


Short Communication

Taxonomic status of the genus *Schismatomma* (lichenized Ascomycota: *Arthoniales*) in India

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The genus *Schismatomma* Flot. & Körb. ex A. Massal. was described by Massalongo (1852) containing five species. The genus is generally characterized by a whitish thallus containing calcium oxalate crystals, lirellate to short rounded ascomata with a poorly developed thalline margin, a carbonaceous hypothecium, 3-septate fusiform ascospores, and roccellic acid as a secondary metabolite (Tehler 1993a). As a result of recent phylogenetic studies in the *Arthoniales*, the species in *Schismatomma* were transferred and segregated under different genera and are now placed in the family *Roccellaceae* (Ertz & Tehler 2011; Ertz *et al.* 2013, 2019).

The species of *Schismatomma* described from India were enumerated by Awasthi (1965) and included eight species: *S. atomellum* (Stirt.) Zahlbr., *S. cinereum* (Müll. Arg.) Zahlbr., *S. flavisedellum* (Nyl.) Zahlbr., *S. glaucoides* (Nyl.) Zahlbr., *S. gregantulum* (Müll. Arg.) Zahlbr., *S. incurvulum* (Stirt.) Zahlbr., *S. kurzii* (Kremp.) Zahlbr. and *S. melastigma* (Nyl.) Zahlbr. Thor (1990) synonymized the species *S. incurvulum* under *Graphidastra multiformis* (Mont. & Bosch) G. Thor., while *S. kurzii* was transferred to *Erythrodection* G. Thor. with the new combination *Erythrodection kurzii* (Kremp.) G. Thor. Later, Henssen & Thor (1998) established a new genus, *Pulvinodecton* Henssen & G. Thor., and proposed a new combination, *P. kurzii* (Kremp.) Henssen & G. Thor. Tehler (1993b) transferred the species *S. glaucoides* to *Sigridea* with the new combination *S. glaucoides* (Nyl.) Tehler. In a worldwide monograph of *Schismatomma*, Tehler (1993a) accepted only eight species and excluded all five species known from India. The species *S. atomellum*, *S. cinereum* and *S. gregantulum* were placed in the genus *Phlyctella* Kremp. without proposing any new combinations. *Schismatomma melastigma* was provisionally placed in the genus *Arthonia* Ach. while *S. flavisedellum* was transferred to the genus *Lecanactis* Körb. with a new combination, *Lecanactis flavidosella* (Nyl.) Tehler.

The existence of *Schismatomma* in India is now doubtful. However, Singh & Sinha (2010) retained the species *S. atomellum*, *S. cinereum*, *S. gregantulum* and *S. melastigma* in 'Indian Lichens: An Annotated Checklist', following Awasthi (2000).

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They stated that a species is retained until its taxonomic status is resolved. During the ongoing revisionary studies on the *Arthoniales* in India, type specimens of all the above species from India were examined. The species *S. atomellum*, *S. cinereum* and *S. gregantulum* were found to have similar morphological, anatomical and chemical characters to the genus *Phlyctis* (Wallr.) Flot. The present study therefore agrees with the observations mentioned in the monograph on *Schismatomma* by Tehler (1993a) where the above species were treated under *Phlyctella*, but no new combinations were proposed. At present, the genus *Phlyctella* is a heterotypic synonym under *Phlyctis*. Due to recent phylogenetic studies, taxonomic changes and the transfer of *Phlyctomia* A. Massal., *Phlyctella* and *Phlyctidia* Müll. Arg. to *Phlyctis*, the genus has become more heterogeneous with several variable characters. *Phlyctis* is characterized by a crustose to subleprose thallus, erumpent ascomata, mostly remaining immersed, sometimes raised, single or clustered, often with a raised margin of thallus fragments, a usually pruinose disc, true exciple not obvious or rudimentary, paraphyses mostly unbranched, asci 1, 2, 4 or 8-spored with transversely septate to muriform hyaline ascospores, and a wide variety of secondary metabolites (e.g. members of the norstictic acid, stictic acid, or psoromic acid aggregates) or lacking lichen substances (Joshi & Upreti 2013; Muscavitch *et al.* 2017). Accordingly, morphological, anatomical and chemical characters of the types of *Schismatomma atomellum*, *S. cinereum* and *S. gregantulum* suggest that they should be assigned to the genus *Phlyctis*. Interestingly, these three species are conspecific with the recently described *Graphidastra himalayana* Jagadeesh & G. P. Sinha from West Bengal (Jagadeesh Ram & Sinha 2010), and the earlier known *Phlyctis himalayensis* (Nyl.) D. D. Awasthi (\equiv *Phlyctella himalayensis* Nyl.) from Sikkim (Awasthi 2000). *Platygrapha atomella* Stirt. (\equiv *S. atomellum*) has priority over the other four names following the rule of priority (Art. 11.4; Turland *et al.* 2018). Thus, the new combination *Phlyctis atomella* (Stirt.) S. Joseph *et al.* is proposed and the other four species are synonymized under it.

Schismatomma melastigma belongs to *Arthoniaceae* due to its *Arthonia*-type ascus and this agrees with the observations by Tehler (1993a). However, spores were not seen in the type material of *S. melastigma* procured from H-NYL, which is in a very poor condition (type: India, Calcutta, 1866, S. Kurz, H-NYL 4628!) and other parts of the type preserved at M were not available for study. Recently, Goni & Sharma (2016) reported

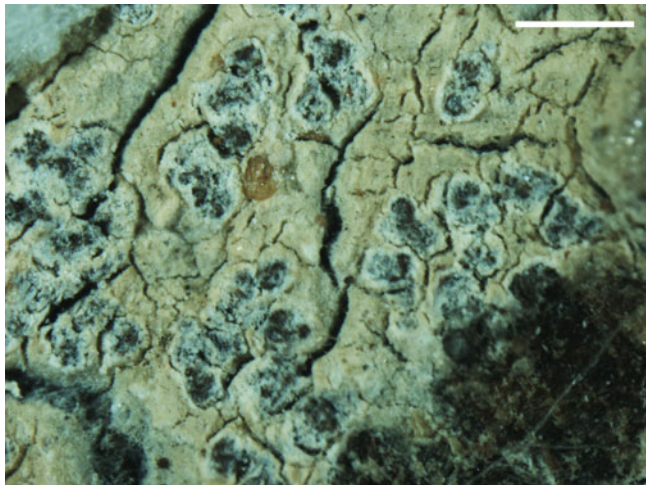


Fig. 1. *Phlyctis atomella*, habitus (type of *Platygrapha atomella*). Scale = 1 mm. In colour online.

Schismatomma galactinum (Leight.) Zahlbr. as a new record from the state of Jammu and Kashmir. Study of the specimen revealed that the Indian specimens belong to the genus *Opegrapha* s. lat.

***Phlyctis atomella* (Stirt.) S. Joseph, G. P. Sinha & S. Nayaka comb. nov.**

Mycobank No.: MB 835457

Platygrapha atomella Stirt., *Proc. Roy. Philos. Soc. Glasgow* **11**, 317 (1879).—*Schismatomma atomellum* (Stirt.) Zahlbr., *Cat. Lich. Univ.* **2**, 553 (1924); type: India, Nilgiris ['Neilghiri'], D. G. Watt s. n. (BM—lectotype!).

Graphidastra himalayana Jagadeesh & G. P. Sinha, *Geophytology* **39**(1), 83 (2010); type: India, West Bengal, Darjeeling district, Neora Valley National Park, Aloori, secondary rainforest, on bark of *Eurya acuminata*, 27°07'31.7"N, 88°43'03.9"E, elev. 2484 m, 17.05.2008, Jagadeesh Ram 4360 (BSA—holotype!; CAL—istotype!), syn. nov.

Platygrapha cinerea Müll. Arg., *J. Linn. Soc., Bot.* **29**, 224 (1892).—*Schismatomma cinereum* (Müll. Arg.) Zahlbr., *Cat. Lich. Univ.* **2**, 555 (1924); type: India, Manipur ['Munipur'], G. Watt 6980 (BM—holotype!), syn. nov.

Platygrapha gregantula Müll. Arg., *J. Linn. Soc., Bot.* **29**, 223 (1892).—*Schismatomma gregantulum* (Müll. Arg.) Zahlbr., *Cat. Lich. Univ.* **2**, 558 (1924); type: India, Manipur ['Munipur'], G. Watt s. n. (BM—istotype!), syn. nov.

Phlyctella himalayensis Nyl., *Lich. Nov. Zel.*, **3** (1888).—*Phlyctis himalayensis* (Nyl.) D. D. Awasthi, *Lichenol. Indian Subcontinent*, **15** (2000); type: India, Himalaya, Sikkim, reg. temp., 7000 ft, Hook. & Thomson 2052 (H-NYL 22302—holotype, image!), syn. nov.

(Fig. 1)

Thallus corticolous, up to 50 µm thick; surface pale yellowish, greyish, whitish, smooth to minutely verruculose, cracked to rimose-like, matt. Border line dark brown, c. 0.2 mm wide. *Photobiont* Trentepohlia.

Ascomata rounded to rarely elongated, solitary or in group of 3–7, immersed to emerged, 0.3–0.6 mm diam., thalline margin thin to thick, 15–57 µm, concolorous with the thallus, rarely


detaching from disc by a slit, sometimes giving a verrucose appearance; *disc* black, plane to concave, white pruinose to epruinose; *excipulum* thin to rudimentary, 10–20 µm, with pale brown to brownish hyphae, K+ slightly olivaceous; *epihymenium* pale brownish, 13–25 µm thick, K+ slightly olivaceous, I–; *hymenium* hyaline, not interspersed, 50–110 µm high, I– or I+ pale blue rapidly changing to orangish red, KI+ pale blue; *paraphyses* slender, simple, unbranched, c. 1.5 µm wide; *hypothecium* dark brownish, 8–35 µm thick, K+ slightly olivaceous, I– or I+ pale blue suddenly changing to orangish red, KI+ pale blue; *asci* cylindrical-clavate, 8-spored, ascospores irregularly to spirally arranged, 60–110 × 13–20 µm, walls KI+ blue, tholus KI+ dark blue; *ascospores* hyaline, fusiform, 7-septate (rarely 5-septate), straight to slightly curved, (33–)45–65(–78) × 4–7 µm, without perispore.

Pycnidia not seen.

Chemistry. Thallus K+ yellow turning red, C–, P+ yellow, UV–. TLC: norstictic acid present.

Additional specimens examined. **India:** *West Bengal:* Darjeeling district, Darjeeling Pashok road, elev. 6000 ft, 1967, D. D. Awasthi & M. R. Agarwal 67.110 (LWG-LWU); Neora Valley National Park, Zero Point - PHE Source foot hack, primary rainforest, elev. c. 2250 m, on fallen tree branches, 2007, Jagadeesh Ram 3933 (BSA); Chaudapheri - Zero Point way, primary rainforest, elev. 2379 m, 2008, Jagadeesh Ram 4274 (BSA); Neora riverine forests, primary rainforest, elev. 2250 m, 2010, Jagadeesh Ram 6077 (BSA); Aloori, secondary rainforest, 27°07'26.9"N, 88°42'44.2"E, elev. 2494 m, on *Eurya acuminata*, 2008, Jagadeesh Ram 4362 (BSA); *ibid.*, 27°07'30.1"N, 88°42'47.7"E, elev. 2511 m, Jagadeesh Ram 4363; *ibid.*, 27°07'25.7"N, 88°43'05.6"E, elev. 2441 m, 2010, Jagadeesh Ram 6119, 6120, 6121, 6143 (BSA); *ibid.*, 27°07'26.9"N, 88°43'06.2"E, elev. 2465 m, 2010, on *Eurya acuminata*, Jagadeesh Ram 6125 (BSA).

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