

## Some interesting lichens for the Iberian Peninsula

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**Abstract.** The presence of 25 species was reported during a survey carried out in the municipality of O Rosal (Pontevedra, NW Spain). Among them, *Arthonia anglica* and *A. ligniaria* are new records for the Iberian Peninsula, while *Rinodina colobinoides* and *Usnea erinacea* are new records for Spain. In addition, *Agonimia opuntiella*, *Cliostomum griffithii*, *Coppinsiella ulcerosa*, *Lecanora barkmaniana*, *Micarea synotheoides*, *Physcia vitii*, *Reichlingia zwackhii*, *Rinodina biloculata*, *R. exrecens*, *R. conradii* and *R. pyrina* are recorded for the first time in Galicia. Another 10 species included in this publication are new records for the province of Pontevedra.

**Keywords:** Ascomycota; lichenized fungi; epiphytes; Spain; Galicia; new records

## [es] Algunos líquenes interesantes para la Península Ibérica

**Resumen.** Se destaca la presencia de 25 de especies identificadas en el transcurso de una recolección llevada a cabo en el municipio de O Rosal (Pontevedra, NO de España). Entre ellas, *Arthonia anglica* y *A. ligniaria* se mencionan por primera vez para la Península Ibérica, mientras que *Rinodina colobinoides* y *Usnea erinacea* son nuevas citas para España. Además, se constata por primera vez la presencia en Galicia de *Agonimia opuntiella*, *Cliostomum griffithii*, *Coppinsiella ulcerosa*, *Lecanora barkmaniana*, *Micarea synotheoides*, *Physcia vitii*, *Reichlingia zwackhii*, *Rinodina biloculata*, *R. exrecens*, *R. conradii* y *R. pyrina*. Otras 10 especies incluidas en esta publicación son nuevas citas para la provincia de Pontevedra.

**Palabras clave:** Ascomycota; hongos liquenizados; epífitos; España; Galicia; nuevas citas.

## Introduction

The first data on the lichen flora of the Iberian Peninsula were published toward the end of the 18<sup>th</sup> century (Asso 1779), but it was not until the last two decades of the 19<sup>th</sup> century and the first half of the 20<sup>th</sup> century that the study of lichens really took off, thanks to the contributions of Spanish and Portuguese botanists and other European authors. Since the 1970s, Spanish lichenology has gained great importance and studies on lichens have multiplied. Llimona & Hladun (2001) presented an excellent historical summary of the different stages and figures of the most important botanists of this period.

Llimona & Hladun (2001) also collected all the bibliographic citations of lichens related to the Iberian Peninsula and the Balearic Islands up to the year 2000. In addition to this landmark work, there are several regional catalogues for different areas. These include Galicia (Carballal et al. 1995; Álvarez et al. 2001; Crespo-Pardo 2016), Comunidad Valenciana (Atienza & Segarra, 1999), Asturias (De la Torre Fernández & Fernández Ordóñez 2000), Cantabria (Pérez-Ortega & Álvarez-Lafuente 2006a), Cataluña (Llop et al. 2013), Castilla y León (Pérez-Ortega &

Álvarez-Lafuente 2006b), Madrid (Burgaz 2006), Andalucía (Burgaz 2014) and Castilla-La Mancha (Blázquez 2022).

Despite the numerous studies carried out in this field, there are still many gaps in our knowledge of the lichen biota of the Iberian Peninsula and large geographical areas remain unexplored. In this study, we report interesting novelties from a study carried out in O Rosal (Pontevedra, Galicia, Northwest Spain).

## Material and methods

The municipality of O Rosal is located in the south of the province of Pontevedra, in the area near the mouth of the river Miño. It has an area of 41.13 km<sup>2</sup>. It has a small urban centre and most of the population is scattered throughout the area in small rural villages. The mountainous areas are located in two strips parallel to the coast, delimiting the valley through which the Tamuxe River flows; the maximum altitude of the municipality is 519 m. From a geological point of view, the mountainous areas of Campo do Couto and O Torroso are formed by alkaline granites, which

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are also found in the valley along with Holocene deposits, while the mountainous area of Niño do Corvo is formed by metavolcanic rocks and schists. The soils formed on these substrates are acidic in nature (Rodríguez-García 2004).

The higher areas are covered by *Pinus pinaster* and, to a lesser extent, *P. radiata* and *Eucalyptus globulus*. However, there are still remnants of natural vegetation, including *Quercus robur* and *Q. suber*. The shrub vegetation is dominated by several species of the genera *Ulex* and *Erica*.

According to the Rivas-Martínez climate classification applied to the Galician region (Gutián & Ramil 2007), the area has a semi-hyper-oceanic bioclimate with a temperate thermoclimate, located in a transition zone between the sub-Mediterranean temperate macroclimate and the typical temperate macrobioclimate. The average annual rainfall is 1,573 mm/m<sup>2</sup>; the average annual temperature is 15.0 °C, ranging from 9.5 °C, which corresponds to the average temperature of the coldest month, to 21.1 °C, the average temperature of the warmest month.

The material was collected and preserved according to standard procedures. The morpho-anatomical characteristics of the specimens were observed using standard lichenological methods, stereomicroscopy and microscopy.

For the identification of *Usnea* and *Ramalina* species chromatographic techniques (TLC) were also used according to the standardised method of Culberson & Kristinsson (1970) and White & James (1985), except for some modifications proposed by Lumbsch (2002) about the extraction of lichen substances in acetone. For the determination of substances not mentioned in these works and some doubtful cases it was necessary to refer to Orange et al. (2001) and Schumm & Elix (2016).

The specimens are kept in the Herbarium of the Faculty of Biology of the Complutense University of Madrid (MACB).

All the sampled localities belong to the municipality of O Rosal, in the province of Pontevedra (Fig. 1).

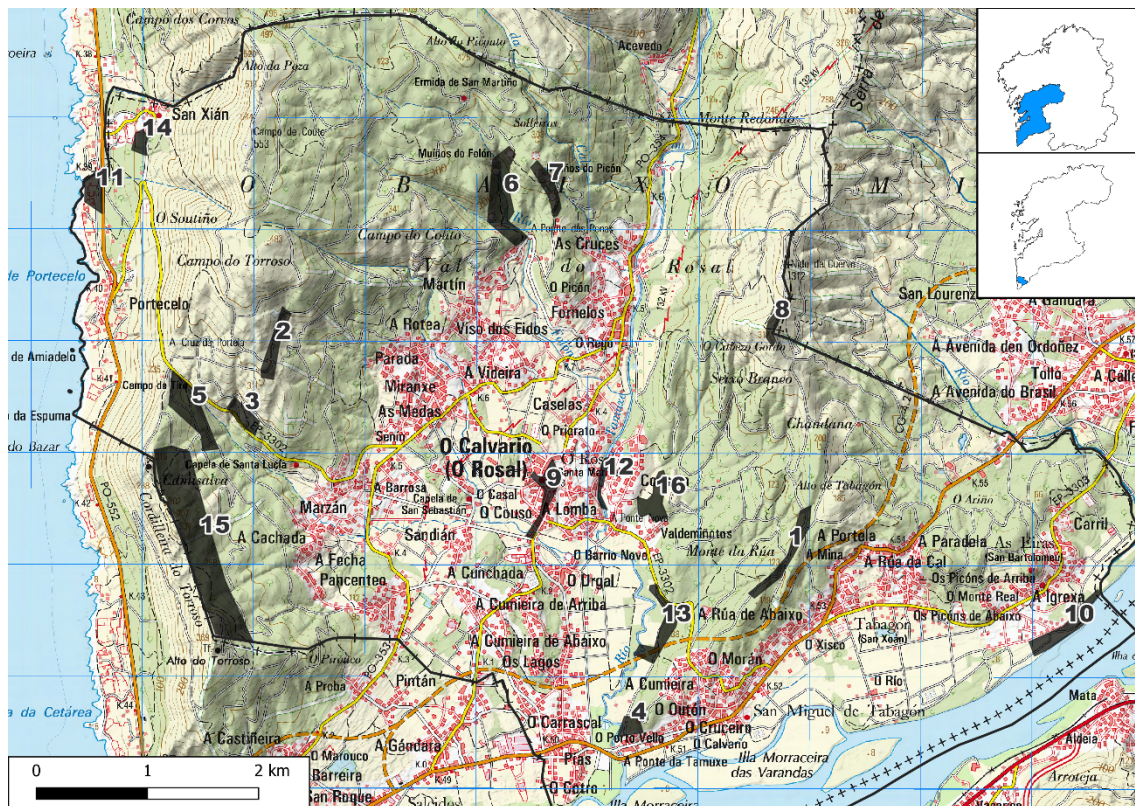


Figure 1. Location of the sampling areas in the municipality of O Rosal (Pontevedra).

#### List of sampling localities:

1. Alto de Tabagón, 41°56'00" N 8°48'27" W, 117 m, *Castanea sativa* Mill., *Quercus robur* L., *Quercus rubra* L. and *Quercus suber* L.
2. Campo do Couto, 41°57'14" N 8°51'33" W, 332 m, *C. sativa*, *Pinus pinaster* Ait., *Q. robur*, *Q. suber* and *Salix atrocinerea* Brot.
3. Campo do Torroso road, 41°56'32" N 8°52'08" W, 165 m, *Q. robur*, *Q. suber* and *S. atrocinerea*.
4. Mirador de Tamuxe, 41°54'58" N 8°49'39" W, 5 m, *C. sativa*, *Eucalyptus globulus* Labill., *Liquidambar styraciflua* L., *P. pinaster*, *Q. robur*, *Q. suber* and *S. atrocinerea*.
5. Monte do Torroso, 41°56'32" N 8°52'29" W, 219 m, *P. pinaster* and *S. atrocinerea*.
6. Muíños do Folón, 41°57'43" N 8°50'26" W, 173 m, *C. sativa*, *P. pinaster*, *Pinus radiata* D. Don, *Pyrus cordata* Desv., *Q. robur* and *S. atrocinerea*.

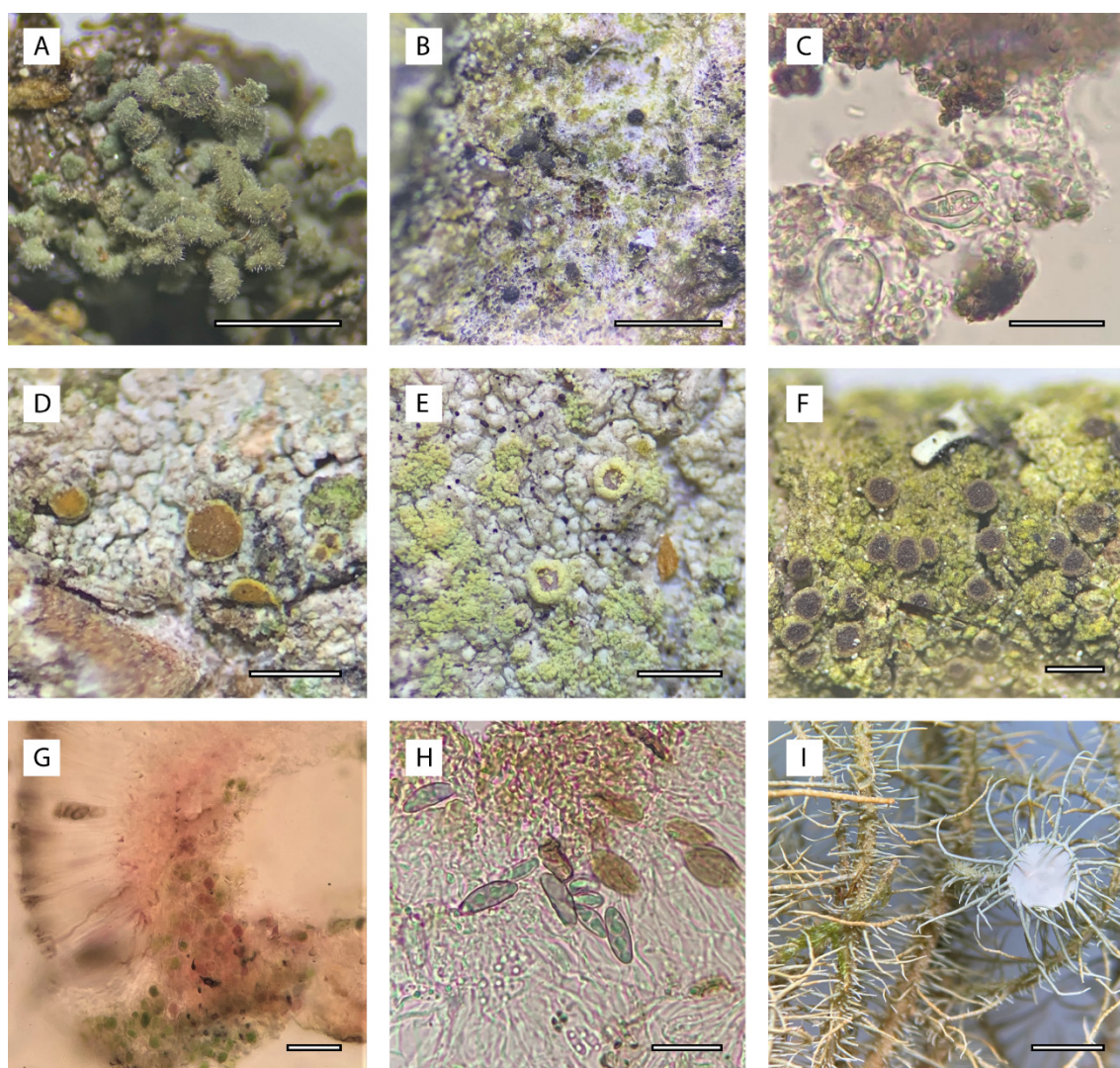


7. Muíños do Picón, 41°57'36" N 8°50'07" W, 211 m, *Betula pendula* Roth, *C. sativa*, *Q. robur*, *Q. suber* and *S. atrocinerea*.
8. Niño do Corvo, 41°56'55" N 8°48'40" W, 304 m, *P. cordata*.
9. Urban centre, 41°56'13" N 8°50'13" W, 43 m, *Camellia* sp., *Liriodendron tulipifera* L., *Robinia pseudoacacia* L., *Q. robur*, *Q. rubra* and *Q. suber*.
10. Praia das Eiras, 41°55'28" N 8°46'46" W, 3 m, *Acer opalus* Mill., *Alnus glutinosa* (L.) Gaertn., *Platanus x hispanica* Mill. ex Münchh., *P. pinaster*, *Populus nigra* L., *R. pseudoacacia*, *Q. suber* and *S. atrocinerea*.
11. Portecelo, 41°57'39" N 8°53'04" W, 28 m, *P. pinaster*.
12. Pozas da Pesqueira, 41°56'17" N 8°49'45" W, 15 m, *A. glutinosa*, *C. sativa* and *P. pinaster*.
13. Tamuxe-As Aceñas river, 41°55'41" N 8°49'24" W, 17 m, *A. glutinosa*, *C. sativa*, *Q. suber* and *S. atrocinerea*.
14. San Xián, 41°57'51" N 8°52'44" W, 128 m, *P. pinaster*.
15. Ascent to Alto do Torroso, 41°55'27" N 8°52'15" W, 338 m, *P. pinaster*, *P. radiata*, *Q. robur*, *Q. suber* and *S. atrocinerea*.
16. Valdemiñotos, 41°56'04" N 8°49'27" W, 30 m, *A. glutinosa*, *P. pinaster*, *Q. robur*, *Q. suber* and *S. atrocinerea*.

## Results and discussion

From a study carried out in the area, where a total of 194 lichen species were identified, this work highlights the presence of 25 species: 2 new record for the Iberian Peninsula, 2 for Spain, 11 for Galicia and 10 for the province of Pontevedra, of which the most relevant data are presented below. The locality numbers are in accordance with the list of sampling localities, followed by the number of the herbarium where the specimens are deposited.

The symbol \*\*\* is prefixed to highlight new records for the Iberian Peninsula, \*\* for new records for Spain, \* for new records for Galicia and # for new records for the province of Pontevedra.



**Figure 2.** A) *Agonomia opuntiella*; *Arthonia ligniaria*: B) surface view of the thallus, C) asci and spore; D) *Coppinsiella ulcerosa*; E) *Lecanora barkmaniana*; *Rinodina colobinoides*: F) superficial view, G) section of the apothecium showing hypothecium K<sup>+</sup> pink; H) *Rinodina conradii* spores; I) *Usnea erinacea*. Scale: A, B, D, E, F, I, 5 mm; C, G, H, 20  $\mu$ m.

\* ***Agonimia opuntiella* (Buschardt & Poelt) Vězda**

Easily recognised by the finely hairy surface of the thalline squamules (Fig. 2A). It was found at the mossy base of *Q. robur* trunks at only one sampling site; it is a scarcely represented species in the study area.

According to Smith et al. (2009) it is widespread in Europe and Macaronesia. In the Iberian Peninsula, it is known in several localities in central Spain and along the Mediterranean coast, as there are also some records from northern Portugal (Llimona & Hladun 2001; GBIF 2022). First record for Galicia.

Sampling collection: 6 (MACB 118211).

\*\*\* ***Arthonia anglica* Coppins**

Characterized by its lobed black apothecia, C+ reddish in section, unlike *A. stellaris* Kremp. Our specimens have a hymenium about 60 µm high, 50 x 20 µm asci and spores 3 or 4 septate, with one end cell enlarged, 18-20 x 6 µm. It was collected on *Alnus glutinosa* accompanied by *Coniocarpon cinnabarinum* DC.

According to Lendemer et al. (2009), it is distributed in the interior and east coast of North America, as well as some isolated points in the British Isles. Smith et al. (2009) noted its presence in the south and southwest of England and Madeira. The only known record on Spanish territory corresponds to a locality in La Gomera (Canary Islands) (Etayo 1998). Our finding is the first record for the Iberian Peninsula.

Sampling collection: 16 (MACB 118212).

# ***Arthonia didyma* Körb**

This species was rare in the area, only collected once on *Quercus robur*.

It is a widespread species in Europe (Smith et al. 2009). In Galicia, it is known from A Coruña and has been reported from Lugo (Crespo-Pardo 2016). Our record is the first for Pontevedra.

Sampling collection: 3 (MACB 118213).

\*\*\* ***Arthonia ligniaria* Hellb.**

It is characterised by its inconspicuous, practically submerged thallus with black, rounded, flat or slightly convex apothecia up to 0.3 mm in diameter (Fig. 2B). The characteristics that best distinguish it from some close species are the lack of reaction of the hymenium to the addition of iodinated reagents and its relatively large spores (18-20 x 6-8 µm) with a single septum (Fig. 2C). It was only found growing on degraded bark of *Pinus pinaster*, accompanied by *Lecanora expallens* Ach.

According to Cannon et al. (2020), it is known from several localities in Great Britain and northern and western Europe. Roux (2012) also shows a locality in the French Pyrenees. It has never been recorded from the Iberian Peninsula.

Sampling collection: 5 (MACB 118214).

# ***Arthonia spadicea* Leight.**

Found on the bark of *Alnus glutinosa* in two of sampled localities.

It is a species with a Holarctic distribution (GBIF 2022). In Spain there is evidence of its presence in the north of the Peninsula: Cataluña (Llop et al. 2013), Navarra (Etayo 1989) and Asturias (De la Torre Fernández & Fernández Ordóñez 2000). In Galicia there is only one record from the province of Lugo (Álvarez & Carballal 2000), so our report extends its distribution to the province of Pontevedra.

Sampling collection: 13 (MACB 118216), 16 (MACB 118215).

\* ***Cliostomum griffithii* (Sm.) Coppins**

This is a very polymorphic species; very rare in the study area. It was found on *Pinus pinaster*.

This species is widespread in various regions of the Northern Hemisphere (Gowan 1990) and Oceania (Kantvilas & Elix 1995); in Spain it is known from the northeastern peninsula and has also been recorded from a place on the Portuguese mid-Atlantic coast (Llimona & Hladun 2001; GBIF 2022). First record for Galicia.

Sampling collection: 11 (MACB 118222).

\* ***Coppinsiella ulcerosa* (Coppins & P. James) S.Y. Kondr. & L. Lököš**

Characterised by the greyish fine granular thallus with characteristic greenish-yellow soralia (Fig. 2D). The K+ reaction (purple) of the epithecium is evident in the microscopic section, but is difficult to see with the stereomicroscope.

It was collected on small branches of *Alnus glutinosa*, *Pinus radiata*, *Quercus robur* and *Salix atrocinerea* at three of the sampling sites.

Most records of *C. ulcerosa* are concentrated in the east of the Iberian Peninsula; it has also been identified in localities close to the coast of central and southern Portugal and in the Macaronesian islands (Azores and Canary Islands) (Silva 1994; Llimona & Hladun 2001), which leads us to affirm that our record is the first for Galicia.

Sampling collection: 3 (MACB 118221), 6 (MACB 118218, 118219, 118220), 12 (MACB 118217).

# ***Haematomma solediatum* R.W. Rogers**

Very common species in the study area, growing on the bark of various phorophytes, often fertile.

It is a rare species with a scattered distribution; most records are concentrated in Oceania, with isolated occurrences in the British Isles, continental Europe and Macaronesia (Smith et al. 2009; GBIF 2022). In Galicia, it has only been recorded in a few



localities in the province of A Coruña (Álvarez et al. 2001); new for Pontevedra.

Sampling collection: 1 (MACB 118229, 118230, 118313, 118314), 2 (MACB 118315, 118324, 118326), 3 (MACB 118325), 4 (MACB 118318, 118319), 6 (118321, 118222, 118223), 7 (MACB 118343, 118344, 118345), 9 (MACB 118341, 118342), 10 (MACB 118320), 13 (MACB 118225, 118226, 118227, 118228), 15 (MACB 118317), 16 (MACB 118223, 118224, 118339, 118340).

#### \* *Lecanora barkmaniana* Aptroot & Herk

This is a recently described species characterised by the presence of green-yellowish soralia, initially well defined, but soon coalescing. Although in the literature it is rarely found fertile, several of our specimens showed apothecia (Fig. 2E). It differs from other members of the *Lecanora subfusca* group by its thallus reactions (C -, K + (yellow), P ± (yellowish and negative in the thalline exciple), UV + (pale orange). It was recorded in different places of the municipality disturbed by human intervention, on *Alnus opalus*, *Eucalyptus globulus*, *Quercus robur*, *Q. rubra*, *Q. suber* and *Salix atrocinerea*.

It is a species with a sub-Atlantic distribution; in Europe it is found in the UK, Germany, the Netherlands, France, etc. (Malíček et al. 2017). In Spain, it is known from Cataluña (Llop et al. 2013). This is a new record for Galicia.

Sampling collection: 2 (MACB 118338), 4 (MACB 118330, 118331), 6 (MACB 118327), 9 (MACB 118328, 118336, 118337), 10 (MACB 118332, 118333, 118335), 13 (MACB 118334), 15 (MACB 118329).

#### # *Micarea adnata* Coppins

It was collected on *Pinus pinaster* and *Salix atrocinerea* in two sampled localities.

It is widespread throughout Europe. In Spain, records are concentrated in a few towns in the north of the peninsula (Llimona & Hladun 2001). In Galicia it is only known from the Sierra del Caurel in the province of Lugo (Álvarez et al. 2001), so our finding extends its distribution to the province of Pontevedra.

Sampling collection: 2 (MACB 118367), 11 (MACB 118369), 15 (MACB 118368).

#### # *Micarea stipitata* Coppins & P. James

Very scarce in the studied area; only two specimens were found on bark of *Quercus suber* at one locality.

It is known from the British Isles, France and Macaronesia (Smith et al. 2009). In Spain, it has been found in several places in the north of the peninsula (Llimona & Hladun 2001). In Galicia, it has only been reported from Lugo (Fernández et al. 2005). First record for Pontevedra.

Sampling collection: 10 (MACB 118366).

#### \* *Micarea synotheoides* (Nyl.) Coppins

Very similar to *Micarea prasina* Fr. from which it differs by its septate ascospores (19-21 x 2-2.5 µm). Rare in the study area, where it was found growing on *Acer opalus* and *Salix atrocinerea* bark.

It is a species with a Holarctic distribution, well represented in northern Europe and Macaronesia (GBIF 2022; Smith et al. 2009). In Spain, most of the records are concentrated in the eastern half of the peninsula (Llimona & Hladun 2001) and it is considered a species of restricted distribution. It has never been recorded in Galicia.

Sampling collection: 2 (MACB 118365), 10 (MACB 118364).

#### # *Ochrolechia arborea* (Kreyer) Almb.

Very common in the area. It was collected on several phorophytes in almost all sampling localities.

It is a widespread species in the northern hemisphere (Jabłońska & Kukwa 2007). It is also known from numerous localities in the Iberian Peninsula; in Galicia it has been reported from the provinces of Lugo and Ourense (Boqueras et al. 1999). First record for Pontevedra.

Sampling collection: 1 (MACB 118352, 118355, 118356, 118357), 2 (MACB 118347, 118348, 118361), 3 (MACB 118359), 4 (MACB 118209), 5 (MACB 118360), 6 (MACB 118346, 118349), 7 (MACB 118350, 118351, 118354), 13 (MACB 118353), 15 (MACB 118210, 118358).

#### # *Ochrolechia turneri* (Sm.) Zopf

It was collected on bark of *Castanea sativa*, *Quercus robur* and *Q. suber* in several localities.

This species is widespread in Europe and the Iberian Peninsula (Kukwa 2008). In Galicia it is known from localities in the provinces of A Coruña and Lugo (Álvarez et al. 2001).

First record for Pontevedra.

Sampling collection: 2 (MACB 118208), 7 (MACB 118202, 118203), 15 (MACB 118204).

#### # *Opegrapha celtidicola* (Jatta) Jatta

Rare in the study area. It was collected in a single locality on trunks of *Platanus x hispanica* and *Salix atrocinerea*.

Most of the areas where this species has been recorded are concentrated in coastal regions or very close to the Mediterranean coast (Egea & Alonso 1996). In Galicia, it has been reported in a site in the province of Lugo, so our report is the first record for the province of Pontevedra.

Sampling collection: 10 (MACB 118201).

\* *Physcia vitii* Nádv

It is easily recognised by the thick, hood-shaped soredia located on the underside of the thallus. Several specimens have been collected in the urban centre of O Rosal on bark of *Camellia* sp. and *Robinia pseudoacacia*.

It can be found mainly in central and southern Europe (GBIF 2022; Nimis & Martellos 2022). In Spain, it has previously been recorded in several locations along the Mediterranean coast (Llimona & Hladun 2001). First record for Galicia.

Sampling collection: 9 (MACB 118363, 118362).

# *Ramalina fraxinea* (L.) Ach.

Their presence was confirmed by the absence of lichenic substances. Some of them correspond to var. *caliciformis* Nyl., which has distinctly ribbed branches and kidney- and crescent-shaped ascospores, in contrast to *R. calicaris* (L.) Fr., which has thinner branches and straight ascospores. It has been collected on the bark of various tree species at several sampling sites, although it is particularly abundant at Praia das Eiras.

It is a common and widespread species in Europe (Smith et al. 2009); common in central Spain, especially in mountainous areas with frequent fog, very rare or absent in coastal areas. First record for Pontevedra.

Sampling collection: *R. fraxinea*: 4 (MACB 118197), 10 (MACB 118198, 118199, 118200), *R. fraxinea* var. *caliciformis*: 10 (MACB 1118186).

\* *Reichlingia zwackhii* (Sandst.) Frisch & G.Thor

Characterized by its numerous slightly pruinose rounded apothecia on an effuse thallus and spores are 3-4 septate, with one end cell enlarged, 17-18 x 6 µm. A very scarce species in the studied area; a single specimen was collected on *Quercus suber*.

It is most common in the British Isles and northern Europe (Smith et al. 2009). In the Iberian Peninsula, it has been frequently recorded in northern and eastern Spain (Llimona & Hladun 2001). First record for Galicia.

Sampling collection: 10 (MACB 118196).

\* *Rinodina biloculata* (Nyl.) Sheard

It is recognised by its thin and continuous whitish thallus and its pseudolecanorine apothecia. Our specimens have a 70 µm high hymenium and *Orcularia*-type spores of 16-17 x 7-8 µm. Although very rare in the study area, it was collected in two sampling places on twigs of *Alnus glutinosa* and *Pyrus cordata*.

Most of the records are concentrated in the British Isles along with other locations in northern and central Europe and the east coast of North America

(Van der Pluijm 2017). In Spain, it is found only in Navarra and Guipúzcoa (Giralt 2010) and apparently also in Portugal (Poelt 1974). Its presence in Galicia has never been reported.

Sampling collection: 8 (MACB 118194), 10 (MACB 118195).

\*\* *Rinodina colobinoides* (Nyl.) Müll. Arg.

This species, with an almost entirely blastidiate thallus (Fig. 2F), is easily distinguished by its *Pachysporaria*-type spores and even *Physcia*-type spores (16-18 x 8 µm) and by the K+ reaction (pink-purple) of the hypothecium, which in our case can occur in the epithecium and other areas of the apothecium (Fig. 2G). It was found only in small branches of *Salix atrocinerea*, together with tiny thalli of *Usnea* and *Parmelia* s.l.

According to Giralt (2010), it is an oceanic species found in the Americas, Africa (Cape Verde) and Australia; in Europe it is only known from localities in central and southern Portugal and the British Isles. Our finding is a first for Spain.

Sampling collection: 15 (MACB 118193).

\* *Rinodina conradii* Körb.

Easily recognizable by its 4-lumen *Conradii*-type spores (Fig. 2H). A single specimen was collected on a trunk of *Quercus robur* in the urban area of O Rosal.

*R. conradii* is reported from most of Europe and western North America, and is also known from Australasia and South America (GBIF 2022). In the Iberian Peninsula, there are records from the centre and north, as well as some localities in the Canary Islands and southern Portugal (Giralt 2010; GBIF 2022). Our report is the first record for Galicia.

Sampling collection: 2 (MACB 118192).

\* *Rinodina excrescens* Vain.

Its areolate thallus provided with blastidia allows it to be differentiated from *R. efflorescens* Malme, with which it shares *Physcia*-type spores. It was collected on trunks of *Robinia pseudoacacia* in the urban area of O Rosal.

According to Czarnota et al. (2018), it occurs in the northern hemisphere. In the Iberian Peninsula, it has only been found in one locality in central Spain (Aragón et al. 2004), making this the first record for Galicia.

Sampling collection: 9 (MACB 118191).

\* *Rinodina pyrina* (Ach.) Arnold

The specimens have an inconspicuous whitish thallus, in most cases, with apothecia that become confluent with age; the thalline exciple can become inconspicuous, although algae can be seen in section. It was collected on *Pinus pinaster* bark in one of the sampled areas.

There is evidence of the presence of this species in almost all of Europe and North America, and also isolated localities in the Southern Hemisphere (Sheard et al. 2011; GBIF 2022). Known from several localities in Spain and Portugal (Giralt 2010), but never recorded from Galicia so far.

Sampling collection: 11 (MACB 118190).

### \*\* *Usnea erinacea* Vainio

It is characterised by its fruticose thallus, erect or subpendulous, with a reddish cortex and white medulla, with abundant papillae and fibrils, without soralia or isidiomorphs (Fig. 2I). Our samples have numerous apothecia. By TLC it was possible to identify usnic, stictic and constictic acids. It was collected on *Quercus robur*, *Q. suber* and *Salix atrocinerea*.

This species is distributed throughout East Africa, Madagascar, South America, southern North America and the Atlantic coast of the Iberian Peninsula; to date, there is only evidence of its presence in Portugal (Araujo-Caviró 2016). Our report is therefore the first record for Spain.

Sampling collection: 1 (MACB 118188), 15 (MACB 118187, 118189).

### # *Usnea subscabrosa* Nyl. Ex Motyka

Recorded from several localities in the area growing on the bark of *Pinus pinaster*, *Quercus suber* and *Salix atrocinerea*. The samples analysed by TLC contained protocetraric acid.

This species is distributed throughout Europe, Northeast and South America and the macaronesian islands (Araujo-Caviró 2016). Its presence is confirmed in several scattered points in the South and East of the Iberian Peninsula (Llimona & Hladun 2001). In Galicia, it has only been recorded in the province of A Coruña, so our report represents the first record for the province of Pontevedra.

Sampling collection: 1 (118181), 2 (MACB 118178), 5 (MACB 112177, 118179, 118182), 8 (MACB 118180), 15 (MACB 118184, 118185), 16 (MACB 118183).

## References

- Álvarez, J. & Carballal, R. 2000. Flora líquénica sobre *Quercus robur* L. en Galicia (NW España). *Cryptogamie, Mycologie* 21 (2): 103–117. [https://doi.org/10.1016/S0181-1584\(00\)00107-X](https://doi.org/10.1016/S0181-1584(00)00107-X)
- Álvarez, J., Sánchez-Biezma, M.J. & López de Silanes, M. E. 2001. Lista de los líquenes y hongos liquenícolas de Galicia. *Nova Acta Científica Compostelana (Biología)* 11: 53–151.
- Aragón, G., Sarrión F.J. & Martínez I. 2004. Epiphytic lichens on *Juniperus oxycedrus* L. in Iberian Peninsula. *Nova Hedwigia* 78: 45–56. <https://doi.org/10.1127/0029-5035/2004/0078-0045>
- Araujo-Caviró, E. 2016. Sistemática integrada del género *Usnea* Dill. ex Adans. (*Parmeliaceae*) en la Península Ibérica. Tesis doctoral. Madrid: E-Prints Complutense, Repositorio Institucional de la UCM. <https://eprints.ucm.es/id/eprint/36353>
- Asso, I.J. 1779. *Synopsis stirpium indigenarum Aragoniae*. Massilia.
- Atienza, V. & Segarra, J.G. 1999. A first approximation checklist of the lichens of the Valencian Community. *Flora Mediterranea* 9: 231–268.
- Blázquez, M. 2022. Catálogo preliminar de los hongos liquenizados y liquenícolas de Castilla-La Mancha (España). *Botanica Complutensis* 46: 1–45. <https://doi.org/10.5209/bocm.81990>
- Boqueras, M., Barbero, M. & Llimona, X. 1999. El género *Ochrolechia* A. Massal. (*Pertusariaceae*, líquenes) en España y Portugal. *Cryptogamie Mycologie* 20(4): 303–328. [https://doi.org/10.1016/S0181-1584\(00\)88858-2](https://doi.org/10.1016/S0181-1584(00)88858-2)
- Burgaz, A. R. 2006. Check-list of lichenized and lichenicolous fungi of Madrid Community (Spain). *Flora Mediterranea* 16: 57–110.
- Burgaz A. R. 2014. Líquenes de Andalucía (S de España): catálogo bibliográfico y nuevos datos del NW del área. *Botanica Complutensis* 38: 53–88. [https://doi.org/10.5209/rev\\_BOCM.2014.v38.45775](https://doi.org/10.5209/rev_BOCM.2014.v38.45775)
- Cannon, P., Ertz, D., Frisch, A., Aptroot, A., Chambers, S., Coppins, B., Sanderson, N., Simkin, J. & Wolsley, P. 2020. Arthoniales: Arthoniaceae, including the genera *Arthonia*, *Arthothelium*, *Briancoppinsia*, *Bryostigma*, *Coniocarpon*, *Diarthonis*, *Inoderma*, *Naevia*, *Pachnolepia*, *Reichlingia*, *Snippocia*, *Sporodophoron*, *Synarthonia* and *Tylophoron*. *Revisions of British and Irish Lichens* 1: 3–48. <http://dx.doi.org/10.34885/173>
- Carballal, R., López de Silanes, M.E., Bahillo, L. & Álvarez, J. 1995. Recopilación bibliográfica de citas líquénicas de Galicia (1851-1993). *Nova Acta Científica Compostelana* 5: 49–134.
- Crespo-Pardo, E. 2016. Actualización del checklist de líquenes y hongos liquenícolas de Galicia. *Revista de Biología*. UVIGO 8: 137-145.
- Culberson C. F. & Kristinsson H.D. 1970. A standardized method for the identification of lichen products. *Journal of Chromatography* 46: 85–93.
- Czarnota, P., Mayrhofer, H. & Bobiec, A. 2018. Noteworthy lichenized and lichenicolous fungi of open-canopy oak stands in east-central Europe. *Herzogia* 31(1): 172–189. <https://doi.org/10.13158/099.031.0111>
- De la Torre Fernández, F. & Fernández Ordóñez, M. D. C. 2000. Catálogo de líquenes de Asturias. *Acta Botánica Malacitana* 25: 45–59. <https://doi.org/10.24310/abm.v25i0.8471>
- Egea, J. M. & Alonso, F. L. 1996. Patrones de distribución en la flora líquénica xerófila del sureste de España. *Acta Botánica Malacitana* 21: 35–47. <https://doi.org/10.24310/abm.v21i0.8665>
- Etayo, J. 1989. Flora líquénica epífita del Robledal de Ibardin (Navarra, España). *Anales del Jardín Botánico de Madrid* 46: 323–332.
- Etayo, J. 1998. Aportación a la flora líquénica de las Islas Canarias. IV. Líquenes epífitos de La Gomera (Islas



- Canarias). *Tropical Bryology* 14: 85–107. <https://doi.org/10.11646/bde.14.1.13>
- Fernández, R., Paz-Bermúdez, G. & Carballal, R. 2005. Líquenes corticícolas del LIC Fraga de “A Marronda” (Galicia, NO de España). *Nova Acta Científica Compostelana* 14: 43–49.
- GBIF 2022. Global Biodiversity Information Facility. <https://www.gbif.org/es/>
- Giralt, M. 2010. *Physciaceae I. Flora Liquenológica Ibérica*, vol. 5. Sociedad Española de Liquenología (SEL). Barcelona.
- Gowan, S.P. 1990. *Cliostomum* (Lichen-Forming Ascomycotina) in North America and Europe. *Micología* 82 (6): 766–771. <https://doi.org/10.1080/00275514.1990.12025958>
- Gutián, M. R. & Ramil, P. R. 2008. Fitogeografía de Galicia (NW Ibérico): análisis histórico y nueva propuesta corológica. *Recursos Rurais* 1 (4): 19–50. <https://doi.org/10.15304/rr.id5310>
- Kantvilas, G. & Elix, J. A. 1995. The lichen genus *Cliostomum* in Australia. *Bibliotheca Lichenologica* 58: 199–212.
- Kukwa, M. 2008. The lichen genus *Ochrolechia* in Poland II. Sorediate taxa with variolaric acid. *Herzogia* 21: 5–24.
- Jabłońska, A. & Kukwa, M. 2007. The lichen genus *Ochrolechia* in Poland. I. *O. androgyna* s. lat. and *O. arborea*. *Herzogia* 20: 13–27.
- Lendemer, J. C., Kocourková, J. & Knudsen, K. 2009. Studies in lichens and lichenicolous fungi: more notes on taxa from North America. *Mycotaxon* 110(1): 373–378.
- Llimona, X. & Hladun, N. L. 2001. Checklist of the lichens and lichenicolous fungi of the Iberian Peninsula and Balearic Islands. *Bocconeia* 14: 1–581.
- Llop, E., Fernandez-Brime, S., Figueras-Balaguer, G., Muñoz, D. P. & Llimona, X. 2013. Aproximació al coneixement de la flora líquènica i dels fongs líquenícules dels altiplans i conques centrals de Catalunya: el sector segarric. *Butlletí de la Institució Catalana d'Història Natural* 77: 39–59.
- Lumbsch H. T. 2002. Analysis of Phenolic Products in Lichens for Identification and Taxonomy. En: Kranner, I., Beckett, R. P. y Varma, A. (Eds.). *Protocols in lichenology: culturing, biochemistry, ecophysiology and use in biomonitoring*. Springer, Berlin: 281–295. <https://doi.org/10.1007/978-3-642-56359-1>
- Maliček, J., Berger, F., Palice, Z. & Vondrak, J. 2017. Corticolous sorediate *Lecanora* species (Lecanoraceae, Ascomycota) containing atranorin in Europe. *The Lichenologist* 49(5): 431–455. <https://doi.org/10.1017/S002428291700038X>
- Nimis, P. L. & Martellos, S. 2022. ITALIC- The information system on Italian Lichens. Version 7.0. University of Trieste, Dept. of Biology. <https://dryades.units.it/italic>
- Orange, A., James, P.W. & White, F.J. 2001. *Microchemical methods for the identification of lichens*. British Lichen Society, London.
- Pérez-Ortega S. & Álvarez-Lafuente, A. 2006a. Primer catálogo de líquenes y hongos líquenícules de la Comunidad Autónoma de Cantabria. *Botanica Complutensis* 30: 5–16. <https://revistas.ucm.es/index.php/BOCM/article/view/BOCM0606110005A>
- Pérez-Ortega, S. & Álvarez-Lafuente, A. 2006b. Primer catálogo de líquenes y hongos líquenícules de la Comunidad Autónoma de Castilla y León. *Botanica Complutensis* 30: 17–52. <https://revistas.ucm.es/index.php/BOCM/article/view/BOCM0606110017A>
- Poelt, J. 1974. *Bestimmungsschlüssel Europäischer Flechten*. J. Kramer. Vaduz.
- Rodríguez-García, A. 2004. Mapa Geomorfológico de España. Distribución de hojas a escala 1:50.000. Hojas nº 298-299 (La Guardia-Tomiño). Instituto Geológico y Minero de España. Madrid.
- Roux, C. (2012). Liste des lichens et champignons lichénicoles de France. *Bulletin de la Société linnéenne de Provence Numéro spécial* 16: 1–220.
- Schumm, F. & Elix, J.A. 2016. *Atlas of images of thin layer chromatograms of lichen substances*. Supplement. Books on Demand GmbH. Norderstedt.
- Sheard, J. W., Knudsen, K., Mayrhofer, H. & Morse, C. A. 2011. Three new species of *Rinodina* (Physciaceae) and a new record from North America. *The Bryologist* 114(3): 453–465. <https://doi.org/10.1639/0007-2745-114.3.453>
- Silva, C. S. 1995. O género *Caloplaca* Th. Fr. em Portugal continental. *Especies novas ou pouco conhecidas*. *Studia Botanica* 13: 109–114.
- Smith, C. W., Aptroot, A., Coppins, B. J., Fletcher, A., Gilbert, O. L., Gilbert, James, P. W. & Woseley, P.A. 2009. *The lichens of Great Britain and Ireland*. British Lichen Society, London.
- Van der Pluijm, A. 2017. *Rinodina biloculata*, een voor Nederland nieuw, oceanisch korstmoss in een Duitse-dotstruweel in de Biesbosch. *Buxbaumiella* 110: 7–11.
- White, F. J. & James, P. W. 1985. A new guide to microchemical techniques for the identification of lichen substances. *British Lichen Society Bulletin* 57 (suppl): 1–41.