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Caloplaca gyrophorica (lichenized *Ascomycota*), a new saxicolous lichen species from India

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Abstract — A gyrophoric acid-containing *Caloplaca* species is reported from India for the first time. *Caloplaca gyrophorica* was found growing over rocks in temperate regions of Neora Valley National Park, Darjeeling, India. It is compared with the other three known gyrophoric acid-containing *Caloplaca* species and with the morphologically similar *C. hueana.*
Key words — depside, parietin, taxonomy, *Teloschistaceae*

Introduction

Gyrophoric acid, an orcinol para-depside, is reported from a number of lichens, but its presence in *Caloplaca* Th. Fr. is so far confined to only three species: *C. bogilana* Y. Joshi & Hur, *C. subflavorubescens* Y. Joshi & Hur, and *C. brownlieae* S.Y. Kondr. et al. (Joshi et al. 2010; Lumbsch et al. 2011). While investigating a specimen from Neora Valley National Park in the Eastern Himalaya, the authors found gyrophoric acid along with parietin as major compound. This is the first time that gyrophoric acid has been reported from an Indian *Caloplaca* species. When compared with other known gyrophoric acid-containing *Caloplaca* species, the specimen was found to differ entirely from those and hence described as new to science.

Materials & methods

Studied specimens are deposited at BSA and LWG. Description and photographs of external morphology are based on air-dried material observed under a dissecting stereomicroscope (Nikon SMZ645). Sections were made with a razor blade under the stereomicroscope and mounted in lactophenol cotton blue. Anatomical descriptions

are based on these preparations under a compound microscope (Nikon Eclipse E200). Ascospores were measured at 400× in water mounts; only free ascospores lying outside the asci were measured. A K+ purple reaction indicates the absence of the parietin complex, and a K+ red reaction indicates its presence. Secondary metabolites were identified by TLC as described by White & James (1985) and Orange et al. (2001) using solvent systems C and D. Mycological terms follow Kirk et al. (2008).

Taxonomy

Caloplaca gyrophorica Jagadeesh, Y. Joshi & G.P. Sinha, **sp. nov.** Fig. 1

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Similis C. hueana *sed differt in non-inspersum hymenium, grandior sporae et C+ rubescens thallus (acidum gyrophoricum).*

Type: India. West Bengal: Darjeeling district, Kalimpong subdivison, Neora Valley National Park, Aloobari, 27°07′33.1″N 88°42′55.2″E, alt. 2479 m, on exposed siliceous rocks, 17 May 2008, T.A.M. Jagadeesh Ram 4356 (**holotype,** BSA; **isotype,** LWG).

Etymology — The specific epithet refers to the presence of gyrophoric acid in the species.

Thallus crustose, saxicolous, areolate to subsquamulose; areoles confluent to scattered, yellowish brown to grayish brown, yellowish gray (when wet), ± rounded to ellipsoid or irregular, 0.2–0.5 mm wide; cortex thin, 7.5 µm thick, paraplectenchymatous, necral layer absent; algal layer continuous; medulla hyaline, of densely interwoven hyphae, with crystals. Hypothallus brownish black, scattered throughout and between the areoles.

Apothecia numerous, scattered to ± aggregated, rounded to somewhat angular, sessile to adnate, distinctly constricted at base, 0.3–0.5(–0.8) mm diam., lecanorine; disc brownish orange, yellowish orange (when wet), plane to convex, epruinose; margin concolorous to thallus, thin, smooth, uneven by age, slightly emergent from the disc. Epihymenium yellowish brown, 10–15.5(–25) µm thick, K+ red. Hymenium hyaline, not inspersed, (49–) 52.5–60(–75) µm high, I+ blue. Hypothecium hyaline, (30–)75–87.5(–100) µm thick, paraplectenchymatous. Thalline excipulum up to 90 µm thick, with algae, without crystals. Proper excipulum hyaline, thin. Paraphyses branched and anastomosing, 1–1.5 µm wide, tips not swollen. Asci clavate, 8-spored, 48–58 × 13–15 µm. Ascospores biseriate, hyaline, ellipsoid, polarilocular, (10–)11.5–14(–16) × 7–10 µm, isthmus 2.5–3.75 µm. Pycnidia not seen.

Chemistry — Spot test reactions: thallus K–, C+ red, KC+ red, P–. Epihymenium K+ red, C–. TLC: gyrophoric acid and parietin.

Ecology & distribution — Found growing over exposed siliceous rocks at ca 2400 m in Neora Valley National Park, Eastern Himalaya. Temperatures range from subzero to 20°C. The hilly slopes are covered by bushy secondary vegetation with some parts cultivated prior to the 1992 park establishment.

Figure 1: *Caloplaca gyrophorica*. Habit. Scale bar = 5 mm.

Remarks — *Caloplaca gyrophorica* is characterized by an areolate to subsquamulose grayish brown thallus, brownish orange lecanorine apothecia with concolorous margins, and gyrophoric acid and parietin as major chemical constituents.

Morphologically the new species is most likely to be confused with the saxicolous *Caloplaca hueana* B. de Lesd., which differs in its inspersed hymenium, much smaller spores (8.5–11(–12) × 5.1–8.5 µm; Wetmore 1996), tropical distribution, and lack of gyrophoric acid.

The saxicolous species *C. bogilana*, differs from *C. hueana* in a grayish areolate thallus, simple to furcate paraphyses with swollen tips, numerous pycnidia, a maritime distribution, and atranorin and lecanoric acid present in most collections (Joshi et al. 2010). *Caloplaca subflavorubescens* differs in a strictly corticolous habit, a squamulose to subfruticose yellowish green to grayish green thallus, septate paraphyses, and the presence of 7-chloroemodin, emodin, fragilin, and atranorin; moreover, gyrophoric acid is present only rarely and absent from the common *C. subflavorubescens* chemotype (Joshi et al. 2010). The saxicolous *C. brownlieae* differs from *C. hueana* in having pinkish orange or cinnabarine areoles and immersed to slightly erumpent apothecia and containing ovoic acid, lecanoric acid, xanthorin, and erythroglaucin (Lumbsch et al. 2011).

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