

Chlorovibrissea (Helotiales, Leotiaceae), a New Genus of Austral Discomycetes

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Kohn, Linda M. (Department of Botany, University of Toronto, Erindale College, Mississauga, Ontario L5L 1C6, Canada). *Chlorovibrissea* (Helotiales, Leotiaceae), a new genus of austral discomycetes. Mem. New York Bot. Gard. 49: 112-118. 1989. The new genus *Chlorovibrissea* is segregated from *Vibrissea* for austral species with green apothecia. Four species are included in the genus: *C. bicolor*, *C. melanochlora* and *C. tasmanica* are transferred from *Vibrissea*; *C. phialophora* is described as new.

Un nouveau genre, *Chlorovibrissea*, caractérisé par la présence d'apothécies vertes, a été obtenu à partir de *Vibrissea* pour les espèces australes. Ce nouveau genre comprend four espèces: *C. bicolor*, *C. melanochlora*, et *C. tasmanica* qui ont été transférées du genre *Vibrissea*; *C. phialophora* a été décrite comme étant une nouvelle espèce.

Key Words: Austral fungi, Helotiales, Leotiaceae, *Vibrissea*, *Chlorovibrissea*, taxonomy

Introduction

The genus *Vibrissea* was erected by Fries (1822) for two species, *Vibrissea truncorum* (Alb. & Schw.) Fr., the type species, and *V. rimarum* Wormsk.: Fr., both with stipitate apothecia, yellow caps, and filiform ascospores. In a revision of *Vibrissea* and several closely allied genera based on a group of species from the Northern Hemisphere, Sánchez and Korf (1966) clarified the generic concept to include aquatic or semi-aquatic fungi on wood or twigs, with yellowish, bluish-grey, or rarely white receptacles, filiform or sigmoid ascospores, J+ or J- asci, and medullary excipula frequently staining blue in iodine. They delimited four sections: *Leucovibrissea* Sánchez, with beige or white pigmentation and an ectal excipulum of brick-shaped cells with their long axes parallel to the outer surface of the receptacle, and *Vibrissea* (Kanouse) Sánchez, *Apostemium* (Karsten) Sánchez & Korf, and *Microstemium* Sánchez, with yellow, bluish-grey, ochraceous, or

"rarely" dark olivaceous pigmentation and an ectal excipulum of cells with their long axes perpendicular to the surface of the receptacle, but differing in being stipitate (*Vibrissea*) or substipitate to sessile (*Apostemium* and *Microstemium*).

In addition to *Vibrissea tasmanica* Rodway, several species have been described more recently from Australasia by Beaton and Weste (1976, 1977, 1980, 1983) who also revised the sectional delimitation of Sánchez and Korf to accommodate these and other austral species (Beaton & Weste, 1980). Among these, *V. melanochlora* Beaton & Weste and *V. bicolor* Beaton & Weste, as well as *V. tasmanica*, produce ascomata that are deep green when fresh, at least in the stipe. In *V. melanochlora* and *V. bicolor* this green pigment is soluble in water or 2% KOH; though insoluble in the type specimen of *V. tasmanica*, I found the pigment to be soluble in two Australian collections accessioned as *V. tasmanica* and confirmed as such in these studies.

Of the seven species of *Vibrissea* previously

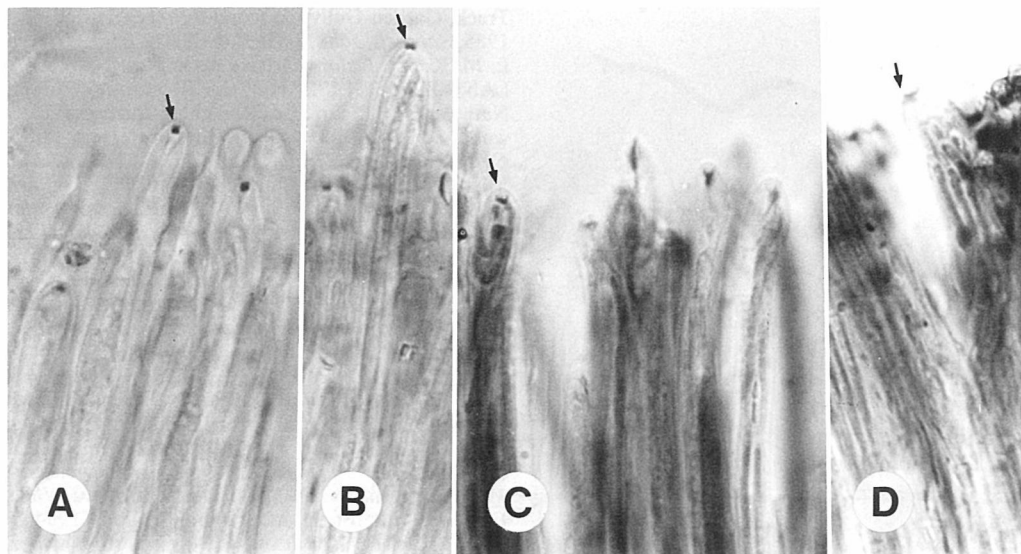


FIG. 1 *Chlorovibrissea*, ascus apices. A. *C. bicolor*, holotype. B. *C. melanochlora*, holotype. C. *C. bicolor*, holotype. D. *C. melanochlora*, holotype. A, B in Melzer's reagent; C, D in methyl blue. $\times 1000$.

reported from Australasia, only two species, *V. albofusca* Beaton and an unnamed white species, have been reported from New Zealand (Beaton & Weste, 1983). An examination of specimens accessioned as *Vibrissea* at PDD (DSIR, Plant Diseases Division, Auckland) as well as my own field studies, suggest that green *Vibrisseas* are not uncommon on wood, twigs, and leaves in New Zealand. Cultural studies on two collections, *LMK 85-67* and *LMK 85-123*, revealed that the colonies were also green. This group of green species are distinctive not only by virtue of their pigmentation and limited geographical distribution in Australia, Tasmania, and New Zealand, but also by the staining characteristics of their ascus apices. In Melzer's reagent or IKI, an intensely bluing, incomplete, apical ring is evident, appearing in longitudinal, optical section as two deeply bluing oval bodies discontinuous with the outer surface of the ascus (Fig. 1A, B). In methyl blue or phloxine, a deeply staining "crown" in the epiplasm is evident just below the area that would be J+ (Fig. 1C, D). In the northern hemisphere specimens of *Vibrissea*, the J+ apical ring is much less broad in optical section, and a small "cap" may stain in methyl blue or phloxine. In holotype material of each of the three species with green apothecia, the ectal excipulum was composed of *textura oblita* in an

orientation parallel to the receptacle surface. The medullary excipulum of these species does not turn blue in Melzer's reagent; a blue reaction is a common feature in the northern hemisphere species of *Vibrissea*. As in *Vibrissea*, these species produce filiform ascospores which may be septate; in one species, *V. bicolor*, the ascospores are folded in the upper third of the spore when in the ascus (Fig. 1), and straight or slightly curved after discharge. The green, austral species, with the addition of one new species, are placed in a new genus.

Materials and methods in this study are as described by Schumacher and Kohn (1985).

Taxonomy

Chlorovibrissea Kohn, gen. nov.

Ascomata stipitata, capitata, olivacea vel melanochlora, pigmento in solutione '2-10% KOH' disperso; texturae excipuli iodo non caerulescentes. Asci inoperculati, elongati, octospori, in summe parte apicali annulo indistincto iodo profunde caerulescenti et apicali corona 'methyl blue' et 'phloxine' valde tincta praediti. Ascospores filiformes, hyalinae. Species typica: *Vibrissea bicolor* Beaton & Weste.

Ascomata stipitate-capitate, olivaceous to

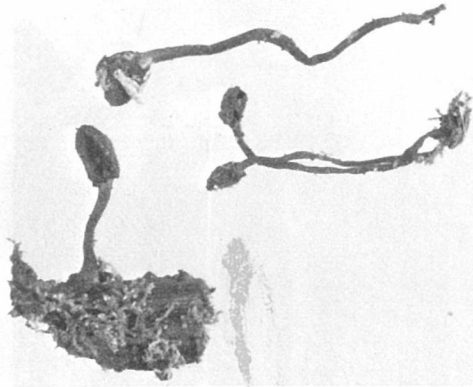


FIG. 2. *Chlorovibrissea phialophora*, ascomata. $\times 1$, approx.

blackish green, with pigment leaching in a 2–10% KOH solution; excipular tissues not bluing in Melzer's reagent or IKI. Asci inoperculate, elongate, 8-spored, with an indistinct apical ring staining deeply blue in Melzer's reagent or IKI, and an apical crown staining intensely in methyl blue or phloxine. Ascospores filiform, hyaline.

TYPE. *Chlorovibrissea bicolor* (Beaton & Weste) Kohn, comb. nov. (basonym: *Vibrissea bicolor* Beaton & Weste, Trans. Brit. Mycol. Soc. 69: 323. 1977).

OTHER INCLUDED SPECIES. *Chlorovibrissea tasmanica* (Rodway) Kohn, comb. nov. [basonym: *Vibrissea tasmanica* Rodway (ut '*Vibrissia*'), Proc. R. Soc. Tasmania 1924: 119. 1925]; *Chlorovibrissea melanochlora* (Beaton & Weste) Kohn, comb. nov. [basonym: *Vibrissea melanochlora* Beaton & Weste (ut '*melanchlora*'), Trans. Brit. Mycol. Soc. 67: 129. 1976].

HOLOTYPE SPECIMENS EXAMINED. *Vibrissea bicolor*: AUSTRALIA. VICTORIA: Melba Gully nr. Laver's Hill, on underside of unidentified log with ascomata partially immersed in stream, 22 Jul 1976, G. Beaton 389 (MELU). *Vibrissea tasmanica*: AUSTRALIA. TASMANIA: NW of Tyenna R., Marriotts Falls, [substrate unknown], Jun 1924, Rodway (HO 325370). *Vibrissea melanochlora*: AUSTRALIA. VICTORIA: Dandenogs, Hardy's Gully, [substrate and collector unknown], 21 Jul 1951 (MELU 5930F).

OTHER SPECIMENS EXAMINED. *Chlorovibrissea cf. melanochlora*: NEW ZEALAND. NORTH ISLAND. BAY OF PLENTY: Urewera National Park, ca. 15 km SE of Ruatahuna, on decorticated wood, 3 Nov 1982, Samuels, Buchanan & Johnston (PDD 47222). SOUTH ISLAND. BULLER: S end of Paparoa Range, Croesus

Track, Garden Gully, on wood (?*Nothofagus*), 2 May 1985, Samuels, Johnston & Kohn (LMK 85-123) (herb. L. M. Kohn). *Chlorovibrissea tasmanica*: NEW ZEALAND. NORTH ISLAND. BAY OF PLENTY: Urewera Natl. Park, ca. 15 km SE of Ruatahuna, on decorticated wood, 24 May 1982, Samuels (immature, PDD 47223) *Chlorovibrissea cf. bicolor*: NEW ZEALAND. SOUTH ISLAND. FIORDLAND: Fiordland Natl. Park, W. arm of Lake Manapouri, Wilmot Pass, on twigs of *Nothofagus menziesii*, 26 Apr 1985, Samuels & Kohn (LMK 85-67) (herb. L. M. Kohn). WESTLAND: Mt. Aspiring Natl. Park, Haast Pass, Robinson's Creek, on wood, 12 Apr 1983, Samuels, Beever, Johnston & Petersen (PDD 50207). *Chlorovibrissea tasmanica*: AUSTRALIA. Apollo Bay, [substrate unknown], May 1935, M. Fawcett (MELU 5929F, 5931F). *Chlorovibrissea sp.*: NEW ZEALAND. NORTH ISLAND. TARANAKI: Mt. Egmont Natl. Park, track from Stratford to Dawson Falls, on decorticated wood, 24 Apr 1983, Samuels, Johnston & Petersen (PDD 50204, possibly a new species). *Vibrissea truncorum*: U.S.A. PENNSYLVANIA: Valley Forge, on rotten twig under water, 23 May 1964, R. F. & W. C. Denison (CUP 48094 ex herb. Sánchez). VERMONT: Stratton Township, Black Brook, on wet wood, 20 Jul 1961, R. P. Korf (herb. R. P. Korf 3113). ENGLAND. Hebden Bridge, Needham, on decaying wood, 14 May 1898, [collector unknown] (CUP-Durand 4-320).

SPECIMEN EXCLUDED FROM CHLOROVIBRISSEA AND VIBRISSEA. NEW ZEALAND. SOUTH ISLAND. NORTH CANTERBURY: Arthur's Pass Natl. Park, on wood of *Nothofagus solandri*, 18 May 1983, Samuels, Matsushima & Rossman (PDD 47225).

NOTES. In attempting to identify nine specimens from New Zealand, no specimen matched, in all permutations of characters, any of the existing species in *Chlorovibrissea*, yet there were only two specimens which were convincingly different enough to be described as a new species. Characters considered to be important in delimiting *C. tasmanica*, *C. melanochlora*, and *C. bicolor*, such as the width of paraphyses tips, length of tomentum hyphae, and ascospore length may be variable; the current delimitation of species is based on study of one or two specimens which may fail to account for a range of variation in characters. Ten ascospores averaging 54.8 μm long were observed outside of the asci in the type specimen of *V. melanochlora*, although 100–115 μm is the range given in the literature (Beaton & Weste, 1976; Rodway, 1925). Specimens of *C. tasmanica* other than the type produced soluble green pigment. It is possible that *C. melanochlora* is a synonym of *C. tasmanica*. Further study of more material and studies of cultures are needed to revise these species concepts. Of note in specimens examined of *C. tasmanica* and *C. bicolor* are the stroma-like stipe bases composed

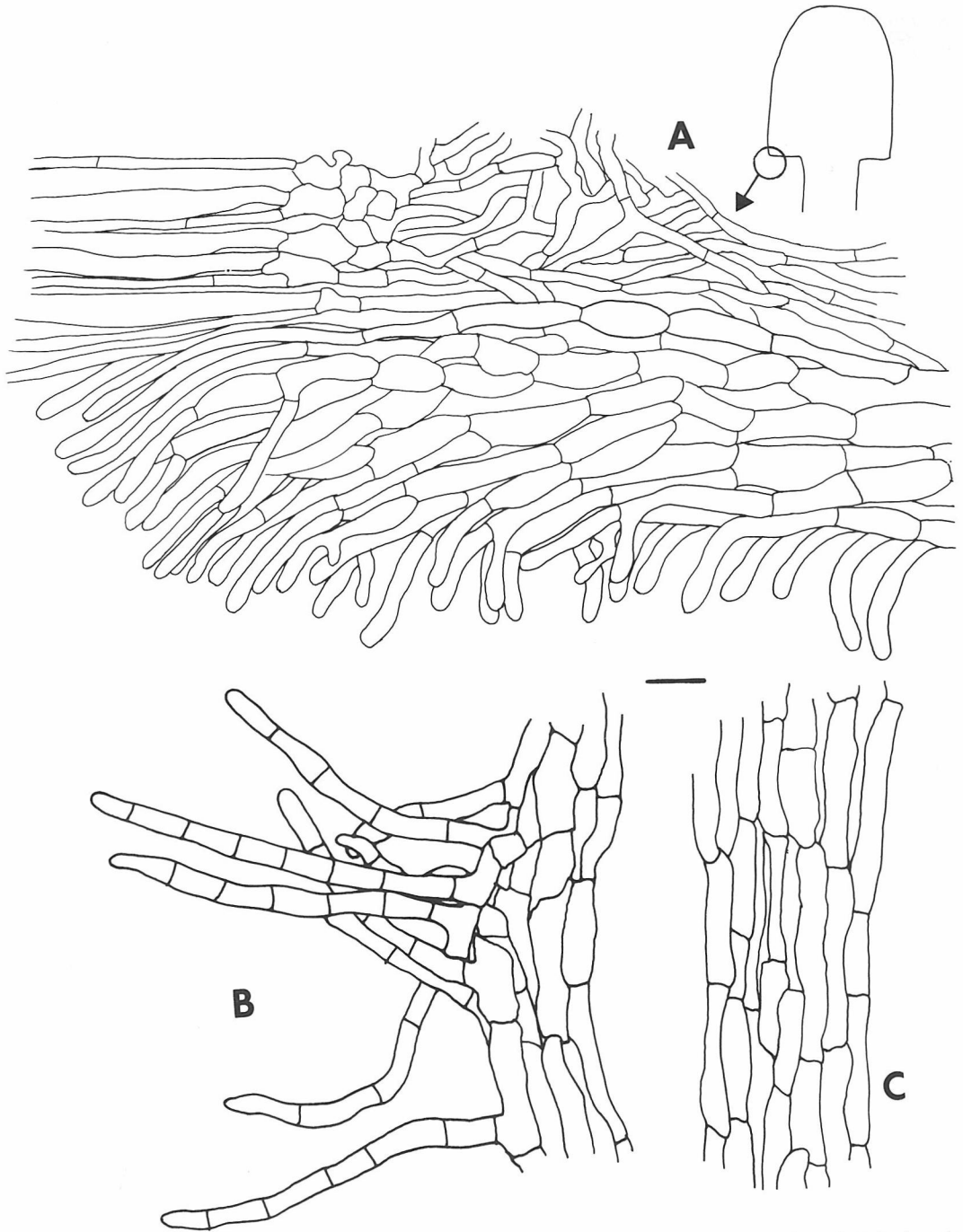


FIG. 3. *Chlorovibrissea phialophora*. A. Margin with portion of hymenium (on left) and ectal excipulum (on right). B. Hairs from surface of stipe. C. Medullary tissue of stipe. All drawn from the holotype. Scale bar = 10 μ m.

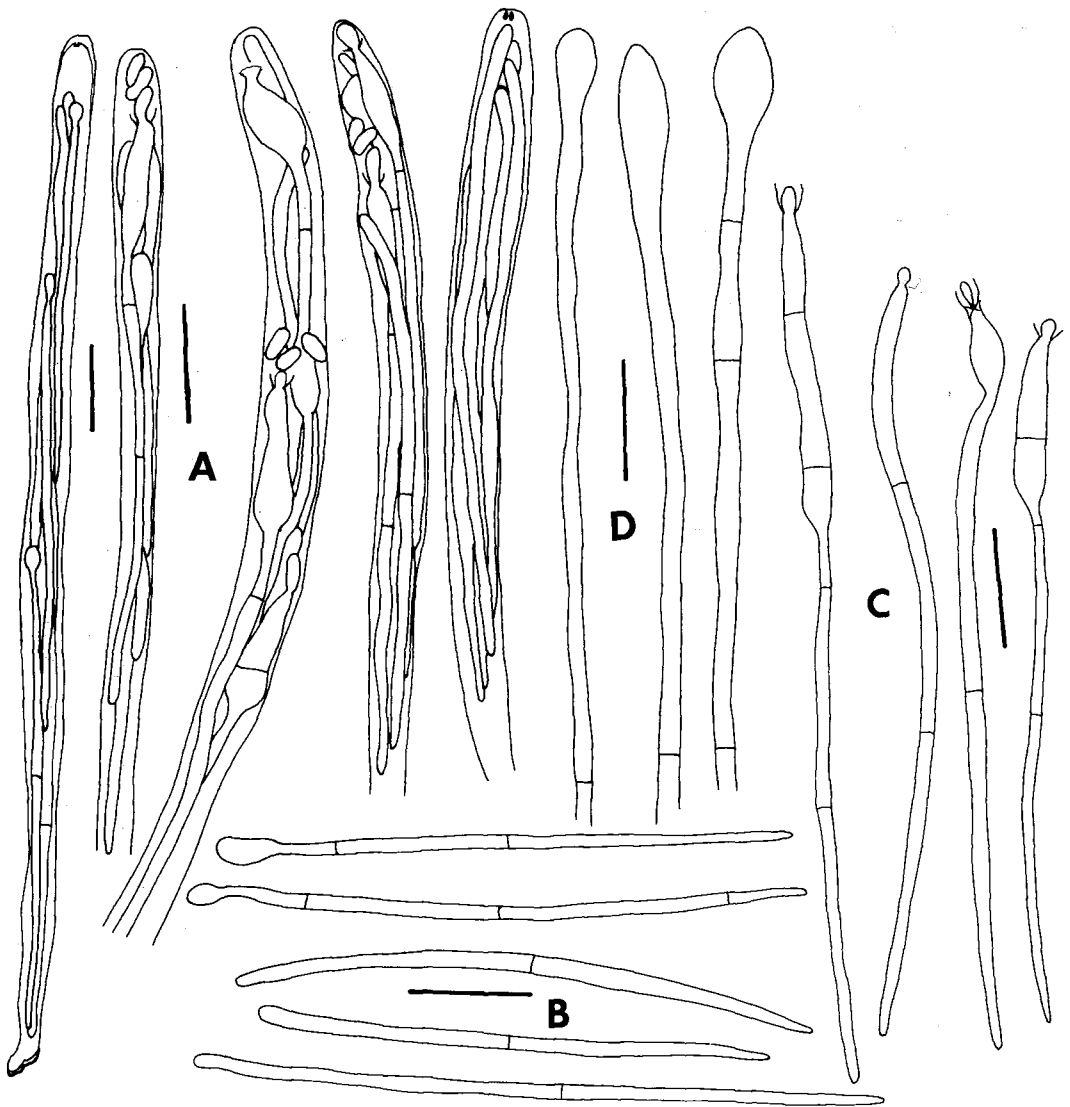


FIG. 4. *Chlorovibrissea phialophora*. A. Asci. B. Ascospores that do not have a phialide. C. Ascospores that have a phialide. D. Paraphyses. All drawn from the holotype. Scale bars = 10 μ m.

of very compact *textura oblita* with a rind-like surface of dark-walled hyphae; such apparently melanized stipe bases are not uncommon in the Helotiales and are not, in themselves, indicative of affinities in the Sclerotiniaceae. Two specimens examined from New Zealand were remarkable in producing ascoconidia from phialides on the apices of ascospores and they are described here as a new species.

***Chlorovibrissea phialophora* Samuels & Kohn,**
sp. nov. Figs. 2-4.

Ascomata stipitato-capitata, melanochlora, 10-30 mm alta. Capitis 2-7 mm altis \times 2-5 latis. Stipitibus 10-25 mm longis \times ca. 1 mm diam. Asci anguste clavati vel cylindrici, (100-)105-116(-123) \times 5-6 μ m; apice cum annulo iodo coeulescenti. Ascospores filiformes, (35.0-)42.0-51.6(-60.0) \times 1.0-1.5 μ m, 0-1-septatae; apice

cum phialide instructo; phialide (9-)10-17(-120) μm longa, *Phialophora*-simili. Ascoconidia oblonga, 1.7-4.0(-5.0) \times 1.0-1.5 μm , hyalina.

Ascomatal Morphology. Apothecia 10-30 mm high, gregarious, stipitate-capitate, produced from a green, pulvinate, mycelial pad 1.5-2.0 mm diam. on the surface of nonblackened wood; stipe 10-25 mm long \times \leq 1 mm diam., green, villose or glabrous, longitudinally or spirally furrowed, circular in section; cap subglobose to cylindrical, 2-7 mm high \times 2-5 mm wide, dark green to nearly black, smooth, viscid or appearing gelatinous at maturity, separated from stipe by a distinct groove; groove not apparent at maturity; ascomata leaching an olivaceous pigment in 10% KOH. *Ascomatal Anatomy.* Asci 8-spored, (100-)105-116(-123) \times 5-6 μm , produced from croziers, narrowly clavate to cylindrical, tapering toward the base and there forming a small foot; apical ring intensely J+ in Melzer's reagent, with a "crown" of intense staining in methyl blue or phloxine just below apical ring; ascospores filling each ascus. Ascospores (35.0-)-42.0-51.6(-60.0) \times 1.0-1.5 μm multiseriate, hyaline; filiform, tapering slightly from rounded apex to pointed base, 0-1-septate; apical cell enlarging while still in ascus and forming a subglobose to cylindrical phialide, collarette cupulate, ca. 1.5 μm deep; length of phialide from apex to first septum of ascospore (9-)10-17(-20) μm ; spore eventually elongating to 85 μm , all cells of spore enlarging, phialide arising only from apical cell. Ascoconidia arising from phialides, 1.7-4.0(-5.0) \times 1.0-1.5 μm , oblong, lacking a basal abscission scar, eguttulate, hyaline. Paraphyses extending beyond asci by ca. 10 μm , hyaline, unbranched, not anastomosing, filiform, 2-3 μm broad, septate, apical cell ca. 40 μm long, subsequent cells ca. 20 μm long, tip clavate to subglobose, 4-5 μm . Subhymenium poorly developed, consisting of tightly interwoven, narrow, nonpigmented hyphae. Medullary excipulum composed of textura intricata, hyphae 3-4 μm broad with walls \leq 0.5 μm thick, becoming gelatinized at maturity, continuous with medulla of stipe; zone adjacent to subhymenium turning green in Melzer's reagent. Ectal excipulum poorly developed, forming a thin, ca. 80 μm wide layer on underside of cap, composed of prosenchyma with the long axis of cells parallel to the excipular surface, cells 25-35 μm long \times ca. 8 μm broad, walls 1.0-1.5 μm thick,

cells producing hyphal hairs up to 30 μm long \times surface cells producing hyphal hairs up to 30 μm long \times 4-5 μm broad, septate, pale green; ectal excipulum continuing down stipe for a distance of ca. 200 μm . Stipe lacking a well-developed cortex, hyphae continuous with medullary excipulum, with refractive, gelatinized walls; stipe hollow at maturity; cells at surface of stipe 6-8 μm , somewhat broader than those within, producing hyphal hairs, hairs 25-35 μm long \times ca. 8 μm broad, septate, infrequently branched, pale green, forming a fine tomentum over surface of stipe, absent at maturity. Mycelial pad from which stipe arises composed of interwoven, septate, branched, green hyphae 3-4 μm broad and to 100 μm long, with many free ends giving pad a wooly aspect.

HOLOTYPE. New Zealand. North Island. Auckland: Waitakere Ranges, Waitemata City, across rd. from Nihotupu Dam, on decaying *Leptospermum* sp., 1 Sep 1982, Johnston (PDD 46963; isotype, CUP).

ADDITIONAL SPECIMEN EXAMINED. NEW ZEALAND. NORTH ISLAND. AUCKLAND: Waitakere Ranges, vic. Swanson, Auckland University Tramping Club Hut, on decaying wood of *Leptospermum* sp., 24 Aug 1982, Samuels et al. (PDD 46964).

NOTES. *Chlorovibrissea phialophora* differs from the other three species, *C. tasmanica*, *C. melanochlora*, and *C. bicolor*, in producing ascoconidia and in turning green in a narrow zone of the medullary excipulum adjacent to the subhymenium. *Chlorovibrissea tasmanica* has narrower paraphysis apices, narrower ectal excipular cells, and a more luxuriant tomentum on the stipe composed of longer hyphal hair than in *C. phialophora*. *Chlorovibrissea melanochlora* produces longer ascospores, asci, and stipe hairs, and narrower ectal excipular cells. *Chlorovibrissea bicolor* produces longer ascospores which are apically coiled in the ascus, narrower paraphysis apices, narrower ectal excipular cells, and longer hyphal hairs.

The formation of ascoconidia is not uncommon in the Helotiales. Species of *Geoglossum* Pers.: Fr., *Cudonia* Fr., *Spathularia* Pers. (Berthet, 1964), *Ascocoryne* Groves & Wilson (Roll-Hansen & Roll-Hansen, 1979), *Tympanis* Tode: Fr. (Groves, 1952), and *Rutstroemia* Karsten (White, 1941) among others, are known to produce conidia from ascospores still in the ascus. Conidiogenesis in *C. phialophora* is unusual be-

cause the tip of the ascospore is converted into a more or less complex phialide. In the other genera, conidia are produced laterally or terminally on barely differentiated conidiogenous loci. Discharged ascospores of *Encoelia pruinosa* (Ell. & Everh.) Torkelson & Eckblad sometimes produce phialidic openings through which microconidia develop (Juzwik & Hinds, 1984), and phialides arise directly from the surface of discharged ascospores of some species of *Rutstroemia* (White, 1941).

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