Graphidastra himalayana (Roccellaceae), a new lichen species from eastern Himalaya, India

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ABSTRACT

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Graphidastra himalayana, a new species in the lichen family Roccellaceae is described from the eastern Himalaya of India. It is characterized by having a byssoid whitish prothallus, ecorticate thallus, apothecioid ascomata with distinct thalline margin, unbranched paraphysoids, fusiform consistently 7-septatate ascospores and norstictic acid as the lichen substance.

Key-words: Byssoid genus, taxonomy, Neora Valley National Park.

INTRODUCTION

The lichen genus *Graphidastra* (Redinger) G Thor is apparently a palaeotropical genus in the family *Roccellaceae* and known by 3 species world-wide (Thor 1990; Sparrius et al. 2006). Thor (1990) revised the genus and included 2 species which were characterized by rounded to lirelliform ascomata, unbranched paraphysoids, biclavate ascospores, and roccellic and protocetraric acids as secondary metabolites. Sparrius et al. (2006) added *Graphidastra laii* Aptroot & Sparrius from Taiwan and Thailand which differs from the earlier by fusiform-acicular ascospores and confluentic, 2-*O*-methylmicrophyllinic and protocetraric acids as secondary metabolites. During the ongoing course of lichenological investigations in Neora Valley National Park in the eastern Himalaya of India a new species which shares most of the characters of *Graphidastra* has been observed. The same is described below as *Graphidastra himalayana*.

MATERIALAND METHOD

Specimens collected from Neora Valley National Park and deposited in BSA were investigated. External morphological features were observed with an Oylmpus SZ61 Stereo microscope. Thin hand-cut sections of thalli and ascomata were mounted in water, 10% KOH solution and Lugol's iodine solution and examined with a Leica DM 2500 microscope. The lichen substances were identified by the usual spot tests and thin layer chromatography following White and James (1985) and Orange et al. (2001).

DESCRIPTION

Graphidastra himalayana
Jagadeesh Ram & G.P. Sinha, sp. nov.

Plate 1, figures 1-6

Thallus corticolus, epiphloeodeus, crustaceus, albidus, rimosus, verrucosus, ecorticatus; isidia et soredia non visa; alga *Trentepohlia*; ascomata lecanorina, sessilia, rotundata, 0.2-0.4 mm lata; discus nigrescens, albide pruinosus; excipulum proprium brunneum; hymenium hemiamyloideum; paraphysoides simplices; asci 8-spori, 92–107 × 15–20 µm; ascosporae hyalinae, fusiformes, 7-septatae, 48–66 × 4–6 µm; acidum norstictícum continens.

Type: India, West Bengal, Darjeeling District, Neora Valley National Park, Aloobari, Secondary rainforest, Lat. 27°07'31.7"N: Long. 88°43'03.9"E, alt. 2484 m, on *Eurya acuminata*, 17 May 2008, T. A. M. Jagadeesh Ram 4360 (BSA-Holotype; CAL-isotype).

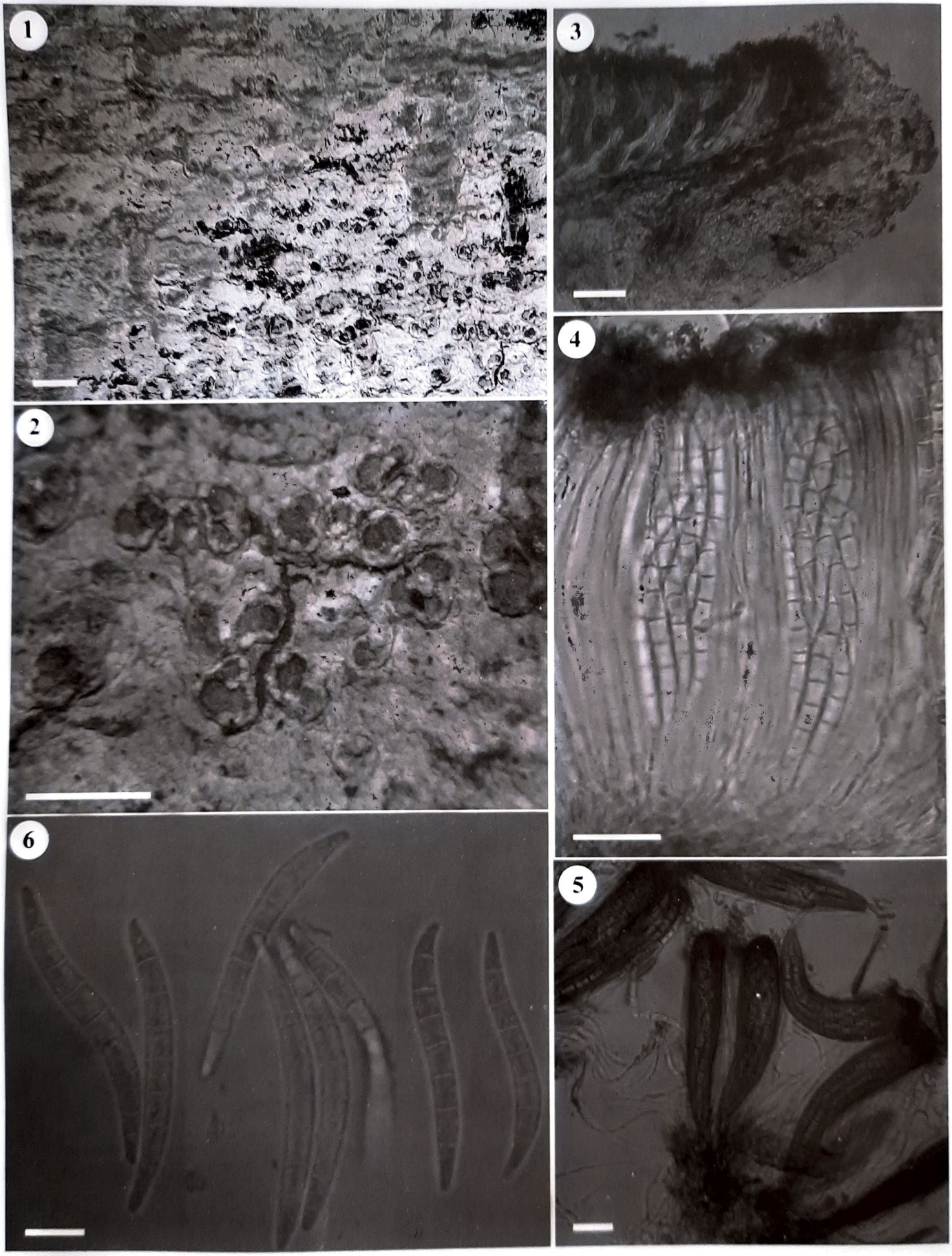

Plate 1

1-6. *Graphidastra himalayana* (Holotype). 1-2. Habit; 3. Vertical section of ascoma in CB; 4. Portion of hymenium in water; 5. Asci and paraphysoids in KI; 6. Ascospores in water. Bar Scale: 1-2 = 1mm; 3 = 50µm; 4-5 = 20µm; 6 = 10µm.

Thallus crustose, corticolous, epiphloeodal, orbicular to suborbicular, up to 9 cm diam., tightly attached, whitish to whitish grey, usually byssoid and felty, rarely weakly byssoid, uneven, minutely verrucose to rimose towards centre, not continuous, lacking isidia and soredia, homoiomerous to heteromerous, lacking calcium oxalate crystals, 26–80(–95) µm thick, ecorticate. Prothallus distinct, whitish, byssoid, mainly of radiating loosely interwoven hyphae, up to 7 mm wide. Photobiont layer occasionally distinct, 12-32 µm thick; photobiont *Trentepohlia*, cells single to in short, irregular threads. Medulla often indistinct, white, 20–65 µm thick. Hypothallus below the thallus, white, ± distinct, sometimes not distinct towards the centre, hyphae 1–1.5 µm wide.

Ascomata apothecioid, lecanorine, scattered to aggregated, solitary, often 2–3 fused together, semi-immersed to emergent, rarely immersed, sessile, constricted at base, mostly rounded, sometimes slightly elongated, 0.2-0.4(-5)mm diam. Disc plane, dark brown to blackish, whitish pruinose. Thalline margin distinct, of same colour as the thallus, raised above the disc, uneven, verruculose, irregularly crenate, often not continuous or ruptured, usually with photobiont and medulla, 32–85 µm thick, sometimes with a bark layer very close to proper exipulum. Proper excipulum pale brown to brown, dark brown at base when older, continuing below the subhymenium, formed by thin walled hyphae, lacking crystals or granules, slightly thickened at base and lateral tip, 5–12 µm thick laterally, 8–15 µm thick at base, K+ olive-green, I–, KI–, hyphae not discerned in K. Epihymenium distinct, brown, 13–20 µm thick, K+ olive-green. Hymenium hyaline, not inspersed, 92–107 µm high, I+ red, KI+ blue. Subhymenium hyaline, thin, K–, I+ red, KI+ blue. Paraphysoids unbranched, 1 µm thick; tips richly branched and anastomosing, ± granular, not thickened, dark brown walled and brown to greenish brown pigmented, mixed with small rounded granules, forming a distinct layer. Asci bitunicate, clavate, with long stalk, 8-spored, 92–107 × 15–20 µm; wall I+ red, KI+ blue, tip deep blue in KI. Ascospores irregular to spirally arranged, hyaline, fusiform, slightly curved to sinuous, with one truncate and another ± subacute end, thin walled, without a gelatinous wall, consistently 7-septate, somewhat fragile, more fragile and granular ornamented when old, 48–66 × 4–6 µm. Pycnidia not seen.

Chemistry: Thallus K+ red, C–, P+ yellow, I–, KI–, UV–; norstictic acid (major) only detected by TLC.

Remarks: *Graphidastra himalayana* is distinct from all the other three species of *Graphidastra* by its rounded ascomata, fusiform 7-septate ascospores and norstictic acid as the secondary metabolite. *Graphidastra laii* Aptroot & Sparrius is close to the new species having fusiform-acicular ascospores but differs in having 3-septate ascospores and confluentic, 2-*O*-methylmicrophyllinic and protocetraric acids as secondary metabolites. *Graphidastra byssiseda* (Müll. Arg.) G. Thor and *Graphidastra multiformis* (Mont. & Bosch) G. Thor, the other species in the genus differ in having biclavate ascospores, and roccellic and protocetraric acids as secondary metabolites. *Graphidastra multiformis* and *Graphidastra laii* are known to have protocetraric acid in the thalline margin of ascomata, but the same was not detected in the new species (Thor 1990; Sparrius et al. 2006). All the three described species of the genus are known to have rounded to lirelliform ascomata whereas most of the specimens of the new species have rounded ascomata, but the specimens 4363, 6077 and 6119 have few slightly elongated ascomata in addition to the rounded.

Angiactis Aptroot & Sparrius, *Sagenidiopsis* Rogers & Hafellner and *Sagenidium* Stirt. are the other genera of *Roccellaceae* having apothecioid ascomata with distinct thalline margin. *Angiactis* has a dark brown to black excipulum, branched and anastomosing paraphysoids, and clavate ascospores with perispores (Aptroot et al. 2008). *Sagenidiopsis* has similar fusiform ascospores but differs in dark brown to dark reddish brown medulla, hyphae of proper excipulum easily discerned after K+ treatment, branched and anastomosing paraphysoids. *Sagenidium* has white medulla, proper excipulum without easily discerned hyphae after K+ treatment and fusiform ascospores similar to the new species but has branched and anastomosing paraphysoids (Egea et al. 1995). The lecanorine ascomata and the simple unbranched

paraphysoids support the species placing in *Graphidastra*.

The new species is so far known from Neora Valley National Park in the eastern Himalaya. It was found to be common on the trunks and branches of *Eurya acuminata* and other small trees in the type locality (secondary forests). It was also found on the branches of trees in the dense primary rainforests, but not observed on trunks.

Additional specimens examined: India: West Bengal, Darjeeling district, Neora Valley National Park: Zero Point – PHE Source foot track, Primary rainforest, alt. ca 2250 m, on fallen tree branches, 9 Mar. 2007, Jagadeesh Ram 3933 (BSA); Chaudapheri – Zero Point way, Primary rainforest, alt. 2379 m, 15 May 2008, Jagadeesh Ram 4274 (BSA); Aloobari, Secondary rainforest, N 27° 07' 26.9", E 88° 42' 44.2", alt. 2494 m, on *Eurya acuminata*, 17 May 2008, Jagadeesh Ram 4362 (BSA); ibid., N 27° 07' 30.1", E 88° 42' 47.7", alt. 2511 m, Jagadeesh Ram 4363; ibid., N 27° 07' 25.7", E 88° 43' 05.6", alt. 2441 m, 15 May 2010, Jagadeesh Ram 6119, 6120, 6121, 6143 (BSA); ibid., N 27° 07' 26.9", E 88° 43' 06.2", alt. 2465 m, 15 May 2010, on *Eurya acuminata*, Jagadeesh Ram 6125 (BSA); Neora riverine forests, Primary rainforest, alt. 2250 m, 14 May 2010, Jagadeesh Ram 6077 (BSA).

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