

## LICHENS AND LICHENICOLOUS FUNGI OF ESTREMADURA, PORTUGAL, COLLECTED IN 2015

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(Received 20 March, 2017; Accepted 30 May, 2017)

One hundred and seven taxa of lichens and lichenicolous fungi are recorded from Estremadura (Portugal), six species are new records to Europe (mainland), *Anisomeridium macropycnidiatum*, *Bacidina brittoniana*, *Graphis striatula*, *Lichenopeltella physciae*, *Pyrenula complanata* and *Thelotrema laurisilvae*. An alphabetical species list with collection localities, substrate and occasional further annotations is presented.

Key words: ascomycetes, biodiversity, distribution, Mycobiota of Portugal, substrata

### INTRODUCTION

The lichens and lichenicolous fungi of mainland Portugal have received considerable attention in recent years. Several new species were described in the following publications: Giralt and van den Boom (2013), Giralt *et al.* (2011), Marques *et al.* (2013), Rodrigues *et al.* (2011), van den Boom and Giralt (2012). Only Rodrigues *et al.* (2011) mentions a new species from the Sintra region, *Lecanora solediomarginata* Rodrigues, Terrón et Elix. The first known paper, which record specimens from Sintra is Arnold (1868). However, many interesting species are known from this region. Papers in which some records from this area can be found are Burgaz and Ahti (2009), Carballal *et al.* (2010), Carvalho (2012), Coutinho (1916), Giralt (2010), Lepista and Aptroot (2016), Muñoz and Hladún (2011), Rico and Barrasa (2011), Sampaio (1970), Tavares (1942, 1945, 1946, 1947, 1951, 1956, 1957, 1958*a, b*, 1960), van den Boom (2005), van den Boom and Etayo (2000) and van den Boom *et al.* (1990). Sintra is the only place in continental Europe of which *Glyphis cicatricosa* is known and where it is still present (see below). The very rare *Coccocarpia erythroxyli* (Spreng.) Swinscow et Krog is also known from the Sintra, but has not been found this time. A survey of lichens and lichenicolous fungi from Estremadura by van

den Boom (2006) treated 228 species from the small hill São Bartolomeu. Below, one hundred and seven taxa are recorded of which six species are new to Europe: *Anisomeridium macropycnidiatum*, *Bacidina brittoniana*, *Graphis striatula*, *Lichenopeltella physciae*, *Pyrenula complanata* and *Thelotrema laurisilvae*. No checklist of lichens and lichenicolous fungi, from Portugal exists. However, a checklist from Algarve is published by van den Boom and Giralt (2012).

## MATERIALS AND METHODS

More than 300 specimens of lichens and lichenicolous fungi were examined, all collected by the author and his wife on volcanic rock, on soil and on trees and shrubs, in 16 localities in the western part of central Portugal, mainly in the area Sintra. Several records are compared with those of the occurrence in Algarve (van den Boom and Giralt 2012). All the known lichen species or lichenicolous fungi from this area are listed below. Identifications mostly follow Smith *et al.* (2009), or Wirth *et al.* (2013), except for recently monographed taxa. Specimens have been identified using standard microscopical techniques. Macroscopical measurements refer to dry herbarium specimens and microscopical measurements refer to material examined in water. Chemical constituents were identified by the standard methods of thin-layer chromatography (TLC) according to Orange *et al.* (2001).

Localities (in Province Estremadura) visited by P. and B. van den Boom.

- 1 = W of Lisbon, W of Sintra, Quinta da Regaleira, park with mixed (mature) trees and shrubs, 38° 48.07' N, 9° 24.00' W, 150 m, 15 October 2015.
- 2 = W of Lisbon, W of Sintra, Park de la Monserrate, with mixed (mature) trees and shrubs, 38° 47.30' N, 9° 25.07' W, 150 m, 15 October 2015.
- 3 = W of Lisbon, 4 km N of Sintra, Casal da Granja, garden of Quinta Verde Sintra, mixed trees and shrubs, 38° 49.54' N, 9° 23.43' W, 180 m, 15 October 2015.
- 4 = W of Lisbon, WSW of Sintra, Capuchos Convent, park with mixed (mature) trees and shrubs, 38° 46.90' N, 9° 26.10' W, 320 m, 16 October 2015.
- 5 = W of Lisbon, W of Sintra, NW of Azoia, Cabo da Roca, coastal trail to Pedra da Ursa, small *Pinus* forest and surroundings, with *Juniperus* shrubs and outcrops, 38° 47.10' N, 9° 29.5' W, 100 m, 16 October 2015.
- 6 = W of Lisbon, N of Sintra, Mafra, park 'do Cerco' along Palace National, with mixed trees and shrubs, 38° 56.29' N, 9° 19.49' W, 235 m, 17 October 2015.
- 7 = W of Lisbon, WSW of Sintra, WSW of Linhó, along road to Malveira da Serra, nature park Quinta do Pisão, trail in forest with mainly *Pinus* trees, 38° 45.50' N, 9° 24.60' W, 160 m, 18 October 2015.
- 8 = W of Lisbon, SW of Sintra, just NE of Malveira da Serra, small road to the north, forest with mainly *Cupressus lusitanica*, 38° 45.50' N, 9° 26.70' W, 250 m, 18 October 2015.
- 9 = W of Lisbon, SW of Sintra, NE of Malveira da Serra, small road, to the west, to Peninha, forest with *Pinus* and *Cupressus lusitanica*, 38° 46.03' N, 9° 26.21' W, 340 m, 18 October 2015.

- 10 = W of Lisbon, SW of Sintra, NNW of Malveira da Serra, Peninha, edge of forest with acidic outcrops, 38° 46.13' N, 9° 27.56' W, 450 m, 18 October 2015.
- 11 = W of Lisbon, SW of Sintra, N of Malveira da Serra, nearby Capuchos Convent, trail PR6, to Barragem, in forest with mainly *Pinus*, *Pittosporum* and shrubs, 38° 46.65' N, 9° 25.82' W, 350 m, 18 October 2015.
- 12 = W of Lisbon, Queluz, garden of the National Palace, mixed trees and shrubs, 38° 44.95' N, 9° 15.61' W, 85 m, 19 October 2015.
- 13 = Lisbon (SW), N of Belem, botanical garden Ajuda, mixed (tropical) trees and shrubs, 38° 42.41' N, 9° 12.09' W, 85 m, 19 October 2015.
- 14 = W of Lisbon, S of Sintra, garden of National Palace de la Pena, mixed (mature) trees and shrubs, 38° 47.23' N, 9° 23.42' W, 490 m, 20 October 2015.
- 15 = W of Lisbon, SW of Sintra, public garden Merendas, mixed (mature) trees and shrubs, 38° 47.72' N, 9° 23.51' W, 235 m, 21 October 2015.
- 16 = W of Lisbon, Sintra, near historic centre, public garden Libertad, mixed (mature) trees and shrubs, 38° 47.74' N, 9° 23.14' W, 225 m, 21 October 2015.

## RESULTS

### Annotated species list

First records for Europe are marked by an asterisk. The locality numbers before the collection numbers correspond with the list of localities above. All records from *Cupressus* regards *Cupressus lusitanica*.

*Abrothallus bertianus* De Not. – Loc. 10 on *Cupressus*, 53814 (on *Xanthoparmelia*).

*Abrothallus parmeliarum* f. *chrysanthus* Stein – Loc. 4 on acidic outcrop, 53735 (on *Usnea*).

*Acrocordia gemmata* (Ach.) A. Massal. – Loc. 8 on *Cupressus*, 53803.

*Agonimia octospora* Coppins et P. James – Loc. 2 on *Metrosideros*, 53944.

*Agonimia opuntiella* (Buschardt et Poelt) Vězda – Loc. 12 on *Fraxinus*, 53854; Loc. 13 on unidentified tree, 53863. – First recorded for Portugal by van den Boom (2005).

*Agonimia tristicula* (Nyl.) Zahlbr. – Loc. 12 on *Fraxinus*, 53852.

*Anaptychia runcinata* (With.) J. R. Laudon – Loc. 10 on acidic rock, 53821.

*Anema nummularium* (Dufour) Nyl. – Loc. 13 on calcareous rock, 53861.

\**Anisomeridium macropycnidiatum* van den Boom – Loc. 14 on *Acer palmatum*, 53881, on *Cupressus*, 53890, 53904, 53905.

*Anisomeridium polyperi* (Ellis et Everh.) M. E. Barr – Loc. 7 on *Eucalyptus*, 53818, on *Olea*, 53794.

*Arthonia leucopellaea* (Ach.) Almq. – Loc. 12 on *Fraxinus*, 53853.

*Arthonia phaeophysciae* Grube et Matzer – Loc. 13 on unidentified tree, 53864 (on *Phaeophyscia orbicularis*).

*Arthonia pruinata* (Pers.) A. L. Sm. – Loc. 2 on *Quercus suber*, 53723.

*Arthonia stellaris* Kremp. – Loc. 12 on *Fraxinus*, 53945.

*Bacidia arceutina* (Ach.) Arnold – Loc. 15 on wood, 53921.

*Bacidia friesiana* (Hepp) Körb. – Loc. 12 on unidentified tree, 53855.

*Bacidia laurocerasi* (Duby) Vain. – Loc. 15 on unidentified tree, 53917.

*Bacidia punica* Llop – Loc. 12 on *Cupressus*, 53837, 53838.

*Bacidia rosella* (Pers.) De Not. – Loc. 16 on *Fraxinus*, 53941.

*Bacidia rubella* (Hoffm.) A. Massal. – Loc. 8 on *Cupressus*, 53802; Loc. 12 on *Fraxinus*, 53850.

*Bacidia viridifarinoso* Coppins et P. James – Loc. 16 on *Taxus*, 53930. – Recorded by van den Boom (2006) from São Bartolomeu.

\**Bacidina brittoniana* (Riddle) La Greca et Ekman – Loc. 12 on unidentified tree, 53856.

*Bacidina chlorotricula* (Nyl.) Vězda et Poelt – Loc. 15 on wood of fence, 53922, 53923, 53926; Loc. 16, on wood of fence, 53933, 53938. – This species is recorded from Beira Litoral and Tras-os-Montes by Llop (2007).

*Bacidina phacodes* (Körb.) Vězda – Loc. 5 on *Quercus suber*, 53747, 53748; Loc. 8 on *Cupressus*, 53799, 53804, 53805. – Llop (2007) recorded this species already from Estremadura without an indication from the locality.

*Biatoridium monasteriense* Körb. – Loc. 2 on *Ficus*, 53724; Loc. 12 on *Fraxinus*, 53840; Loc. 13 on *Platyclusus*, 53857.

*Byssoloma leucoblepharum* (Nyl.) Vain. – Loc. 4 on *Erica*, 53740; Loc. 14 on conifer, 53883.

*Catapyrenium psoromoides* (Borrer) R. Sant. – Loc. 13 on unidentified tree, 53865.

*Chaenotheca brunneola* (Ach.) Müll. Arg. – Loc. 10 on *Cupressus*, 53813.

*Cladonia cyathomorpha* Walt. Watson – Loc. 4 on acidic outcrop, 53738.

*Cladonia squamosa* (Scop.) Hoffm. var. *subsquamosa* (Leight.) Vain. – Loc. 4 on acidic outcrop, 53728.

*Cladonia subcervicornis* (Vain.) Kernst. – Loc. 10 on acidic outcrop, 53829, 53832.

*Coenogonium luteum* (Dicks.) Kalb et Lücking – Loc. 14 on *Cupressus*, 53888.

*Coenogonium tavaresianum* (Vězda) Lücking, Aptroot et Sipman – Loc. 5 on *Pinus*, 53764; Loc. 8 on *Cupressus*, 53797.

*Cresponia premnea* (Ach.) Egea et Torrente – Loc. 4 on tree-fern, 53811.

*Dendrographa decolorans* (Turner et Borrer) Ertz et Tehler – Loc. 2 on *Cupressus*, 53714; Loc. 5 on *Pinus*, 53767. – This specimen was originally identified as *Schismatomma albocinctum* (Nyl.) Zahlbr., but Ertz and Tehler (2011) proposed it as a synonym of *Dendrographa decolorans*.

*Endohyalina ericina* (Nyl.) Giralt, van den Boom et Elix – Loc. 5 on cone of *Pinus*, 53777.

*Enterographa crassa* (DC.) Fée – Loc. 1 on *Castanea*, 53700.

*Enterographa elaborata* (Leight.) Coppins et P. James – Loc. 1 on *Castanea*, 53705.

*Enterographa hutchinsiae* (Leight.) A. Massal. – Loc. 1 on *Castanea*, 53699.

*Fellhaneropsis myrtillicola* (Erichsen) Sérus. et Coppins – Loc. 14 on *Cupressus*, 53891.

*Fulvophyton solediatum* (Sparrius, P. James et M. A. Allen) Tehler et van den Boom – Loc. 5 on acidic outcrops, 53773. – This species is not rare in Algarve where it recently has been found fertile (van den Boom and Giralt 2012). This specimen is sterile.

*Glyphis cicatricosa* Ach. – Loc. 14 on *Fagus*, 53880.

*Graphis scripta* (L.) Ach. – Loc. 14 on *Fagus*, 53884; Loc. 15 on unidentified tree, 53918; Loc. 16 on *Camellia*, 53935.

\**Graphis striatula* (Ach.) Spreng. – Loc. 16 on *Camellia*, 53943. This is a pantropical species, easily overlooked for *G. elegans* (Sm.) Ach., in the field, but our specimen has a completely carbonised excipulum and it lacks chemical compounds.

*Gyalideopsis muscicola* P. James et Vězda – Loc. 4 on acidic outcrop, 53773.

*Heterodermia japonica* (M. Sato) Swinscow et Krog – Loc. 4 on acidic outcrop, 53739; Loc. 10 on acidic outcrop, 53833.

*Hypotrachyna britannica* (D. Hawksw. et P. James) Coppins – Loc. 9 on *Pinus*, 53807.

*Intralichen lichenicola* (M. S. Christ. et D. Hawksw.) D. Hawksw. et M. S. Cole – Loc. 16 on wood, 53929 (on *Bacidina chlorotricula*).

*Jamesiella anastomosans* (P. James et Vězda) Lücking, Sérus. et Vězda – Loc. 14 on *Cupressus*, 53889.

*Lecania cyrtella* (Ach.) Th. Fr. – Loc. 15 on wood of fence, 53925.

*Lecania subfuscata* (Nyl.) S. Ekman – Loc. 12 on *Fraxinus*, 53848. – The 3-septate ascospores and the granular-subsquamulose thallus fit well with the species concept, but no pycnidia were found. However, the long curved conidia of  $30\text{--}55 \times 1\text{--}1.5 \mu\text{m}$ , are characteristic for this species.

*Lecanographa lyncea* (Sm.) Egea et Torrente – Loc. 4 on *Quercus suber*, 53720.

*Lecanora argentata* (Ach.) Röhl. – Loc. 7 on *Fraxinus*, 53792.

*Lecanora chlorotera* Nyl. – Loc. 15 on wood, 53927.

*Lecanora praepostera* Nyl. (syn.: *Lecanora schistina* (Nyl.) Arnold) – Loc. 5 on acidic outcrop, 53772.

*Lecidella elaeochroma* (Ach.) M. Choisy – Loc. 7 on *Fraxinus*, 53791.

*Leptogium brebissonii* Mont. – Loc. 7 on *Olea*, 53795. – López de Silanes *et al.* (2012) recorded it from many localities in Portugal.

*Leptogium cochleatum* (Dicks.) P. M. Jørg. et P. James – Loc. 4 acidic outcrop, 53737; Loc. 14 on *Cupressus*, 53906. – López de Silanes *et al.* (2012) recorded it from many localities in Portugal.

*Lichenocodium erodens* M. S. Christ. et D. Hawksw. – Loc. 5 on *Pinus*, 53757 (on *Ramalina*).

*Lichenodiplis lecanorae* (Vouaux) Dyko et D. Hawksw. – Loc. 5 on *Pinus*, 53770 (on *Lecanora*).

\**Lichenopeltella physciae* Diederich – Loc. 6 on unidentified tree, 53782 (on *Physcia erumpens*). – This species is described from Papua New Guinea (Aptroot et al. 1997), but also recorded from Bolivia and Ivory Coast (Flakus and Kukwa 2012).

*Lobaria scrobiculata* (Scop.) P. Gaertn. – Loc. 14 on acidic outcrop, 53911.

*Micarea byssacea* (Th. Fr.) Czarnota, Gruzow-Krzemińska et Coppins – Loc. 5 terricolous, 53751, 53752, 53753, 53754; methoxymicareic acid by TLC.

*Micarea doliiformis* (Coppins et P. James) Coppins et Sérus. – Loc. 1 on *Grevillea*, 53702; Loc. 2 on *Thuja*, 53715; Loc. 10 on *Cupressus*, 53815.

*Micarea meridionalis* van den Boom, Brand, Coppins et Sérus. – Loc. 2, on Palm, 53713; Loc. 5 on *Juniperus*, 53755, on *Pinus*, 53763; Loc. 13 on *Grevillea robusta*, 53858, on Palm, 53870. – This species seems to be very common in the Sintra area, where it was found sometimes in rather big populations.

*Micarea micrococca* (Körb.) Coppins – Loc. 11 on *Pittosporum*, 53835; Loc. 14 on *Cupressus*, 53886.

*Micarea peliocarpa* (Anzi) Coppins et R. Sant. – Loc. 7 on *Pinus*, 53790; Loc. 9 on *Pinus*, 53808.

*Milospium graphideorum* (Nyl.) D. Hawksw. – Loc. 2 on *Quercus suber*, 53722 (on unidentified crust).

*Normandina pulchella* (Borrer) Nyl. – Loc. 10 on acidic rock, 53828.

*Opegrapha vermicellifera* (Kunze) J. R. Laundon – Loc. 2 on *Arbutus*, 53710.

*Parmelinopsis minarum* (Vain.) Elix et Hale – Loc. 9 on *Pinus*, 53809.

*Parmotrema robustum* (Degel.) Hale – Loc. 4 on acidic outcrop, 53727.

*Physcia erumpens* Moberg – Loc. 6 on unidentified tree, 53784; Loc. 16 on *Acer*, 53931. – This mainly tropical species has been published as new to Portugal, also from Estremadura, by Moberg (1989), a record from 1931 collected by Degelius.

*Physcia tribacia* (Ach.) Nyl. – Loc. 10 on acidic outcrop, 53824.

*Physcia undulata* Moberg – Loc. 13 on *Erythrina*, 53860. – This mainly tropical species has already been published as new to Portugal, from Estremadura, by Moberg (1989), a record from 1931 collected by Degelius.

*Porina aenea* (Wallr.) Zahlbr. – Loc. 2 on *Metrosideros*, 53725.

*Porina atlantica* (Erichs.) P. M. Jørg. – Loc. 4 on *Cupressus*, 53741; Loc. 14 on *Cupressus*, 53872, on unidentified tree, 53898.

*Porina borrieri* (Trevis.) D. Hawksw. et P. James – Loc. 1 on *Castanea*, 53704.

*Porina coralloidea* P. James – Loc. 14 on *Cupressus*, 53892.

*Porina effilata* M. Brand et Sérus. – Loc. 1 on *Thuja*, 53696; Loc. 4 on *Cupressus*, 53742; Loc. 14 on *Cupressus*, 53871, on *Acer*, 53878, on *Castanea*, 53894, on *Quercus robur*, 53909.

*Porina hibernica* P. James et Swinscow – Loc. 2 on *Arbutus unedo*, 53709; Loc. 15 on *Quercus faginea*, 53919. – Our specimens have black perithecia of ca 0.4 mm diam. and ascospores of  $50\text{--}70 \times 5\text{--}6.5 \mu\text{m}$ , 11–17 septate, which fit well the description in Smith *et al.* (2009). However, these specimens have a thin thallus without isidia. Development of isidia seems to be rather variable within the genus *Porina* (Sérusiaux *et al.* 2007).

*Punctelia borreri* (Sm.) Krog – Loc. 1 on *Castanea*, 53704; Loc. 10 on acidic outcrop, 53820.

\**Pyrenula complanata* (Mont.) Trevis. – Loc. 16 on *Camellia*, 53936. – This species is widely distributed in the tropics (pers. comm. H. Sipman).

*Pyrenula macrospora* (Degel.) Coppins et P. James – Loc. 12 on *Fraxinus*, 53851.

*Pyxine subcinerea* Stirt. – Loc. 13 on *Erythrina*, 53859.

*Ramalina hierrensis* Krog et Østh. – Loc. 5 on *Juniperus*, 53779, on *Pinus*, 53759. – This species is rather common on shrubs in coastal areas, mainly in southern Portugal.

*Ramalina lacera* (With.) J. R. Laundon – Loc. 5 on *Pinus*, 53766.

*Ramalina pusilla* Le Prévost – Loc. 5 on *Pinus*, 53758.

*Ramalina siliquosa* (Huds.) A. L. Sm. – Loc. 5 on acidic outcrop, 53768.

*Ramalina subgeniculata* Nyl. – Loc. 5 on *Pinus*, 53760, 53769, 53778. – This species seems to be rather common in coastal areas of Sintra.

*Ramonia chrysophaea* (Pers.) Vězda – Loc. 7 on *Eucalyptus*, 53788. – Two species of *Ramonia* are recorded from the Iberian Peninsula, *R. calcicola* Canals et Gomez-Bolea and *R. subsphaeroides* (Tav.) Vězda (Carballal *et al.* 2004). The latter has multiseptate ascospores, but they are fusiform and 7–9(–10) septate, the apothecia are 0.2–0.4 mm diam. However, we have found apothecia of 0.7(–0.8) mm diam. and spindle-shaped ascospores up to 14-septate.

*Rinodina capensis* Hampe – Loc. 13 on Palm tree, 53869. – This species is widely distributed in Portugal (Giralt 2010), even recorded from Estremadura, but without locality.

*Rinodina colobinoides* (Nyl.) Zahlbr. – Loc. 13 on unidentified tree, 53862, 53867. – This species seems to be rare in Portugal, it is already recorded from Estremadura, but without locality (Giralt 2010).

*Solenopsis vulturiensis* A. Massal. – Loc. 10 on acidic outcrop, 53826.

*Sphinctrina tubiformis* A. Massal. – Loc. 12 on unidentified tree, 53849 (on *Pertusaria*).

*Stictographa lentiginosa* (Leight.) Mudd – Loc. 2 on *Cinnamomum*, 53717 (on *Phaeographis dendritica*). – This species, formerly placed in *Melaspilea* is recorded from France, Ireland, Madeira and UK by Ertz and Diederich (2015).

*Stigmidium pumilum* (Lettau) Matzer et Hafellner – Loc. 10 on acidic rock, 53825 (on *Physcia tribacia*).

*Taeniolella phaeophysciae* D. Hawksw. – Loc. 13 on unidentified tree, 53866 (on *Phaeophyscia hirsuta*).

*Teloschistes flavicans* (Sw.) Norman – Loc. 10 on acidic outcrop, 53823.

\**Thelotrema laurisilvae* Lücking et Breuss – Loc. 14 on *Acer*, 53883. – Lücking and Breuss (2012) described this species from Madeira. Van den Boom (2016) recorded this species from the Azores.

*Trapelia corticola* Coppins et P. James – Loc. 14 on *Cupressus*, 53885.

*Tremella parmeliarum* Diederich – Loc. 10 on acidic outcrop, 53822 (on *Parmotrema reticulata*). – Diederich (1996) and van den Boom and Giralt (2012) recorded it from Algarve. Van den Boom (2006) recorded it from the province Estremadura, nearby Nazaré.

*Tylophoron hibernicum* (D. Hawksw., Coppins et P. James) Ertz, Diederich, Bungartz et Tibell – Loc. 2 on *Quercus robur*, 53708.

*Wadeana dendrographa* (Nyl.) Coppins et P. James – Loc. 1 on *Thuja*, 53697; Loc. 14 on *Castanea*, 53893.

*Waynea stoechadiana* (Abassi Maaf et Cl. Roux) Cl. Roux et P. Clerc – Loc. 8 on *Cupressus*, 53796.

*Zwackhia prosodea* (Afzel.) Ertz – Loc. 2 on *Cupressus*, 53712.

*Zwackhia viridis* (Ach.) Poetsch et Schied. – Loc. 2 on *Cupressus*, 53719.

\*

*Acknowledgements* – Thanks for identification/confirmation are due to Maarten Brand (*Micarea*), Roland Moberg (*Physcia*) and Harrie Sipman (*Graphis*, *Pyrenula*). Special thanks are for Bern van den Boom, because she did a lot of very useful fieldwork as well as some work on identification. Two anonymous reviewers are thanked for their valuable comments on the manuscript.

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