

NOTES ON CANTHARELLOID FUNGI—II
Some new taxa, and notes on *Pseudocraterellus*¹

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(With Plate 10 and fourteen Text-figures)

A new species of *Craterellus*, *C. carolinensis*, is described. Descriptions are given for the type specimens of *Thelephora subundulata* and *Stereum calyculus* and for representative specimens of *Craterellus sinuosus*, *C. crispus*, and *Cantharellus lutescens* sensu Fr. 1821. Comments on the relative taxonomic relevance of accepting *Pseudocraterellus* at generic rank are made. Two North American varieties of *Cantharellus cibarius* thought to have wide distribution are informally described.

When Corner (1957) described *Pseudocraterellus* as a new genus of the Cantharellaceae, he emphasized fruiting body development and secondary septation of tramal hyphae as distinguishing characters, separating the genus from *Cantharellus* (similar developmental pattern, and clampless, but not secondarily septate hyphae). However, no new combinations in *Pseudocraterellus* were made. Therefore, even though the type species of the genus was plainly stated as *Cantharellus sinuosus* Fr., the species was not nomenclaturally transferred to the new genus. Heinemann (1958) perpetuated the oversight by stating no basionym for the combination *Pseudocraterellus sinuosus*. Reid (1962) was forced validly to publish the combination, and correctly ascribed it to himself as *P. sinuosus* (Fr.) D. Reid. Still later Corner (1966) insisted on retaining authorship by stating the combination as *P. sinuosus* (Fr.) Corner ex Heinemann. The correct citation is the one by Reid.

I was informed by Dr. R. Santesson of Uppsala that no specimen of *C. sinuosus* existed from the herbarium of E. M. Fries, but that several specimens collected and determined by later workers had survived. These specimens were listed under two names, *Craterellus crispus* and *Craterellus sinuosus*. A separate discussion and description of each specimen would be too voluminous, but the specimens may be sorted into three general categories. Table I lists some pertinent data.

First, Lundell no. 2345 (UPS) is quite close to *Craterellus calyculus* [= *Pseudocraterellus calyculus* (Berk. & C.) D. Reid] in stature; the fruiting bodies are very small and with smooth hymenium. However, when measured carefully, the spores are

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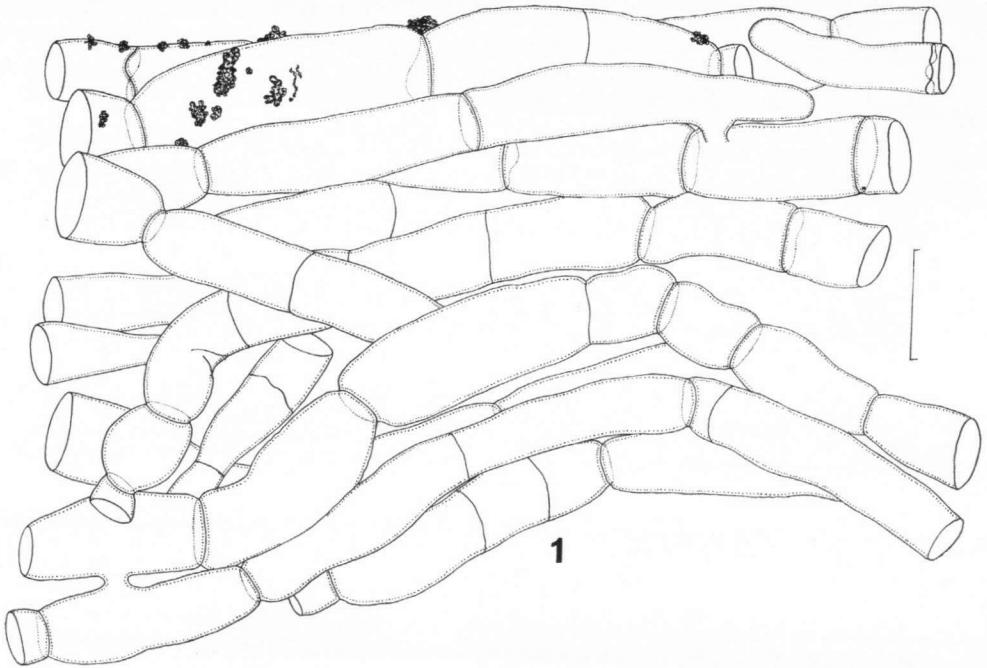


Fig. 1. *Pseudocraterellus sinuosus* (UPS, Lundell no. 55). — Section of pileus surface. Note inflated hyphae and secondary septation. Standard line = 15 μ . Surface is opposite numeral.

TABLE I

PERTINENT DATA ON SPECIMENS OF *C. SINUOSUS* AND *C. CRISPUS* FROM UPS

Text designation	UPS name	Text name	Basial length	Relative abundance of secondary septa
Lundell 46	<i>Crat. crispus</i>	<i>Crat. crispus</i>	?	2
Fung. exs. succ. 1779	" "	" "	63-87 μ	1
Lundell 2345	" "	" "	85-100 μ	2
Andersson	" "	" "	77-105 μ	2
Lundell 5720	<i>Crat. sinuosus</i>	<i>Crat. sinuosus</i>	95-110 μ	2
Lundell 55	" "	" "	70-85 μ	3
Fung. exs. succ. 2670	" "	(no specimen)	—	—

found to be slightly narrower than those of *P. calyculus*, with the latter having a length-width ratio (E) of 1.29 and No. 2345 with E = 1.39. I conclude that the fruiting bodies of No. 2345 are juvenile forms of *C. sinuosus* or *C. crispus*.

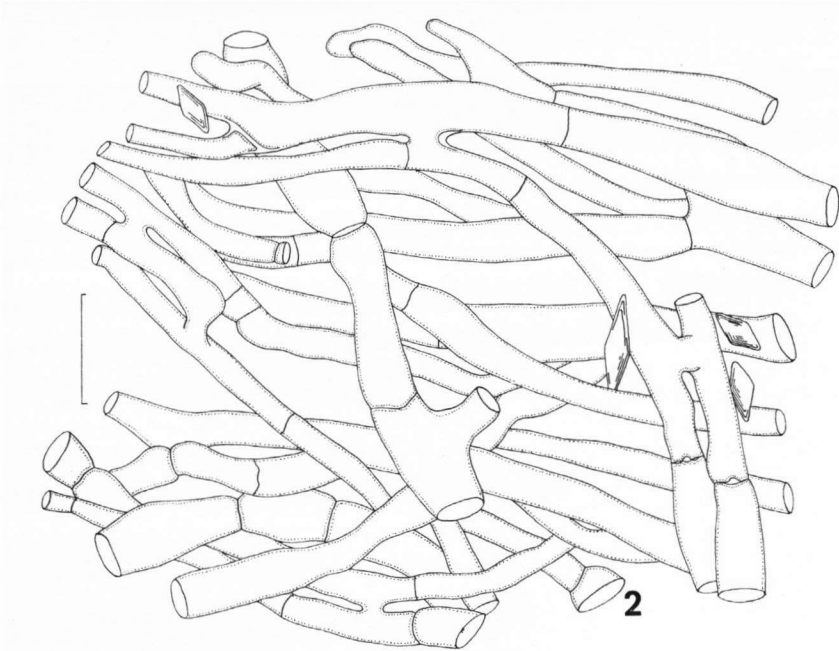


Fig. 2. *Cantharellus crispus* (UPS, Fungi exs. succ. no. 1779). — Section of pileus surface. Note generally uninflated hyphae and few secondary septa. Standard line = 15 μ . Surface is opposite numeral.

Second, the configuration and construction of the hyphae of the pileus surface is very variable. Lundell no. 55 possesses pileus surface hyphae which are inflated and copiously secondarily septate (Fig. 1), while Fungi exsiccati succici no. 1779 has almost uninflated surface hyphae with very little secondary septation (Fig. 2). The other specimens exhibit pileus surface hyphae which are intermediate between these two.

Third, the length of the basidia is also variable. Fungi exs. succ. no. 1779 and Lundell no. 55 have basidia 63–87 μ long, while all other specimens have significantly longer basidia. In all specimens the hymenium has thickened to some extent, generally comparable to the fruiting body age.

In a note on the label of Fungi exs. succ. no. 2670, Lundell stated, "*Cr[aterellus] crispus* (distributed earlier from Göteborg as n. 1779) represents in my present opinion only a form of *Cr. sinuosus* with more crispate margin and more marked, veined to folded, almost lamelliform hymenium." Fungi exs. succ. no. 1779 exhibits just the characters noted by Lundell, as well as possessing the relatively uninflated, hardly secondarily septate pileus surface hyphae mentioned above. I therefore, consider this specimen (Fungi exsiccati succici, praesertium uppsalienses no. 1779, at UPS) a representative specimen of *Craterellus sinuosus* **C. crispus* (Bull. ex L. March.) Fries

[Epicr. 533. 1838 \equiv *Helvella crispa* Bull. \equiv *Merulius tubaeformis* var. *crispus* (Bull.) ex L. March. in *Bijdr. natuurk. Wetensch.* 3: 272. 1828 \equiv *Craterellus crispus* (Bull. ex L. March.) Berk., *Outl. Brit. Fung.* 266. 1860]. In my opinion, this has the effect of placing this taxon under *C. sinuosus*, but leaves the way open for separation by those who wish to use the degree of secondary septation as a distinguishing character.

In the same way, because it most obviously exhibits the characters described by Corner (1957, 1966) for *Pseudocraterellus*, I consider the specimen *Craterellus sinuosus*, leg. K. G. Ridelius, det. Lundell no. 55 (UPS) a representative specimen of *Cantharellus sinuosus* Fries [Syst. mycol. 1: 319. 1821 \equiv *Craterellus sinuosus* (Fr.) Fr. \equiv *Pseudocraterellus sinuosus* (Fr.) D. Reid].

A watercolor labelled by Fries as "*Craterellus pusillus*. Fr." is reproduced on Plate 12 fig. 1. This species is often also reduced to *Pseudocraterellus sinuosus* by European authors.

Corner (1966), in redescribing his concept of *Pseudocraterellus sinuosus*, listed *Stereum calyculus* Berk. & C. and *Thelephora subundulata* Peck as synonyms. No convincing evidence was presented other than Reid's (1962) assertion that these species of *Stereum* and *Thelephora* should be assigned to *Pseudocraterellus*, except Corner's statement, "It [*P. sinuosus*] is a very variable species, both in size of fruit-body and the spores, for which reason I can see no means of distinguishing *P. calyculus* and *P. subundulatus*."

The type specimens of *Thelephora subundulata* and *Stereum calyculus* are still intact, and support accurate microscopic as well as macroscopic examination. They may be described as follows:

PSEUDOCRATERELLUS SUBUNDULATUS (Peck) D. Reid — Figs. 12, 13

Thelephora subundulata Peck in Bull. Torrey bot. Club 22: 492. 1895. — *Craterellus subundulatus* (Peck) Peck in Bull. N.Y. St. Mus. 67: 27. 1903. — *Pseudocraterellus subundulatus* (Peck) D. Reid in *Persoonia* 2: 16^r. 1962.

Fruiting bodies (Figs. 12, 13) five—one individual with stipe branched about half way through its length, with separate upper stipes and discrete pilei; two individuals basally so juxtaposed as to appear joined—up to 2 cm high, pilei up to 1.2 cm broad, stipes 1–1.5 mm thick. Pileus umbilicate to deeply depressed, but not perforate, minutely, innately, radially fibrillose, now between "deep olive buff"² and "dark olive buff"; margin crenulate. Hymenium smooth where pileus joins stipe, becoming somewhat wrinkled toward the margin, although with discrete lamellar folds, now "clay color", to "tawny olive". Stipe solid, even or slightly tapering downward, inserted nakedly, with a very small ball of soil substrate involved at the base, smooth but longitudinally subrugulose above, minutely scurfy below.

Pileus surface hyphae 3.4–6.3 μ diam., repent, parallel, simple-septate, occasionally secondarily septate, uninflated, hyaline singly, but pale yellowish in mass under bright field. Pileus tramal hyphae 5.3–6.5 μ diam., now collapsed for the most part,

² Colors enclosed in quotes are from Ridgway (1912).

thin-walled but somewhat rigid, simple-septate, hyaline, branched at wide angles. Basidia $35-45 \times 7-8 \mu$, simple-septate, subclavate to subcylindric, refringent under phase contrast when young, often subgeniculate, becoming multigranular at maturity, 5-6-sterigmate; sterigmata cornute, coronately disposed, divergent, incurved.

Spores $6.2-7.6 \times 4.6-5.0(-5.8) \mu$, ovoid with the adaxial side slightly flattened, smooth, refringent under phase contrast, hyaline to very pale yellowish in mass under bright field, yellowish under phase contrast; contents cyanophilous; wall acyanophilous, thin; apiculus eccentric, small and abrupt, slightly tapering and slightly drooping.

SPECIMENS EXAMINED (only the type is described).—U.S.A., Delaware, leg. C. H. Peck, 1895 (holotype of *Thelephora subundulata*; NYS); South Carolina, Society Hill, Botanical Garden, 1902 (as *Stereum calyculus*; FH).

PSEUDOCRATERELLUS CALYCVLUS (Berk. & C.) D. Reid — Fig. 11

Stereum calyculus Berkeley & Curtis in Hook. J. Bot. 1: 238. 1849. — *Craterellus calyculus* (Berk. & C.) Burt in Ann. Missouri bot. Gdn 1: 338. 1914. — *Pseudocraterellus calyculus* (Berk. & C.) D. Reid in Persoonia 2: 124. 1962.

Fruiting bodies (Fig. 11) two, each missing some portion of the stipe; up to 23 mm high, pilei up to 7 mm broad, stipes 1-1.5 mm thick. Pileus infundibuliform but not perforate, smooth, minutely, innately, radially fibrillose, deep olivaceous brown; margin crenulate to minutely fimbriate, inrolled. Hymenium smooth, decurrent, now very deep orange-ochre. Stipe solid, felty-tomentose at the very base, and inserted with a small scurfy-tomentose mat of whitish mycelium, smooth upward, even or slightly tapering downward.

Pileus surface hyphae $3.5-4.5 \mu$ diam., repent, parallel, simple-septate, occasionally secondarily septate, uninflated, hyaline to pale yellowish under bright field. Basidia $45-65 \times 9.5-12.5 \mu$, clavate, simple-septate, arising sequentially from repent subhymenial hyphae; hymenium thickening very slightly.

Spores $9.7-12.1 \times 6.8-9.1 \mu$, ovoid with adaxial side slightly flattened, smooth, thin-walled, refringent under phase contrast, hyaline to very pale yellowish under bright field, yellow-ochre under phase contrast; contents cyanophilous; wall acyanophilous; apiculus eccentric, small but abrupt.

SPECIMEN EXAMINED.—U.S.A., South Carolina, Santee Canal, Ravenel 282 (portion of type collection of *Stereum calyculus*; FH).

Reid (1962) transferred several species from thelephoroid genera to *Pseudocraterellus*, apparently on the characters of simple-septate hyphae and basidia, and monomitic hyphae construction, for he made no mention of secondary septation. Corner (1957, 1966) has described other diagnostic characters, chiefly secondary septation of tramal hyphae and cantharelloid fruiting body development. Both of the above species develop in an apparently typically cantharelloid manner, for the margin of the pileus is inrolled even though the pileus is broadly funnel- or trumpet-shaped in the mature fruiting bodies. Moreover, the hyphae of the pilear surface and trama are occasionally secondarily septate, although hardly inflated. This combination of characters indicates designation in *Pseudocraterellus*. Neither species matches *P. sinuosus*, however, *P. calyculus* having much smaller fruiting bodies and slightly larger

TABLE II

SPORE MEASUREMENTS FROM SPECIMENS OF PSEUDOCRATERELLUS

Name	Herbarium	Spore measurements
<i>P. crispus</i>	UPS	8.7-11.2 × 6.3-7.1 (- 8.1) μ
<i>P. sinuosus</i>	UPS	8.5-10.5 (- 12.5) × 6.3-8.4 μ
<i>P. subundulatus</i> (type)	NYS	6.2-7.6 × 4.6-5.0 (- 5.8) μ
<i>P. calyculus</i> (type)	FH	9.7-12.1 × 6.8-9.1 μ
<i>P. pseudoclavatus</i> (type)	MICH	8.7-10.5 (- 11.9) × 4.9-6.2 (- 7.0) μ

spores, and *P. subundulatus* having slightly smaller spores and much smaller fruiting bodies. Table II presents spore dimensions from the type and representative specimens of pertinent species.

Interestingly, the type and auxiliary specimens of *Cantharellus pseudoclavatus* A. H. Sm. apud Sm. & Morse also should be included in *Pseudocraterellus*. A number of characters agree, namely smooth, pale ochre spores with vitreous-opalescent contents under phase contrast, and simple-septate, secondarily septate hyphae throughout the fruiting body. As a comparison, the hyphae of the pileus surface (Fig. 3) are quite close to those found on the pileus surface of the specimens of *P. sinuosus* mentioned above. Macroscopically, the species is very different, however, apparently (Smith & Morse, 1947) appearing quite similar to *Gomphus clavatus* when fresh, and bearing some superficial resemblance to that species when dry. With drab to purplish hymenium, the species is surely distinct within the genus. I propose the following new combination: ***Pseudocraterellus pseudoclavatus*** (A. H. Sm. apud Sm. & Morse) R. H. Petersen, *comb. nov.*, basionymum: *Cantharellus pseudoclavatus* A. H. Smith apud Smith & Morse in *Mycologia* 39: 505. 1947.

Corner's generic character of developmental pattern of the fruiting body for separation of *Craterellus* from *Cantharellus* and *Pseudocraterellus* is open to some question. There can be no doubt that the fruiting bodies of the *Cantharellus cibarius* complex develop quite typical gymnocarpic pilei, and that *Craterellus cornucopioides* fruiting bodies develop by differential growth of the margin of the primordium, but the developmental pattern of those species whose mature pilear portion is everted or funnel-shaped, must still remain in doubt. One can only observe the position of the pileus margin of the mature (and often dried) specimen, assuming that an inrolled margin indicates a cantharelloid developmental sequence. For herbarium material, this often seems a doubtful conclusion to draw.

The second diagnostic character for *Pseudocraterellus* is the presence of secondary septation in the tramal hyphae. Even in the limited specimens representing *P. sinuosus* and *Craterellus crispus* (in my opinion, a single species, but the type of the

genus) the relative abundance of secondary septa varies from almost absent to predominant in all the tissues of the fruiting body (pilear surface, pileus flesh, stipe flesh).

Smith & Shaffer (1964) have already reduced *Pseudocraterellus* to a subgenus under *Craterellus* without validly publishing the new combination. Although I have serious doubts concerning its eventual fate, I prefer to accept *Pseudocraterellus* for the time being, if not on the character of fruiting body development, then on the presence of secondary septation and absence of clamp connections, especially if accompanied by inflation of the tramal hyphae.

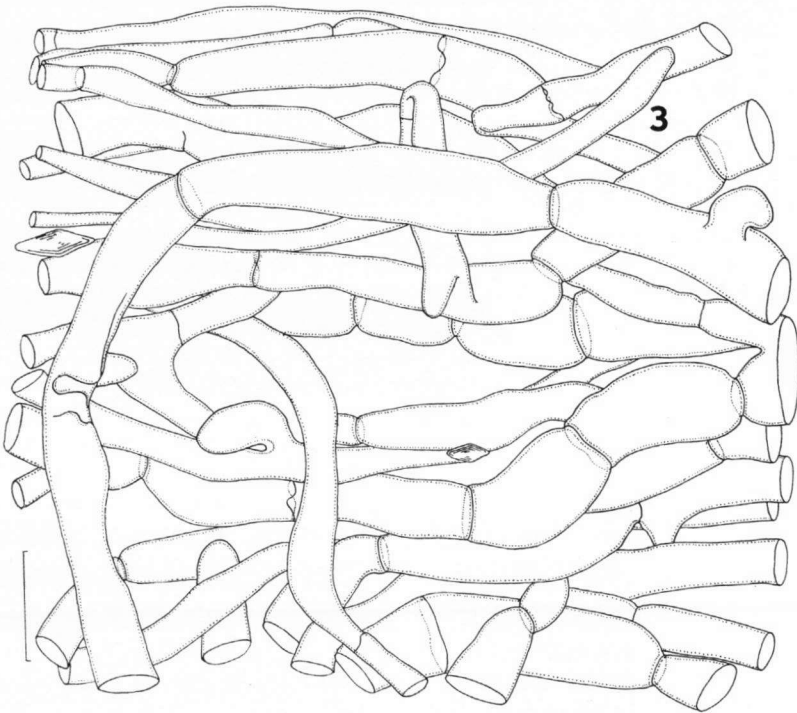


Fig. 3. *Pseudocraterellus pseudoclavatus* (MICH, paratype). — Section of pileus surface. Note moderately inflated hyphae and some secondary septa. Standard line = 15 μ . Surface is above.

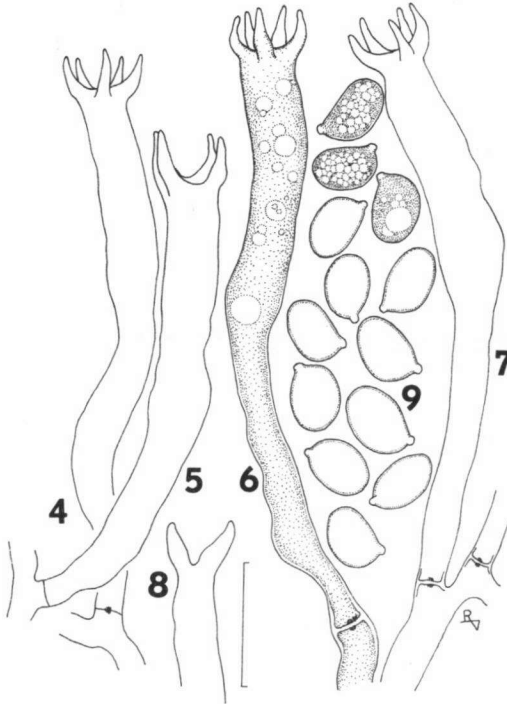
***Craterellus carolinensis* R. H. Petersen, sp. nov.** — Figs. 4–10, 14

Receptacula 1.5–4 cm alta, solitaria, gregaria vel cespitosa. Pileus 6–12 mm latus, strigososquamulosus, umbilicatus vel infundibuliformis, haud perforatus, “fuscous black”. Stipes 2–25 \times 2–3 mm, saepe pruinoso-furfuraceus, paulo deorsum attenuatus, “fuscous black”. Hymenium laeve vel exigue rugulosum, ad stipitatis apicem abrupte delimitatum, “fuscous” ad “benzo brown.”

Hyphae contextualae 3.7–7.0 μ latae, tunicis subbrunneolis, fibulis deficientibus, hyphis plerumque ordine secundo septatis. Basidia 60–100 \times 6.0–8.4 μ , defibulata, subclavata vel

subcylindrica; sterigmata (2-4)-5, crassa, subcornuta. Sporae 8.0-10.5 \times 5.2-7.0 μ , albae, laeves, intus oleaginosae.

Fruiting bodies 1.5-4 cm high, solitary, gregarious or cespitose in small clusters on wood or deep woody humus. Pileus 6-12 mm broad, umbilicate to infundibuliform, not tubular or perforate, fimbriate at the margin, finely to coarsely scaly, the scales narrow, raised, often branched, especially toward margin; surface radially and reticulately rugulose, "fuscous black". Stipe 2-25 \times 2-3 mm, minutely furfuraceous, longitudinally rugulose, equal to slightly tapering downward, inserted nakedly in substrate, turning nearly black at base on handling, "fuscous black". Hymenium smooth to shallowly wrinkled, fertile area clearly distinguishable from sterile, "fuscous" to "benzo brown".



Figs. 4-9. *Craterellus carolinensis*. — 4-8. Basidia, showing simple-septate base, and variable number of sterigmata. — 9. Spores. Standard line = 15 μ .

Contextual hyphae (Fig. 10) 3.7-7.0 μ diam., very slightly brownish under bright field, with scattered small guttules within, somewhat thick-walled (wall up to 0.3 μ thick), radially arranged (surface) to somewhat interwoven (context), especially toward the subhymenium, simple-septate, commonly secondarily septate, slightly inflated. Basidia (Figs. 4-8) 60-100 \times 6.0-8.4 μ , subclavate to subcylindrical, simple-septate, (2-4)-5-sterigmate; sterigmata stout, divergent and incurved, subcornute. Spores (Fig. 9) 8.0-10.5 \times 5.2-7.0 μ , smooth, hyaline to pale greenish under bright field, multiguttulate, ovoid to broadly ellipsoid, with a small but abrupt apiculus.

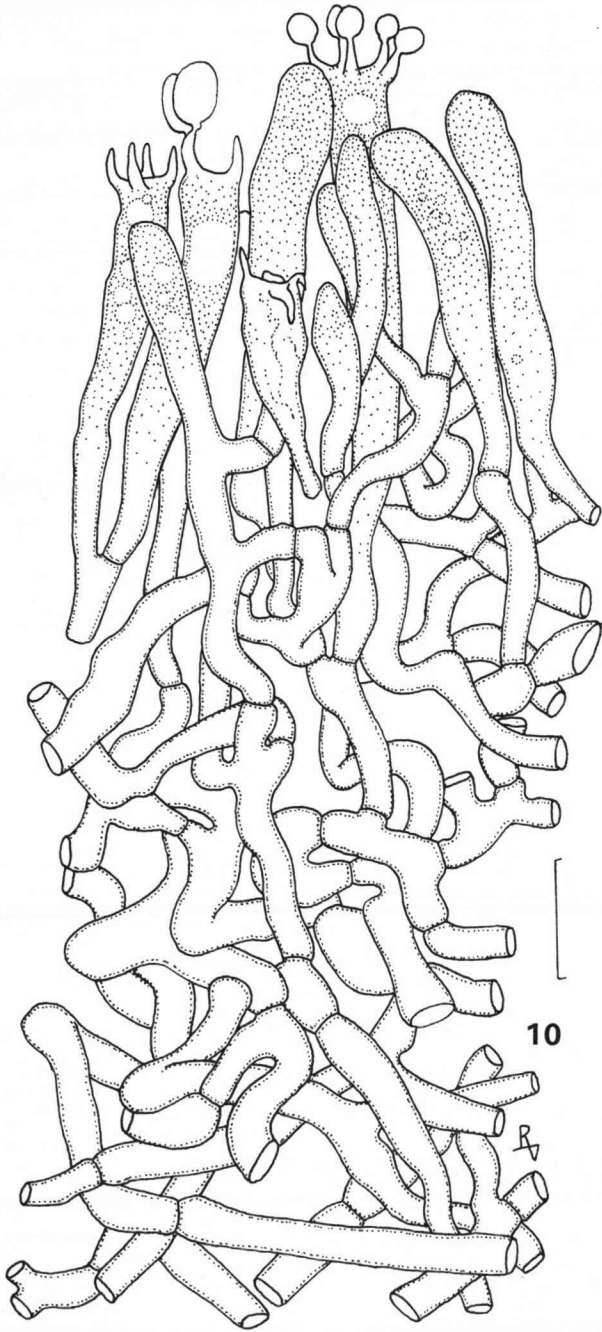
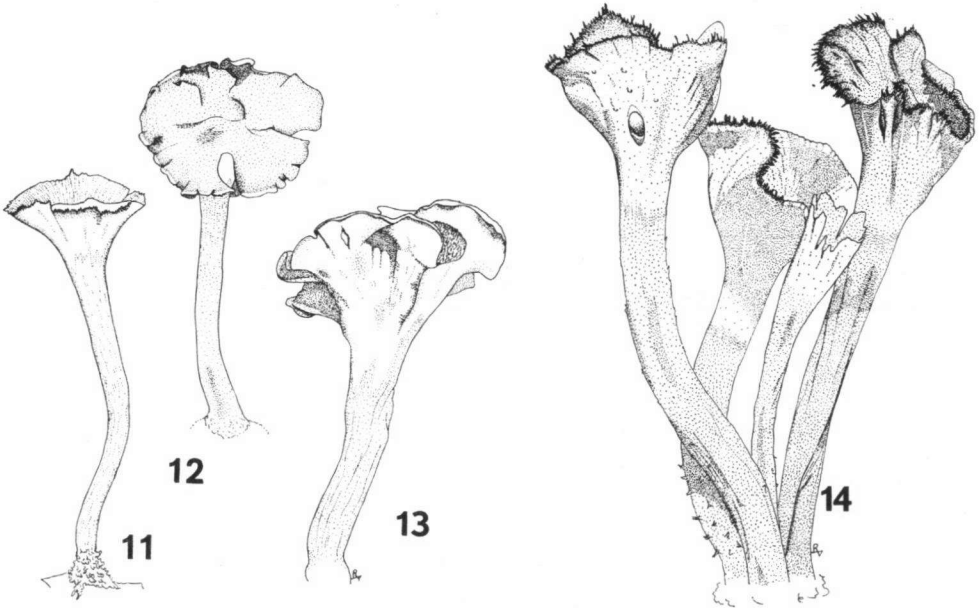


Fig. 10. *Craterellus carolinensis*. — Section through pileus trama, subhymenium and hymenium. Standard line = 15 μ .

SPECIMENS EXAMINED.—U.S.A., North Carolina, Macon County, Coweeta Hydrologic Laboratory (holotype, TENN 24962; isotype, herb. R. H. Petersen 2450³); Macon County (R. H. Petersen 2281, 2628).

These specimens fit none of the descriptions of North American species as published by Burt (1914), Coker (1919) or Smith & Morse (1947), and none noted by Corner (1966). When first collected, the taxon was thought to be very close to *Cantharellus hystrix* Corner which it closely resembles, both macroscopically and microscopically, except for the absence of clamp connections. The species adds to the evidence against retention of *Pseudocraterellus* at the genus level, for, except for the common secondary septation, this species bears all the microscopic characters of



Figs. 11–13. Cantharelloid fruiting bodies. — 11. *Stereum calyculus* (FH, type). — 12, 13. *Thelephora subundulata*. 12, type (NYS). 13, Bot. Gdn. — Appr. $\times 3.5$.

Fig. 14. *Craterellus carolinensis*. — Fruiting bodies. Appr. $\times 2.5$.

Craterellus. On the other hand, the pilei are not perforate in any fruiting body (I have seen a total of about 25 fruiting bodies up to this writing), and the stipe is quite distinct and usually relatively long. So the pattern of fruiting body development is between *Craterellus* and *Cantharellus*, while microscopic characters fall between *Craterellus* and *Pseudocraterellus*. It would appear that a better method of taxonomic separation at the genus level might be found.

³ Herbarium of the author at Knoxville, Tenn.

CANTHARELLUS LUTESCENS (Pers.) ex Fr. sensu Fr. — Pl. 12 Fig. 2

Cantharellus lutescens (Pers.) ex Fr. sensu Fr. 1821, saltem p.p.; non *Cantharellus lutescens* (Fr.) Kickx 1867.

During an examination of specimens of clavarioid and cantharelloid fungi from the Royal Botanic Gardens, Edinburgh, a specimen of *Cantharellus lutescens* which had been annotated by Fries was discovered.

Pileus 3–3.7 cm broad, now everted, apparently perforate (not readily observable); margin grossly crenate to wavy, lobed imperfectly; surface smooth, minutely matted to minutely tomentose or furfuraceous in places, minutely zonately ridged in drying; flesh pale, thin at margin, slightly thicker in disc; surface color now deep fuscous brown. Stipe 2.5–3.2 cm long, 2–4 mm thick, smooth above, and there now greyish brown to dull orange; base lighter in color, slightly expanded, mycelial, tapering slightly downward. Hymenium hardly more than wrinkles on one fruiting body, rugose and anastomosing on the other fruiting body, but not lamellar; wrinkles occasionally forking irregularly, especially outward; color dull ochre to dull orange.

Hyphae of pileus trama clamped, thin- to somewhat thick-walled, tightly interwoven. Hymenopodium without discernable mediostratum. Basidia cylindrical to elongate-clavate, 70–80 × 8.0–8.4 μ , clamped, 4–5-sterigmate; sterigmata up to 7 μ long, divergent, incurved, coronate. Spores 9.6–11.2 × 6.3–8.4 (–9.1) μ , ovoid to ellipsoid, more convex abaxially, smooth, aguttulate (in age ?), with a prominent, eccentric, truncate-rounded apiculus; cytoplasm cyanophilous.

SPECIMEN EXAMINED.—Collected by Greville and annotated by Fries, 1826 (E).

CANTHARELLUS CIBARIUS Fr.

This variable species complex occurs quite commonly in the southern Appalachian Mountains during much of the collecting season, but apparently has never been carefully examined there for specific, consistent variations which might lead to taxonomic conclusions. Both Coker (1919) and Smith & Morse (1947) have treated the species broadly, making few distinctions of varietal level, but Corner (1966) included several varieties and forms. In that work, however, the varietal characteristics do not match those of the species as listed in the species key, thus making identification of the several varieties very difficult from the more general key.

At least two taxa of the species complex occur in the southern Appalachian Mountains. One, judging from European specimens and illustrations, comes close to true *Cantharellus cibarius* (cream-spored form below), but the other is not distinctly described in literature to my knowledge. Although my knowledge has not progressed far enough to give these forms taxonomic and nomenclatural status, it is hoped that the following descriptions, designed only to separate one from the other, will bring these variations to the attention of other workers, especially European, in an effort to recognize the more subtle variations within the species in its type distribution area.

Cantharellus cibarius, yellow-spored form

Fruiting body 5–9 cm high when mature. Pileus 3–7 cm broad at maturity, “capucine yellow”, quickly becoming whitish-hoary over the disc, and then appearing somewhat floccose, especially in distinct sectors of concentric circles, planar to deeply depressed but not infundibuliform at maturity; margin inrolled when young, becoming everted in age, so that the mature fruiting bodies rarely show an inrolled margin. Gill folds 2.8–3.2 mm high, crowded, usually wavy, often forked but rarely anastomosing, deeply decurrent, obtuse, “orange buff” to “capucine orange” in daylight, but “orange buff” to “light orange yellow” in fluorescent light. Stipe 3.5–5.5 × 0.5–1.5 cm, often slightly bulbous at the base, usually bent, basal mycelium white, becoming “pale orange yellow”, “apricot yellow” or “light orange yellow” toward the top of the stipe, unstaining or staining very slightly darker on handling or cutting. Flesh near white throughout, sometimes staining slightly toward the pale ochre shades when bruised.

Hyphae of pileus surface undifferentiated, thick-walled, clamped, loosely interwoven, refringent under phase contrast. Hyphae of pileus trama thin-walled, clamped, hyaline with sludgy intercellular deposits of pigmented material, densely interwoven. Hyphae of lamellar trama loosely interwoven, with densely interwoven pileus trama tissue extending a short distance into the lamellar trama base. Hyphae of subhymenium densely interwoven; hymenium thickening, with no differentiated sterile elements. Spores “Naples yellow” in prints, (6.5–)7.0–9.0(–9.5) × (4.0–)4.5–5.5(–6.0) μ , smooth, thin-walled, multiguttulate to uniguttulate.

Cantharellus cibarius, cream-spored form

Fruiting bodies, 3–6.5 cm high when mature, solitary to gregarious. Pileus 2.5–6.5 cm broad at maturity, “light orange yellow” to “antimony yellow” toward the margin, “yellow ocher” on disc, dry, smooth to minutely scurfy or tomentose, the tomentum slightly darker than underlying hyphae; margin inrolled in youth and maturity; flesh white, thin at margin. Gill folds 0.8–1.2 mm high, not crowded, often forking dichotomously but only occasionally anastomosing, “pinkish buff”, “light ochraceous buff” or “capucine buff” in daylight, deeply decurrent. Stipe 2–5 × 1–1.8 cm, equal or narrowing slightly downward; base whitish, becoming “pale orange yellow,” “cream buff” or “pale ochraceous buff” upward, staining to “tawny” or “ochraceous buff” where bruised or cut.

Hyphae of pileus surface undifferentiated, thick-walled, clamped. Hyphae of pileus trama densely interwoven, thin-walled, clamped, hyaline, of generally two widths. Hyphae of lamellar trama very loosely interwoven; trama almost hollow. Hyphae of subhymenium subparallel, undifferentiated; subhymenium rudimentary. Basidia clavate, clamped, densely pigmented; hymenium thickening, with no differentiated sterile elements. Spores “pale pinkish cinnamon” in prints, (8.5–)9.0–11.0(–11.5) × (4.0–)4.5–6.0(–6.5) μ , ovoid to ellipsoid, smooth, thin-walled, multiguttulate to uniguttulate.

I have found the two forms not only in the southeastern United States, but in Idaho, Washington, and northern California as well. The cream-spored form matches very closely the description of *C. cibarius* by Smith & Morse (1947), but the fungus described by Coker (1919) would include both forms. They may be distinguished by (1) the deeper, brighter gill fold coloration of the former, (2) the more

crowded, more well-developed gill folds of the former, (3) the usually more everted pileus of the former, (4) the much paler spore print of the latter, and (5) the larger spores of the latter. Dr. A. H. Smith (personal communication and Annual Lecture to the Mycological Society of America, College Station, Texas, 1967) has reported a form of *C. cibarius* with salmon spore print, and a taxon occurs in eastern North America which exhibits salmon shades over the entire fruiting body, but which only superficially resembles *C. cibarius*. All these forms should be investigated further. Moreover, although *C. cibarius* (both forms) occurs uncommonly in the far western United States, the prevalent species which is usually called *C. cibarius* is really *C. formosus* Corner, and may be distinguished in the field by a "yellow-ocher" to "buckthorn brown" pilear disc, slightly pinkish tint to the hymenium ("pale yellow orange" to "light ochraceous buff"), and much more highly developed gill folds.

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EXPLANATION OF PLATE 12

- Fig. 1. Reproduction of watercolor illustration of *Craterellus pusillus* labelled by E. M. Fries.
- Fig. 2. Photograph of the representative specimen of *Cantharellus lutescens* sensu Fr. 1821 described in this paper.

