

On the taxonomic identity of *Bactrospora lamprospora* (lichenized Ascomycota: Arthoniales)

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Abstract: The species, *Bactrospora lamprospora* (Nyl.) Lendemer is treated as a synonym of *B. metabola* (Nyl.) Egea & Torrente. The comparison of characters of all accessible materials and type specimens confirmed that *B. lamprospora* is conspecific with *B. metabola*. The distinguishing characters of *B. metabola* from other species in this group are initially a *Homalotropa*-type ascospores becomes muriform at maturity, with up to 24–30 transverse septa and ascospore size of 48–105 × 7–14 µm.

Introduction

The genus *Bactrospora* A. Massal. was first described by Massalongo in 1852 to accommodate *B. dryina* (Ach.) A. Massal. (\equiv *Lichen dryinus* Ach.). Rabenhorst (1870) proposed the family Bactrosporaceae for this genus and the same was accepted by Eriksson (1981) in his work ‘The families of bitunicate ascomycetes’. Eriksson (1981) mentioned that for the time being the family is recognized as a separate taxon along with the Opegraphaceae and the Roccellaceae. Later, Eriksson & Hawksworth (1991) treated Bactrosporaceae under Opegraphaceae. The same were followed by Egea & Torrente (1993) during the revision of the genus *Bactrospora*. Hawksworth *et al.* (1995) and Grube (1998) treated this genus under the family Roccellaceae.

During the large-scale phylogenetic revision of Roccellaceae, Ertz *et al.* (2014) stated that “several attempts to sequence different species of this genus failed for unknown reasons and despite the use of fresh material”. The same issues were encountered during the establishment of *Bactrospora ochracea* Ertz & van den Boom (van den Boom *et al.* 2018), a unique species of *Bactrospora* characterized by ascomata covered with orange pruina. Herein, they stated that “our attempts to sequence the lichen failed, probably because the specimen was too old”. Jaklitsch *et al.* (2016) placed this genus under the family Opegraphaceae whereas Lücking *et al.* (2017) replaced this genus under order Arthoniales “genera incertae sedis” and noted that “Classification changed due to lack of molecular data”.

During the ongoing revisionary studies on the Arthoniales in India, type specimens of *B. lamprospora* (Nyl.) Lendemer and *B. metabola* (Nyl.) Egea & Torrente from H-NYL, and voucher specimens labelled as the above species from Indian herbaria viz., ASSAM, BSA, LWG and PBL were examined.

The species, *Bactrospora metabola* is proposed by Egea & Torrente (1995) to transfer *Melampyridium metabolum* (Nyl.) Müll. Arg. (\equiv *Melaspilea metabola* Nyl.), and they designated H-NYL 4907 as lectotype, and H-NYL 4908, 4909 as isolectotypes. The species is uniquely distinguished from other *Bactrospora* species by its pyriform, wide asci, and its ascospores [(55–) 65–95 × 8–13 (–14) µm] of *Homalotropa*-type but muriform at maturity (Egea & Torrente 1995). Lendemer (2004) transferred *Gyalecta lamprospora* Nyl. under *Bactrospora* with a new combination, *B. lamprospora* (Nyl.) Lendemer., and also designated lectotype and isolectotype (H-

NYL 21968). He also synonymized the species, *B. macrospora* R.C. Harris under *B. lamprospora*. The species is characterized by a *Homalotropa*-type ascospores of (60–) 70–98 × (6–) 7–10 μm, (18–) 20–28-transversely septate, occasionally with one or two longitudinally divided cells (*vide* Egea & Torrente 1993). These longitudinal septa may be a stage in ontogeny of spore development which would become muriform at maturity. However, Egea & Torrente (1995) did not compare *B. macrospora* with *B. metabola* during latter's description. Henssen in Henssen & Thor (1994) transferred *B. macrospora* under *Melampylidium* Stirt. with new combination *M. macrosporum* (R.C. Harris) Henssen because of its asci and ascospores are of the same type as in *Melampylidium*. In this treatment, they opined that *M. macrosporum* is most closely related to *M. metabolum* (≡*B. metabola*), the type species of the genus. Later, Egea & Torrente (1995) treated *Melampylidium* as a synonym of *Bactrospora*. In the world key to species of the genus *Bactrospora* by Sobreira *et al.* (2015), *B. lamprospora* was keyed out in 'ascospores transversely septate only' category.

In the present study, we examined the isolectotypes of *B. lamprospora* (H-NYL 21968) and *B. metabola* (H-NYL 4909). As a result, we observed that the ascospores of *B. lamprospora* has initially transversely septate ascospores (*Homalotropa*-type) which becomes muriform at maturity like *B. metabola* (Fig. 1). Spore lengths in types of *B. lamprospora* ranges from 50–105 μm, and in *B. metabola* ranges from 55–95 μm. We examined other voucher specimens of *B. metabola* from India, in which spore length varies from 48–102 μm. The other taxonomic characters are similar in both the species. It is better to place *B. lamprospora* under *B. metabola* as a new synonym because of *Melaspilea metabola* (≡*B. metabola*) has nomenclatural priority over *Gyalecta lamprospora* (≡*B. lamprospora*).

We did not examine the type of *B. macrospora* which is considered as a new synonym under *B. lamprospora* by Lendemer (2004). But in the description by Egea & Torrente (1993), and in the protologue (Harris, 1990) mentioned that ascospores occasionally with one or two longitudinal septa. It may be a tendency towards becoming a muriform ascospore at maturity. Detailed study is required to ascertain the correct identity of the species. The Indian specimen reported as *B. lamprospora* [India, Kerala, Idukki district, ICRI Campus, Myladumpara, 1200 m, on bark of tree, 1 March 1984, Awasthi & Awasthi 84.139 (LWU-LWG!)] by Nayaka & Upreti (2007) belongs to *Bactrospora pleistophragmoides* (Nyl.) Egea & Torrente.

The Species

Bactrospora metabola (Nyl.) Egea & Torrente, Mycotaxon 53, 58 (1995). Fig. 1

≡ *Melaspilea metabola* Nyl., Bull. Soc. Linn. Normandie, sér. 2, 2, 69 (1868). *Melampylidium metabolum* (Nyl.) Müll. Arg., Bull. Herb. Boissier 2, 79 (1894); Type: Nova Caledonia, Lifu, Layalty, 1864, Thiébaud *s.n.* (H-NYL 4907 - lectotype; H-NYL 4908, 4909 - isolectotypes!).

= *Bactrospora lamprospora* (Nyl.) Lendemer, Mycotaxon 89(2), 256 (2004). *Gyalecta lamprospora* Nyl., Flora 68, 31 (1885). *Lecidea lamprospora* (Nyl.) Hue, Nouv. Arch. Mus. Hist. Nat., sér. 3, 3, 101 (1891); Type: USA, Pennsylvania, Philadelphia, Eckfeldt 45 (PH - lectotype; H-NYL 21968 - isolectotype!), *syn. nov.*

Descriptions and additional synonymy of this species are provided by Egea & Torrente (1995) and Lendemer (2004). The species can be easily distinguished from other species in this group by initially a *Homalotropa*-type ascospores becomes muriform at maturity, with up to 24–30 transverse septa and ascospore size of (48–) 65–95 (–105) × (6.9–) 8–12 (–14) μm. This species is first reported for India by Nylander (1873; as *Melaspilea metabola* from Andaman Islands). It is a widespread species known from Africa (Seychelles), Asia (India, New Guinea, Singapore, and Thailand), Australasia (Fiji, New Caledonia, New Zealand, and Tasmania), Brazil, Florida, and Puerto Rico (Sipman 2010, Lumbsch *et al.* 2011, Sobreira *et al.* 2015).

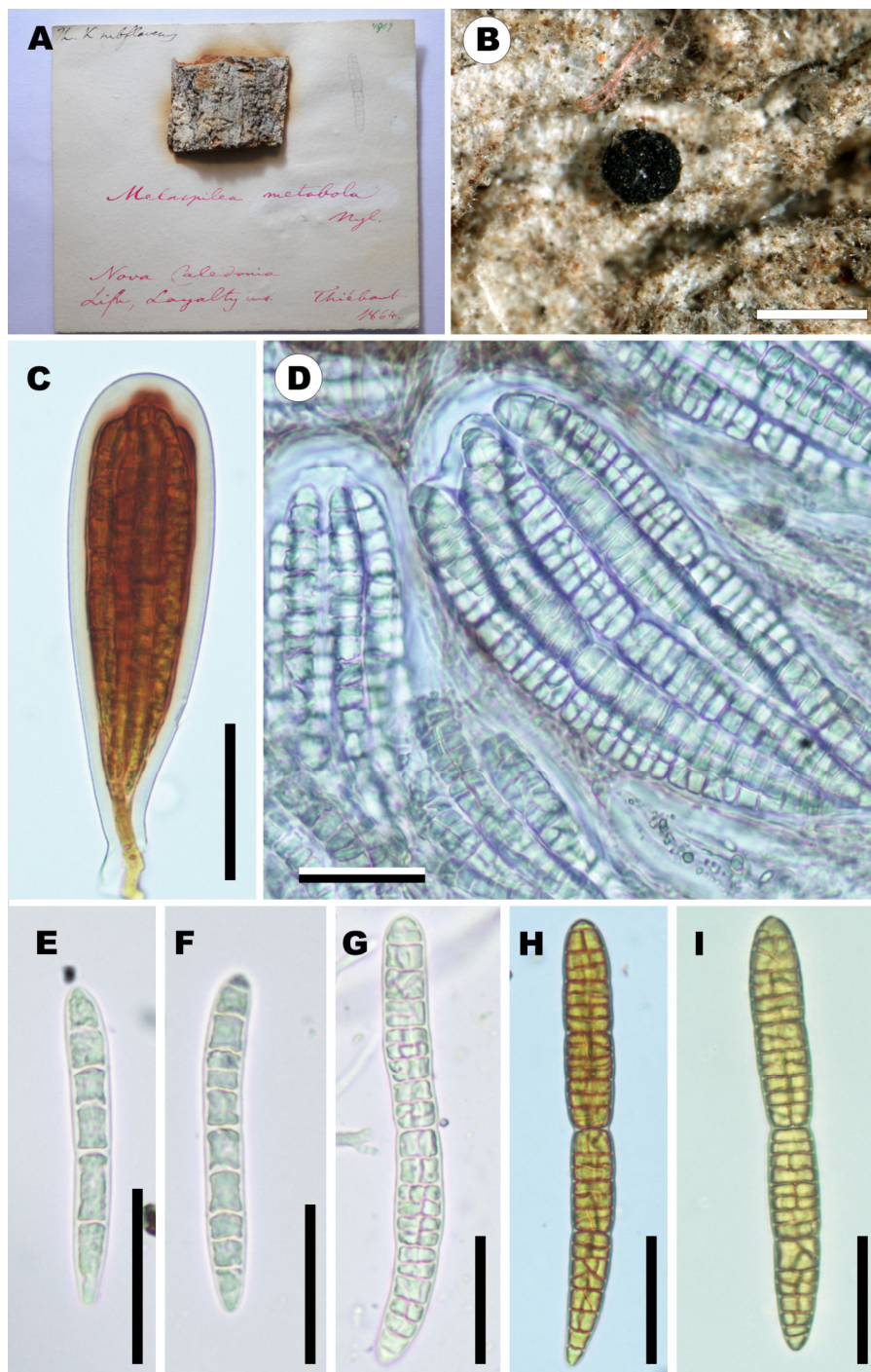


Fig. 1. *Bactrospora metabola* (A & I, HNYL-4909–isoelectotype of *B. metabola*; B–D, G & H, HNYL 21968–isoelectotype of *B. lamprospora*; E & F, Jagadeesh Ram 926). A, herbarium sheet of *Melaspilea metabola*. B, an enlarged view of ascomata. C, ascus (in Lugol's iodine). D, asci with ascospores. E–I, some stages of ascospore ontogeny (H & I, muriform ascospores at maturity mounted in Lugol's iodine). Scales: B = 1 mm; D–I = 25 μ m.

Additional material examined. India: Andaman & Nicobar Islands: South Andaman, Rani Jhansi Marine National Park, Outram Island, N12°12'38.2", E93°05'42.6", elev. 10 m, 10 May 2012, Jagadeesh Ram 1820 (PBL). West Bengal: Sundarbans Biosphere Reserve, Buridubri, on *Excoecaria agallocha*, 21 Feb. 2004, Jagadeesh Ram 823 (BSA); Chamta, on *Excoecaria agallocha*, 25 Feb. 2003, Jagadeesh Ram 13501 (ASSAM); *ibid.*, on *Xylocarpus mekongensis*, 01 March 2004, Jagadeesh Ram 1112 (BSA); Goshaba, on *Excoecaria agallocha*, 29 Feb. 2004, Jagadeesh Ram 1073 (BSA); Haldibari, on *Ceriops decandra*, 26 Feb. 2004, Jagadeesh Ram 926 (BSA); Maya dwip, on *Xylocarpus mekongensis*, 27 Feb. 2004, Jagadeesh Ram 1005 (BSA); Sunderkhali Wildlife Sanctuary, on *Rhizophora apiculata*, 01 March 2003, Jagadeesh Ram 13697 (ASSAM).

Acknowledgments

The authors are grateful to the Director, CSIR-National Botanical Research Institute (NBRI), Lucknow, and to the Director, Botanical Survey of India (BSI), Kolkata for providing facilities. The authors are thankful to the curator, and H-NYL (Herb. William Nylander, Finnish Museum of Natural History, University of Helsinki, Finland) for the loan of type specimens, and to the curators of ASSAM (BSI, Shillong) and PBL (BSI, Andaman & Nicobar Islands) for the loan of voucher specimens. The author (SJ) is also thankful to Department of Science & Technology (DST), New Delhi for the financial assistance under INSPIRE Faculty scheme (IFA18-LSPA 124). (CSIR-NBRI MS No.: CSIR-NBRI_MS/2020/09/03).

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