

Bacidia genuensis B. de Lesd. resurrected

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Article info

Received: 3 Jul. 2023
Revision received: 23 Aug. 2023
Accepted: 31 Aug. 2023
Published: 29 Dec. 2023

Associate Editor

Martin Kukwa

Abstract. The species described as *Bacidia genuensis* is transferred here to *Bacidina* as *B. genuensis* (*Ramalinaceae*, *Lecanorales*, lichenized *Ascomycota*). An updated morphological description is provided. The species is characterized by mostly blackish apothecia on a thick, microsquamulose thallus, a crystal-inspersed proper exciple that is mostly prosoplectenchymatous, an ascus with a wide and dome-shaped axial body and an expanded c-layer (resulting in a thin, amyloid d-layer), a blue-green pigment in the epihymenium, proper exciple, and pycnidial wall, and an orange-brown, K⁺ intensifying pigment in the hypothecium and sometimes proper exciple. This combination of characters sets the species apart from its potentially close relatives *Bacidina egenula* and *B. indigena*, as well as the superficially similar, but more distantly related, *Toniniopsis bagliettoana*. *Bacidina genuensis* is currently known from a few sites in northern Italy, where it inhabits weathered and apparently shaded mortar of masonry.

Key words: *Bacidia*, *Bacidina*, crustose lichens, Italy, *Lecanorales*, *Ramalinaceae*, *Toniniopsis*

Introduction

Bacidia genuensis was described in 1937 by Maurice Bouly de Lesdain (1937) based on material collected by Camillo Sbarbaro earlier the same year in Genova, Liguria (Bouly de Lesdain 1937). The material studied by Bouly de Lesdain was later lost when his herbarium in Dunkirk was destroyed during World War II (Abbayes 1966). Fortunately, duplicates (all syntypes) were distributed by Köfaragó-Gyelnik (1937). The name *Bacidia genuensis* has subsequently been neglected, although it was listed by Lamb (1963). Clauzade & Roux (1985) synonymized it with *Bacidina egenula* (Nyl.) Vězda (as *Bacidia egenula* (Nyl.) Arnold), a treatment followed by, e.g., Nimis (1993, 2016), Roux (2012), and Nimis et al. (2018).

This paper aims to clarify the taxonomic status of *Bacidia genuensis* and provide an up-to-date morphological description. It is argued that *B. genuensis* is a distinct species belonging in the genus *Bacidina* (*Ramalinaceae*) as circumscribed by Ekman (2023).

Material and methods

This study is based on specimens in LD, S, and UPS. Methods for studying anatomy and chemistry closely followed those of Ekman (2023). Measurements of quantitative characters in the description below are given either as

‘minimum value – maximum value’ (pycnidial characters), ‘(minimum value) – subjective interval including most measurements – (maximum value)’ (photobiont cells and thallus granules), or ‘minimum value – arithmetic mean value – maximum value (s = sample standard deviation, n = sample size)’ (other characters). The terminology of the ascus structure follows Bellemère & Letrouit-Galinou (1988). Names of apothecial and pycnidial pigments follow Meyer & Printzen (2000). Specimens were screened for lichen substances in system C following the method described by Arup et al. (1993).

Taxonomy

Bacidina genuensis (B. de Lesd.) S. Ekman, comb. nov.
(Fig. 1A–D)

Mycobank MB 849347

Basionym: *Bacidia genuensis* B. de Lesd., Bull. Soc. Bot. France 84: 282. 1937.

Type: Italy, Liguria, Genova: “Genua, in Via Priaruggia, muscicola ad caementum muri, loco umbroso”, March 1937, C. Sbarbaro s.n., distributed as Köfaragó-Gyelnik, Lichenotheca Parva 29 (UPS L-947684 – lectotype!, designated here, MycoBank MBT 10013915; LD 1095246 – isolectotype!).

Nomenclature. It is possible that *Bacidia genuensis* first appeared as a *nomen nudum* in Köfaragó-Gyelnik’s Lichenotheca Parva 29 (Köfaragó-Gyelnik 1937, dated 1 October). Nonetheless, the name was first validly published by Bouly de Lesdain (1937), which appeared

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sometime in early October of 1937 (Staffleu & Menega 1993).

Description. Thallus crustose, continuous, \pm thick, yellowish grey in the herbarium (probably grey-green in a fresh state), composed of firmly fused, 30–85 μm wide thallus granules with a cortex of 1(–2) cell layers of thick-walled, ellipsoidal cells with 1.5–3 μm long lumina, forming irregular or shallowly incised, imbricate, minute squamules that do not dissolve into loosely arranged, soredia-like granules, but sometimes bud tiny granules from the terminal segments of the squamules. Prothallus lacking. Photobiont a member of *Trebouxio-phyceae*, unicellular, globose to ellipsoid, (5.5–)7.5–11(–14) μm long. Apothecia biatorine, 0.3–0.6–1.0 mm diam. ($s=0.18$, $n=20$), at first slightly concave, soon flat, finally becoming convex. Disc usually matt black, sometimes pale brownish yellow, blue-grey, or mottled in different colors. Margin concolorous with disk or (in pale apothecia) darker than disk (bluish or blackish in uppermost part), slightly raised above disc in young apothecia, soon level with the disc, excluded in convex apothecia, sometimes with thin whitish pruina. Proper exciple 37–47–56 μm wide ($s=6$, $n=10$), often dark blue-green in uppermost part, sometimes with pale orange-brown along edge, colorless inside, sometimes with radiating clusters of minute crystals (insoluble in KOH); excipular hyphae indistinctly radiating, dichotomously branched and anastomosing, \pm thin-walled-walled hyphae with \pm cylindrical cell lumina up to 25 μm long and up to 2 μm wide; terminal 2–3 cells distinctly larger than subterminal cells, globose or irregular, up to 10 μm long. Hypothecium \pm orange-brown (K⁺ intensifying) in upper part. Hymenium 61–68–73 μm tall ($s=4$, $n=10$), making up 17–30% of the height of the apothecium, blue-green in vertical streaks surrounding paraphyses and reaching up to 2/3 into the hymenium, without crystals. Paraphyses 1.2–1.3–1.6 μm wide in mid-hymenium ($s=0.1$, $n=20$), unbranched or sparsely branched in uppermost part; apices \pm clavate, 2.3–3.5–4.7 μm wide ($s=0.7$, $n=30$). Asci clavate; young spore mass with small and bluntly conical ocular chamber; c-layer thick, non-amyloid; d-layer thin, uniformly amyloid; axial body broadly dome-shaped, non-amyloid. Ascospores 8 per ascus, colorless, without perispore or ornamentation, acicular, straight or only slightly curved, straight or coiled in young asci, 23–34–43 μm long ($s=5$, $n=30$), 1.2–1.8–2.3 μm wide ($s=0.3$, $n=30$), 13.3–19.3–28.0 times as long as wide ($s=3.8$, $n=30$), with 0–2.6–7 septa ($s=2.3$, $n=30$). Conidiomata pycnidia, \sim 60 μm diam., immersed, unilocular, globose, with blue-green pigment around ostiole, otherwise unpigmented; inside of cavity lined with conidiophores terminated by ampulliform conidiogenous cells, 4–5 \times 1.0–1.5 μm . Conidia formed terminally from conidiophores, filiform with blunt ends, \pm strongly curved, non-septate, 11–20 \times 1.0 μm .

Chemistry and pigmentation. Thallus without acetone-soluble lichen substances. Apothecia and conidiomata with Bagliettoana-green (proper exciple and hymenium in apothecia, ostiole in pycnidia) and

Rubella-orange (hypothecium and sometimes proper exciple in apothecia).

Distribution and ecology. *Bacidina genuensis* has been collected once at the fortress of Peschiera del Garda in Veneto and at three different sites around Genova in Liguria. All specimens were collected on weathered mortar of masonry, probably in more or less shaded sites, often growing between small tufts of acrocarpous mosses (but only rarely overgrowing decaying moss tufts). Some specimens were annotated as if the lichen was muscicolous, but this is not actually the case.

Notes. *Bacidia genuensis* is transferred here to *Bacidina* in the sense of Ekman (2023). This is based on the composition of the thallus (fused thallus granules with a thin cortex), the partially widened cell lumina in the proper exciple, and the peculiar morphology of the ascus apex, which is composed of a wide, dome-shaped axial body and an expanded c-layer, resulting in a quite thin, amyloid d-layer (Fig. 1B). This ascus apex is quite similar to the one for *Bacidina egenuloidea* (Fink) S. Ekman (Ekman 1996, Fig. 5N) and has never been reported from any other genus in the *Ramalinaceae*.

Bacidina genuensis is superficially strikingly similar to a *Toniniopsis*, particularly a poorly pigmented version of the species known as *T. bagliettoana* (A. Massal. & De Not.) Kistenich & Timdal, formerly named *Bacidia bagliettoana* (A. Massal. & De Not.) Jatta. Brief descriptions of that species have been published by Ekman (2004), Kantvilas (2018), and Cannon et al. (2021), but the portrayal of the thallus and ascus below are based on my own, previously unpublished observations. The thallus of *B. genuensis* tends to be composed of minute squamules formed by fused, 30–85 μm wide granules. *Toniniopsis bagliettoana*, on the other hand, starts like a thin film encrusting the substrate and soon forms coarse, 80–160 μm wide areoles or flattened granules that mostly fuse to a largely continuous, uneven thallus, often with wart-like projections. Apothecia in *T. bagliettoana* are never pruinose, unlike the apothecia in *B. genuensis*, which often possess a thin, white pruina on the apothecial rim (Fig. 1A) formed by crystals in the proper exciple (Fig. 1D). *Bacidina genuensis* has an orange-brown hypothecium with the K⁺ intensifying pigment Rubella-orange (Meyer & Printzen 2000), whereas the hypothecium in *T. bagliettoana* is darker red-brown and K⁺ purplish from the pigment Laurocerasi-brown. Furthermore, *B. genuensis* tends to be distinctly blue-green in the excipular crown in an otherwise poorly pigmented proper exciple. In *T. bagliettoana*, on the other hand, most of the internal, upper part of the proper exciple is dark and contains Laurocerasi-brown and some Bagliettoana-green. The proper exciple in *B. genuensis* is formed by relatively thin-walled hyphae forming globose or irregular cell lumina in the terminal 2–3 cells, whereas excipular hyphae in *T. bagliettoana* have thicker (gelatinised) walls and only occasionally form expanded cell lumina in the very terminal cell. Furthermore, unlike *B. genuensis*, *T. bagliettoana* possesses a ‘standard’ *Ramalinaceae* ascus apex, with a narrowly conical and pointed axial body surrounded by a thick and

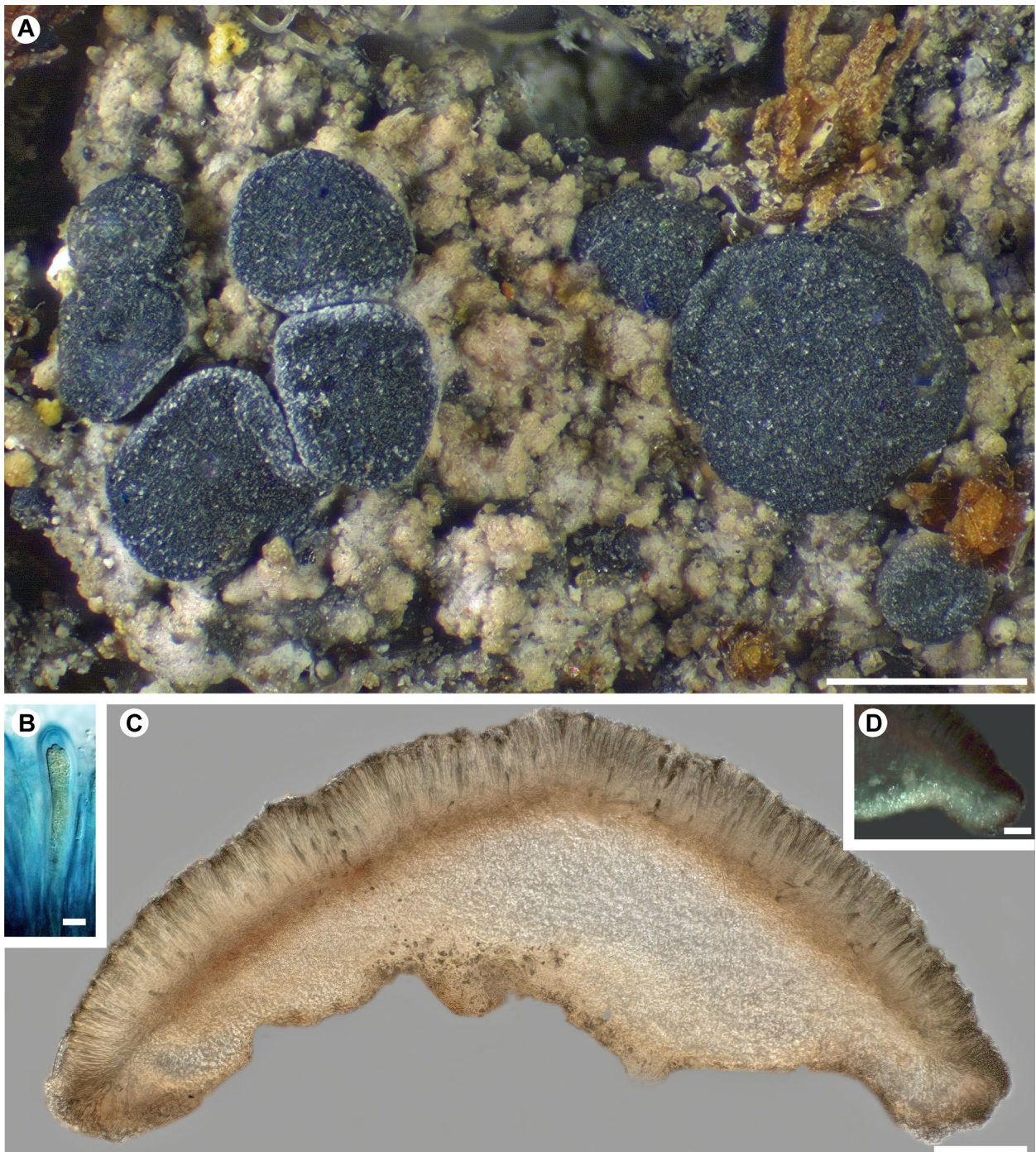


Figure 1. *Bacidina genuensis*. A – thallus with apothecia. The straw color of the thallus is likely to be an herbarium artifact. Note the white pruina on the margin of some apothecia. UPS L-947678; B – ascus with young spore mass, stained in 0.3% IKI. Note the large, dome-shaped axial body, expanded c-layer, and the thin, amyloid d-layer. UPS L-947684; C – section through apothecium displaying pigmentation. UPS L-947678; D – part of section through apothecium in polarised light, displaying crystals in the proper exciple. UPS L-947678. Scales: A = 0.5 mm; B = 5 μ m; C–D = 50 μ m.

distinctly amyloid d-layer that is slightly darker closest to the axial body.

Bacidina genuensis can also be confused with *B. egenula*, under which it has been treated as a synonym. Unlike *B. genuensis*, *B. egenula* always lacks crystals in the largely paraplechtenchymatous proper exciple, possesses Arnoldiana-brown in the hypothecium (brown, K⁺ greenish), and the hymenium makes up a somewhat larger proportion of the apothecium height, 38–50% versus 17–30% in *B. genuensis* (Ekman 2023). In the key of Ekman (2023), *B. genuensis* would lead with some

doubt to *B. indigena* (Vain.) S. Ekman & J. Gerasimova at couplet 8. That species has a distinctly paraplechtenchymatous proper exciple, paler hypothecium (at most pale yellowish brown), coarse and coalescing thallus granules that do not form a thick, minutely squamulose thallus, and it never possesses crystals in the proper exciple (Gerasimova & Ekman 2017; Ekman 2023).

Massalongo (1853) may have intended to apply the name *Raphiospora viridescens* A. Massal. to the species referred to here as *Bacidina genuensis*. However, the lectotype in VER belongs to *T. bagliettoana*, but the

specimen is in quite poor condition and seems to have been grazed by snails (Ekman et al. 2019). A few years later, Massalongo (1856) distributed material in *Lichenes exsiccati Italiae* (as number 231) under the combination *Scoliciosporum viridescens* (A. Massal.) A. Massal. that corresponds to *B. genuensis*, which may have confounded the interpretation of Massalongo's name. The combination *Bacidia viridescens* (A. Massal.) Th.Fr. was later used for the species now called *Bacidina indigena* (Gerasimova & Ekman 2017; Ekman et al. 2019).

Alongside *B. genuensis*, Clauzade & Roux (1985) synonymized two additional names with *B. egenula*, viz. *Bacidia sbarbaronis* B. de Lesd. and *B. mediterranea* B. de Lesd. *Bacidia sbarbaronis*, described by Bouly de Lesdain (1954), appears to be a saxicolous form of *B. arceutina* (Ach.) Th. Fr. (UPS L-1072786, topotype!), whereas *Bacidia mediterranea* is a nomen nudum and the material collected by Sbarbaro belongs to *Bacidina egenula* (UPS L-1072785, S F316635).

In addition to the specimens seen and listed below, there are duplicates in several herbaria (GBIF.org 2023). Several of Sbarbaro's specimens are annotated 'specimen originale' or similar but are merely topotypes.

Additional specimens examined. ITALY. Liguria: Genova, "Priaruggia (Quarto, Genova), muricola", 21 Jan. 1937, C. Sbarbaro s.n. (UPS L-947478); "loco Via Montino, Staglieno (Genova), ad cementum muri", 21 Mar. 1947, C. Sbarbaro s.n. (UPS L-947678); "Genuae, S. Pantaleo, ad pedem muscosum muri", 20 Feb. 1949, C. Sbarbaro s.n. (UPS L-947675); "Staglieno, ad caementum muscosum muri", 16 Mar. 1951, C. Sbarbaro s.n. (S F316494); "Quarto, ad murum muscorum in Via Priaruggia", July 1951, C. Sbarbaro s.n. (S 316495). Veneto: Verona, "ad moenia arcis Peschiera Prov. Mantuanae inter muscos", A. B. Massalongo s.n. in Massalongo: *Lichenes exsiccati Italiae* 231 (UPS L-1074773).

Discussion

Bacidina genuensis is yet another overlooked member of its genus. It is currently known from a few sites in northern Italy and does not seem to have been collected for over half a century. The known localities are situated in different ecoregions of Italy (Martellos et al. 2020), making an extrapolation of the species distribution very difficult. Species of *Bacidina* often have large, not seldom intercontinental distributions (Ekman 2023), although there are also examples of species with apparently restricted distributions, e.g., *B. californica* S. Ekman and *B. coniecta* S. Ekman & T. Sprib. (Ekman 1996; Spribille et al. 2009). All the known occurrences are from anthropogenic sites, begging the question what the primary habitat of *B. genuensis* is. In the end, *B. genuensis* may prove to be widely distributed in the Mediterranean region and perhaps beyond, possibly both on mortar as well as weathered limestone in shade.

Acknowledgements

This paper is dedicated to Tor Tønsberg on the occasion of his 75th birthday. Tor and I first got to know each other at the Nordic Lichen Society meeting in Saxnäs in 1991, and the collaboration

that emerged resulted in our first joint paper on *Megalaria* in 1996. Soon after, I moved to Bergen and we subsequently worked as close colleagues and friends for a decade. Tor's sharp eye for the most inconspicuous of lichens is unsurpassed, and many of his collections, not least of the genus *Bacidina*, have turned out to be invaluable to my research over the years.

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