

**NEW SOUTH AMERICAN TAXA OF CANTHARELLUS,
C. NOTHOFAGORUM, C. XANTHOSCYPHUS AND C. LATERITIUS VAR.
COLOMBIANUS**

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Summary *New South American taxa of Cantharellus, C. nothofagorum, C. xanthoscyphus and C. lateritius var. colombianus.* Two new species and one new variety of *Cantharellus* are reported from South America. *Cantharellus nothofagorum* was collected under *Nothofagus dombeyi* in the province of Neuquén, Argentina and is the first representative of the Cantharellaceae reported from the south temperate forests of South America. *Cantharellus xanthoscyphus* was collected in southeastern Brazil while *C. lateritius var. colombianus* was encountered under *Quercus humboldtii* in the montane forests of southern Colombia. All three taxa are characterized by having a smooth to nearly smooth hymenium.

INTRODUCTION

Recent field work in South America uncovered several new taxa in the Cantharellaceae. Two of these, *C. xanthoscyphus* and *C. lateritius var. colombianus*, were collected in tropical South America. A third taxon, *C. nothofagorum*, represents the first report of a member of this family from temperate South America. Only two other *Cantharellus* putatively associated with *Nothofagus*, both from New Zealand, have been previously reported. All three of these new taxa are characterized by having a smooth hymenophore and they are the first Cantharellaceae with this characteristic reported from South America. These data emphasize the necessity of continued collecting throughout South America for determining species composition and biogeographical patterns in higher fungi.

Colors are indicated by author-generated names followed by reference to colors in Kornerup and Wanscher (1978) listed in parentheses by page-column-row (e.g., 6-A-4). In addition to basidiospore range data, basidiospore length/width ratios (E), mean basidiospore length/width ratio (E^m), mean basidiospore length (L^m) and mean basidiospore width (W^m) are given to more fully describe basidiospore shape and variability.

Cantharellus nothofagorum G. M. Mueller & Petersen, *sp. nov.*
(Figs. 1, 2A & B)

Basidiomatis 17-22 mm latis, usque ad 22 mm altis, macromorphologice Gompho similis; pileo sicco, subtiliter fibrilloso, aurantio siccando aurantio-brunneo; hymenio laevi; stipete 10 mm diam., ad apicem attenuato ad basin albo. Hyphis multifidulatis. Basidii 58-108 x 7-13 μ m. Basidiosporis 6-8.5 x 4-6 μ m, subglobois vel ellipsoideis, laevibus, hyalinis, inamyloideis, acyanophilis.

Holotypus: ARGENTINA. *Prov. Neuquén*: Rt. 65 between Confluencia and Rt. 234 (approx. 10 km east of Rt. 234) at Paso El Portezuelo, 28-III-1988, coll. G. M. Mueller, B. A. Strack and R.E. Halling, along steep road bank in bare soil; mature moist *Nothofagus dombeyi* forest, 900-950 m, G.M. Mueller 3685 (F).

Basidiomata 17-22 mm broad, up to 22 mm high, gomphoid with smooth hymenium. Pileus plane with central depression (subinfundibuliform), dry, finely fibrillose, when fresh carrot orange (near 7-A-5 to 7-A-7) fading orange brown (near 6-A-4). Hymenial surface with very shallow wrinkles or folds, white to slightly off-white. Stipe up to 10 mm at apex, tapering to base, dry, white. Context very thin at disc, continuous with stipe context, solid, concolorous with pileus near apex, white below. Odor none (but older specimens). Taste slightly acid. Spore print color not obtained.

Contextual hyphae mostly 4-10 μ m diam, filamentous, tightly interwoven, clamped at nearly

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every septum. Basidia 58-108 x 7-13 μm , narrowly clavate, clamped, hyaline, often multiguttulate; sterigmata (2-)4(-5), slender, up to 15 μm long.

Basidiospores 6.2-8.6 x (4-)4.5-5.8(-6) μm [$E = (1.17-)$ 1.27-1.62; $E^m = 1.39$; $L^m = 7.2 \mu\text{m}$; $W^m = 5.2 \mu\text{m}$], subglobose to ellipsoid, smooth, hyaline, uniguttulate to multiguttulate, nonamyloid, acyanophilous; hilar appendage truncate, prominent.

Collections examined: Only known from the type collection.

Commentary: *Cantharellus nothofagorum* can be separated from other smooth-hymenophored *Cantharellus* taxa by its relatively small basidiospores, geographic distribution, and association with *Nothofagus*. Members of the Cantharellaceae have not been reported previously from south temperate South America. Singer (1967) described *Gomphus nothofagorum* Singer from the Cordillera Pelada (Region X, Chile) growing in association with *Nothofagus dombeyi* and *N. alpina*. Although the basidiomata appear superficially similar, *G. nothofagorum* differs by having ornamented, cyanophilic basidiospores.

Only two species of *Cantharellus* have been reported from under *Nothofagus* in New Zealand (Segedin, 1987). One of these species, *C. elsae* (Ste-

venson) Horak (Horak, 1971), originally described as a *Hygrophorus* (Stevenson, 1963), is evidently a *Craterellus* based on McNabb's (1971) report of absence of clamp connections. This species was found under *Nothofagus* in Nelson on the South Island. The other species, *C. wellingtonensis* McNabb (McNabb, 1971), was found under at least two species of *Nothofagus* as well as *Leptospermum*. Basidiomata are uniformly pallid yellow, and appear much more agaricoid than those of *C. nothofagorum*. Of the four taxa of *Cantharellus* with pileus and stipe flesh solid reported from South Australia by Cleland (1934), none conform to the description of *C. nothofagorum*, nor was *Nothofagus* mentioned as a potential mycorrhizal associate for any of them.

Cantharellus xanthoscyphus Petersen, *sp. nov.*
(Fig. 2C & D)

Basidiomatis 20-30 x 15-18 mm; *pileo* late infundibuliformi, laevi, flavo; *marginibus* fimbriato vel lacerato; *hymenio* laevi, flavo; *stipite* tereti, fistuloso, laevi, flavo. *Hyphis* fibulatis, tenui-tunicatis. *Basidiis* 60-80 x 9-11 μm , clavatis, 4-sterigmatibus. *Basidiosporis* 7.6-8.6 x 6.2-7.6 μm , laevibus, tenui-tunicatis, hyalinis.

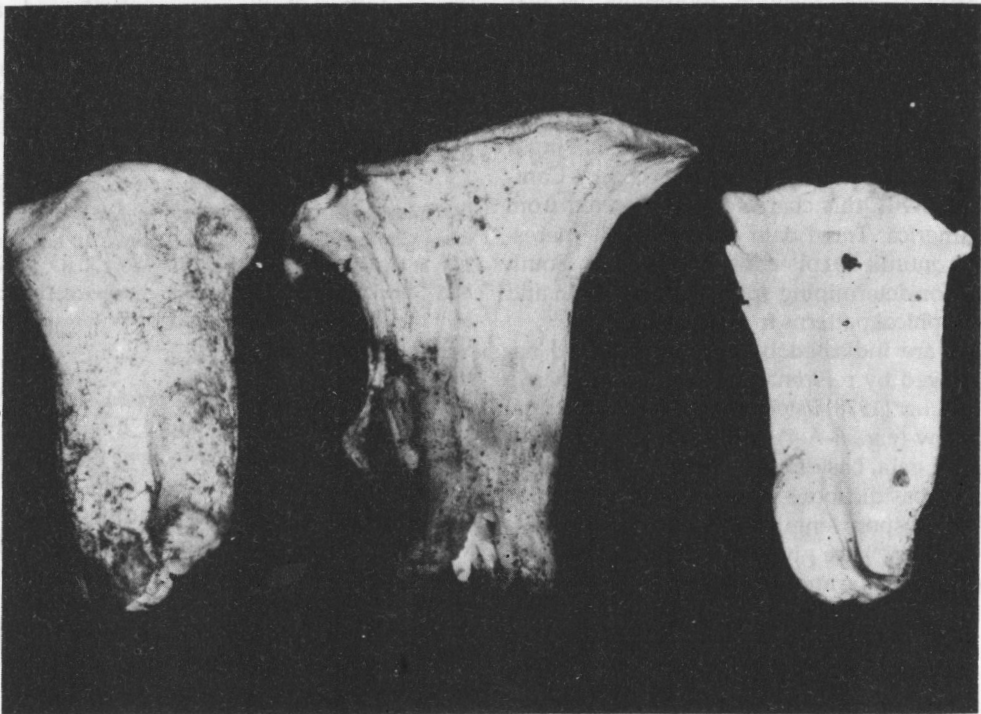


Fig. 1.-- Basidiomata of *Cantharellus nothofagorum* (G.M.M. 3685, Holotype). Ca. 3X.

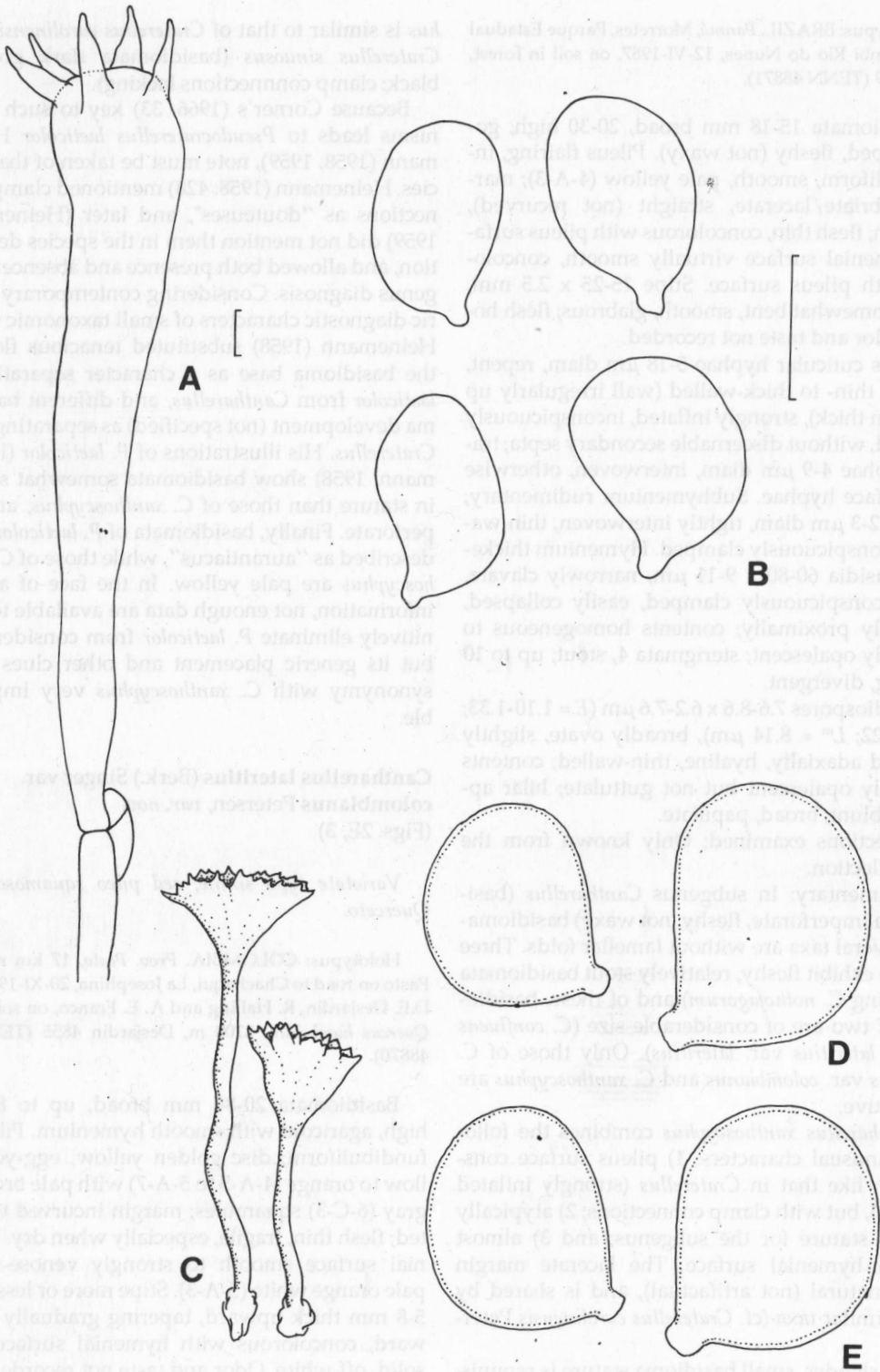


Fig. 2.-- Representative macro- and micromorphological structures from the holotypes of *Cantharellus nothofagorum*, *C. xanthoscyphus* and *C. lateritius* var. *colombianus*. A. basidium of *C. nothofagorum*. B. basidiospores of *C. nothofagorum*. C. basidiomata of *C. xanthoscyphus*. D. basidiospores of *C. lateritius* var. *colombianus*. E. basidiospores of *C. xanthoscyphus*. Scale lines = 5 μ m for basidiospores and 5 mm for basidioma.

Holotypus: BRAZIL. Paraná, Morretes, Parque Estadual do Marumbi Rio do Nunes, 12-VI-1987, on soil in forest, Meijer 969 (TENN 48871).

Basidiomata 15-18 mm broad, 20-30 high, goblet-shaped, fleshy (not waxy). Pileus flaring, infundibuliform, smooth, pale yellow (4-A-3); margin fimbriate/lacerate, straight (not recurved), very thin; flesh thin, concolorous with pileus surface. Hymenial surface virtually smooth, concolorous with pileus surface. Stipe 15-25 x 2.5 mm, terete, somewhat bent, smooth, glabrous; flesh hollow. Odor and taste not recorded.

Pileus cuticular hyphae 5-18 μm diam, repent, hyaline, thin- to thick-walled (wall irregularly up to 0.5 μm thick), strongly inflated, inconspicuously clamped, without discernable secondary septa; tramal hyphae 4-9 μm diam, interwoven, otherwise like surface hyphae. Subhymenium rudimentary; hyphae 2-3 μm diam, tightly interwoven, thin-walled, inconspicuously clamped. Hymenium thickening; basidia 60-80 x 9-11 μm , narrowly clavate, very inconspicuously clamped, easily collapsed, especially proximally; contents homogeneous to obscurely opalescent; sterigmata 4, stout, up to 10 μm long, divergent.

Basidiospores 7.6-8.6 x 6.2-7.6 μm ($E = 1.10-1.33$; $E^m = 1.22$; $L^m = 8.14 \mu\text{m}$), broadly ovate, slightly flattened adaxially, hyaline, thin-walled; contents obscurely opalescent but not guttulate; hilar appendix blunt, broad, papillate.

Collections examined: Only known from the type collection.

Commentary: In subgenus *Cantharellus* (basidiomata imperforate, fleshy, not waxy) basidiomata of several taxa are without lamellar folds. Three of these exhibit fleshy, relatively stout basidiomata (including *C. nothofagorum*) and of these, basidiomata of two are of considerable size (*C. confluens* and *C. lateritius* var. *lateritius*). Only those of *C. lateritius* var. *colombianus* and *C. xanthoscyphus* are diminutive.

Cantharellus xanthoscyphus combines the following unusual characters: 1) pileus surface construction like that in *Craterellus* (strongly inflated hyphae), but with clamp connections; 2) atypically slender stature for the subgenus; and 3) almost smooth hymenial surface. The lacerate margin seems natural (not artificial), and is shared by other similar taxa (cf. *Craterellus carolinensis* Petersen).

The slender, small basidioma stature is reminiscent of *C. minor* Peck, but that species differs in having well-defined lamellar folds, smaller basidiospores and basidia, and a well-differentiated pileus. Instead, the stature (only) of *C. xanthoscyphus*

is similar to that of *Craterellus carolinensis* and *Craterellus sinuosus* (basidiomata dark grey to black; clamp connections lacking).

Because Corner's (1966: 33) key to such organisms leads to *Pseudocraterellus laeticolor* Heinemann (1958, 1959), note must be taken of that species. Heinemann (1958: 428) mentioned clamp connections as "douteuses", and later (Heinemann, 1959) did not mention them in the species description, and allowed both presence and absence in the genus diagnosis. Considering contemporary generic diagnostic characters of small taxonomic value, Heinemann (1958) substituted tenacious flesh of the basidioma base as a character separating *P. laeticolor* from *Cantharellus*, and different basidioma development (not specified) as separating from *Craterellus*. His illustrations of *P. laeticolor* (Heinemann, 1958) show basidiomata somewhat stouter in stature than those of *C. xanthoscyphus*, and not perforate. Finally, basidiomata of *P. laeticolor* were described as "aurantiacus", while those of *C. xanthoscyphus* are pale yellow. In the face of all this information, not enough data are available to definitively eliminate *P. laeticolor* from consideration, but its generic placement and other clues make synonymy with *C. xanthoscyphus* very improbable.

***Cantharellus lateritius* (Berk.) Singer var. *colombianus* Petersen, var. nov.**
(Figs. 2E, 3)

Varietate typo simile, sed pileo squamoso et in Querceto.

Holotypus: COLOMBIA. Prov. Pasto, 17 km north of Pasto on road to Chachaqui, La Josephina, 20-XI-1988, coll. D.E. Desjardin, R. Halling and A. E. Franco, on soil under *Quercus humboldtii*, 2700 m, Desjardin 4855 (TENN no. 48870).

Basidiomata 20-80 mm broad, up to 80 mm high, agaricoid with smooth hymenium. Pileus infundibuliform; disc golden yellow, egg-yolk yellow to orange (4-A-5 to 5-A-7) with pale brownish gray (6-C-3) squamules; margin incurved to everted; flesh thin, fragile, especially when dry. Hymenial surface smooth to strongly venose-ridged, pale orange white (5-A-3). Stipe more or less terete, 5-8 mm thick upward, tapering gradually downward, concolorous with hymenial surface; flesh solid, off-white. Odor and taste not recorded.

Hyphae of pileus surface 3-5 μm diam, thin-walled, repent, parallel, smooth, with conspicuous clamp connections; hyphae of squamules identical. Tramal hyphae 4-14 μm diam, hyaline, tightly in-



Fig. 3.-- Basidiomata of *Cantharellus lateritius* var. *colombianus* (Desjardin 4855, Holotype). Ca. 0.8 X.

terwoven, with conspicuous clamp connections; contents homogeneously hyaline or occasionally with irregularly yellowish guttules. Subhymenial hyphae 3-6 μm diam, tightly interwoven, conspicuously clamped. Hymenium thickening; basidia cymose, 68-90 x 8.5-11 μm , subcylindrical to narrowly clavate, broad-based, conspicuously clamped, hyaline; contents uni- to multiguttulate, the guttules well-defined, yellowish; sterigmata (3-)4(-5), up to 8 μm long, stout, cornute.

Basidiospores 7.2-9.3 x 5.9-6.6 μm ($E = 1.24-1.50$; $E^m = 1.35$; $L^m = 8.38 \mu\text{m}$), bluntly ovate to ellipsoid, smooth, thin-walled, hyaline, acyanophilous; contents uniguttulate, the guttulae virtually filling the spore lumen, appearing heterogeneous in content; hilar appendix blunt, broad, conspicuous.

Collections examined: Only known from the type collection.

Commentary: In the forests of the southern Appalachian Mountains (North America), two taxa of *Cantharellus* with smooth hymenium, *C. confluens* (B. & C.) Petersen and *C. lateritius* (Berk.) Singer var. *lateritius* (see Petersen, 1979), are common. Of these, *C. lateritius* var. *lateritius* is rather similar to *C. lateritius* var. *colombianus* in the following respects: 1) basidiomata are gregarious but not branched (those of *C. confluens* usually produce more than one pileus per stipe); and 2) basidioma color tends toward pinkish orange or salmon-orange (those of *C. confluens* are more egg-yolk yellow). Conversely, var. *lateritius* differs from var. *colom-*

bianus in the following ways: 1) pileus surface in never squamulose, but smooth to (at most) minutely radially fibrillose; 2) basidiomata are uniformly larger than those of the type specimen of var. *colombianus*; and 3) var. *lateritius* seems indiscriminate in habitat, being found under second-growth hardwood trees, including *Quercus*, but surely not limited to that genus.

Basidiomata of var. *colombianus* are edible, and we understand that most of the type collection was consumed by its collectors.

ACKNOWLEDGEMENTS

Thanks are extended to Drs. Dennis Desjardin and Roy Halling for providing the specimen and photo of *C. lateritius* var. *colombianus*, and to Mr. Andre de Meijer of Curitiba, Brazil, for furnishing the specimen of *C. xanthoscyphus*. *Cantharellus nothofagorum* was collected during field work by the second author which was supported by NSF grant number BSR 86-07106. This field work was greatly facilitated by Dr. Jorge Wright and his students, especially Dr. Mario Rajchenberg, and their help is gratefully acknowledged.

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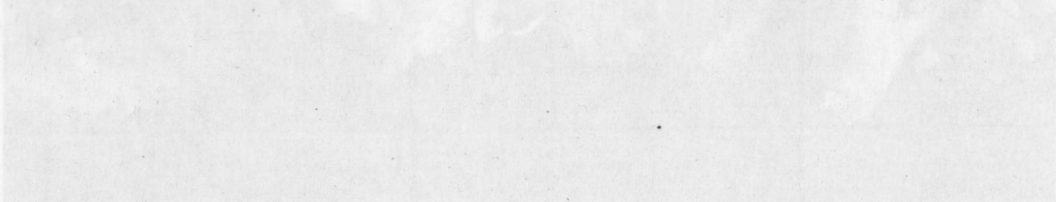


Fig. 1. Basidiomata of *Cantharellus lateritius* var. *colombanus* (Dennis) Dennis & R. S. Wang. (x 100)

taxa in the following way: 1) pileus surface in
 never spumose, but smooth to (at most) gran-
 ularly fibrillose; 2) basidiomata are uni-
 formly larger than those of the type specimen of
 var. *colombanus*; and 3) var. *lateritius* stems indi-
 cating in basidia being found under second-
 growth hardwood trees, including Quercus, but
 surely not limited to that genus.

Basidiomata of var. *colombanus* are edible and
 we understand that most of the type collection was
 consumed by its collector.

ACKNOWLEDGEMENTS

Thanks are extended to Drs Dennis, Wang and Roy
 Dennis for providing the specimen and photo of *C. col-
 umbanus* and to Mr. André de Meijer of Canth-
 arellus for loaning the specimen of *C. lateritius*.
Cantharellus colombanus was collected during field work
 by the second author which was supported by NSF grant
 number BSR 88-07106. This fieldwork was greatly facilitat-
 ed by Dr. Jorge Wright and his students, especially Dr.
 Roberto Sánchez and Roberto Sánchez.

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taxa, with conspicuous clamp connections
 contents homogeneously hyaline or occasionally
 with irregularly yellowish granules. Subhyaline
 hyphae 3-6 µm diam, tightly interwoven, conspic-
 uously clamped. Hyaline thick-walled basidia
 cyriform, 8.8-9.8 x 8.2-11 µm, subperpendicular to an-
 terly clavate, broad-based, conspicuously clam-
 ped, hyaline; contents uni- to multiseptulate, the
 guttules well-defined, yellowish, tergestate (2-4)-
 5) up to 8 µm long, stout, coarse.
 Basidiospores 7.2-7.8 x 5.9-6.5 µm (n = 12) 1.50-
 1.75 µm (n = 8) 38 µm, plerumque ovate to ellipsoid,
 smooth, thin-walled, hyaline, aplanophorous; con-
 tents uniseptulate, the guttules usually along the
 spore lumen, appearing heterogeneous in content;
 hilar appendage blunt, broad, conspicuous.

Collectors examined: Only known from the
 type collector.

Comments: In the forests of the southern
 Appalachian Mountains (North America), two
 taxa of *Cantharellus* with sinuous hymenium, *C. col-
 umbanus* H. & C. (Peterson and C. lateritius) (Peterson
 & Singer var. *lateritius* (see Peterson, 1977), are com-
 mon. Of these, *C. lateritius* var. *lateritius* is rather
 similar to *C. lateritius* var. *colombanus* in the fol-
 lowing respects: 1) basidiomata are gregarious but
 scattered; 2) basidiomata usually produce
 scattered (more or less) *C. columbus* usually produce
 mats that are more or less *C. columbus* and
 other taxa toward distal margin of stipe or stem.
 The fruit of *C. columbus* is more or less yellow.
 However, var. *lateritius* differs from var. *col-
 umbanus* in the following characters: 1) pileus surface
 never spumose, but smooth to (at most) gran-
 ularly fibrillose; 2) basidiomata are uni-
 formly larger than those of the type specimen of
 var. *colombanus*; and 3) var. *lateritius* stems indi-
 cating in basidia being found under second-
 growth hardwood trees, including Quercus, but
 surely not limited to that genus.