to the south, to Alajeró (starting point of trail to top of mountain 'Garajonay'), paved and unpaved trail with mainly *Erica arborea* shrubs and trees, 28°06.50'N 17°14.67'W, 1395 m, 5.IX.2011.

26 = La Gomera, Garajonay N.P., NE of Igualero, crossing TF-713 with road to the south, to Alajeró (starting point trail to Los Roques and Imada), trail with mainly *Erica arborea* and *Myrica faya* shrubs and trees, 28°06.46'N 17°14.57'W, 1370 m, 5.IX.2011.

27 = Garajonay N.P., E of Las Hayas, trail in laurisilva from La Laguna Grande to the southeast, to the top of mountain Garajonay, 28°07.23'N 17°15.18'W, 1260 m, 6.IX.2011.

28 = NE of Valle Gran Rey, c. 1.5 km S of Arure, between two tunnels, along restaurant and mirador César Manrique, steep acidic outcrops on top of hill, 28°07.16'N 17°19.04'W, 720 m, 6.IX.2011.
Localities of D. Ertz collections

29 = San Sebastián, road to Hermigua, La Gerode, path to Casas de Jaragán and Montaña Ismael, 28°07'45"N 17°08'50"W, 642 m, 29.III.2011.

30 = La Laja, Mirador de la Laja (Degollada de Peraza), 28°05'58"N 17°11'05"W, 965 m, 29.III.2011.

31 = Cumbre de Tajaque, near Mirador de Agando, 28°06'38"N 17°13'05"W, 1216 m, 30.III.2011.

32 = N of Imada, trail E of the island summit (Garajonay), W of the road from Alajero to Vallehermoso, 28°06'31"N 17°14'37"W, 1397 m, 30.III.2011.

33 = San Sebastián de la Gomera, Roque de Berruga, 28°05'34"N 17°11'17"W, 870 m, 30.III.2011.

34 = Hermigua, Mirador del Bailadero, 28°07'24"N 17°18'30"W, 980 m, 2.IV.2011.

35 = Vallehermoso, Chorros de Epina, trail "Ermita San Isidro" to Alojera, 28°09'06"N 17°16'57"W, 872 m, 31.III.2011.

36 = Vallehermoso, S of La Meseta, trail from the crest road to Vallehermoso, at the limit of the Parque Nacional de Garajonay, 28°09'25"N 17°14'43"W, 1044 m, 31.III.2011.

37 = N of Las Hayas, S of the road from Vallehermoso to Playa de Santiago, along the trail to Arure, 28°08'51"N 17°17'27"W, 1065 m, 31.III.2011.

38 = Las Rosas, Parque National de Garajonay, along road going from S to N, S of Mirador de Vallehermoso, in laurisilva. 28°08'29"N 17°15'03"W, 1065 m, 31.III.2011.

39 = Las Rosas, Parque National de Garajonay, Alajero, Lomo de la Mulata, 1320-1340 m, Pine plantations, 23.IX.1986. PhC.

40 = Hermigua, Cabezo Alto, 900-1000 m, windy ridge, 27.IX.1986. PhC.

41 = Hermigua, El Cedro, Las Mimbreras, Laurisilva, 27.IX.1986. PhC.

42 = Vallehermoso, Montana Quemada, above El Carmen, rocky slope, 1000-1100 m, 27.IX.1986. PhC.

43 = Garajonay N. P., La Carbonera, 700 m, I.2007. H&P.

44 = Garajonay N. P., Cumbre del Carbonero, 900-1000 m, I.2007. D&H.

45 = Vallehermoso, Montana de la Zarza, Fayal-Brezal, 900 m, 26.IX.1986. PhC.

Localities Herbarium Geneva (G) - Collectors: H&P = Hernández & Pérez; D&H = Defago Paroz & Hainard; PhC = Clerc.

46 = Alajero, Lomo de la Mulata, 1320-1340 m, Pine plantations, 23.IX.1986. PhC.

47 = Hermigua, Bosque El Cedro, 850-900 m, cultivated landscape 5.X.1986. PhC.

48 = Garajonay N. P., La Carbonera, 700 m, I.2007. H&P.

49 = Garajonay N. P., Cumbre del Carbonero, 900-1000 m, I.2007. D&H.

50 = Garajonay N. P., Sobre Los Loros, 900 m, I.2007. D&H.

51 = Valle Gran Rey, Las Cabecillas, 1080 m, 23.IX.1986. PhC.

52 = Versant N. du Mt. Garajonay, Barranco del Cedro, Caurisilve, 1250 m, 7.IV.2004. D&H.

53 = Vallehermoso, Mirador de Igualero, dry slope, 25.IX.1986. PhC.

Localities Herbarium Oslo (O) - Collectors: D = Dahl; K&Ø = Krog & Østhagen.

54 = Vallehermoso, Montana de la Zarza, Fayal-Brezal, 900 m, 26.IX.1986. PhC.

55 = Cero de Armas above Arure, 950 m, in Erica arborea forest, 11.I.1973. D.

56 = Monte de la Zarza, S. of Vallehermoso, Lauris forest, 1000 m, 11.I.1973. D.

57 = La Atalaya, S. of Hermigua, 980 m, 12.I.1973. D.

58 = Lomo del Lomito Plantado, S. of Quemado, 1100 m, 16.IV.1978. K&Ø.

59 = Bco De la Calle del Monte below Cabeso Alto, 850-900 m, in Laurel forest, 16.IV.1978. K&Ø.

Localities Herbarium Oslo (O) - Collectors: D = Dahl; K&Ø = Krog & Østhagen.

60 = N of Las Hayas, Las Creces, laurisilva, 28°08'21"N 17°19'32"W, 1015 m, 1.IV.2011.

61 = Bco De la Calle del Monte below Cabeso Alto, 850-900 m, in Laurel forest, 16.IV.1978. K&Ø.