Mycoscience (2012) 53:17–24
DOI 10.1007/s10267-011-0133-4

FULL PAPER

Taxonomic and nomenclatural notes on sooty mould names based on species mixtures: *Hormiscium handelii* and *Torula lechleriana*

Stanley J. Hughes · Keith A. Seifert

Received: 14 March 2011 / Accepted: 8 June 2011 / Published online: 23 July 2011

Abstract Sooty moulds often grow in colonies of more than one species, and taxonomic descriptions thus often unknowingly combine elements of different fungi. The species composition of such mixtures can be clarified by microscopic examination of undisturbed colonies removed from the substrate using the collodion technique. This method facilitates analysis of hyphal morphologies and the associations of different synanamorphs with these hyphae, i.e., the recognition of character suites that correlate with sooty mould families. Earlier versions of the International Code of Botanical Nomenclature allowed a name based on a mixture to be designated a nomen confusum, but since 1978 the Code has required selection of one species or one morph to serve as the lectotype for the name. Two binomials are revised here, with the component parts of their holotypes characterized and compared with their protologues. The type specimen of *Hormiscium handelii* is dominated by monilioid hyphae of a member of the Metacapnodiaceae with a hyphomycetous *Capnophialophora* anamorph; this latter morph is selected as the lectotype. No new combination is made because no spores were observed, so that it is impossible to adequately characterize the fungal species represented by this morph. The type of *Torula lechleriana* comprises three species, but it is dominated by the characteristic monilioid hyphae of a member of the Metacapnodiaceae, with *Capnobotrys* conidiogenous cells and conidia. The latter anamorphic fungus is chosen as the lectotype, and a taxonomic description is provided for the resulting new combination, *Capnobotrys lechleriana*.

Keywords Dematiaceous hyphomycetes · International Code of Botanical Nomenclature · Lectotypification · Nomen confusum · Synanamorphy

S. J. Hughes · K. A. Seifert (✉)
Biodiversity Theme (Mycology and Botany),
Agriculture and Agri-Food Canada,
Ottawa, ON K1A 0C6, Canada
e-mail: keith.seifert@agr.gc.ca

S. J. Hughes
e-mail: sjhughes@sympatico.ca

Introduction

Many natural colonies of sooty moulds are often mixtures of species from different families (see Fig. 1d); the same colonies are sometimes also inhabited by hyperparasites. Hughes (1972, 1976) documented individual sooty mould colonies with as many as eight different species. The diagnostic hyphal morphology of the principal sooty mould families can be used to distinguish some of these components. As a further complicating factor, many species have synanamorphs (two or more hyphomycetous morphs and sometimes a coelomycetous morph), which may or may not be associated with a teleomorph. Therefore, accurate interpretation of sooty mould specimens requires knowledge of the component species and recognition that the heterogeneity of the colonies might result in the observation of different suites of species on different slide preparations. Gatherings considered as one specimen by collectors (different twigs or leaves from one gathering) may be colonized by entirely different mixtures of species.

The complications inherent in working on these fungi are indicated by the few available cultures and the small number of DNA sequences deposited in GenBank. Only species of the Capnodiaceae have frequently been cultured, and as of March 2011, only 53 ribosomal DNA sequences representing 15 species were available for the

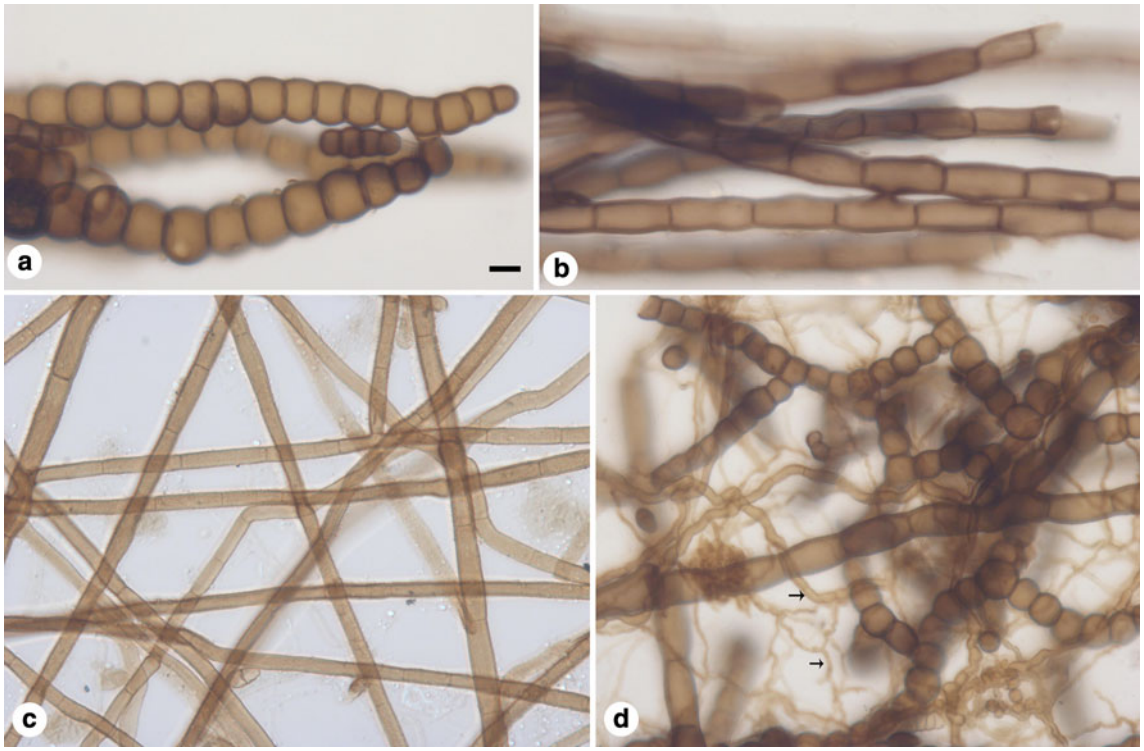

Fig. 1 Hyphal morphology of three families of sooty moulds and a typical mixture of hyphae from a leaf. **a** Moniliform hyphae of a member of the Metacapnodiaceae (*Metacapnodium moniliforme* DAOM 93416d). **b** Brick-like hyphae of a member of the Euantennariaceae (*Antennaria scoriadea* DAOM 105819). **c** Cylindrical hyphae of a member of the Triposporiopsidaceae (*Tripospermum* sp. DAOM 149581). **d** A mixture of hyphal types from a collodion preparation of a sooty mould colony, with conspicuous hyphae of members of the Metacapnodiaceae and Euantennariaceae, and two hyphal types of uncertain affinity (*arrows*) (*Metacapnodium moniliforme* DAOM 93416d). *Bar* 10 μm

Capnodiaceae and Euantennariaceae (an increase from 35 sequences of 8 species in September 2009), with 3 sequences for one strain of *Tripospermum* (Triposporiopsidaceae) and none for the Metacapnodiaceae.

Recognition of the frequency of species mixtures and an understanding of patterns of synanamorphy are critical for accurate interpretation of type specimens. Previous versions of the International Code of Botanical Nomenclature allowed the rejection of names based on species mixtures under the general category of nomen confusum. However, starting with the 1978 Code (Leningrad Code), this concept was abandoned, and the present version (Vienna Code; McNeill et al. 2006) recommends that one portion of the holotype be selected as lectotype to fix usage of a name. The specific articles of the Code governing this process are reviewed below.

This article is the first of a planned series that will revise sooty mould names based on species mixtures. As possible, each component of the type specimens will be illustrated and interpreted in the context of the published protologues and sometimes unpublished illustrations that accompany the types. Each binomial will then be considered, and one of the component species will be selected as lectotype, where possible in a manner that preserves the nomenclatural stability of known species. The two binomials considered were treated briefly in the overview of sooty moulds by Hughes (1976), but are now presented in detail here, with our complete observations, discussion, and conclusions.

Hyphal morphologies and synanamorphs of some sooty mould families

A summary of hyphal morphologies and synanamorphic patterns for the three families of primary concern in this article is presented here as Table 1. Examination of sooty mould colonies requires determining whether a mixture of different hyphal types is present, linking spore types to perithecia, pycnidia, or hyphomycetous conidiophores, or inferring the most probable connections based on prior knowledge.

Euantennariaceae

The hyphae of species of the Euantennariaceae are brown, with smooth to coarsely roughened walls, are uniformly cylindrical, with cells longer than wide, and have slightly

Table 1 Hyphal morphology and hyphomycetous anamorph patterns characterizing three of the sooty mould families that frequently occur in mixed colonies

Family	Hyphal characters				Hyphomycetous anamorphs						
					Conidiophores	Phialides producing microconidia	Macroconidia				
							Blastic		Tretic		Blastic
	Pigmentation	Component cells	Width	Other features			1-septate	3–7 septate	3–5 septate	Stauro	Stauro
Euantennariaceae	Brown or dark brown	Cylindrical, brick-like, slightly constricted	Narrow	One-cell-thick thallus[a]	Erect, seta-like or minimal	Globose usually in whorls, *Hormisciomyces*	–	+ *Capnokyma* *Antennatula*	–	–	–
Metacapnodiaceae	Dark brown	Monilioid, very constricted	Up to 45 μm	Tapered hyphal ends, schizolytic fragmentation into viable propagules, *Hyphosoma*	Erect or minimal	Ampuliform in irregular groups, *Capnophialophora*	+, *Capnobotrys*	+, *Capnocybe*	+, *Capnosporium*	+, *Hormiokrypsis*	–
Triposporopsidaceae	Medium brown	Cylindrical, slightly constricted	Narrow	–	Minimal	Narrow, solitary	–	–	–	–	+, *Tripospermum*

[a] Present only in some species of the family

constricted septa, giving the appearance of a row of bricks (Hughes 1974; Fig. 1b). Most species in this family combine two synanamorphs. *Hormisciomyces* Bat. & Nascim. anamorphs have terminal whorls of globose phialides yielding sparse, minute ameroconidia. Phragmoconidial synanamorphs also occur. Most are classified in *Antennatula* Fr., the species of which usually lack discrete conidiophores, with the exception of the fasciculate conidiophores of *Euantennaria mucronata* (Mont.) S. Hughes. The phragmoconidial species of *Capnokyma* S. Hughes differ by having seta-like conidiophores. Species of the holomorphic genus *Trichopeltheca* Bat., C.A.A. Costa & Cif. produce a characteristic, spreading, one-cell-thick thallus, composed of a two-dimensional layer of brick-like cells similar to the constituent cells of the hyphae of other genera in the family; hyphae not part of this thallus are subhyaline or pale brown.

Metacapnodiaceae

The distinctive hyphae of species of the Metacapnodiaceae are broad, with dark brown walls, and composed of more or less globose cells with strong constrictions at the septa, giving the appearance of a monilioid chain; the terminal cells are usually conspicuously tapered toward the apex (Fig. 1a). In some species, the hyphae disarticulate schizolytically into cells that can serve as propagules. As noted by Hughes (1970), the anamorph name *Hyphosoma* Syd. may be an appropriate genus for such propagules. All species in this family have a *Capnophialophora* S. Hughes anamorph, characterized by plump, ampuliform phialides on the tapered parts of erect monilioid conidiophores, producing small ameroconidia. Several other synanamorphs occur, with solitary, dry phragmoconidia (*Capnosporium* S. Hughes), solitary, dry stauroconidia (*Hormiokrypsis* Bat. & Nascim.), or slimy heads of phragmoconidia (*Capnocybe* S. Hughes).

Triposporiopsidaceae

The hyphae of species of the Triposporiopsidaceae are medium brown and composed of long cells without obvious constrictions (Fig. 1c). Species in this family have two characteristic synanamorphs. A *Tripospermum* Speg. synanamorph, with its conspicuous, pale to dark stauroconidia, is often the first clue that a member of this family is present. Once these are observed, the unnamed phialophora- or acremonium-like anamorph can generally be found; it is composed of scattered, relatively long and subhyaline to pale brown phialides producing ameroconidia. The anamorph genus *Heptaster* Cif., Bat. & Nascim., considered a synonym of *Tripospermum* by Hughes (1976), probably represents species with stauroconidia with six rather than four arms.

The International Code of Botanical Nomenclature and species mixtures

The complications caused by pleomorphy and mixed colonies of sooty moulds challenge the tenets of the International Code of Botanical Nomenclature (McNeill et al. 2006). The present Code emphasizes the importance of explicit and appropriate typification for genera and species. Previous versions allowed names to be informally rejected if they were based on a mixture of species, but the designation of such nomina confusa is no longer permitted.

Article 9.9 indicates that "…when the material designated as type is found to belong to more than one taxon, a lectotype … may be designated," representing a single element or morph present on the type and mentioned in the protologue. Article 9.12, which states "…the name must remain attached to that part which corresponds most nearly with the original description or diagnosis," is more problematic. For many species of sooty moulds, the original diagnosis, illustrations, or material accompanying the herbarium specimens clearly depict elements of more than one species that the original authors considered to belong to one fungus. Any of these elements, including illustrations that were never published but accompany the specimens, could be selected as lectotype according Article 9.12. Some interpretation of which morphological elements were considered of primary importance by the original authors can be inferred from the genus in which the species were placed. For example, a species described in *Torula* Pers. or *Hormiscium* Kunze presumably would have a monilioid element that the author considered diagnostic at the generic level.

Further guidance is offered in Recommendation 9A.5, which notes that "…the lectotype should be so selected as to preserve current usage." In particular, if another author has already segregated one or more elements as other taxa, one of the remaining elements should be designated as the lectotype provided that this element is not in conflict with the original description or diagnosis. Avoiding the replacement of well-understood species names by lectotypification should thus be a guiding principle.

Some sooty mould anamorphs, in particular those producing microconidia, lack diagnostic characters and are rather similar among all members of a family. Selection of morphs as lectotypes that cannot conclusively be identified to species may sometimes be indicated by Article 9.12; this will result in a precise generic assignment but imprecise species identity. Subsequent designation of epitypes (Art. 9.7) to the holotypes, lectotypes, or neotypes can also be used to further stabilize usage.

Materials and methods

Microscopy was performed using an Olympus BX 50 light microscope, and micrographs were obtained with an Evolution MP Media Cybernetics Camera tethered to Image-Pro Plus v6 (Media Cybernetics, Bethesda, MD, USA). Specimens were analyzed using slides prepared with collodion, a solvent-based solution of nitrocellulose (Callan and Carris 2003). Permanent slides of colonies were prepared with glycerin jelly (Hughes 1987), after warming the slide with a small drop of lactic acid to eliminate air bubbles.

The scanning electron micrograph was prepared by G.P. White from an unfixed, gold-coated, air-dried herbarium specimen using an AMRay 1000A scanning electron microscope.

Taxonomic part

1. ***Hormiscium handelii*** Bubák, *in* Handel-Mazzetti, Ann. K. K. Naturh. Hofmus. Wien, 23:106, table 5, fig. 4, 1909

Figs. 2, 3, 4

≡*Antennularia handelii* (Bubák) Maire, combination not traced, presumably a nomen nudum listed by MycoBank

Hormiscium handelii was illustrated and described by Bubák (1909) based on a specimen from bark of *Pinus pithyusa* collected at Prinkipo near Constantinople (now Istanbul), Turkey. The original illustration (Bubák's fig. 4) is reproduced here as Fig. 2. Isotypes were issued as *Kryptogamae exsiccatae* 2127 edit. Mus. Hist. Vindobon. We examined the Herb. G copy (slides preserved as DAOM 152137).

Bubák's description of the "conidia globosis, utrinque parum applanatis, magnitudine varia, usque 40 µm in

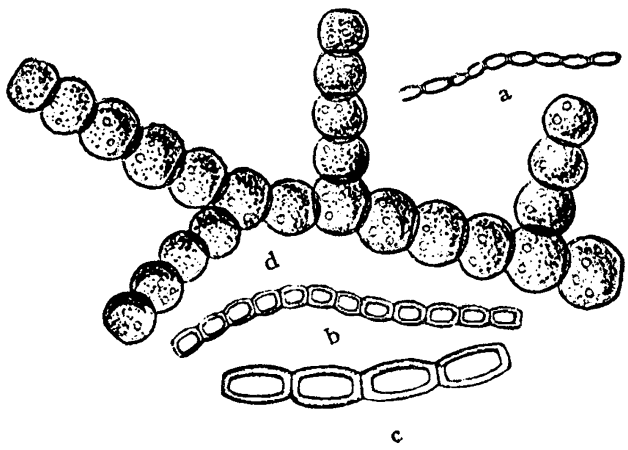

Fig. 2 *Hormiscium handelii*. Original illustration by Bubák (1909) (i.e., his fig. 4 with the original lettering, but with the number 4 before each letter removed to simplify our discussion)

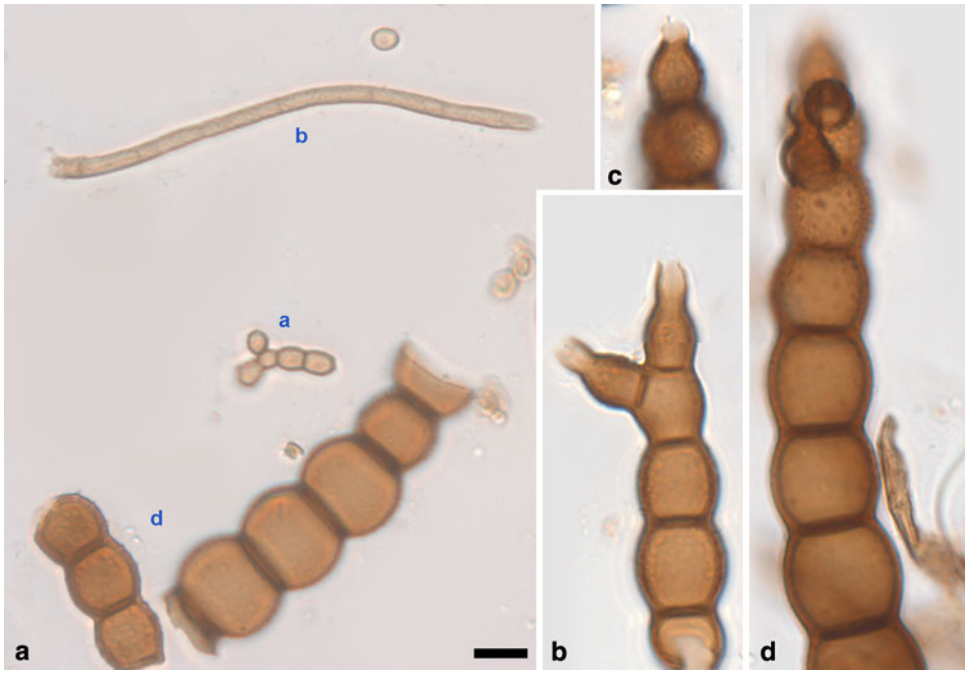

Fig. 3 *Hormiscium handelii* (isotype, G). **a** Three hyphal types from the specimen, with *blue letters* corresponding to tentative hyphal types indicated with the *same letters* in Fig. 2. **b–d** Ampuliform phialides of *Capnophialophora* on monilioid metacapnodiaceous conidiophores: the pair of photographs in the *upper right* includes the terminal phialide in two planes of focus. Photographs are composite digital images; colors and backgrounds have been digitally adjusted slightly for uniformity. *Bar* 10 μm

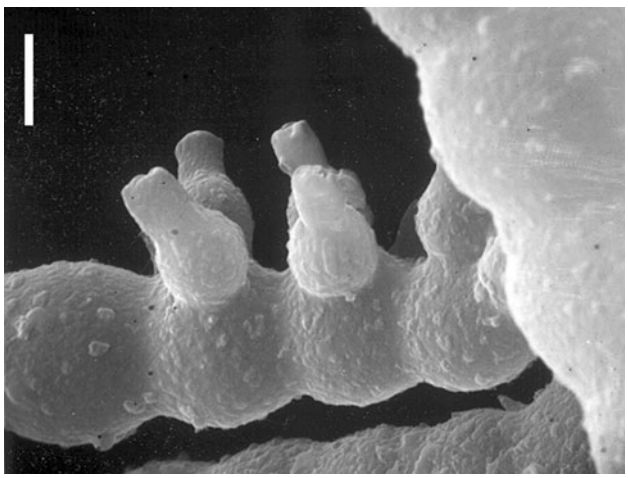

Fig. 4 *Hormiscium handelii* (isotype, G). Scanning electron microscopy (SEM) showing ampulliform phialides of *Capnophialophora* and rough-walled, monilioid hyphae. *Bar* 10 μm

diam., tunica crass. obscure castaneo-brunnea, reticulata-verrucosa" must refer to the predominant, conspicuous, tapering hyphae of a member of the Metacapnodiaceae on the specimen (Fig. 2d; see *blue d* on Fig. 3a), as previously noted by Hughes (1976). At the proximal ends of these hyphae are barrel-shaped cells that are moniliform, broader than long, and up to 43 μm wide. Older hyphae have fragmented schizolytically into single cells that are flattened at each end ("utrinque parum applanatis"), or into groups of cells, similar to those found in species such as *Ophiocapnocoma batistae* S. Hughes (Hughes 1967; Metacapnodiaceae).

We observed phialides on the isotype (Figs. 3, 4), but these were not illustrated by Bubák. They are produced singly or in pairs, terminally or laterally on cells at or toward the ends of narrowed metacapnodiaceous hyphae (Figs. 3, 4). We found no conidia, nor were any described or illustrated by Bubák, but the shape of the phialides is typical of *Capnophialophora*, a hyphomycetous anamorph produced by most members of the Metacapnodiaceae.

Also present on the isotype are pale brown to subhyaline, more or less cylindrical hyphae, with cells 3.5–5 μm wide and 7–14 μm long. These hyphae are, at least in part, the "sterile Fäden, olivbraun, verzweigt 5–7 μ breit einzelne Zellen ellipsoidisch, länglich oder zylindrisch" mentioned in the original diagnosis (Bubák 1909). These hyphae are probably one of the three additional hyphal types illustrated in the protologue (our Fig. 2a–c), which could be members of families other than the Metacapnodiaceae. Hyphal type a (Fig. 2a; see *blue a* on Fig. 3a) could represent a species of the Antennulariaceae, but we did not observe the hyphomycetous *Capnodendron* S. Hughes or the coelomycetous *Antennariella* Bat. & Cif. synanamorphs that characterize this family. Hyphal type b (Fig. 2b; see *blue b* on Fig. 3a) could represent a member of the Triposporopsidaceae, but we did not find pigmented, subulate phialides or stauroconidia typical of that family. We did not find cells resembling hyphal type c (see Fig. 2c) on our preparations from the isotype.

The dominant elements of this specimen are the hyphae and attached phialides of the metacapnodiaceous fungus; we here designate that portion of the specimen represented by these elements as the lectotype. *Hormiscium*, typified by

Hormiscum expansum Kunze, is considered a taxonomic synonym of *Torula* (Hughes 1958). The fact that Bubák (1909) described his species in *Hormiscium* is consistent with our lectotypification, because the hyphae of the Metacapnodiaceae are reminiscent of the monilioid conidial chains that define the classical concept of *Torula*. Unfortunately, because there are no spores, the fungus represented by this name cannot be sufficiently characterized and therefore we do not propose a new combination in *Capnophialophora*. If a similar fungus can be recollected in a sporulating state in a nearby locale and on the same host, it may be appropriate to epitypify and rename the species at that time.

Additional records

We examined a second collection of *H. handelii* identified by Keisler, from trunks of *Rhododendron decorum* from Yunnan, China (No. 2936 in Krypt. exsicc. edit. Mus. Hist. Vindobon). The predominant but scanty sooty mould is metacapnodiaceous. *Capnophialophora* phialides occur, but no phialoconidia or any other of the possible synanamorphs were seen. The other hyphae present are cylindrical, scarcely constricted at the septa, with the cells 14–18 µm long and 9–11 µm wide. These hyphae belong to a species of the Euantennariaceae, but neither of the two commonly encountered synanamorphs of that family was found, i.e., *Hormisciomyces* phialides or *Antennatula* macroconidia. Collection 2936 has hyphal cells up to 35 µm wide, similar to those of the isotype of *H. handelii*, but further collections on these different hosts from such distant localities would be necessary to confirm their possible conspecificity.

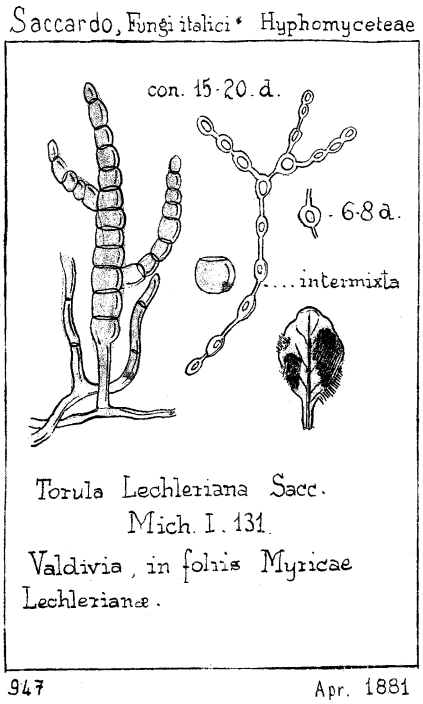

Fig. 5 *Torula lechleriana*. Original illustration by Saccardo (1881) in *Fungi italica* (his fig. 947)

2. ***Torula lechleriana*** Sacc., Michelia 1:131, 1878 [as *Torula* (*Antennaria*) *lechleriana*; non *Torula lechleriana* Thüm. 1879] Figs. 5, 6, 7

≡*Hormiscium lechlerianum* (Sacc.) Sacc., Syll. Fung. 4:265, 1886

We examined the holotype of this species, collected on living leaves of *Myrica lechleriana* (now *Amomyrtus luma*) in Valdivïa, Chile, by Lechler, in October 1851 (PAD). The

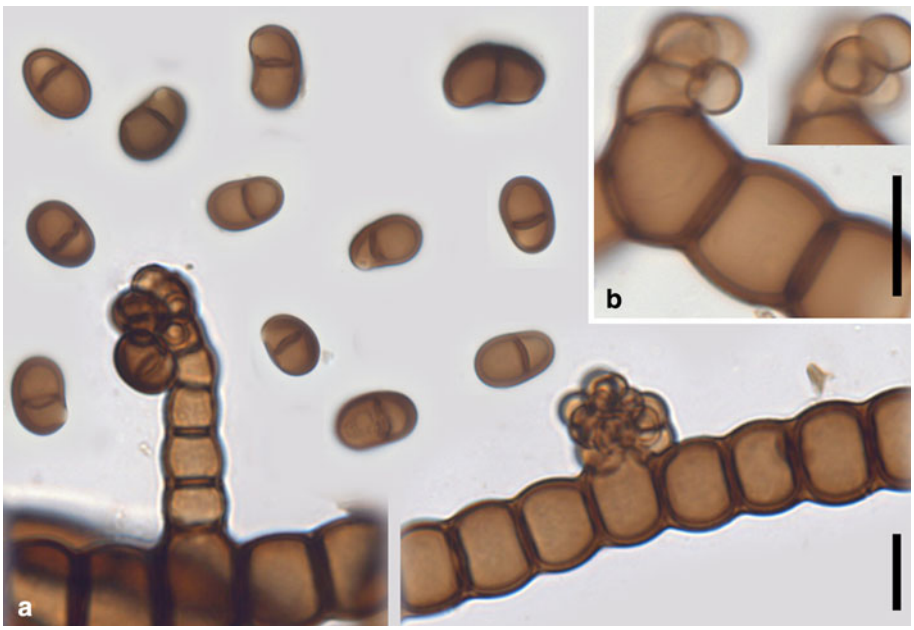

Fig. 6 *Capnocybe lechleriana* (holotype of *Torula lechleriana*, PAD). **a** 1-septate conidia and conidiogenous cells of *Capnobotrys* on metacapnodiaceous hyphae. The figure is a composite digital images of many photographs; colors and backgrounds have been digitally adjusted slightly for uniformity. **b** Higher magnification of a cluster of conidiogenous cells, in two planes of focus. **a** *Bars* 10 µm

Fig. 7 *Tripospermum* conidia (holotype of *Torula lechleriana*, PAD). **a** Single conidium. **b** Germinating stauroconidium, with *arrows* indicating germ hyphae. *Bar* 10 μm

specimen is labeled *Torula lechleriana* in Saccardo's handwriting and bears illustrations essentially identical to those published as fig. 947 in *Fungi italici* (Saccardo 1881); the latter is reproduced here as Fig. 5. For simplicity, we will refer to Saccardo's published illustration in the following discussion, although it is not part of the protologue, instead of the illustration accompanying the specimen, which is part of the protologue.

In several preparations from the holotype, we found one *Tripospermum* species and a species of *Capnobotrys* S. Hughes emerging from hyphae typical of the Metacapnodiaceae, as previously noted by Hughes (1976). A third fungus, mentioned by Saccardo (1878) in the paragraph following his formal diagnosis, was also found in some preparations (see following).

Saccardo (1878) described the first element as "caespitulis … denique secedentibus … conidiis … in catenulas, rotundato-cuboideis utrinque planis, 15–20 [μm] diam. nitide fuligineis." This element refers to the moniliform hyphae that dominate the left of Saccardo's fig. 947, and the metacapnodiaceous hyphae in our preparations. The *Capnobotrys* anamorph attached to these moniliform hyphae is described in detail at the end of this paper.

The "hyphis filiformibus repentibus remote septatis, circ. 8 [μm] cr. tortuosis, ramulosis…" refer to the repent, cylindrical, tortuous, sparingly branched, brown to dark brown, thick-walled, (6–)7–9(–10) μm-wide hyphae, which are septate at 15- to 25-μm intervals. These hyphae arise from germinated arms of a concolorous, typical *Tripospermum* conidium. A few such conidia have two pairs of divergent arms, with the basal cell of one pair bearing a stalk cell. The arms are up to 90 μm long, dark brown, up to 8-septate, up to 14 μm wide at the base, and taper to about 5 μm wide at their apex. We did not find phialides or ameroconidia of the synanamorph that often occurs with species of *Tripospermum* (Hughes 1951). The few stauroconidia found in the holotype of *Torula lechleriana* are reminiscent of *Tripospermum gardneri* (Berk.) Speg., but this identification is tentative. Saccardo apparently did not see these stauroconidia and only illustrated the cylindrical hyphae of the fungus.

The third but unrelated hyphal element in Saccardo's (1881) illustration was described below the protologue as "In caespitulorum basi adest mucilago quaedam, in qua natant catenulae ramosae e conidiis globosis, 1-nucleatis, 6–8 [μm] diam., subhyalinis, per sterigmata cylindracea brevia connexis conflatae. An alga?" The illustration and description evidently refer to lobed colonies or conidia of a species of *Seuratia* Pat. (cf. Arnaud 1910; Meeker 1975a,b; Gillis and Glawe 2008), which are frequently found in preparations from sooty mould specimens. We found a few clusters of ellipsoidal brown cells, about 8–9 × 6.5–8 μm, that probably represent conidia or hyphal fragments of *Seuratia*. However, Saccardo's query, "An alga?" indicates that he did not consider these to be part of his fungus, although he did illustrate them.

Because no teleomorphic structures have been described or observed, the name *Torula lechleriana* can only be applied to an anamorph. The conidia of the *Tripospermum* anamorph were not included in the protologue, and are thus unsuitable as lectotype. Similarly, Saccardo did not consider the *Seuratia* conidia to be part of the described organism. Therefore, we lectotypify the name here with the *Capnobotrys* anamorph arising from the metacapnodiaceous hyphae and propose the following new combination.

Capnobotrys lechleriana (Sacc.) S. Hughes & Seifert, *comb. nov.* Fig. 6

MycoBank no: MB 561016

≡*Torula lechleriana* Sacc., Michelia 1: 131, 1878 (basionym).

Hyphae typical of the Metacapnodiaceae, medium to dark brown, smooth-walled, mostly 9–17 μm wide, with walls about 0.5–1 μm thick. Conidiophores terminal or lateral on the monilioid hyphae, thick-walled, constituting 1–8 stalk cells, up to 66 μm tall, up to 10–15 μm wide at the base; terminal 1–2 cells 4.5–7 × 5–6.5 μm, surrounded

by clusters of conidiogenous cells. Conidiogenous cells globose to ellipsoidal, 3.5–8 × 3.5–7.5 µm, unilateral on one side of conidiophore, or forming a cluster up to about 14 µm wide around the terminal cells of the conidiophore; walls about 0.5 µm thick. Conidia at first ellipsoidal, becoming allantoid in side view, somewhat cornute at one or both ends, brown, 1-septate, 9–17 (11.8 ± 0.33, $n = 25$, average ± SE) × 7–10.5 (8.0 ± 0.21) µm. Mature conidia have an asymmetrically placed hilum near the base, with a thinner wall; the apical cell also has an area of wall thinning, sometimes with a minute pore, usually on the same side as the hilum; one conidium germinating through this area was observed. In general, the cell wall opposite the hilum appear thicker.

Capnobotrys lechleriana is generally similar to the *Capnobotrys* anamorph of *Metacapnodium moniliforme* (L.R. Fraser) S. Hughes, but we did not see other *Capnosporium* and *Capnophialophora* synanamorphs on the type. The conidia of *Capnobotrys leichleriana* are of a similar overall morphology, with similar dimensions when young, but smaller than the enlarged, mature conidia of *M. moniliforme*, which can be as long as 25 µm (Hughes 1980). We compared the type of *C. lechleriana* with specimens of *M. moniliforme* on *Myrceugenia fernandeziana* from Chile reported by Hughes (1980) and confirmed the presence of the synanamorphs on these specimens. On the basis of the apparent absence of *Capnosporium* and *Capnophialophora* synanamorphs, and the smaller mature conidia, we suggest that *C. lechleriana* is distinct from the *Capnobotrys* anamorph of *M. moniliforme*. Careful study of better specimens on *Amomyrtus luma* from Chile may be necessary to confirm this, along with molecular studies if possible. Judicious epitypification of *C. lechleriana* would then be appropriate.

Additional records

Höhnel (1909) noted that a collection of *Limacinula samoënsis* Höhn. from Java had the "*Antennaria* Form welche wahrscheinlich identisch ist mit *Torula lechleriana* Sacc… ohne Zweifel als Conidienpilz zu *Limacinula* gehört." The illustration (his taf. 1) undoubtedly represents hyphae of the Metacapnodiaceae, but there is no reason to believe they are the same as Saccardo's species. The figure also included pycnidia on narrow cylindrical hyphae, typical of *Antennariella*, and a third illustration of a typical *Tripospermum* conidium "auf dem Subiculum."

Höhnel (1909) later noted that *Seuratia* species were often seen in sooty mould colonies, noting that they were illustrated in Saccardo's treatment of *T. lechleriana*.

Acknowledgments We are grateful to the curators of DAOM, G, and PAD for the loan of specimens in their keeping. Drs. Scott Redhead and Toni Atkinson kindly provided presubmission reviews.

References

Arnaud G (1910) Contribution a l'étude des fumagines. 1 Partie (*Limacinia*, *Seuratia*, *Pleosphaeria*, etc.). Ann École Natl Agric Montpellier Sér 2 9:239–277

Bubák F (1909) Pilze. In von Handel-Mazzetti HF (ed) Ergebnisse einer botanischen Reise in das Pontische Randgebirge im Sandschak Trapezunt. Ann K K Naturhist Hofmus (Wien) 23:101–107

Callan BE, Carris LM (2003) Fungi on living plant substrata, including fruits. In: Mueller GM, Bills GF, Foster MS (eds) Biodiversity of fungi: inventory and monitoring methods. Elsevier, Amsterdam, pp 105–126

Gillis IM, Glawe DA (2008) Characterization of *Seuratia millardetii* on *Camellia* species and in artificial culture. N Am Fungi 7:215–229

Hughes SJ (1951) Studies on micro-fungi XII. *Triposporium*, *Tripospermum*, *Ceratosporella*, and *Tetraposporium* (gen. nov.). Mycol Pap 46:1–35

Hughes SJ (1958) Revisiones hyphomycetum aliquot cum appendice de nominibus rejiciendis. Can J Bot 36:727–836

Hughes SJ (1967) New Zealand fungi 9. *Ophiocapnocoma* with *Hormiokrypsis* and *Capnophialophora* states. N Z J Bot 5:117–133

Hughes SJ (1970) New Zealand fungi 14. *Antennaria*, *Antennularia*, *Antennatula*, *Hyphosoma*, *Hormisciella*, and *Capnobotrys* gen. nov. N Z J Bot 8:153–209

Hughes SJ (1972) New Zealand fungi 17. Pleomorphism in Euantennariaceae and Metacapnodiaceae, two new families of sooty moulds. N Z J Bot 10:225–242

Hughes SJ (1974) New Zealand fungi 22. *Euantennaria* with *Antennatula* and *Hormisciomyces* states. N Z J Bot 12:299–356

Hughes SJ (1976) Sooty moulds. Mycologia 68:293–820

Hughes SJ (1980) New Zealand fungi 31. *Capnobotrys*, an anamorph of Metacapnodiaceae. N Z J Bot 19:193–226

Hughes SJ (1987) Pleomorphy in some hyphopodiate fungi. In: Sugiyama J (ed) Pleomorphic fungi: the diversity and its taxonomic implications. Elsevier, Amsterdam, pp 103–139

McNeill J, Barrie FR, Burdet HM, Demoulin V, Hawksworth DL, Marhold K, Nicolson DH, Prado J, Silva PC, Skog JE, Wiersema JH, Turland NJ (eds) (2006) International Code of Botanical Nomenclature (Vienna Code). Reg Veget 146:1–568

Meeker JA (1975a) Revision of Seuratiaceae. I. Morphology of *Seuratia*. Can J Bot 53:2462–2482

Meeker JA (1975b) Revision of Seuratiaceae 11. Taxonomy and nomenclature of *Seuratia*. Can J Bot 53:2483–2496

Saccardo PA (1878) Fungi novi ex herbario Professoris Doct. P. Magnus Berolinensis. Michelia 1:117–132

Saccardo PA (1881) Fungi italici autographice delineati Fascs 17–28. Patavii, Italy Tabs 641–1120

von Höhnel F (1909) Fragmente zur Mykologie VIII. Mitteilung, Nr. 354 bis 406. Sitzungsber Kais Akad Wiss Wien Math-Naturwiss Kl Abt 1 118:1157–1246