

Rhymbocarpus aggregatus, a new species of lichenicolous fungi (Helotiales) growing on *Buellia griseovirens* in Spain, with a revised key to species of the genus

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Abstract. The new species *Rhymbocarpus aggregatus* is described from northern Spain (Basque country), growing on the thallus of *Buellia griseovirens*. It is distinguished from all other known species of the genus by slightly pruinose ascomata. A new, revised key to all known *Rhymbocarpus* species is presented.

1. Introduction

When Diederich & Etayo (2000) revised the genus *Rhymbocarpus*, ten species were accepted and keyed out. Diederich et al. (2010) combined two further species in *Rhymbocarpus*, *R. ericetorum* (Körb.) Etayo, Diederich & Ertz and *R. roccellae* (Etayo, Paz-Bermúdez & Diederich) Etayo, Diederich & Ertz. A new species of *Rhymbocarpus*, lichenicolous on *Buellia griseovirens*, has recently been discovered in Spain, differing from all hitherto known species of the genus by slightly pruinose ascomata. The aim of this paper is to describe and illustrate the new species, and to give a new, revised key to all known *Rhymbocarpus* species.

2. Material and Methods

The specimens examined are located in the institutional herbarium VIT and in the personal collection of the first author. The morphological characters of dry herbarium material have been studied and illustrated using a dissecting microscope. The microscopical examination was carried out using hand-cut sections mounted in water, 5% KOH (K), concentrated nitric acid (N), Congo Red, or Lugol's reagent, without (I) or with (K/I) pre-treatment with KOH.

3. Results and Discussion

Rhymbocarpus aggregatus Etayo & Diederich, sp. nov. Fig. 1

A Rhymbocarpo neglecto ascomatibus pruinosis, excipulo brunneo, paraphysibus raro ramosis differt.

Mycobank: MB 519670.

Typus: Spain, Basque Country, Álava, amongst Larraona and Kontrasta, 42°46'51" N, 2°16'35" W, alt. 815 m, open *Quercus × subpyrenaica* wood, on *Juniperus communis*, 29 August 2010, J. Etayo 26165 (VIT–holotypus, hb. Etayo–isotypus).

Ascomata erumpent, sessile, roundish or elongate, often irregular in form by mutual compression, mostly agglomerate in dense, convex, roundish groups 0.4–0.9 mm diam. comprising 5–20 ascomata, rarely dispersed, individual ascomata (100–)120–200(–250) µm diam., with a distinct, prominent, blackish, permanent, even margin, 20–35 µm thick, and a black, matt, applanate disc with a rough surface, frequently covered by a whitish to yellowish green pruina. Exciple reddish brown, K– (or darker), N+ orange brown, laterally of thick-walled, isodiametric to elongate (mainly in the upper part), radiating hyphae, 15–30 µm thick, without hairs, basally of conglutinated, thick-walled, more or less isodiametric cells, 5–12 µm diam., 20–30 µm thick. Subhymenium brownish.

Epihymenium green, K+ olivaceous-green, N+ slightly greenish, gelatinous, irregular in thickness. Hymenium pale greenish, 40–45 µm tall, I–, KI–. Paraphyses septate, simple, rarely branched, with many small oil guttules, 2–2.5 µm thick, apically slightly swol-

len, up to 2.5–3.5 µm thick and green due to surrounding gelatine in the upper 10–25 µm. Asci elongate-clavate to subcylindrical, apically rounded, 8-spored, wall laterally and apically thin, without ocular chamber, 33–39 × 6–8 µm, I–, KI–. Ascospores bise-

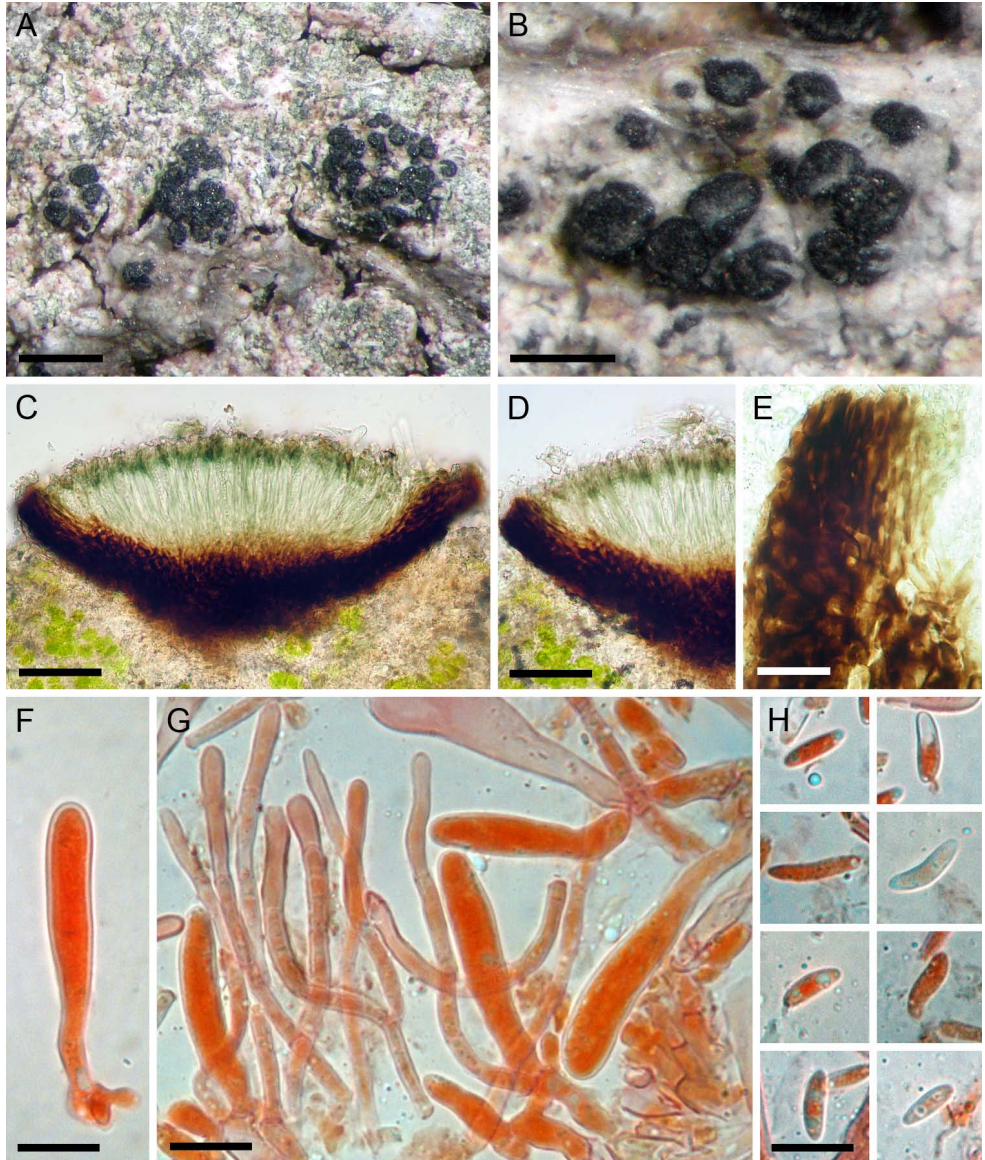


Fig. 1. *Rhymbocarpus aggregatus* (holotypus). A–B, Aggregated ascomata on the thallus of *Buellia griseovirens*. C, Section through ascoma in water. D, Section through ascoma in K (note the weak olivaceous reaction of the epihymenium). E, Upper part of exciple in K, showing the vertically elongate apical cells. F–H, Asci, paraphyses and ascospores in Congo Red after pre-treatment with K. Scale bars: A = 500 µm, B = 200 µm, C–D = 50 µm, E = 20 µm, F–H = 10 µm.

riate in the ascus, non-septate, colourless, narrowly ellipsoid, sometimes irregularly curved, biguttulate, 7–10(–14) × 2–3(–4) µm, wall smooth, very thin, without perispore. Conidiomata unknown.

Because of the grouped ascomata, a green, K+ olivaceous green epihymenium, a brown exciple, the lower part with isodiametric cells and the upper part with elongate cells, and the biguttulate ascospores, the new species perfectly fits in the genus *Rhymbocarpus* as circumscribed by Diederich & Etayo (2000). It is the first known species of the genus in which most apothecia have a pruinose disc. The most similar species with erumpent to superficial ascomata with a distinct margin without hairs are *R. neglectus* (Vain.) Diederich & Etayo (Kümmerling et al. 1993) and *R. makarovae* Diederich & Etayo (Diederich & Etayo 2000). *R. neglectus* grows on lichens of the *Lepraria neglecta*-group. It is very similar to the new species but is distinguished by the epruinose disc, an exciple made of more elongate, radiating cells in the entire outer part (not only in the upper part), frequently branched paraphyses, and a greenish brown pigment in the upper part of the excipulum. *R. makarovae*, known to grow on *Porpidia* species, has apothecia finally divided by 3–4 cruciately arranged fissures, paraphyses with a smaller number of oil guttules and longer asci of 47–57 µm.

In the similar and probably closely related genus *Llimoniella*, two species, *L. pyrenulae* Diederich & Etayo and *L. ramalinae* (Müll. Arg.) Etayo & Diederich, have a very variable pigmentation, including specimens with a greenish epihymenium, but these are always accompanied by additional pigments giving strong reactions in K (Diederich et al. 2010). Both genera are distinguished by a combination of several differences, mainly concerning the outer excipular structure and the pigmentation (Diederich & Etayo 2000, Diederich et al. 2010).

R. aggregatus is known only from the type locality, where it grows on the well-developed thallus of fertile *Buellia griseovirens* on the bark of *Juniperus communis*. The fungus does not visibly damage the host thallus.

4. A revised key to the species of *Rhymbocarpus*

1. Ascomata ± immersed, in some species almost perithecioid; margin indistinct, at least when young; disc punctiform or enlarged..... 2
1. Ascomata erumpent to superficial, with a distinct margin..... 7
2. Ascomata remaining immersed, even when mature; margin hardly visible 3
2. Ascomata initially immersed, when old erumpent, developing a thick, black margin, mostly 100–200 µm diam. 6
3. Ascomata 100–500 µm diam.; ascospores 10.5–14 × 3–3.5 µm; on *Dibaeis baeomyces* ***R. ericetorum***
3. Ascomata up to 120 µm diam.; ascospores usually shorter..... 4
4. Ascospores 11–12 × 4–5 µm; ascomatal margin sometimes with short hairs; on *Rhizocarpon*..... ***R. geographicum***
4. Ascospores 8–10.5 × 3–4 µm; ascomatal margin without hairs..... 5
5. Lower exciple brownish; epihymenium brownish or olivaceous; on *Rocella* ***R. roccellae***
5. Lower exciple hyaline to greenish; epihymenium olivaceous; on *Dirina ceratoniae* ***R. boomii***
6. Ascomata, when mature, deeply cruciate; margin divided by 3 or 4 deep fissures, almost completely covering the disc, except when old; ascospores 9–12(–13) × 3–4(–4.5) µm; on *Lecidea fuscoatra* ***R. fuscoatrae***
6. Ascomatal margin, when old, not deeply fissured; ascospores 7–10 × 3–4 µm; on *Porpidia*..... ***R. makarovae***
7. Ascomatal margin with hairs (in *R. cruciatus* only visible in microscopical section)..... 8
7. Ascomatal margin without hairs 10
8. Ascospores narrowly ellipsoid to fusiform, 10–15 × 2–3.5 µm; ascomata with or without hairs; on *Pertusaria panyrga*.. ***R. pertusariae***
8. Ascospores ellipsoid, mostly under 9 µm.... 9
9. Exciple entirely covered by hairs; ascomatal margin usually without, or with inconspicuous fissures; ascospores 5.5–9 × 2.5–3.2 µm; green pigment present in the epihymenium and the upper exciple; on *Lepraria lobificans* and *Lepraria* sp..... ***R. pubescens***
9. Hairs restricted to the excipular margin; ascomatal margin often divided by a few deep fissures; ascospores 7–8.5(–10.5) ×

- (2.5–)3–3.5 μm ; green pigment only present in the epihymenium, exciple entirely brown; on *Diploicia canescens* **R. cruciatus**
10. Ascospores 15–17(–20) \times 2.5–3 μm ; on *Stereocaulon* **R. stereocaulorum**
10. Ascospores shorter **11**
11. Ascomata deeply cruciate; margin divided by 3 or 4 deep fissures, almost completely covering the disc, except when old; ascospores 9–12(–13) \times 3–4(–4.5) μm ; on *Lecidea fuscoatra* **R. fuscoatrae**
11. Ascomata not cruciate, margin not, or not deeply fissured **12**
12. Ascospores 10–15 \times 2–3.5 μm ; on *Pertusaria panyrga* **R. pertusariae**
12. Ascospores usually shorter **13**
13. Ascomata immersed, almost perithecioid when young, later erumpent to superficial; ascospores 7–10 \times 3–4 μm ; asci 47–57 \times 6–8 μm ; on *Porpidia* **R. makarovae**
13. Ascomata sometimes immersed when young, soon superficial; ascospores narrower, 2–3 μm broad; asci shorter, up to 45 μm **14**
14. Ascomatal disc pruinose; exciple laterally of isodiametric to slightly elongate cells, in the

upper part of elongate cells; paraphyses rarely branched; entire exciple reddish brown, without a greenish pigment; ascospores 7–10(–14) \times 2–3(–4) μm ; asci 33–39 \times 6–8 μm ; on *Buellia griseovirens* **R. aggregatus**

14. Ascomatal disc epruinose; exciple entirely of more elongate, radiating cells in the outer part (not only in the upper part); paraphyses frequently branched; upper part of excipulum with a greenish brown pigment; ascospores (8–)9–11(–14) \times 2–3(–3.5) μm ; asci 35–45 \times 6.5–8 μm ; on the *Lepraria neglecta*-group **R. neglectus**

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