

Diploicia christinae sp. nov. (Ascomycota: Caliciales: Caliciaceae), an overlooked lichen species from Bermuda

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Article info

Received: 21 Feb. 2025
Revision received: 2 May 2025
Accepted: 5 May 2025
Published: 26 May 2025

Associate Editor

Martin Kukwa

Abstract. A crustose lichen species new to science – overlooked by previous workers – is formally described. This new species, *Diploicia christinae*, differs from all other species in the genus by its narrow lobes (<1 mm) and its effuse soralia that contain consistently white soredia. Its secondary chemistry, and lack of apothecia and pycnidia, are also diagnostic. The new species is known only from the Bermuda archipelago.

Key words: biodiversity, Christine Watlington, endemic, Neotropics, taxonomy

Introduction

Between 1905 and 1914, New York Botanical Garden co-founders Nathaniel Lord Britton and Elizabeth Gertrude Knight Britton embarked on multiple expeditions to Bermuda with various botanical colleagues. In total, Mrs. Britton collected about 78 lichen specimens from Bermuda (S. LaGreca, unpubl. data). She sent duplicates to Harvard's Farlow Herbarium of Cryptogamic Botany (FH) for identification by lichenologist and then-director Lincoln W. Riddle, who published a list of 91 taxa (Riddle 1916). One of her Bermudian collections (Britton 155; Fig. 1) was determined by Riddle as *Buellia canescens* (Dicks.) DeNot. (now *Diploicia canescens* (Dicks.) A. Massal.), who considered it noteworthy because it represented (a) the first New World specimen of this species and (b) a possible dispersal event from the UK on substrates imported by British settlers (Riddle 1916). Both the FH and NY duplicates of Britton 155 consist of tiny, broken, sorediate thalli and limestone fragments (S. LaGreca, pers. obs.), making morphological determination difficult – although in a 1952 annotation, Henry Imshaug (MSC) verified Riddle's identification of the NY duplicate (Imshaug 1957).

The genus *Diploicia* is characterized by a placodioid, crustose thallus that is areolate in the center, but distinctly lobed along the periphery; lack of a lower cortex; lecideine apothecia with a dark brown hypothallus; *Bacidia*-type asci with *Dirinaria*-type spores; bacilliform conidia; and the production of diploicin and related secondary products in the medulla. *Diploicia canescens* is

the most common species, occurring worldwide in temperate, oceanic to suboceanic habitats. A thorough taxonomic review of the genus was provided by Bungartz et al. (2016), who described three species new to science

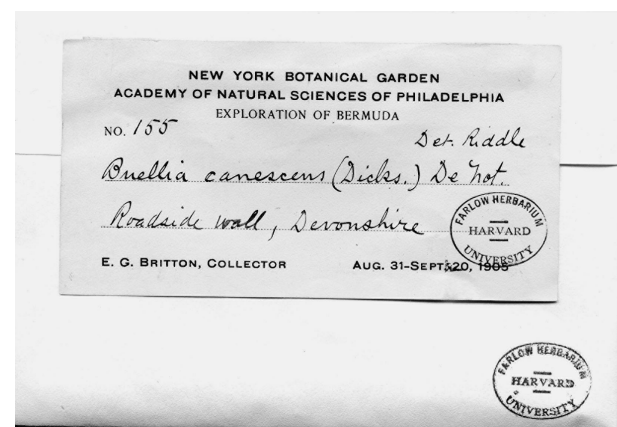


Figure 1. Label of Britton 155 (FH duplicate).

from the Galápagos Islands, and also recombined both a *Physcia* species and a *Pyxine* species into the genus. More recently, Miranda-González et al. (2025) described a new species of *Diploicia* from tropical, dry forests in Mexico. These two recent publications strongly suggest that *Diploicia* is more diverse than previously recognized, which prompted re-examination of Bermudian *Diploicia* material. The present paper presents the results of those re-examinations, contributing further to our knowledge of *Diploicia* with the description of another species new to science.

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Materials and methods

All specimens were examined with a Bausch & Lomb StereoZoom 5 dissecting microscope. Hand-cut sections of lichen tissues were mounted in water, and then examined at 400× and 1000× magnification (the latter in oil immersion) using an Olympus CX43 compound microscope. The micrographs showing thallus morphology (Fig. 2B and Fig. 2C) were taken using a Canon Rebel Xsi camera attached to a Leica MZ125 dissecting microscope.

TLC of all specimens was performed using pre-gelled silica plates and the following solvents: A, B', and C (Culberson & Ammann 1979; Culberson & Johnson 1982). Following TLC, a fragment of Britton 155 was sent to Jack Elix (CANB) for chemical verification.

Results and discussion

Diploicia christinae LaGreca & F. Berger, sp. nov. (Fig. 2)

MycoBank: MB 858826

Diagnosis: Superficially similar to *Diploicia canescens* and the sorediate morphotype of *D. neotropica* Kalb, Elix & Bungartz (Bungartz et al. 2016), but possessing much narrower lobes (<1 mm) and more effuse, concave soralia that contain soredia that are always white (never tinged with yellow or gray). With particular regard to the latter taxon, the lobes of the sorediate morphotype of *D. neotropica* are not only broader, but generally shorter, less splayed out, and – especially in the thallus center – distinctly more convex than those of *D. christinae*. In addition, unlike both *D. canescens* and *D. neotropica*, *D. christinae* consistently produces the secondary products buellolide and nor-



Figure 2. A – field photograph showing typical habit of *Diploicia christinae*; B – close-up micrograph of effuse soralium containing white soredia (LaGreca 1306, DUKE); C – micrograph showing macromorphology (Watlington s.n., DUKE). Scales: A = 1 cm, B = 0.5 mm, C = 1.0 mm.

buellolide, and appears to lack apothecia and pycnidia, although these structures may be discovered in the future.

Type: Bermuda, Devonshire Parish, on the east side of Brighton Hill Road, directly across from Old Devonshire Church, 106 Middle Road, at the junction of Middle Road and Brighton Hill Road. 32.305753°N, 64.754075°W, ~16 m alt., on limestone wall, 15 May 2017, Christine Watlington s.n., with Scott LaGreca (DUKE 383540 – holotype!).

Description. Thallus saxicolous, crustose to subfoliose, placodioid, typically 1–5 cm in diameter, with elongate, sometimes convex, contiguous areoles in the center, but radiating, contiguous, fan-shaped, apically broadened, flattened marginal lobes; surface white to greyish white, usually dull, never darkened along the lobe margins, with a roughened texture (rarely \pm smooth), completely and evenly covered by fine to slightly coarse pruina that sometimes reflect the light, especially pronounced along the lobe margins and tips; lobes (0.2–)0.3–0.7(–0.9) mm; soralia concave or flat (rarely slightly convex), ulcerose, irregular and effuse, occasionally \pm confluent, arising as breaks between lobes, or sometimes breaks at the tops of convex lobes in internal parts of the thallus; soredia white, fine, granular, ecorticate, 25–35 μ m in diameter, with slightly projecting hyphae, compact in the center of the soralia to scattered at the margins of the soralia; cortex phenocorticate, with fine crystals (soluble in KOH), phenocortical layer prosoparenchymatous (~10 μ m wide), with minute crystals (soluble in KOH) and a few dead algal cells, and the photobiont layer below; medulla of densely interwoven hyphae, white throughout, no crystals seen; lower surface white, ecorticate, fixed to the substrate with a weft of loose, hyaline hyphae (rhizohyphae), 3–4 μ m in diameter. Apothecia and pycnidia not observed.

Chemistry. Thallus P+ yellow, K+ yellow, C–, KC–, UV–; medulla P–, K–, KC–, C–, UV–; atranorin (major), chloroatranorin (minor), diploicin (major), dechlorodiploicin (minor), isofulgidin (minor), dechloro-*O*-methyl diploicin (minor), and secaloic acid B (minor). [All known specimens tested except Berger 20104 and Berger 22458]

Etymology. Named in honor of the collector, Bermudian botanist, conservationist, and artist Christine Maple Watlington, 1952–2022 (Fig. 3). A champion of Bermuda's

native flora (Bell 2022), she authored the book *Bermuda's Botanical Wonderland* (Phillips-Watlington 1996). Christine was invaluable to the author's work during his three collecting trips to Bermuda, providing accommodations, transportation, advice, and encouragement. The pruina on the lobes of this lichen – probably calcium oxalate crystals, given the limestone substrate – causes this lichen to sparkle under bright light (especially in older specimens), calling to mind Christine's bright mind and personality.

Ecology and distribution. Presently known only from the Bermuda archipelago, but possibly more widely distributed in the Neotropics. This species occurs on worked limestone walls and mortar (usually vertical surfaces) in sunny to semi-shaded sites; one specimen was collected from sandstone (Berger 22458; Berger & LaGreca 2014).

Remarks. In 2005, exactly one hundred years after Britton 155 was collected, Austrian lichenologist Franz Berger collected the second specimen of this Bermudian lichen (Berger 20104). This 2005 collection, together with two other modern collections of this taxon, were erroneously reported in Berger & LaGreca (2014) as *Diploicia canescens*. In 2017, the author enlisted the help of Christine Watlington to find the original locality where Britton 155 was collected. The site was rediscovered, and the ample, well-developed material collected there provides the basis for describing the new *Diploicia* species presented here, overlooked until now.

Diploicia christinae can be distinguished from all known *Diploicia* species (summary: Bungartz et al. 2016) by its (a) narrow lobes, always less than 1 mm wide and (b) more effuse, amorphous, confluent soralia containing soredia that are consistently white. The lack of apothecia and pycnidia is also diagnostic, though these structures may be discovered in the future. The lack of buellolide and norbuellolide in the new species is another consistent character, although of limited use, as these two compounds are best detected with high performance liquid chromatography, not standard lichen TLC. It should be noted here that unpublished molecular data (Medeiros et al., in prep.) indicate that *D. christinae* is distinct from the two taxa most similar to it, i.e., *D. canescens* and the sorediate morph of *D. neotropica*. In Bermuda, *D. christinae* is the only species of *Diploicia* present (LaGreca 2024), so it cannot be confused with any other species in the field.

Diploicia christinae is the latest of many lichen species described from Bermuda (Crombie 1877; Riddle 1916; Aptroot et al. 2008; Berger & Aptroot 2008; Berger et al. 2016; LaGreca 2020; Berger 2021). Most, but not all, are considered endemic to the islands – the result of Bermuda being one of the most remote archipelagos in the world (Thomas 2004). However, the estimated 5% rate of lichen endemism in Bermuda (LaGreca & Berger 2021) bears closer inspection; some so-called endemics may be discovered elsewhere as the lichens of the Caribbean are further investigated.

Specimens examined. BERMUDA. Devonshire Parish: Old Devonshire Church, 106 Middle Road, at the junction of Middle Road and Brighton Hill Road, in churchyard behind church,



Figure 3. Bermudian botanist Christine Watlington, ~2001. Photo courtesy Victoria Watlington.

32.305553°N, 64.754342°W, ~16 m alt., on limestone wall, 15 May 2017, LaGreca 3104, 3105 (DUKE 383539, 383538); Devonshire Parish: roadside wall, 31 Aug.–20 Sept., 1905, Britton 155 (FH, NY); Paget Parish: Hinson's Island, 7 Balla Machree, 9 June 2021, MCB s.n. (DUKE 384319); Paget Parish: Paget, South Coast Lane, ~32.266667°N, 64.788333°W, 10 m alt., on mortar, 5 May 2005, Berger 20104, 20160 (both hb. Berger); St. George's Parish: on south side of Ferry Road, between Mullet Bay Road and Royal Dutch/Shell Companies, 32.371666°N, 64.700278°W, 15.5 m alt., on limestone wall, 10 Aug. 2006, LaGreca 3107 (DUKE 383536); Sandy's Parish: Royal Naval Cemetery, 32.315°N, 64.845°W, 2–5 m alt., on sandstone, 4 Nov. 2007, Berger 22458 (hb. Berger); Sandy's Parish: Scaur Hill Fort Park, ~32.2825°N, 64.8925°W, 12.8 m alt., on limestone, 11 Aug. 2006, LaGreca 3106 (DUKE 383537).

Acknowledgements

This research was performed over a twenty-year period during which I worked at the following herbaria: FH, BM, CUP and DUKE. The researchers, staff and students of all four of these herbaria are thanked for their support and encouragement. Franz Berger is thanked for his insights into this new species, and for his long collaboration with me on the Bermuda lichen flora. I am grateful to Frank Bungartz (ASU) for discussions on the genus *Diploicia*, and to Melanie Schori (USDA ARS) for nomenclatural guidance. Lisa Greene, Robby Struan, Christine Watlington, Tom Watlington and David Wingate are all thanked for logistical support in Bermuda. TLC facilities provided by the Lutzoni Lichen Lab at Duke University were indispensable for completing this work. Jack Elix is warmly thanked for verification of the chemistry. Keith Babuszcak provided valuable advice and support throughout this project. A version of this paper was reviewed by Victoria Watlington, who made helpful suggestions and provided the photo of her mother, Christine.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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