

## *Waynea giraltiae*, a new lichen species from the Iberian Peninsula

Pieter P.G. van den BOOM

**Abstract:** A new lichen species, *Waynea giraltiae* van den Boom, is described from southern Portugal and Spain. It is characterized by a very fine tomentum on the squamulose thallus, fusiform, 3-septate ascospores, and strongly curved filiform conidia. It is the first species of the genus containing argopsin. The new species is compared with related *Waynea* species. *Waynea cretica* is recorded as new to the Iberian Peninsula.

**Key words:** Portugal, Algarve, lichen taxonomy, ecology, new records

### Introduction

The genus *Waynea* is rather well represented in the Iberian Peninsula. *Waynea stoechadina* is the most common species, occurring abundantly in south-western Spain and south-eastern Portugal. *Waynea adscendens* is known from south-eastern Spain (Roux *et al.* 1995) and north-eastern Portugal (van den Boom & Giralt 1999). *Waynea cretica* is recorded here for the first time from Portugal and it seems to be rare in the eastern Algarve. Two species are known from the genus elsewhere. *Waynea californica* is not known from Europe but occurs in the western USA (Moberg 1990, 2002) and *Waynea hirsuta* Tretiach is known from Russia (Siberia) only (Tretiach 1998). The genus *Waynea* has recently been studied by Llop (2006), who provides a survey of the genus. The present study describes a further species, *Waynea giraltiae*, from southern Portugal and Spain.

An extensive search for earlier names in relevant literature [e.g. Sampaio (1970), Moberg (1990, 2002), Roux & Clerc (1991), Roux & Giralt (1991), Roux *et al.* (1995), Tretiach (1998), Llop (2006)] has been carried out, but without any information which could refer to the new species. A recent visit to the herbarium of PO by the author, check-

ing mainly the collections made by G. Sampaio (including those from Algarve) of bacidioid genera, such as *Bacidia*, *Bacidina*, *Hypocenomyce*, *Phyllopsora* and *Tominia*, proved that none of the specimens refer to the new species.

### Material and Methods

This study is based on specimens of the genus *Waynea* from USA, Spain and Portugal, collected by the author. All specimens are kept in the private herbarium of van den Boom, except the type specimen of *Waynea giraltiae* which is in BCN. The type collection was analyzed by TLC, with solvent C. Spot tests were used for several specimens to prove the presence of argopsin.

*Comparative specimens examined.* *Waynea adscendens* Rico: **Portugal:** Beira Alta: Serra da Estrela, S of Manteigas, Caldas de Manteigas, trout nursery, source with N slope, on *Fraxinus angustifolia*, 7° 32.30' W, 40° 23.30' N, 750 m, 1995, P. & B. van den Boom 17247.

*Waynea californica* Moberg: **USA:** California: Monterey, between Big Sur and Morro Bay, Nacimiento, near crossing south coast/north coast trail, W sloping *Quercus* forest, 121° 27.1' W, 36° 00.6' N, 840 m, 2002, P. & B. van den Boom 29466; NE of San Diego, S of Ramona, Barona Ranch Indian Reservation, area with granite rocks and *Quercus* trees, 116° 48.0' W, 33° 00.0' N, 600 m, 2000, P. & B. van den Boom 25219.

*Waynea cretica* Llop: **Portugal:** Algarve: NNE of Albufeira, c. 9 km NE of Alte, Pé de Coelho, along road to the north, to Malhão, old orchard with *Olea europaea*, *Ceratonia siliqua* and *Ficus carica*, on *Olea*, 8° 05.87' W, 37° 18.03' N, 274 m, 2009, P. & B. van den Boom 41719; W of Vila Real de Santo António, ENE of Tavira, Corte António Martins, on roadside *Quercus rotundifolia* trees, 7° 34.0' W, 37° 14.4' N, 185 m, 2003, P. & B. van

P. P. G. van den Boom: Arafura 16, NL-5691JA, Son, the Netherlands. Email: pvdboom@zonnet.nl

*den Boom* 31229, 31213; NE of Albufeira, Paderne, W side of the village, orchard with *Olea europaea*, on *Olea*, 8° 11.93' W, 37° 11.23' N, 60 m, 21 i 2009, P. & B. *van den Boom* 41511, 41515; NE of Albufeira, between Boliqueime and Paderne, 1.5 km SE of Paderne, along road, orchard with *Ceratonina siliqua*, *Ficus carica* and *Olea europaea*, on *Ceratonina*, 8° 10.37' W, 37° 10.28' N, 105 m, 2009, P. & B. *van den Boom* 41508.

*Waynea stoehadiana* (Abassi Maaf et Roux) Roux et Clerc: **Spain:** *Huelva:* W of Aracena, NNW of Cortegana, Sierra la Cigüena, road between La Corte and Las Cefiñas, on *Quercus rotundifolia*, 6° 50.75' W, 37° 57.74' N, 560 m, 2007, P. & B. *van den Boom* 48643.—**Portugal:** *Alentejo:* SSE of Beja, 6 km SE of Vale de Açor, S of Azinhal, on roadside *Quercus rotundifolia* trees, 7° 47.9' W, 37° 44.9' N, 205 m, 2003, P. & B. *van den Boom* 31252; N of Mértola, road to Pulo do Lobo, near Amendoeira da Serra, on roadside *Quercus rotundifolia*, 7° 39.0' W, 37° 48.7' N, 135 m, 2003, P. & B. *van den Boom* 31189; ENE of Beja, NNE of Serpa, c. 2 km N of Moura, along road N 386, on *Quercus rotundifolia* in orchard, 7° 24.68' W, 38° 10.72' N, 160 m, 2007, P. & B. *van den Boom* 38667. *Algarve:* NNW of Tavira, 2 km S of Martim Longo, along road to Vaqueiros, near Finca Rodilha, on scattered *Quercus rotundifolia* in field, 7° 45.3' W, 37° 25.2' N, 270 m, 2006, P. & B. *van den Boom* 36049; N of Barranco do Velho, S of Almodoro, Ameixial, S of village, on roadside *Quercus rotundifolia* trees, 7° 57.7' W, 37° 21.7' N, 435 m, 2003, P. & B. *van den Boom* 31146; N of Albufeira, E of São Bartolomeu de Messines, c. 3 km NNE of Alte, W side of hill 'Rocha dos Soidos', field on W exposed slope, on very old *Ceratonina siliqua*, 8° 08.99' W, 37° 16.18' N, 130 m, 2009, P. & B. *van den Boom* 41567; W of Lagos, N of Luz, W side of Espiche, *Olea* orchard along road, on *Olea*, 8° 44.8' W, 37° 06.0' N, 25 m, 2004, P. & B. *van den Boom* 32593.

## The Species

### *Waynea giraltiae* van den Boom sp. nov.

*Waynea cretica* Llop similis sed differt thallo minute squamuloso, tomentososo, squamulis 0.05–0.3(–0.4) mm latis, apotheciis 0.2–0.9 mm in diametro, griseis vel nigro-fuscis vel nigris; ascosporae fusiformes, (1–)3-septatae, 10–18 × 2–2.5 µm. Conidia filiformia, curvata vel circinata, 20–29 × 0.5 µm. Acidum argopsinum continens.

Typus: Portugal, Algarve, NNW of Tavira, 2 km S of Martim Longo, along road to Vaqueiros, near Finca Rodilha, some scattered *Quercus rotundifolia* in field, on *Q. rotundifolia*, 7° 45.3' W, 37° 25.2' N, 270 m, 3 March 2006, P. & B. *van den Boom* 36051 (BCN—holotypus; hb. v.d. Boom, hb. Brand—isotypus).

(Figs 1 & 2)

*Thallus* corticolous on rough bark, effuse, up to 2 cm wide, finely squamulose to somewhat granulose (Fig. 1); squamules scattered

to crowded, often aggregated in patches, plane to slightly convex and appressed or strongly convex to subglobose and ascending, imbricate, larger squamules often incised, roundish to somewhat elongate, 0.1–0.3(–0.4) mm wide, up to 0.2 mm thick; with a very fine tomentum on the upper surface and the margins; tomentum consisting of hyaline hairs hardly visible with a hand lens; hairs subulate, composed of thick-walled, (mostly) septate hyphae protruding from the cortex, 10–22 × 3–6(–7) µm (Fig. 2A); upper surface greenish grey, pale brown or yellowish brown to medium brown, matt; upper cortex in section prosoplectenchymatous, 25–35 µm thick, cells strongly conglutinated (Fig. 2A); algal layer 40–80 µm thick; *medulla* composed of loosely interwoven hyphae; hyphal lumina branched (Fig. 2B); upper surface uneven, irregular, 2.5–3 µm wide; *lower cortex* absent. *Photobiont* cells ± globose, 5–12 µm diam. *Prothallus* not observed.

*Apothecia* rare to abundant, scattered to rarely crowded, appressed to sessile, slightly constricted at base, rounded to sometimes irregularly angular or flexuose, 0.2–0.9 mm diam.; margin prominent, initially raised, especially in young apothecia, becoming level with the disc and excluded in mature apothecia, entire, concolorous with the disc, up to 0.1 mm wide; disc plane to slightly concave, sometimes becoming weakly convex, greyish, dark grey to dark brown or blackish, epruinose, often with a mixture of pale and dark colours (Fig. 1). *Excipulum* with cortex, prosoplectenchymatous, composed of branched and anastomosing hyphae, to 50 µm wide; hyphae 6–11 × 2–2.5 (–3) µm wide, septate, often strongly constricted at the septa, terminal cells not widened, hyaline at the underside of the excipulum, sometimes violaceous greyish in the upper part. *Epihymenium* hyaline to spotted pale olive to violaceous greyish to brownish, N+ reddish purple, K+ violet. *Hymenium* hyaline, 35–50 µm thick. *Hyphothecium* hyaline, with intricately branched hyphae, 60–100 µm high. *Paraphyses* weakly conglutinated in water, simple or mostly branched in the upper part, septate, sometimes slightly



FIG. 1. *Waynea giraltiae*, habitus, showing squamulose thallus and apothecia. Scale = 1 mm.

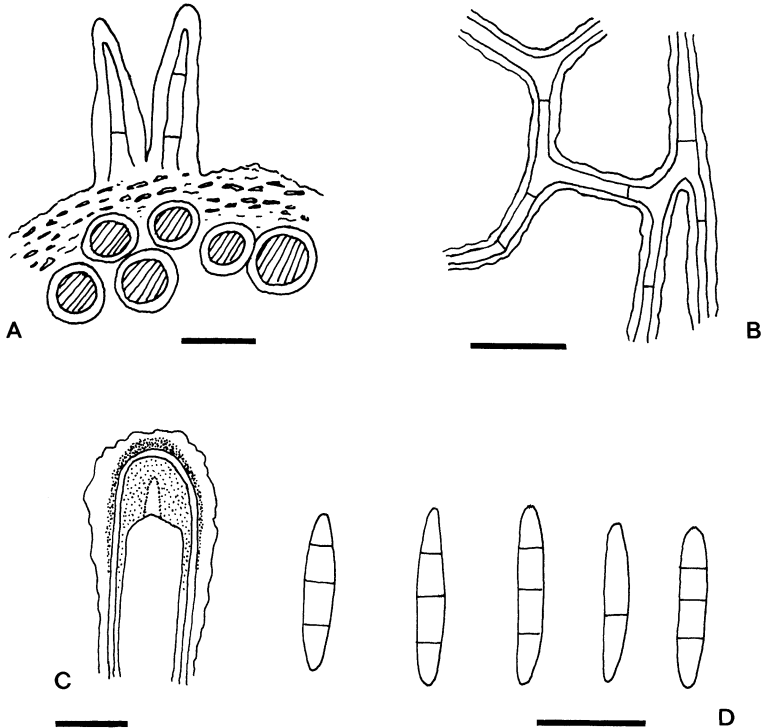


FIG. 2. *Waynea giraltiae*. A, thallus hairs; B, detail of medulla hyphae; C, ascus; D, ascospores. Scales: A–D = 10  $\mu$ m.

constricted at the septa, especially at the upper cells, 2–2.5  $\mu\text{m}$  wide in the middle, the top often slightly widened, up to 5  $\mu\text{m}$  wide, hyaline to greyish olive-brown, not covered by a gelatinous layer. *Asci* 8-spored, *Bacidia*-type, with tendencies to the *Biatora*-type, clavate, broadly clavate to broad ellipsoid, often with a gelatinous layer, 18–35  $\times$  10–12  $\mu\text{m}$  (Fig. 2C). *Ascospores* colourless, fusiform, (1–)3-septate, 12–18  $\times$  2–2.5  $\mu\text{m}$  (Fig. 2D).

*Pycnidia* very rare, 35–50  $\mu\text{m}$  wide, pale brownish at the upper part, hyaline below; conidia filiform, strongly curved to almost circular, 20–29  $\times$  0.5  $\mu\text{m}$ .

**Chemistry.** Thallus K–, KC–, C–, Pd+ reddish. Argopsin detected by TLC. Sedifolia-grey (Meyer & Printzen 2000) in the epihymenium and in the excipulum.

**Etymology.** The epithet is chosen in honour of Dr Mireia Giralt for her outstanding work on lichens, especially in taxonomy, in Iberian Peninsula and Macaronesia.

**Distribution and ecology.** The new species occurs in the south-westernmost part of Europe, in the south-eastern part of Alentejo to the eastern Algarve in Portugal, with a single record from south-western Spain (Fig. 3). It is a lowland species ranging from 125–560 m altitude. The new species is known only from the phorophyte *Quercus rotundifolia*, from epiphytic communities poor in lichens. In the type locality, accompanying species were *Agonimia* sp., *Bacidia igniarum* (Nyl.) Oxner, *Caloplaca obscurella* (J. Lahm) Th. Fr., *Collema* sp., *Lecania viridulogramulosa* (Harm.) Zahlbr., *Parmelina tiliacea* (Hoffm.) Hale, *Phaeophyscia orbicularis* (Neck.) Moberg, *Physcia* sp. and *Waynea stoechadiana*.

**Discussion.** In Llop (2006) a key to the known *Waynea* species is not given, but a table with diagnostic characters is included. Diagnostic characters for *W. giraltiae* are: squamules flat to convex, often ascending, not sorediate; cortex prosoplectenchymatous, medulla hyphae 2.5–3  $\mu\text{m}$  wide; ascospores fusiform, 12–18  $\times$  2–2.5  $\mu\text{m}$ ,

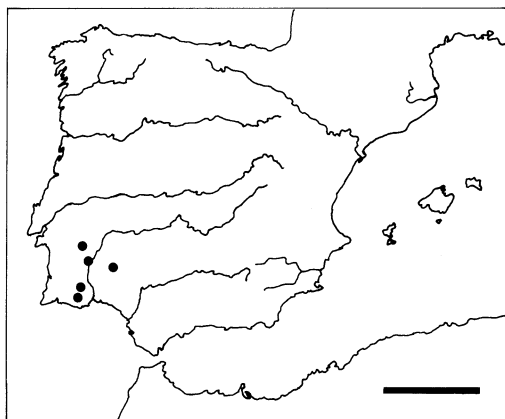


FIG. 3. Distribution map of the known localities of *Waynea giraltiae*. Scale = 200 km.

3-septate; thallus containing argopsin. The asci are mostly clearly of *Bacidia*-type. However, in a few cases asci with a somewhat stronger amyloid central tube, were observed and even the fuzzy coat is usually rather strongly amyloid. *Waynea giraltiae* is easily confused with *W. cretica*, which also has small squamules. However these are more addressed. Ascospores in the latter are acicular, 5–7 septate and 30–45  $\times$  1.5–2  $\mu\text{m}$ . The chemistry is also different, as *W. cretica* has no chemical compounds. Both species can occur in the same habitats and on the same phorophyte, but *W. giraltiae* seems to be restricted to one phorophyte only, *Quercus rotundifolia*, whereas *W. cretica* has a wider amplitude regarding substratum, occurring on the same *Quercus* but also on *Ceratonia siliqua* and *Olea europaea* (in Portugal). Confusion is also possible with *Waynea hirsuta* which also has hairy squamules, but the ascospores are 1-septate and somewhat shorter (10–15  $\times$  2–2.4  $\mu\text{m}$ ), it has no chemical compounds and it is sorediate. The granular thallus parts resemble *Bacidia rubella*, occurring in the same habitats as the new species, but in that species the granules are not tomentose and the apothecia are pale to dark red-brown. *Waynea giraltiae* seems to be a rare species, as the habitats in which it occurs have been found are abundant in the eastern and central part of Algarve and they are not even rare in south-western Spain. Where it

occurs, many phorophytes in many localities were checked for *Waynea* species but it has been found in only five localities, so it seems to be as rare as *Waynea cretica*. In Portugal the latter species is known from four localities. *Waynea stoechadiana* appears to be the most common species of the genus in the south of Portugal. It is an accompanying species in many specimens of other taxa (hb van den Boom).

*Additional specimens examined.* **Spain:** Huelva: W of Aracena, NNW of Cortegana, Sierra la Cigüeña, road between La Corte and Las Cefiñas, orchard with *Quercus rotundifolia* on W slope, on *Quercus*, 6° 50.75' W, 37° 57.74' N, 560 m, 2007, P. & B. van den Boom 38637 (hb. v.d. Boom).—**Portugal:** Alentejo: ENE of Évora, SE of Estremoz, along road from Estremoz (Martires) to Bencatel, 2 km S of crossing to Glória, orchard with outcrops and mature *Quercus rotundifolia* trees, on *Quercus*, 7° 30.78' W, 38° 47.4' N, 390 m, 2007, P. & B. van den Boom 38732, 38747 (hb. v.d. Boom); SE of Beja, SSE of Serpa, along road to Mértola, c. 3 km S of Santa Iria, orchard with young *Quercus suber* and mature *Quercus rotundifolia* trees, on *Q. rotundifolia*, 7° 31.84' W, 37° 52.04' N, 125 m, 2007, P. & B. van den Boom 38690 (hb. v.d. Boom). **Algarve:** N of Barranco do Velho, S of Almodoro, Ameixial, S of village, on roadside *Quercus rotundifolia* trees, 7° 57.70' W, 37° 21.70' N, 435 m, 2003, P. & B. van den Boom 31139, 31143 (hb. v.d. Boom).

The author thanks Harrie Sipman for taking the photographs and for reviewing the text, Jack Elix for the chemical TLC analyses. and two referees for their critical comments.

## REFERENCES

- Llop, E. (2006) *Waynea cretica*, a new species from the Mediterranean Region. *Lichenologist* **38**: 519–527.
- Meyer, B. & Printzen, C. (2000) Proposal for a standardized nomenclature and characterization of insoluble lichen pigments. *Lichenologist* **32**: 571–583.
- Moberg, R. (1990) *Waynea*, a new lichen genus in the *Bacidiaceae* from California. *Lichenologist* **22**: 249–252.
- Moberg, R. (2002) *Waynea*. In *Lichen Flora of the Greater Sonoran Desert Region*. Vol. 1 (T. H. Nash III, B. D. Ryan, C. Gries & F. Bungartz, eds): 507–508. Tempe, AZ: Lichens Unlimited.
- Tretiach, M. (1998) *Waynea hirsuta*, a new epiphytic lichen species from Central Siberia. *Nordic Journal of Botany* **18**: 721–726.
- Roux, C. & Clerc, P. (1991) Présence du genre *Waynea* Moberg (Lichenes) en Europe. *Bulletin de la Société linnéenne de Provence* **42**: 123–130.
- Roux, C. & Giralt, M. (1991) La apotecioj de *Hypocomyce stoechadiana* Abbassi Maaf et Roux. *Bulletin de la Société linnéenne de Provence* **42**: 117–122.
- Roux, C., Clerc, P., Clauzade, G. & Bricaud, O. (1995) La genro *Waynea* Moberg (Ascomycetes, Lecanorales, Bacidiaceae). *Bibliotheca Lichenologica* **58**: 383–404.
- Sampaio, G. (1970) Miscelânea dos trabalhos sobre liquenes. *Publicações do Instituto de botânica Dr. Gonçalo Sampaio*, ser. 3, **20**: 7–228.
- van den Boom, P. P. G. & Giralt, M. (1999) Contribution to the flora of Portugal, lichens and lichenicolous fungi II. *Nova Hedwigia* **68**: 183–196.

Accepted for publication 17 July 2009