Meliolina subramanianii sp. nov.

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Abstract. A foliicolous fungus occurring on Syzygium in the Nilgiris and previously recorded as Meliolina mollis (Berk. & Br.) v. Höhn. is redescribed as M. subramanianii sp. nov.

Keywords. Fungi; Ascomycetes; Meliolina; Syzygium.

The road from Ootacamund, crowning the Nilgiri Hills, to Gudalur on the northern slopes of Wynaad, winds through a high, undulating plateau before descending a steep embankment, in sharp twists and turns, on its way to Mysore. Once lushly forested the Wynaad-Nilgiri countryside bears marks of the climatic depredations of the Pleistocene, the long presence of man, and of his more recent ritual—the afternoon tea. Much of the primary forest has been replaced by heavily grazed, fire-prone shrubby savanna and, since 1836, by plantations of exquisite tea. Only in deeper, more sheltered and moister gullies and depressions remain isolated pockets of indigenous vegetation attesting to the former arborescent glory of the high Western Ghats. Here fungi too, as if seeking refuge, appear to have congregated in the remaining patches of the original vegetation.

The world knows much about these fungi, which often bear exotic names derived from Sanskrit, because Wynaad–Nilgiri, for the past thirty years, has been the favourite stomping ground of C V Subramanian. The fungi are certainly exotic, in aspect as well as name, but only now are we beginning to recognize the extent of their eccentricity: for the ecologically inflexible pockets of tropical, evergreen “shola” forest contain relics of a different world and of a different era—the Cretaceous Gondwanaland.

In this paper we record one such relict, a fungus collected in Wynaad–Nilgiri at an altitude of about 2000 m along the Mysore road near Gudalur. The fungus was originally recorded as Meliolina mollis (Berk. & Br.) v. Höhn. (Pirozynski 1974) but now, following a more critical study, it is redescribed as M. subramanianii sp. nov.

Meliolina subramanianii sp. nov.

Coloniae hypophyllae, atrae, dense velutinae, plus minusve circulares, ad 14 mm diam. Mycelium superficiare ex hypis radiantibus, levibus, ramosis, brunneis vel atrobrunneis, 7.2–9 μm cr. compositum. Stomatopodia lateralia, dispersa, plerumque sessilia interdum breviter stipitata, subglobulosa vel ellipsoidea vel obovoidea, recta vel flexa, ad 29 μm long., 9–12 μm lat., unicellularia, interdum hyphas laterales gerentia. Hyphae immures per stomata ingredientes, dein intercellulariter extensae.
Phialophora numerosa, dense aggregata, setiformia, erecta, in hyphis super-
faciaribus portata, ad 370 μm long., 1-4(-5) dichotome ramosa, arborescentia, basim
versus atrobrunnea, crasso-tunica, 9-11 μm cr., apicem versus angustata, 5-6.5 μm
cr., brunnea et tenui-tunicata: rami in phialide terminantes. Phialides anguste
obclavatae vel plus minusve subulatae, 34-48 μm long., basim versus pallide brunneae
et 5-4-8 μm lat., apicem versus subhyalinae et 2.3-2.7 μm lat., collariaque praeeditae.
Phialoconidia cuneiformia, hyalina, 4-5 × 2.1-2.5 μm.

Perithecia atra, subglobosa ad 450 μm lat., ad 350 μm alt., ostiolata, setis lateralibus
simplicibus; plerunque recitis, septatis, atrobrunneis, ad 330 μm long., basim versus
7-9 μm cr., apicem versus 4-7 μm cr. Paraphyses conspicuae, simplices vel basim
versus 1-ramosae, hyalinae, ad 190 μm long., septatae (cellulis 27-48 μm long.,
5-7-2(-9) μm cr.), ad apicem rotundatae. Ascii clavati vel anguste obovoidei. 160-170 × 50-55 μm, (4-8) spori.

Ascosporeae ellipsoidicae vel subcylindricae, utrinque subpapillatae vel papillatae,
3-septatae, ad septa constricta, brunnea vel atrobrunnea sed papillis polari
subhyalini vis pallide brunnea, 50-70 × 18-23.4 μm. Sub papilla apicali basali
disco tenui atrobrunneae acetabuliformi 7-8.5 μm lat. annullando aspectu annul
atrobrunneae. Cellulae polares zona subhyalina, tenui-tunicata, angusta (circa 1 μm) sub
disco atrobrunneae et prope septa praeeditae.

In foliis vivis Syzygii montani (Wight) Gamble (= Eugenia montana Wight), India,
Tamil Nadu, Niligiris, prope Gudalur. K A Pirozynski (318a), 22.II.1966, DAOM 145762
(holotypus), IMI 120229a (isotypus).

Colonies hypophyllous, black, densely velutinous, more or less circular in outline, up
to 14 mm diam. larger by confluence. Superficial mycelium composed of pale to dark
brown, smooth, branched, radiating hyphae 7.2-9 μm wide with cells up to 90 μm long
and pore-like anastomoses between occasional contiguous hyphae. Stomatopodia
lateral, scattered, concolorous with the hyphae, mostly sessile, sometimes shortly
stalked, subglobose to ellipsoidal to obovoid, straight or bent, up to 29 μm long and
9-12 μm wide, 1-celled, sometimes producing one or two lateral hyphae. From the
appressed surface each stomatopodium produces a hypha which penetrates a stoma;
the hypha is brown to dark brown, usually swollen below the stoma itself and then
branched within the substomatal chamber, gradually becoming hyaline and invading
the leaf intercellularly at least as far as the palisade tissue. No haustoria were observed.
Just above the stomatal aperture is an ellipsoidal cavity formed in the thickened outer
wall of the epidermal layer. The invading hypha expands within this cavity. When
colonies are removed from the leaf surface by the collodion technique this hyphal
swelling may remain within the cavity or it may be torn away attached to the
stomatopodium. In the latter circumstance the swelling appears as an additional
subglobose to ellipsoidal cell attached to the appressed surface of the stomatopodium.

At the margin of a few of the larger colonies some diminutive colonies of the fungus
up to 1 mm diam. have been seen, and a few bear occasional phialophores. Each of
these colonies has arisen from a hypha which has reached the leaf surface from within
the leaf tissues by growing through a stoma: at the leaf surface a swollen dark brown
cell is produced which finally develops 3 or 4 hyphae that grow over the leaf surface.
The central cell of such secondary colonies bears an ellipsoidal scar on the appressed
surface. Such colonies are scanty in this species but are exceedingly abundant in some
others.

Phialophores numerous and densely crowded, setiform, erect, arising laterally on
superficial hyphae, 1-(4(-5)-dichotomously branched and arborescent. They are thick-
Figure 1. *Meliolina subramanianii*. A, superficial hyphae and stomatopodia. B, vertical section through leaf (longitudinally through stoma) showing intercellular hyphae, sub-stomatal hyphae and torn hyphal cell below outer stomatal cavity. C, bases of two phialophores and five phialides with phialoconidia. D, central part of small secondary colonies with scar on the cell which has emerged through a stoma. E, phialophores showing 1–5 dichotomies. Semidiagramatic: phialophore thickness not shown. From the holotype. (Scale bars in A–D are 10 μm, in E, 100 μm.)
walled, very dark brown and 9–11 μm wide just above the base, tapering gradually and becoming paler to brown and thinner-walled toward the ends of the branches: they are up to 370 μm long with most ends terminating in a phialide. Phialides are narrowly obclavate to more or less subulate, 34–48 μm long, pale brown and 5.4–8 μm wide at the base, subhyaline toward the narrowed apex which is 2.3–2.7 μm wide below a funnel-shaped collarette. Phialoconidia (presumably spermatia) are cuneiform, hyaline, 4–5 μm long and 2.1–2.5 μm wide: they gather in a group at the end of the phialides.

Perithecia arise on the superficial mycelium and are at first obscured by the arborescent phialophores. At maturity they are globose up to 450 μm wide and 350 μm high, ostiolate, and they bear numerous unbranched, radiating, septate, thick-walled, dark brown setae up to 330 μm long, 7–9 μm wide at the base tapering to 4–7 μm wide at a bluntly rounded apex. The perithecium wall is 40–50 μm thick with an outer dark brown layer of thick-walled cells merging with an inner layer of thin-walled subhyaline and tangentially flattened cells. Asci clavate to narrowly obovoid, 160–170 × 50–55 μm, (4–)8-spored, relatively undifferentiated. Paraphyses conspicuous, unbranched or once branched toward the base, septate and barely constricted at the septa, hyaline 5–7.2(–9) μm wide at the base, tapering imperceptibly to 5–6.5 μm at the bluntly rounded apex.

Ascospores ellipsoidal to subcylindrical, subpapillate to papillate at each end, brown to dark brown, 3-septate, constricted at the septa, with a darkened and raised ring around the septal pores and a thin, darker band of wall partially obscuring the septa. At the apex and base the inner wall forms a conspicuous, circular, convex, dark brown, centrally thinner disc. The end cells show two transverse, circumferential, narrow, subhyaline bands, each representing a thinner zone in the ascospore wall, one next to each darkened disc and the other near the septum. Ascospores measure 50–70 × 18–23 μm.

On living leaves of Syzygium 'montanum (Wight)Gamble (= Eugenia montana Wight), India, Tamil Nadu, Nilgiris, near Gudalur, K A Pirozynski (318a), 22.II.1966, DAOI 145762 (holotype), IMI 120229a (isotype).

Meliolina subramanianii differs from other species of the genus in its papillate ascospores. *Meliolina mollis* (Berk. & Br.) Höhnel *sensu* Höhnel (1910, 1919) (= *M. pulcherrima* (H & P Syd.) H & P Sydow 1914) differs in its longer, narrower ascospores with bluntly rounded ends and mostly 8 hyaline bands two to each cell.

It is with the greatest pleasure that we name this species to honour Prof. C V Subramanian whose friendship we have treasured for many years.

Wynaad is the site of another collection of *Meliolina*. The fungus was recorded as *Meliola cladotricha* Lév. (Sydow *et al* 1911) and subsequently listed under this name by Butler and Bisby (1931) and Vasudeva (1960). The same collection was listed by Mukerji and Juneja (1975) but *sub Meliolina arborescens* (H & P Syd.) H & P Syd. according to a re-identification by Kapoor (1967). The material (in Herb. HOO and IMI) collected by W McRae on *Eugenia jambolana* Lam. (= *Syzygium cuminii* (L) Skeels) in Cottamunda on 22 Nov. 1909 has been examined by us and found to match *M. pulcherrima*. Hansford (1946) listed this collection under *M. mollis*.

Particulars of three other occurrences of *Meliolina* in India have been recorded in the literature:

(i) A specimen on leaves claimed to be *Syzygium jambolanum* (Lam.)DC from Poona was recorded as *Meliolina cladotricha* (Uppal *et al* 1935). Portion of this collection
Meliolina subramanianii

Figure 2. Meliolina subramanianii. A four-spored ascus, paraphysis and six loose ascospores. From the holotype. (Scale bars are 10 μm.)

(in Herb. F) has been annotated by Hansford to the effect that the mycelium found on leaves appears to be chaetothyriaceous. The host lacks laminar glands and is not, therefore, a Syzygium.

(ii) The specimen listed by Hansford (1946) as 'Hooker, s.n. on Myrtaceae. Khasia, India in Herb. Kew' is also sterile. The packet (in Herb. K) is illegibly labelled with what looks like 'Amure, Khasia' which could refer to the Kharia distinct of the Chota-Nagpur Plateau or, more likely, to the Khari Hills of Assam.

(iii) Meliolina pulcherrima was listed by Mukerji and Janeja (1975) with reference to Ponappa (1967) who collected it on Syzygium cuminii in Murnad–Coorg, Karnataka. We have not seen this specimen.
Figure 3. *Meliolina subramaniani*. Young and mature ascospores. From the holotype ($\times 730$).
In addition, the following herbarium specimens (in Herb. IMx) from India bear species of *Meliolina*:

(i) Another collection from Coorg on *Syzygium cuminii*.
(ii) A University of Gorakhpur specimen on *S. tetragonum* Kurz [originating from the foothills of the Nepalese Himalayas?]
(iii) Three specimens collected in Burnihat, Assam: (a) on unidentified host, apparently *Syzygium*, (b) on *S. cuminii*, and (c) on "*Terminalia bellerica* Roxb". The latter entry calls for the verification of the identity of the host because this is the only record of the occurrence of *Meliolina* on Myrtales other than the Myrtaceae.

The fragments of leaves comprising this specimen show numerous spherical laminar glands the presence of which is inconsistent with the host determination.

Both from the herbarium and the published records, *Meliolina* in India has a clearly disjunct distribution: the higher elevations in the Malabar section of the Western Ghats, and the foothills of the eastern Himalayas. The present-day pattern appears to have been imposed by the discontinuity of the combination of host and wet, tropical, montane habitat rather than that of the potential host alone. *Syzygium* is more widely distributed along Western Ghats from the latitude of Bombay to Cape Comorin, the Himalayan foothills of Sikkim and Bhutan, North Caabar, Khasi. Garo and Lushai Hills (in the Chittagong area) in Assam, Balaghat and Canar in the Satpura Range of Madhya Pradesh, Seshachalam Hills in Andhra Pradesh and Javadi Hills in North Arcot, Tamil Nadu. *Syzygium cuminii* is extensively cultivated in all but the driest parts of India.

The overwhelming majority of the Indian Myrtaceae is concentrated in the southern end of the peninsula. The southern ranges of the Western Ghats and Wynaad—Nilgiri especially is an important centre of endemicism (Blasco 1971) and the home of the monotypic *Meteoromyrtus wynaadensis* Gamble a relative of *Syzygium* (Aubréville 1974), and of some members of *Syzygium* itself. *S. montanum* (Wight) Gamble, the probable host of *M. subramanianii*, is strictly endemic to dense forests of the Nilgiri Plateau at about 1800 m, being absent from similar ecosystems even of the neighbouring Palni (Blasco 1971).

The flora of peninsular India, both fossil and living, shares many elements with the floras of Africa and Australia (Axelrod and Raven 1978; Specht 1981). The *Syzygium/Meliolina* association provides a further example of this vicarious relationship of India to its former Gondwanalandian neighbourhoods of Africa and Australia. In all three of these now discrete lands most of the original mesophytic floras have been eliminated, modified or fragmented and forced into more humid montane refugia. In all three the *Syzygium/Meliolina* associations are found in precisely such locations.

To students of Indian fungi, especially those following Subramanian’s footsteps in the Wynaad—Nilgiri, to those puzzled by consistent similarities of the mycota of India, intertropical Africa and Australo-Papua/New Zealand, we offer a reminder: the mycological road from Ootacamund winds its way to Mysore through Gudalur, Brisbane and Entebbe.

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