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ORIGINAL ARTICLE

Rinodina capensis and three other *Rinodina* species from Chile

Rinodina capensis y otras tres especies de *Rinodina* de Chile

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ABSTRACT

Records of four *Rinodina* species and *Orcularia insperata* from the Los Lagos region and Aysén Region in Chile are presented. *Orcularia insperata* and *Rinodina capensis* are new to Chile. Information on the worldwide distribution of these species and three others is provided. Furthermore, a key is provided to the *Rinodina* and related species currently known from Chile.

Keywords: distribution, lichens, new records, Physciaceae.

RESUMEN

Se presentan registros de cuatro especies de *Rinodina* y *Orcularia insperata* de la región de Los Lagos y de la región de Aysén en Chile. *Orcularia insperata* y *Rinodina capensis* son nuevas para Chile. Se proporciona información sobre la distribución mundial de estas especies y de otras tres. Además, se proporciona una clave de las especies de *Rinodina* y afines conocidas actualmente en Chile.

Palabras clave: distribución, líquenes, nuevos registros, Physciaceae.

INTRODUCTION

The checklist of lichens and lichenicolous fungi by Galloway & Quilhot (1998) contains 1383 lichen species for Chile, thirteen of them belonging to the genus *Rinodina*. After publication of the checklist, *R. pyrina* (Ach.) Arnold from the surroundings of Santiago de Chile (Vargas *et al.* 2013) and *R. sophodes* (Ach.) A. Massal. from the Bío-Bío Region (Pereira *et al.* 2016) were found. Vargas *et al.* (2017) recorded *R. intrusa* (Nyl.) Malme from the Atacama, but this specimen may have been confused with *R. viridis* Müll. Arg. Additionally, Trinkaus *et al.* (1999) collected *Rinodina gennarii* Bagl. on coastal rocks near Puerto Montt and verified the occurrence of this species in South America. However, the knowledge about the genus *Rinodina* in general and especially the geographical distribution, frequency and habitat requirements of its species is still rather poor in Chile.

Here we present further records of four *Rinodina*, and one *Orcularia* species, collected during field excursions by the first author in 2013 and 2019 and a key for *Rinodina* and closely related species known from Chile.

MATERIAL AND METHODS

For identification, the specimens were studied in the usual way with stereomicroscope and compound microscope. Measurements were taken on thin hand-cut sections mounted in water. Lichen substances were analyzed by spot tests and polarized light. Cited specimens are kept in the private herbarium of the first author.

An asterisk (*) represents species reported as new to Chile in the list below.

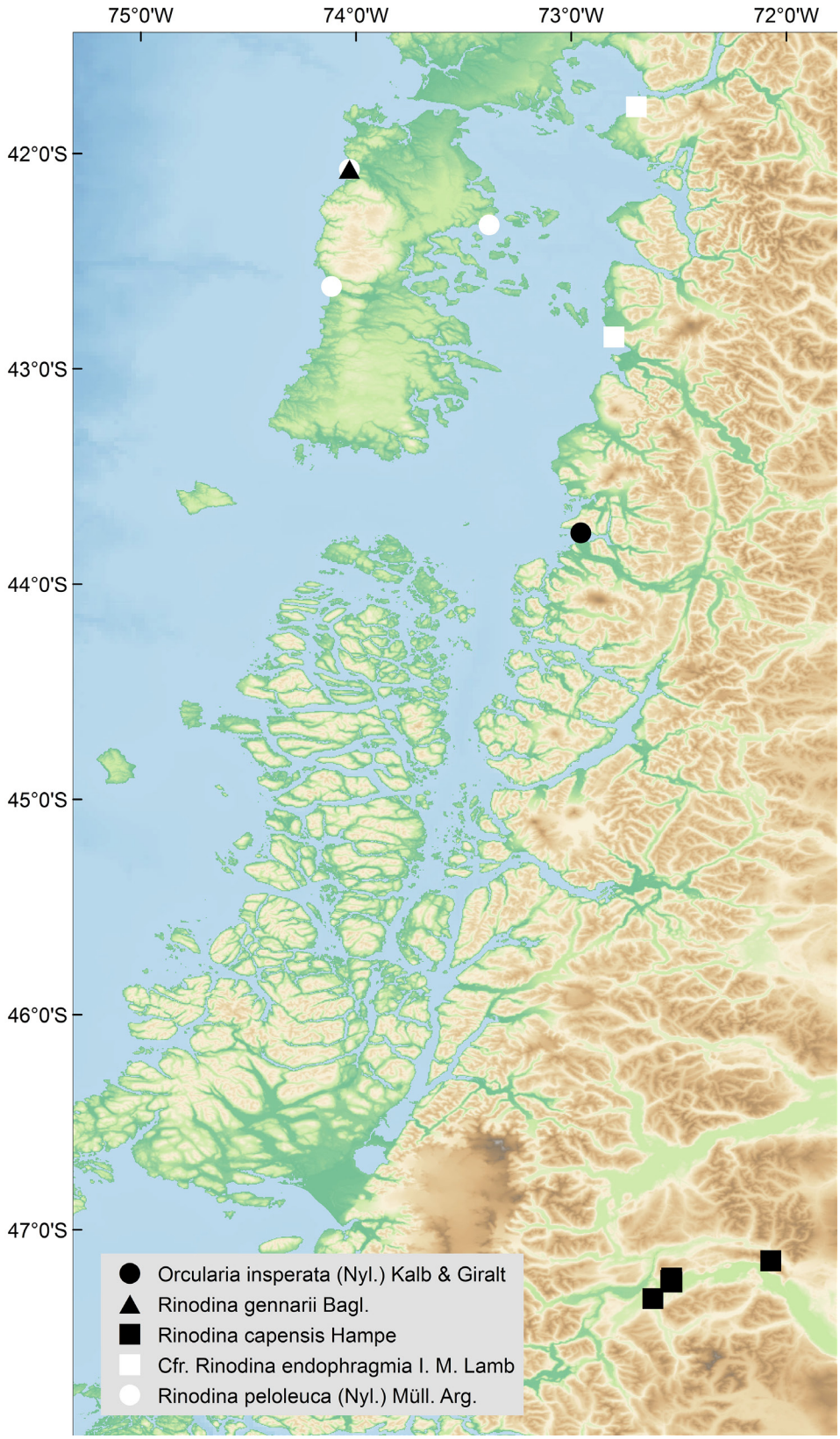

Figure 1. Localities of the studied specimens. / Localidades de los especímenes estudiados.

SPECIES LIST

****Orcularia insperata*** (Nyl.) Kalb & Giralt

A corticolous or lignicolous species. The specimen has the typical *Orcularia*-type spores of the genus. The size of the spores is 15–17 × 8–9 µm, n=8. The hypothecium and thalline margin are darkly pigmented.

Orcularia insperata is widely distributed in both hemispheres and occurs mainly in (sub-)oceanic regions. The distribution area on the Northern Hemisphere comprises the temperate and meridional vegetation zone. It is known from Europe (British Islands: Kalb & Giralt 2011, Russia, Caucasus: Urbanavichus *et al.* 2020, Spain: Kalb & Giralt 2011), Africa (Macaronesia: Kalb & Giralt 2011) and North America (North Carolina: Lendemer *et al.* 2008). In the Southern Hemisphere, the species spreads over the austrosubtropical and austral vegetation zone. It has been found in New Zealand (Mayrhofer *et al.* 1999), eastern Australia (GBIF.org 2020a, Mayrhofer *et al.* 1999), South Africa (GBIF.org 2020a) and eastern South America (Argentina, Brazil, Paraguay, Uruguay: Kalb & Giralt 2011, Osorio 2000). Furthermore, *O. insperata* grows at high altitudes in tropical regions (Costa Rica, Colombia: GBIF.org 2020a, Equador, Réunion: Kalb & Giralt 2011) and on New Zealand's subantarctic islands (Elix 2018).

CHILE, Aysén Region, Aysén Province, Puerto Raúl Marín Balmaceda, dunes N of the village, open dunes with dense *Cytisus*? shrubbery, 72°57'17,3''W, 43°45'45,9''S, c. 5 m, 24-II-2019, U. Schiefelbein 5208.

****Rinodina capensis*** Hampe

A corticolous species. The examined specimens have the characteristic features: atranorin in the cortex, *Physcia*-type spores, absent or a light torus and spore size of 22.5–23.5 × 10–11.5 µm, n=24.

In the Northern Hemisphere, *Rinodina capensis* occurs mainly in oceanic and sub-oceanic regions of the temperate and meridional vegetation zone. It is known from western North America (GBIF.org 2020b, Sheard 2004, 2010), Europe (Austria: Ropin & Mayrhofer 1993 as *R. corticola*, Bosnia and Herzegovina: Bilovitz & Mayrhofer 2010, Bulgaria: Mayrhofer *et al.* 2005, Czech Republic: Malíček & Palice 2015, Croatia: Magnusson 1947 as *R. corticola*, France: Roux 2014, Georgia: Ropin & Mayrhofer 1993 as *R. corticola*, Germany: Wirth *et al.* 2013, Greece: Abbott 2009, Italy: Nimis 2016, Romania: Ropin & Mayrhofer 1993 as *R. corticola*, Slovakia: Pišút *et al.* 1998, Slovenia: Ropin & Mayrhofer 1993 as *R. corticola*, Suppan *et al.* 2000, Spain: Giralt 2010, Switzerland: Ropin & Mayrhofer 1993 as *R. corticola*, Turkey: John *et al.* 2017, Ukraine: Faltynowicz & Sulma 1994 as *R. corticola*), North Africa (Morocco: Ravera 2001) and Asia (Russia, southern Siberia: Urbanavichus, & Andreev 2010, Taiwan: GBIF 2020b).

In the Southern Hemisphere, the species has been so far reported from South Africa (Doidge 1950, GBIF 2020b, Mayrhofer *et al.* 2014) and Argentina (GBIF 2020b).

CHILE, Aysén Region, Capitán Prat Province, Cochrane, W of Lago Esmeralda, c. 7,5 km SSW of Cochrane, pasture with old trees, 72°37'12,1''W, 47°19'12,5''S, c. 290 m, 18-II-2019, U. Schiefelbein 5116, 5124. Aysén Region, Capitán Prat Province, Cochrane, Tamango National Reserve, path to Laguna El Cangrejo, old farmyard, c. 3,6 km NE of Cochrane, old freestanding trees, 72°31'57,3''W, 47°13'25,3''S, c. 490 m, 19-II-2019, U. Schiefelbein 5142, 5148, 5150. Aysén Region, Capitán Prat Province, Cochrane, Tamango National Reserve, path to Laguna El Cangrejo, c. 2,5 km NE of Cochrane, old freestanding trees, 72°32'13,5''W, 47°14'08,9''S, c. 460 m, 19-II-2019, U. Schiefelbein 5153. Aysén Region, Capitán Prat Province, Cochrane, Tamango National Reserve, path to Laguna El Cangrejo, NW of the entrance to the national reserve, c. 2,6 km E of Cochrane, shrubbery, 72°31'52,1''W, 47°14'35,6''S, c. 210 m, 19-II-2019, U. Schiefelbein 5157. Aysén Region, Capitán Prat Province, Cochrane, Chacabuco valley, Los Gatos Trail, c. 3,5 km N of the Alta Valle Campground, old forest, 72°04'20,4''W, 47°08'39''S, c. 670 m, 20-II-2019, U. Schiefelbein 5166.

Cfr. Rinodina endophragmia I. M. Lamb

A saxicolous species with relatively thick white to light brown thallus and spores of the *Bicincta*-type, 18.0–21.0 × 11.0–12.5 µm, n=16. The identification is tentative because of the light orange-brown color of the epihymenium, which is not typical for this species or of their occurrence on the coast in the littoral zone. Because of the spore type and the color of the epihymenium it may be close to *R. lecanorina* but this species differs in possessing smaller spores and occurring on calcareous rocks.

This species grows in the so-called black zone together with a *Hydropunctaria* species and other "marine" lichens.

CHILE, Los Lagos Region, Palena Province, Chaitén, Santa Bárbara, nothern edge of the beach, coastal rocks, on horizontal surface, in lower part of the rock, above the barnacle zone, on schist, 72°48'03,8''W, 42°51'10,8''S, c. 5 m, 25-II-2019, U. Schiefelbein 5231. Los Lagos Region, Provincia de Palena, Contao, Seno de Reloncaví, beach c. 1,3 km NE of Contao, boulder beach, upper part of the beach, together with *Hydropunctaria*, on schist, 72°41'49,1''W, 41°47'00,8''S, c. 2 m, 26-II-2019, U. Schiefelbein 5720.

Rinodina gennarii Bagl.

The examined specimen has spore development of type B that belong to the *Dirinaria*-type, c. 15.5 × 8.0 µm, n= 8,

slightly swollen at septum and without a torus.

A saxicolous species. *Rinodina gennarii* is often included in *R. oleae* (e.g. Kaschik 2006, Giavarini *et al.* 2009) in the recent past, but in our opinion, this species is restricted to corticolous substrata, in contrast to *R. gennarii*, which grows primarily on coastal and more rarely on inland rocks.

In the Northern hemisphere, the distribution area of *R. gennarii* reaches from the boreal (Mayrhofer 1984, Mayrhofer & Moberg 2002) to the meridional vegetation zone (Egea 1996, Mayrhofer 1984), and it occurs on both coasts of North America (Sheard 2010, GBIF.org 2020c) as well as the Old World (Africa: Egea 1996, Mayrhofer 1984, Asia: Sheard *et al.* 2017, Europe: e.g. Giralt 2010, Mayrhofer 1984, Mayrhofer & Moberg 2002, Wirth *et al.* 2013), but because of its integration into *R. oleae* and its maritime preference, it is uncertain how far inland it occurs within the continents.

In the Southern Hemisphere, the distribution area of *R. gennarii* seems to be almost restricted to austral vegetation zone. The species is so far known from Australia, New Zealand (Trinkaus *et al.* 1999), South Africa (Matzer & Mayrhofer 1996), Île Saint-Paul, an island in the Indian Ocean, (Mayrhofer 1984) and Chile (Trinkaus *et al.* 1999). In Chile it was found in coastal habitats on Isle of Chiloe and north of that island (Trinkaus *et al.* 1999).

CHILE, Región de los Lagos (X), Chiloé Province, Chiloé, coast c. 5,5 km SW of Chepu, rocky coast, on schist, 74°01'50"W, 42°04'25"S, c. 5 m, 24-II-2013, U. Schiefelbein 5285.

Rinodina peloleuca (Nyl.) Müll. Arg.

A saxicolous species. Spores of the examined specimens are of the *Physcia-Physconia*-type, sometimes *Dirinaria*-like, 18.5–24.0 × 10.5–14.0 µm, n=15, without apical thickening. Skyrin is not always seen as a medullary pigment but K+ red-violet patches are always present in the medulla.

Rinodina peloleuca is a well-known southern South America species occurring in Tasmania, New Zealand, southern South America, on subantarctic islands, and in maritime Antarctica (Kaschik 2006, Matzer *et al.* 1998). In Chile, it was already found in the Los Lagos region (Región de los Lagos) and along the strait of Magellan (Matzer *et al.* 1998).

CHILE, Los Lagos Region, Chiloé Province, Chiloé, coast W of Tenaun, boulders at the coast, on granite, 73°22'53"W, 42°19'56"S, c. 1 m, 22-II-2013, U. Schiefelbein 5284. Los Lagos Region, Chiloé Province, Chiloé, coast c. 5,5 km SW of Chepu, rocky coast, on schist, 74°01'50"W, 42°04'25"S, c. 5 m, 24-II-2013, U. Schiefelbein 5286. Los Lagos Region, Chiloé Province, Chiloé, National park Chiloé, coastal rocks c. 5 km NNW of Cucao, rocks adjacent to the sandy beach, on schist, 74°06'50"W, 42°37'05"S, c. 20 m, 21-II-2013, U. Schiefelbein 5287.

Key to *Rinodina* and related species in Chile

1a. Ascospores 3-septate at maturity ..... *Rinodina conradii* Körb.
1b. Ascospores 1-septate at maturity 2
2a. Growing on wood, or bark (corticolous, lignicolous) 3
2b. Growing on rock (saxicolous), or on soil, terricolous mosses or decaying plant debris (terricolous) 6
3a. Ascospores *Orcularia*-type ..... *Orcularia insperata* (Nyl.) Kalb & Giralt
3b. Ascospores of another type 4
4a. Ascospores *Milvina*-type ..... *Rinodina sophodes* (Ach.) A. Massal.
4b. Ascospores of another type 5
5a. Ascospores *Physcia*-type, atranorin in cortex ..... *Rinodina capensis* Hampe
5a. Ascospores *Physconia*-like, atranorin absent ..... *Rinodina pyrina* (Ach.) Arnold
6a. Growing on rock (saxicolous) 7
6b. Growing on soil (terricolous), terricolous mosses or decaying plant debris 13
7a. Thallus yellow or yellowish ..... *Rinodina thiomela* (Nyl.) Müll. Arg.
7b. Thallus not yellow/yellowish (whitish-grey or brown) 8
8a. Ascospores *Dirinaria*-type ..... *Rinodina gennarii* Bagl.
8b. Ascospores of another type 9
9a. Ascospores *Pachysporaria*-type II ..... *Rinodina viridis* Müll. Arg.
9b. Ascospores of another type 10
10a. Ascospores *Bicincta*-type ..... cfr. *Rinodina endophragmia* I. M. Lamb
10b. Ascospores *Physcia*- or *Phsyconia*-type 11
11a. Thallus containing atranorin, K + yellow ..... *Rinodina occulta* (Körb.) Sheard

11b. Thallus not containing atranorin, K – 12
12a. Medulla with dispersed patches of an orange pigment containing skyrin, K+ red-violet, ascospores 15–23 × 10–13 µm, without pronounced apical, internal wall-thickenings ..... *Rinodina peloleuca* (Nyl.) Müll. Arg. [syn. *Rinodina endochrysodes* (Nyl.) Müll. Arg., *Rinodina deceptionis* I. M. Lamb.]
12b. Medulla with an evenly distributed orange pigment not containing skyrin, K+ red, ascospores 20–30 × 10–12 µm, with pronounced apical, internal wall-thickenings ..... *Rinodina infuscata* (Nyl.) Zahlbr.
13a. Thallus squamulose ..... *Phaeorrhiza nimbosa* (Fr.) H. Mayrhofer & Poelt [syn. *Rinodina nimbosa* (Fr.) Th. Fr.]
13b. Thallus crustose 14
14a. Cortex of apothecial margin 40–70 µm, sphaerophorin present ..... *Rinodina turfacea* (Wahlenb.) Körb.
14b. Cortex of apothecial margin, 20–40 µm, sphaerophorin absent ..... *Rinodina olivaceobrunnea* C. W. Dodge & G. E. Baker

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