

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* [\equiv *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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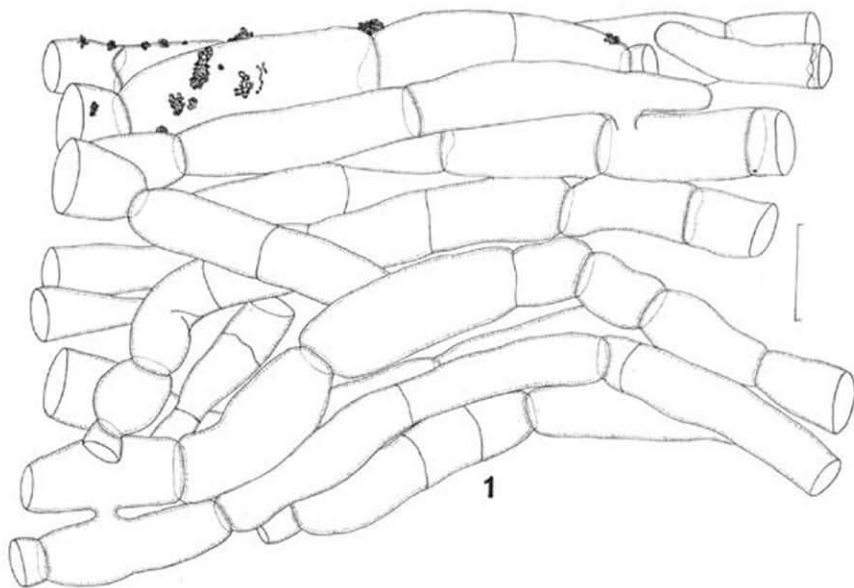


Fig. 1. *Pseudocraterellus sinuosus* (UPS, Lundell no. 55). — Section of pileus surface. Note inflated hyphae and secondary septation. Standard line = 15 μ . Surface is opposite numeral.

TABLE I

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

Text designation	UPS name	Text name	Basidial 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*.

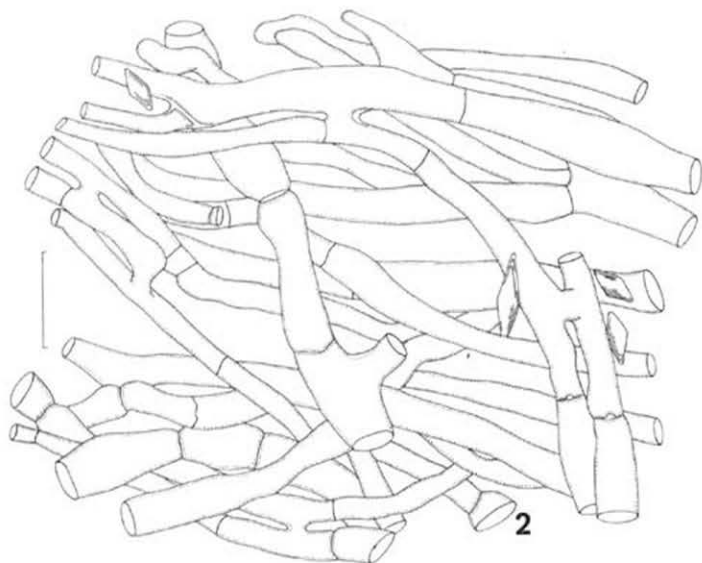


Fig. 2. *Cantharellus crispus* (UPS, Fung. exs. succ. no. 1779). — Section of pileus surface. Note generally uninflated hyphae and few secondary septa. Standard line = $15\ \mu$. Surface is opposite numeral.

Second, the configuration and construction of the hyphae of the pileus surface is very variable. Lundell no. 55 possesses pilear 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 pilear 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 $63\text{--}87\ \mu$ 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 pilear 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 = *Helvella crispa* Bull. = *Merulius tubaeformis* var. *crispus* (Bull.) ex L. March. in *Bijdr. natuurk. Wetensch.* 3: 272. 1828 = *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 = *Craterellus sinuosus* (Fr.) Fr. = *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. 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 pileus 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.

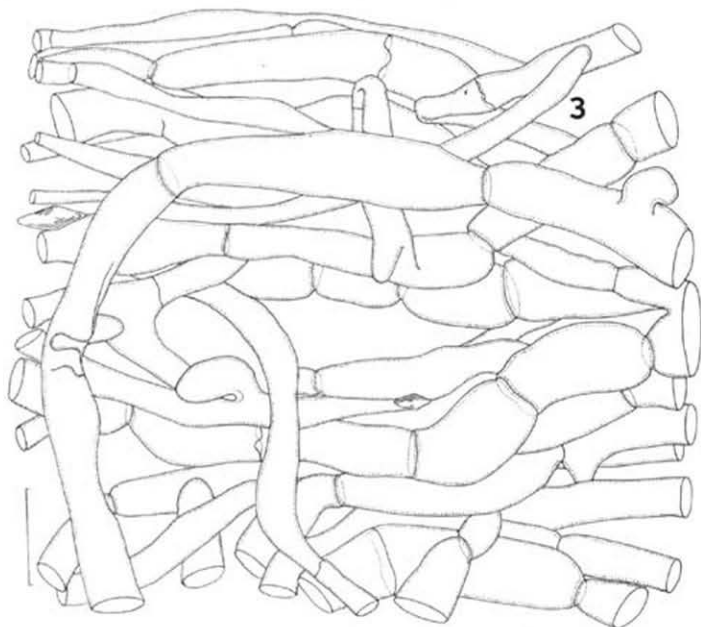


Fig. 3. *Pseudocraterellus pseudoclavatus* (MICH, paratype). — Section of pileus surface. Note moderately inflated hyphae and some secondary septa. Standard line = 15 μ . Surface is above.

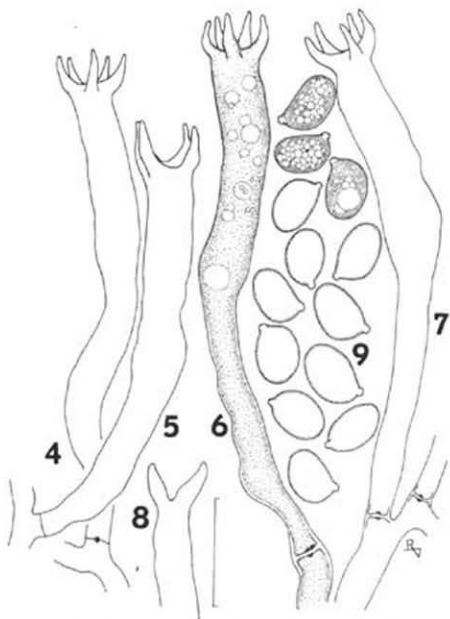
Craterellus carolinensis R. H. Petersen, *sp. nov.* — Figs. 4–10, 14

Receptacula 1.5–4 cm alta, solitaria, gregaria vel cespitosa. Pileus 6–12 mm latus, strigosus-squamulosus, 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 contextuales 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 2-2.5 \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.

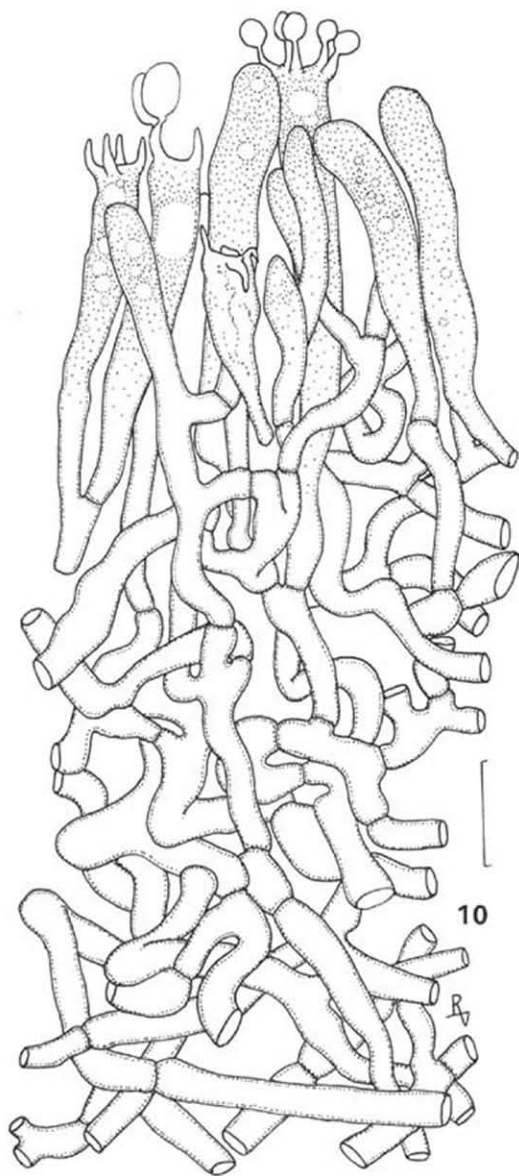
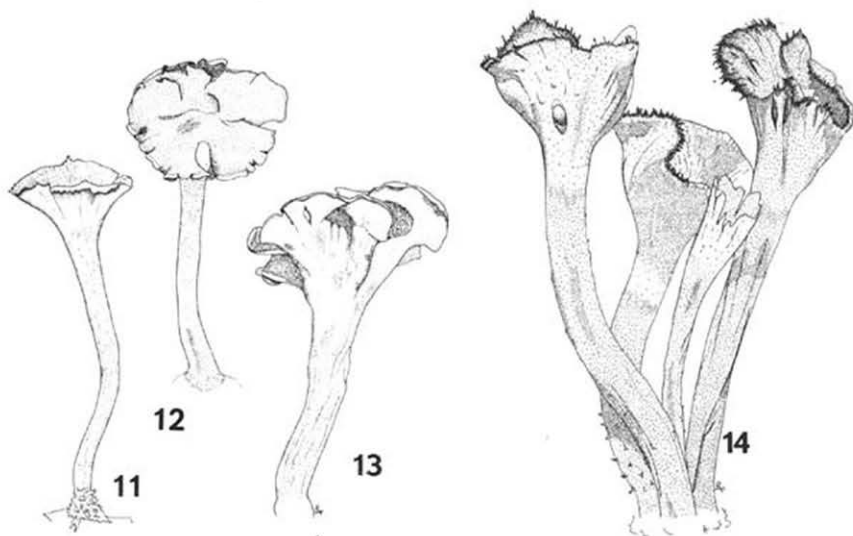


Fig. 10. *Craterellus carolinensis*. — Section through pileus trama, subhymenium and hymenium. Standard line = 15 μ .

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, $70-80 \times 8.0-8.4 \mu$, clamped, 4–5-sterigmate; sterigmata up to 7μ long, divergent, incurved, coronate. Spores $9.6-11.2 \times 6.3-8.4 (-9.1) \mu$, 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

Fructing 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

Fructing 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 ochre" 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.

STUDIES ON DISCOMYCETES—III

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Ascobolus amethystinus Phill. and *Peziza phillipsii* Cooke are studied. The two are considered to be synonyms. The new combination *Jafneadelphus amethystinus* (Phill.) Brumm. is proposed. *Saccobolus succineus* Brumm. is described as a new species from Thailand.

***Jafneadelphus amethystinus* (Phill.) Brumm., comb. nov.**—Figs. 1, 2, 3

Ascobolus amethystinus Phill. in *Grevillea* 4: 84. 1875 (exclusive of part of type, vide Wakefield, 1920; basionym). — *Galactinia amethystina* (Phill.) Wakef. in *Trans. Br. mycol. Soc.* 6: 375. 1920. — Lectotype: Phillips, s. loc., XI. 1875 (K-A2453, exclusive of the contaminating species of *Ascobolus*; originally the material of collection K-A1980 was also part of the type).¹

Peziza phillipsii Cooke, *Mycographia* 1: 48 f 80. 1876. — *Humaria phillipsii* (Cooke) Sacc., *Syll. Fung.* 8: 140. 1889. — *Galactinia phillipsii* (Cooke) Boud., *Hist. Class. Discom. Eur.* 49. 1907 ["*phillipsii*"]. — Holotype: Phillips, s. loc., XI. 1875 (K-A2453).

Apothecia scattered, sessile on a broad base, 4–20 mm across, 0.8–2.0 mm high. Receptacle at first cup-shaped, then flattened, purplish-violet or blackish-violet; surface scurfy; margin irregularly roughened by projecting warts, slightly inrolled. Disk concave, then almost flat, dark purplish-violet or blackish-violet. Hymenium 270–330 μ thick. Hypothecium 55–65 μ thick, consisting of interwoven hyphae (textura intricata) 2.5–6 μ wide, together with groups of plasm-rich isodiametric or slightly elongated cells 3.5–13 \times 3.5–9 μ . Flesh of varying thickness, consisting of interwoven hyphae (textura intricata) 2–4(–6) μ wide, pale violet. Excipulum 42–60 μ thick, consisting of an inner and an outer layer; inner layer 3–5 cells thick, with the cells cylindrical or oblong, 7–25 \times 4–8 μ and their longitudinal axis at right angles to the surface of the receptacle (textura prismatica); outer layer more or less discontinuous, consisting of globular cells 7–20 μ across (textura globulosa); near the margin these globular cells smaller (7–10 \times 6–8 μ) and more compacted, forming irregular warts up to 220 μ high. Asci cylindrical, rounded above, 240–270 \times 16–20 μ , 8-spored; no part of wall staining blue with iodine. Ascospores obliquely uniseriate, at first ellipsoid, then fusiform-ellipsoid or ellipsoid with strongly pointed ends, hyaline (sometimes stained by the hymenial pigment), (18–)19.5–22(–23) \times (9.5)11–12.5(–13) μ , containing two larger and several smaller globules that disappear at maturity, covered by coarse, hyaline, rounded tubercles and semi-globular apiculi at the ends, 1.5–3 μ high and 3–5.5 μ across. Paraphyses simple, septate in the lower half, cylindrical, 2–3 μ thick, not or slightly enlarged, up to 4.5 μ at tip, dark purplish-violet, surrounded by dark purplish-violet, gelatinous masses of pigment soluble in water.

On humid, sandy soil.

¹ For a more accurate indication of herbarium specimens, especially where the labelling is not wholly adequate, I have used the customary abbreviations; these are followed by my own revision numbers.

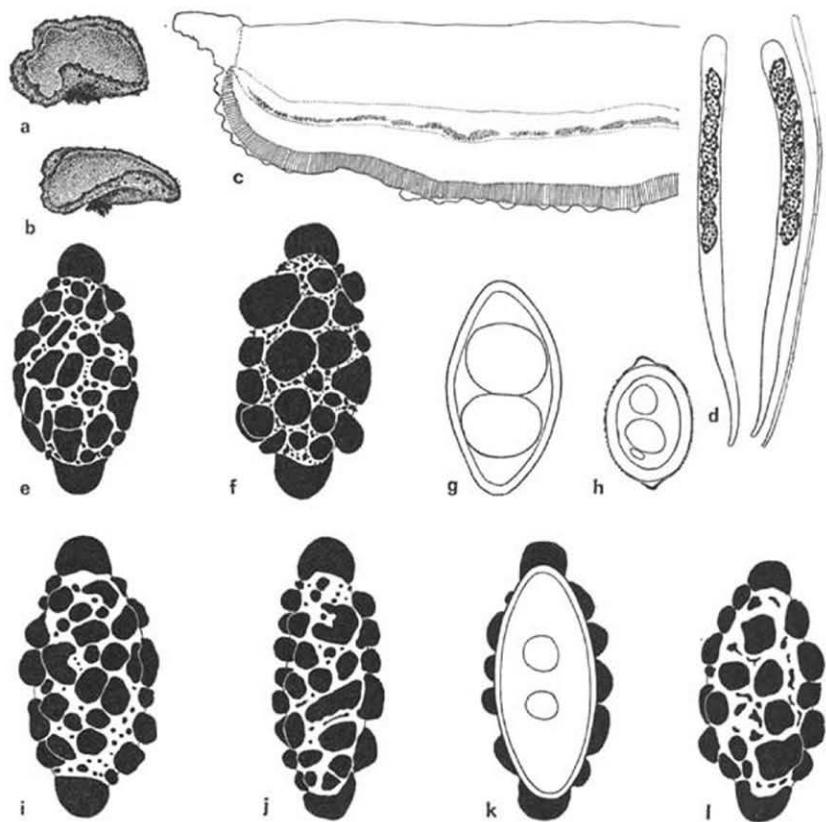


Fig. 1. *Jafneadelphus amethystinus*. — a, b. Habit of fruit-bodies, $\times 3.5$. — c. Diagrammatic section of fruit-body, $\times 50$. — d. Asci and paraphysis, $\times 200$. — e, f, i, j, l. Ascospores, $\times 1600$. — g, h. Young ascospores in optical section, $\times 1600$. — k. Ripe ascospore in optical section, $\times 1600$. (d, i-l, from lectotype of *J. amethystinus*, K-A2453; a-c, e-h, from coll. Petersen, L.)

SPECIMENS EXAMINED.—**Great Britain:** *Phillips, s. loc.*, XI. 1875 (K-A1980, as '*Ascobolus amethysteus*'; contaminated with *Ascobolus behnitziensis* Kirschst.); *Phillips, s. loc.*, XI. 1875 (K-A2453, lectotype of *A. amethystinus*, holotype of *Peziza phillipsii*; contaminated with *Ascobolus behnitziensis* Kirschst.; as "*Peziza (Humaria) phillipsii*" in Herb. Cooke); *Rodger*, woods near Perth [Scotland] *s. dat.* (K-A2454).

Denmark: *P. M. Petersen*, on sandy soil, near "Krudtvaerket", Frederikvaerk, Sjaelland[†] 10.X.1967 (C, L).

When Phillips (1875) described *Ascobolus amethystinus* two species were involved: a species of *Ascobolus* and *Peziza phillipsii* Cooke (Cooke, 1876: 48; Wakefield, 1920; van Brummelen, 1967: 146, 206).

From Phillips' description and study of the authentic material it is clear that he had mainly described the *Peziza*. At any rate all the decisive characters mentioned in the description refer to the *Peziza*. When Cooke (*l.c.*) described *Peziza phillipsii* from the same parcel, he probably divided Phillips' collection into two parts (my revision numbers K-A1980 and K-A2453), the former containing for the most part a species of *Ascobolus* identified as *Ascobolus behnitziensis* Kirschst., the latter part chiefly fruit-bodies of the *Peziza*. This latter collection is here formally designated as holotype of *Peziza phillipsii* and lectotype of *Ascobolus amethystinus* Phill. emend Wakef.

Cooke (1876) and Phillips (1887: 90) considered *Ascobolus amethystinus* in part as a synonym of *Peziza phillipsii*. Phillips did not mention *A. amethystinus* under *Ascobolus* in his "Manuel of the British Discomycetes". Moreover, Masee (1895: 417) studied and redescribed the type of *Peziza phillipsii* and placed *Ascobolus amethystinus* in the synonymy of *Humaria phillipsii* (Cooke) Mass. Bearing in mind the principle of priority, Wakefield (*l.c.*) proposed the name *Galactinia amethystina* (Phill.) Wakef. The position of this species in *Galactinia* (Cooke) Boud. (= *Peziza sensu auct.*) is not acceptable, however, because no part of the ascus-wall stains blue with iodine.

Because of the strong similarity in structure of the excipulum and flesh, the type of ascospore ornaments, and the absence of blue staining of the ascus-wall with iodine I have placed this species in the genus *Jafneadelphus* Rifai in the Humariaceae.

In the species of *Jafneadelphus* described so far (cf. Rifai, 1968) the colour of the disk and the receptacle is usually brown and sometimes purplish-brown. *Jafneadelphus amethystinus* is easily recognized by its abundant, dark purplish-violet pigment.

The purplish-violet pigment, abundantly present in the slightly gelatinous hymenium and among the exterior cells of the excipulum, readily dissolves in water and other mounting media, and stains the surrounding objects, e.g. ascospores, in the microscopical preparations. Superficially this species resembles *Jafneadelphus calosporus* Rifai and *J. ferrugineus* (Phill. apud Cooke) Rifai, especially because of the ornamentation of the ascospores. It differs markedly, however, from the latter two species in the structure of the details of the outer layer of the excipulum and the shape of the ascospores.

Further, Masee & Crossland (1906: 9) described this species also from fresh specimens, collected near Masham in England. In this material the asci measured "270-290 \times 15 μ " and the ascospores "22-23 \times 12 μ ".

Some well-preserved fruit-bodies from Denmark, sent by the kindness of Dr. H. Dissing, enabled me to augment the description of this species.

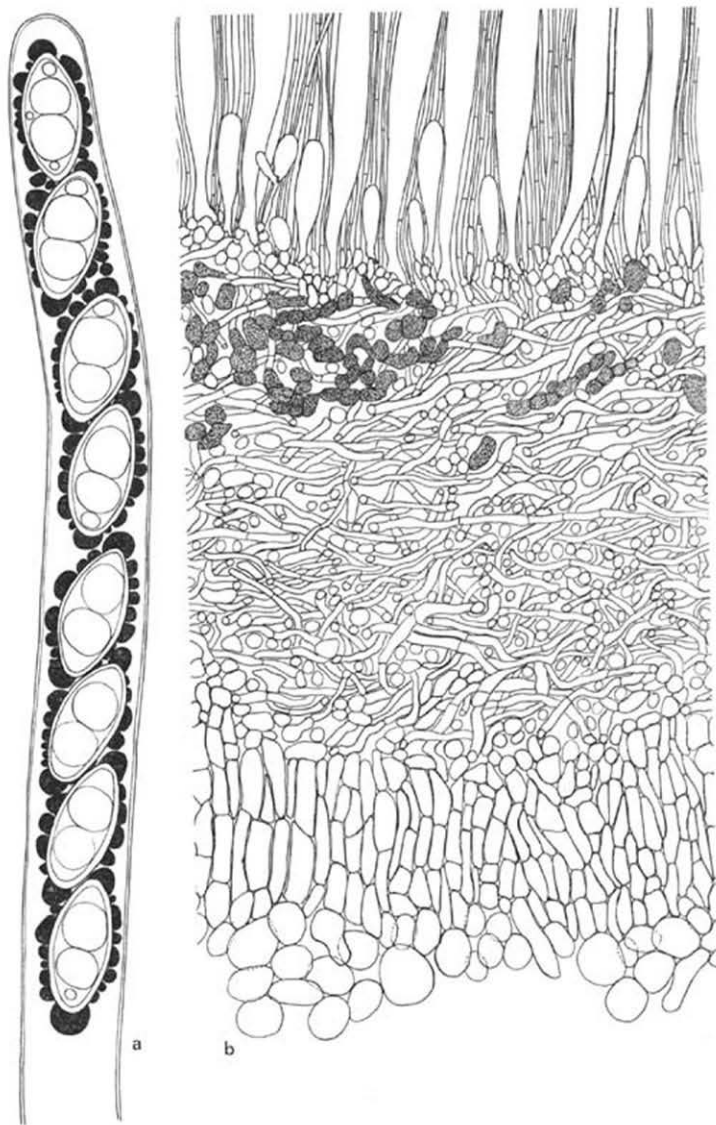


Fig. 2. *Jafneadelphus amethystinus*. — a. Ascus, $\times 1000$. — b. Section of excipulum, flesh, hypothecium and lower part of hymenium, $\times 500$. (From coll. Petersen, L.)

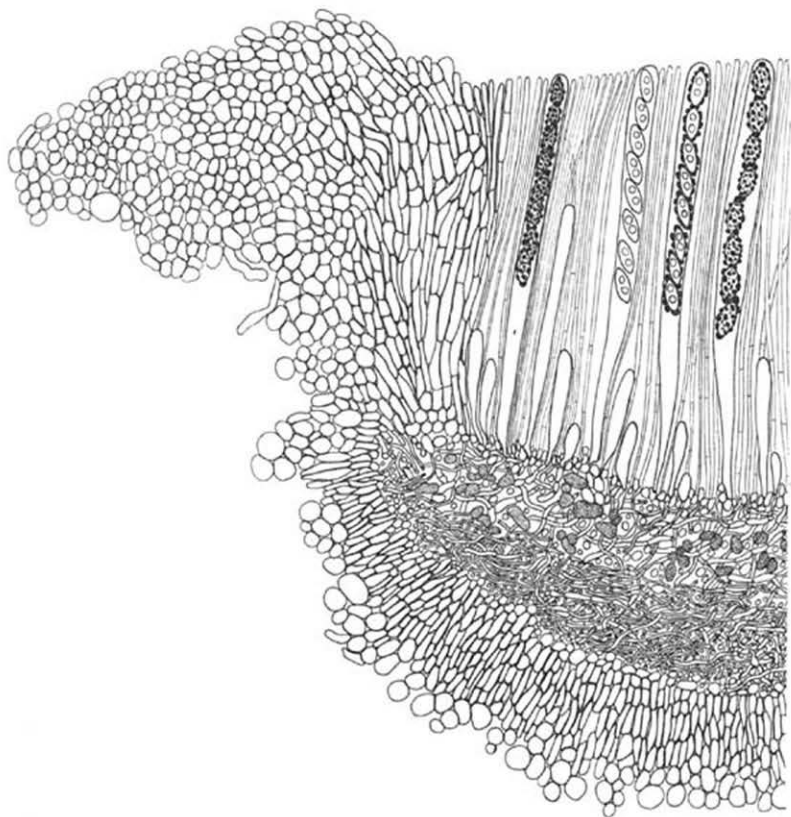


Fig. 3. *Jafneadelphus amethystinus*. — Median section of margin of fruit-body, $\times 250$. (From coll. Petersen, L).

***Saccobolus succineus* Brumm., spec. nov.**—Fig. 4

Apothecia sessilia, 90–170 μ diam. Receptaculum initio globulare et luteolum, denique pulvinatum et succineum, laeve. Asci clavati, apice truncati, 100–120 \times 27–31 μ , 8-sporei, pariete omnino iodo caerulescente. Sporum fasciculi elongati, 41–55 \times 15.5–18.5 μ . Ascosporeae secundum typum I dispositae, ellipsoideae, 18.5–20.5 \times 9–10 μ , punctis inter sese distantibus ornatae. Paraphyses valde ramosae, irregulariter filiformes, 1.7–2.6 μ crassae, apice leviter incrassatae, cellulis terminalibus materia succinea repletis. In fimo elephantorum equorumque invenitur. Typus: *van Brummelen 2661* (L).

Apothecia solitary or in small coherent groups, superficial, sessile, 90–170 μ across, 100–120 μ high, watery-fleshy. Receptacle at first globular and pale yellow,

then pulvinate and amber-coloured, sometimes slightly irregular in shape, smooth, without margin, seated on a narrow base. Disk at first flat, then convex, pale yellow to amber-coloured, sometimes rather vividly amber yellow, dotted with the black tips of protruding ripe asci. Hypothecium very thin. Flesh not clearly differentiated. Excipulum of one layer of subglobular or somewhat elongated cells $6-16 \times 6-12 \mu$ (textura globulosa). Asci clavate with a short stalk, with truncate apex, $100-120 \times 27-32 \mu$, 8-spored, the wall blue in Melzer's reagent. Spore-clusters elongated, $41-55 \times 15.5-18.5 \mu$, surrounded by a thick gelatinous envelope. Ascospores arranged according to pattern I (cf. van Brummelen, 1967: 40), ellipsoid, often slightly asymmetrical or ventricose; at first hyaline, then violet to brownish-purple, finally brownish, $18.5-20.5 \times 9-10 \mu$, ornamented with a regular pattern of isolated dots; pigment in a thin layer about 0.3μ thick. Paraphyses rather frequently branched, septate, irregularly filiform, $1.7-2.6 \mu$ thick, not or slightly enlarged, up to 4μ in the terminal element which is filled with an amber-coloured substance.

On dung of elephant and horse.

ETYMOLOGY.—From Latin, succineus, amber-coloured.

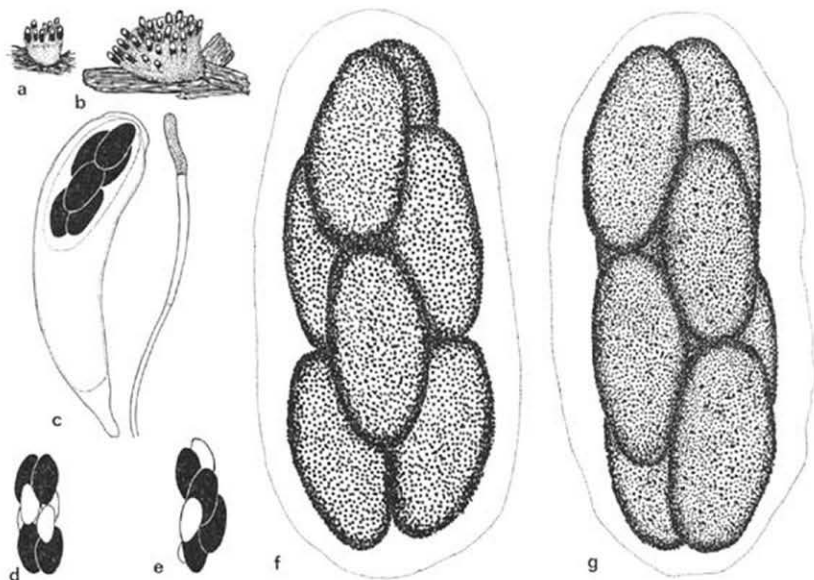


Fig. 4. *Saccobolus succineus*. — a, b. Habit of fruit-bodies, $\times 55$. — c. Ascus and paraphysis, $\times 200$. — d, e. Spore-clusters showing anisospory, $\times 200$. — f, g. Spore-clusters, $\times 1600$. (All from type.)

SPECIMENS EXAMINED.—**Thailand**: van Brummelen 2661, on dung of wild elephant (sent by Mr. C. F. van Beusekom), Khao Yai, prov. Kanchanaburi, 10.V.1968 (L, holotype); van Brummelen 2662, on dung of horse (sent by Mr. C. F. van Beusekom), Erawan National Park on the Mae Khlong, prov. Kanchanaburi, 15.V.1968.

Judging by the yellowish pigment in the paraphyses and the arrangement of the ascospores in the cluster this is a typical representative of *Saccobolus* sect. *Saccobolus*. The ascospores are arranged according to a symmetrical pattern, with four longitudinal rows of two spores. In fully mature asci, as a result of contraction the clusters are up to 10 % shorter than in almost mature ones.

Saccobolus succineus is related to *S. citrinus* Boud. & Torrend and to *S. truncatus* Vel., occupying a somewhat intermediate position between these species. It differs from *S. citrinus* mainly in its broader ascospores, the slight contraction of the cluster, the finer ornamentation of the episporium, and the colour of the disk. It can be distinguished from *S. truncatus* by its smaller asci and ascospores, different degree of contraction of the spore-cluster, and more vivid colour of the disk.

This is the first time that in a species of *Saccobolus* anisospory has been found within a single spore-cluster. In some fruit-bodies high frequencies of clusters with two or four colourless and smaller ascospores occurred (Fig. 4d,e).

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CLUES FOR THE DETERMINATION OF THE SPORE-SIZES IN BOUDIER'S ILLUSTRATED PUBLICATIONS

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A scale communicated in a letter written by Boudier makes possible the establishment of the spore-sizes in his earlier publications; it is here reproduced. Similarly, but with a different scale, the sizes of the spores in Boudier's publications from 1885 onwards can be reevaluated. His microscopic measurements have been found to be usually about 10 % too high.

The correct interpretation of Boudier's descriptions of fungi in his earlier publications is often hampered by his omission of the sizes of the microscopic details. This is especially true of his "Mémoire sur les Ascobolés" (Boudier, 1869) in which many species of Ascobolaceae were described and illustrated. Even a cursory study of the fine plates accompanying this *mémoire* reveals that the microscopical drawings do not agree with the relevant enlargements.

Contrary to most of the others, the spore-drawings in Boudier's early publications were usually drawn to the same scale of enlargement, which was stated to be 340 times. This, however, is far too low.

In the British Museum (Natural History) I found by chance a letter written by Boudier on 21st July 1878, probably directed to M. C. Cooke (Fig. 1). In this Boudier explained how he arrived at his enlargement of the spore-drawings.

It is evident that Boudier himself strongly doubted whether the numeral he stated was correct. Probably 340 as well as the other figures he gave for his enlargements of the microscopical drawings refer to the optical enlargements by his microscope of certain combinations of objectives and oculars. This he inferred from information received from Nacet, the manufacturer of his instrument.

It was Boudier's (1886: 138) habit to measure the objects drawn by means of a self-made scale. The scale from his letter about the drawings indicated by $\frac{340}{1}$ makes it possible to determine the correct sizes of the spores and to establish the exact enlargement of these drawings. Since the measuring-scale in its total length represents 0.1 mm, the correct enlargement of his early spore-drawings is in reality about 840 times. This fully agrees with the enlargement Boudier gave for the spore-drawings in his succeeding illustrated paper (Boudier, 1881).

In 1885, however, Boudier slightly changed the usual enlargement of his spore-drawings to 820 times (instead of 840). From then on his values for microscopic sizes in the descriptions were exaggerated. After that, because of an error in the construction of his measuring-scale (cf. Maire, 1917: 247; 1926: 47, his measurements were usually about one-tenth too high.


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 PHARMACIEN DE 1^{re} CLASSE
 De l'École supérieure de Paris
 Lauréat
 DE L'ACADÉMIE DE MEDECINE
 ET DES HOPITAUX
 A MONTMORENCY
 (Seine-et-Oise)


Montmorency, le 21 Juillet 1878.

Mon cher Collègue,

Je vous remercie beaucoup
 cher Monsieur, des observations
 que vous me donnez sur les
 espèces dont je vous ai envoyé
 les dessins, Mais comme vous
 je suis très indécis sur la valeur
 à accorder aux $\frac{340}{1}$ que j' mets
 sur mes dessins.

Mon Microscope est un ^{Microscopie}
 de Nacher. J'indique le n° $\frac{340}{1}$
 comme celui que ma donné
 m' Nacher lui-même comme
 représentant l'amplification
 produite par son objectif n° 6
 et son oculaire n° 1. J'emploie
 cette formule comme plus commode

pour moi et chargeant moins la
 planche que de mettre la longueur
 et la largeur en M. Millim. Sachant
 que sous cette amplification $\frac{340}{1}$
 1 millim = 

une spore qui aurait, par exemple
 $0,022^m$ de long sur $0,011^m$ à 12. comme celle
 de P. Vesiculosa par exemple sera
 représentée sous cette amplification
 de $\frac{340}{1}$ ainsi .

J'espère, cher Monsieur,
 qu'avec ces diverses indications
 il vous sera facile d'accorder
 mes mesures avec les vôtres.

Boudier

Fig. 1. — Part of Boudier's letter with a scale used to measure spores in his early spore-drawings that were enlarged about 840 times. (Natural size).

Since Boudier's drawings are models of accuracy and no deviations from the reproduction-scale of the later drawings could be established, even now it is possible to measure the spores in these drawings with a correct measuring-scale.

Using the scale reproduced in Figure 2 details can be measured from drawings with an 820-times enlargement, thereby making it possible to control the spore-measurements in most of Boudier's publications after 1885. Among these is his 'Icones Mycologicae' (Boudier, 1904-1911).

Although this method of measuring is very indirect it provides more reliable spore-sizes for most of Boudier's fine drawings than those given previously.

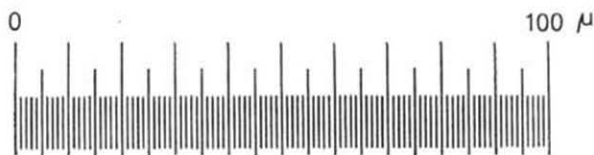


Fig. 2. — Scale to measure spores in Boudier's drawings with an enlargement of 820 times.

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NOTES ON EUROPEAN POLYPORES—III¹
Notes on species with stalked fruitbody

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For the most part the species or specific names discussed belong to the genus *Polyporus* sensu stricto; a few of them belong to *Albatrellus* S. F. Gray and *Coltricia* S. F. Gray. It appears not only that the taxonomy of many species is far from settled but also that quite a number of protologues have never been scrutinized with care. Here an attempt is made to emend the names of a number of species. Further studies are needed before some of these species can be definitively delimited and their nomenclature determined. *Polyporus agariceus* (König) ex Berk. sensu Bourd. & G. is called *P. anisoporus* Mont.; *P. picipes* Fr., *P. badius* (Pers.) ex S. F. Gray; *P. lentus* Berk. and allied forms are referred to *P. floccipes* Rostk., &c. A recapitulation at the end of the paper briefly reviews many of the conclusions.

Except in a few cases it has been impossible to associate the specific names discussed here with type specimens that are still preserved. This has necessitated thorough going study of the protologues. Many of the original descriptions involved are brief and often very incomplete, making determination of the species difficult, especially if no accompanying figures were published. Even where this is not the case there are discrepancies between text and figures or else the text is too brief and the figure not readily recognizable. In one of two instances, where the author (Bulliard) dealt with a mixture of species, it looks as though occasionally characters of the two species were entered in a single figure; this would explain the different interpretations.

Moreover some of the species are themselves rather poorly known so far, even species that appear the most often in local lists. To give only one instance, I find it a most puzzling problem to make up my mind about *Polyporus arcularius*. Italian mycologists owe mycologists working in Northern Europe a thorough study of this species.

As a whole the species of *Polyporus* emend. (including *Polyporus* sensu stricto, *Leucoporus*, *Hexagona* sensu stricto, and *Melanopus*) produce very variable fruitbodies, many of which may be difficult to identify. Dwarf specimens with a cap of only a few millimetre diameter are occasionally found in species in other fruitbodies of which the cap may often be as much as four to ten centimetres in diameter.

ACKNOWLEDGEMENT.—I am particularly grateful to Mrs. E. van Maanen-Helmer, Amsterdam, for her painstaking advice in an attempt to improve the English text.

¹ Part I appeared in *Persoonia* 4: 337-343. 1966, Part II in *Persoonia* 5: 47-130. 1967.

agariceus. — *Boletus agariceus* König, in herb.; *Polyporus agariceus* (König) ex Berk. 1843: 371.

The following discussion is based on the assumption that the species that Bourdot & Galzin (1928: 531) called *Leucoporus agariceus* is a 'good' one, even though it varies as to the size of both the fruitbodies and the pores. The pores are big enough to justify the qualification of ample-pored.

The epithet 'agariceus' used by the French authors must be reconsidered. At one time Bresadola (1915: 291) called the European fungus *Polyporus agariceus* (König) ex Berk., a species originally described from Ceylon. Petch (1916: 89) was not convinced that Bresadola had interpreted the species correctly. As conceived by Bresadola the species would be not only widely distributed in the tropics of the Old World, but it would also occur in Europe as far north as the Baltic Sea. Judging from Bresadola's determinations of certain collections from the Philippine Islands I think that as far as the Indomalaysian region is concerned there is an earlier published name for the species he had in mind, viz. *Polyporus umbilicatus* Jungh. However, I regard it as premature to take up this name for the European fungus; careful taxonomic study on a world-wide scale is needed before nomenclative decisions can be made in this respect. I should not be surprised if certain elements now referred by North American authors to *P. arcularius* turned out to be close to the *P. agariceus* of European authors and *P. arculariformis* Murrill (1904: 151 fs. 1-4). These thinner-capped forms have a tendency to contract upon drying, which causes concentric rugosity of the cap and makes the pores look less elongate than in the fresh fruitbody.

In a report on Ceylon fungi Berkeley himself retracted his species in the following passage:

"I formerly considered [*Polyporus agariceus*] as distinct from *P. arcularius* because it did not accord with the characters given by Fries, but as these appear to have been taken from Micheli's figure, and Dr. Montagne's plant from the south of France, (of which I have a specimen) is referred to *P. arcularius* by Fries himself, I have been induced to alter the opinion I had previously formed."—Berkeley (1854: 497-498).

This argument is far from convincing. I would suggest that Montagne's fungus was really *P. agariceus* sensu Bourd. & G. I can see no particular reason why Fries should have known *P. arcularius* in its original sense any better than other authors. As is pointed out below he had not seen it himself when he compiled Micheli's species and validly published its name; moreover, it appears from his later work that he never had particularly keen insight in the taxonomy of the species of *Polyporus* of the *Leucoporus* group.

Previous to his use of the name *P. agariceus* for certain European collections Bresadola had taken up the name *P. floccipes* Rostk. (q.v.); this was published later (1848) than *P. agariceus*. In my opinion this interpretation is incorrect. Soon after having fixed upon *P. agariceus*, Bresadola concluded that the correct name for the European fungus was *Polyporus boucheanus*. This, too, I find difficult to accept (see under 'boucheanus').

Not until more is known about the complex as a whole would I consider the introduction of a name based on extra-European material for the European taxon. This leads to acceptance of the name *Polyporus anisoporus* Delastre & Mont. apud Mont. (1845) for the European fungus; it was included by Bresadola in his conception of *P. agariceus*.

anisoporus. — *Polyporus anisoporus* Delastre & Mont. apud Mont. 1845: 357.

Bresadola (1915: 291) first referred this taxon to *Polyporus agariceus* (q.v.) and later (Bresadola, 1916: 223) to *P. boucheanus* (q.v.). The original description strongly suggests that *P. anisoporus* is the earliest name available for the European specimens of the species he had in mind. In the preceding note I mention why for the time being I prefer to adopt this name as the correct one.

arcularius. — *Polyporus exiguus, pileo hemisphaerico* . . . Mich. 1729: 130 pl. 70 f. 5; *Boletus arcularius* Batsch 1783: 97 (devalidated name); *Polyporus arcularius* (Batsch) per Fr. 1821: 342.

The correct interpretation of *Polyporus arcularius* is, in my opinion, still an open question. Micheli described it in the pre-Linnaean era: his description is brief and is accompanied by a crude figure with the pores drawn in a much simplified manner. Batsch provided a binomial name for it, *Boletus arcularius*. It should be pointed out that Batsch based his phrase exclusively on Micheli's account. He had not seen the species himself, as he made clear by not marking the name with an asterisk, a sign he reserved for species that he knew from personal experience (see Batsch, 1783: 3, 4). There is no supplementary description. As will be shown below this conclusion is of importance; it is diametrically opposed to what Kreisel (1963: 136) wrote: "*P. arcularius* wurde zuerst von Batsch (1783) aus der Umgebung von Jena in Mitteldeutschland beschrieben." The mere fact that Batsch provided it with a binomial name is in itself no proof that Kreisel was right; this is implied by the title of Batsch's "Elenchus fungorum". The book was meant to cover a wider scope than merely the publication of personal descriptions of fungi found around Jena. He introduced many new binomials, on a large scale for species depicted by Schaeffer, for instance, apparently without knowing that Schaeffer himself had done the same thing many years earlier.

Fries accepted Batsch's name in the starting-point book in the recombination *Polyporus arcularius*. His treatment consists of a blending of Micheli's account and the devalidated protologue of *Boletus exasperatus* Schrader (1794: 155); Schrader had cited *B. arcularius* as synonym of his *B. exasperatus*, which he described from Germany. The information taken from Schrader's description dominates in that of Fries. Fries himself had not seen any collection, as is testified by his indication "v. ic.", which refers to Micheli's figure.

Boletus exasperatus Schrad. is now a forgotten name and the description is scarcely sufficient for deciding to which of the smaller ample-pored species of *Polyporus* it

was given. The habitat ("in arborum truncis") differs from that of the type of *B. arcularius*, which is fallen branches, as can be seen from Micheli's figure. It would seem that the following four taxa should be kept in mind when trying to identify *B. exasperatus*: viz. *Polyporus floccipes* (q.v.) with long spores, and *P. agariceus* sensu Bourd. & G. (= *P. anisoporus*), *P. arcularius* sensu Bres. and perhaps even ample-pored forms of *P. brumalis*, all of which have smaller spores.

Before deciding on the status or the identity of *P. arcularius* the type of this name must be agreed upon. So far no one has deliberately excluded Micheli's figure from the conception covered by the name *P. arcularius* and its basionym, which was especially introduced in order to incorporate Micheli's species in the Linnaean system. Furthermore Schrader's listing of *B. arcularius* as synonym of his own *B. exasperatus*, in conjunction with Fries's preference for the name that was provided for Micheli's species, together form an impressive set of arguments for leaving the currently implied typification unimpaired: viz. the fruitbody depicted by Micheli's figure. Accordingly it is selected here, making Italy the type locality.

It must now be decided which species should go with the name *Polyporus arcularius*. Some years ago Kreisel (1963) published a paper devoted to the distinction between three closely related species of *Polyporus* subgen. *Leucoporus*. He called them *Polyporus brumalis*, *P. ciliatus* (including *P. lepideus*), and *P. arcularius*. The last species was separated from the two others because of its ample pores and the dissepiments which in dried specimens are irregularly lacerate along their edges. This second feature is not without significance, but it must not be overrated; I have seen specimens of *P. brumalis* which also show this feature to a pronounced degree.

Kreisel paid attention to only a few gross differential characters; no full descriptions were included in his paper and microscopical data were left out completely. What was also omitted was any mention of the species that under the name *P. agariceus* (q.v.) both Bresadola and Bourdot & Galzin had kept distinct from *P. arcularius*. This makes it difficult to decide from Kreisel's paper alone to which taxon he was actually applying the name *P. arcularius*; I assume that he had *P. anisoporus* in mind.

I follow Bresadola and Bourdot & Galzin in distinguishing between *P. arcularius* sensu Bres. and the fungus they called *P. agariceus* (= *P. anisoporus*). Bourdot & Galzin called the former *P. arcularius* var. *strigosus* Bourd. & G. The other variety they admitted within their conception of *P. arcularius* is *P. arcularius* var. *scabellus* Bourd. & G., which is now identified with *P. brumalis* sensu stricto. They considered that the two varieties were connected by intermediate forms; this thesis deserves special attention from mycologists who live in regions where they regularly come across both taxa. In this connection it may be recalled that there is also a *Polyporus brumalis* var. *megaloporus* Kreisel (1963: 133) that perhaps represents one of these intermediates.

Overholts's conception (1953: 271) is apparently far from homogeneous. This is testified to not only by his synonymy but also by his figures. Modern North American authors have completely forgotten the existence of *Boletus alveolarius* Bosc

(1811: 84 pl. 4 f. 1) \equiv *Polyporus alveolarius* (Bosc) per Fr. (1821: 343); this may turn out to be the correct name for one of the elements they include in *P. arcularius* (cf. *P. arcularius* sensu Overholts, 1953: pl. 36 fs. 215-216).

badius. — *Boletus badius* Pers. 1801: 523 (devalidated name); *Grifola badia* (Pers.) per S. F. Gray 1821; *Polyporus badius* (Pers. per S. F. Gray) Schw. 1832, not *P. badius* Berk. 1841, not *P. badius* (Berk.) Lév. 1846, not *P. badius* Jungh. ex Bres. 1912.

Boletus badius Pers. was well described when first published. It was placed in a generic subdivision characterized, "Pileo dimidiato stipitato: stipite laterali." I do not hesitate to recognize in it the species that Fries was later on to call *Polyporus picipes*. In the specific description compare:

"subcespitosus, pileo glabro tenace badio (castaneo), margine pallidior, . . . stipite laterali brevi crasso nigrescente-cinereo. . . / Hab. praesentim ad *Salices* cavas, autumnno. / Color pilei primo lutescens, et substantia mollis, ille in adultis praesentim in disco depresso spadiceus et fere nigrescit. Pori in uno latero stipites decurrunt, minuti. / OBS. Variat pileo integro."—Persoon (1801: 523).

Persoon listed as synonyms *Boletus perennis* Batsch (*q.v.*; \equiv *B. durus* Timm), while *B. calceolus* Bull. (*q.v.*) was appended as a variety.

At first Fries (1821: 352) did not differentiate between *Polyporus varius* and *Boletus badius*. He considered the latter to be a mere form of the first (form a). In a note to this broadly conceived *Polyporus varius* he then proceeded to describe his future *Polyporus picipes*, without actually giving it a name. When he definitely introduced *P. picipes* he simultaneously misinterpreted *P. varius* (*q.v.*) by reserving the latter name for certain big forms of the latter species and he continued to refer *Boletus badius* as a synonym of this conception. It is astonishing to note not only that Fries himself did not identify *Polyporus picipes* with *Boletus badius*, but also that other mycologists failed to realize that Fries's restricted interpretation of *P. varius* was incorrect.

The correct species name for the present fungus will be considered in the discussion on *P. picipes*.

batschii, see *perennis* Batsch.

boucheanus. — *Favolus boucheanus* Kl. 1833: 316 pl. 5; *Polyporus boucheanus* (Kl.) Fr. 1838.

A most troublesome name given to a European species of *Polyporus* is *Favolus boucheanus* Kl. There are two rival interpretations for this ample-pored taxon. The first, which is ascribed here to Lloyd for the sake of convenience, associates the name with the long-spored species that Lloyd identified with *P. forquignonii* (\equiv *P. floccipes* *q.v.*). He published a photographic picture of what he regarded as the type specimen (Lloyd, 1911: 86 f. 506, "the long stemmed one").

Bresadola (1915: 291) disagreed and revived the name *P. boucheanus* for what he had previously called *P. agariceus* Berk. (*q.v.*) and *P. floccipes* Rostk. (*q.v.*), a species with medium-sized spores: "*Pol. Boucheanus* Kl. typicus, sporas habet 7-9 = 3-4 μ nec ut in Lloyd: Synopsis of the Section Ovinus p. 86, 12 = 7 μ . *Polyporus* ibi descriptus est *P. lentus* Berk. (idem *Pol. Forquignonii* Quél.!) qui, in Herbario Berolinensi cum *Pol. Boucheano* Kl. confusus fuit. *Polypori Boucheani* typici, ad truncos *Betulae*, unicum extat specimen, ex parte destructus, quod sporas habet 7-9 = 3-4 μ ."

If the problem were merely that of choosing between the two interpretations I, for my part, would of course select that of Bresadola. But it is not as simple as that. The protologue of *P. boucheanus* depicts a few fruitbodies which are all rather short- and thick-stalked; the description states, "Stipes 2-5 lin. crassus, $\frac{1}{2}$ -unciam longus". This rules out the specimen depicted by Lloyd as the type, which has a stalk of about 2.5 \times 0.7 cm; but in my opinion it also rules out the species that Bresadola had in mind, which is typically slender-stalked and in the examples with short stalks these are relatively much thinner than those depicted by Klotzsch. This leaves us with Klotzsch's protologue as the only guide.

His description and figures are not sufficiently detailed. No coarse, hyaline hairs are mentioned (but compare, "stipite . . . tomentoso") and the substratum is not the usual dead branches but is given as "in truncis emortuis *Betulae*"; in other respects the protologue (and especially the figures) would suggest *P. lentus*. The figures perhaps also suggest *P. coronatus* (poorly developed fruitbodies of *P. squamosus*), but the stalk has no far-decurrent pores and is not blackish (only 'fuscescent'). For still another suggestion as to its identity, see under 'tiliae'. As the name *P. boucheanus* is no longer in current use, mainly it would appear, because the taxon is interpreted in divers ways, and because I am not prepared to make up my mind about its correct identity, I am forced to consider it not only a nomen ambiguum but also a nomen dubium.

brumalis. — *Boletus brumalis* Pers. 1794: 107 | 1797: 27 (devalidated name); *Polyporus brumalis* (Pers.) per Fr. 1821: 348.

Since no type material was left, the correct interpretation of *Boletus brumalis* should be based primarily on the original description, which is very brief. It runs: "*B. brumalis*, pileo convexo tenui cinereo-pallido margine ciliato; poris oblongis candidis. — *Bol. lacteus* Batsch var. α . Elench. fung. tab. 42. | Prov. ad trunc. Novemb. Decemb. mense. (Stipes centralis fibrillosus pileo concolore.)" Persoon's next description (1801: 517) is somewhat more detailed. The pores remained 'oblong'. Fries's earliest description (1818: 255) of *P. brumalis* suggests what has since been called *P. subarcularius* *q.v.*

When validly publishing *Polyporus brumalis*, Fries (1821: 348, 518) ascribed the name to Persoon and cited "*B. brumal.* Pers. syn. p. 517!" in the synonymy. Hence in my opinion this re-publication of the name should not change the type. His description and the accompanying synonymy indicate that in 1821 he conceived the species broadly, apparently including *Polyporus lepideus* Fr., which he had

previously described but which was not mentioned on this occasion. The shape of the pores was given a wide range, "poris subangulatis . . . Pori angulati l. juniores oblongi, . . . denticulati." This description is sufficiently broad for us to assume that the original fungus was also included. Although not every word of Persoon's original description will be found paired, there are no serious discrepancies, except perhaps as to the ciliate margin, which Fries did not mention.

Thus true *Polyporus brumalis* should have oblong pores. Nothing is stated explicitly about their size but it may be concluded that in view of those depicted on Batsch's figure cited in the original description these would be rather small. This tends to exclude the species with 'big' pores, like *Polyporus arcularius* and *P. anisoporus*, leaving only *P. subarcularius*. Batsch's figure suggests this species too, although the pores were drawn as thick-walled; apparently they were either not yet fully developed or else somewhat abnormal. I have seen specimens agreeing exactly with Batsch's figure. The other features of the original description (1794) perhaps do not agree too well, but in my opinion they do not really contradict an identification of *P. brumalis* with *P. subarcularius*. The ciliate margin mentioned in Persoon's original description might point to the *P. arcularius* of certain European authors, but the pores of this species, which are much bigger, would not match those of *Boletus lacteus*.

When Fries (1838: 430) re-introduced *P. lepideus* the pores of *P. brumalis* were emphasized as being 'oblong and angular with thin, sharp dissepiments', rather than 'minute, round' in *P. lepideus*. I feel little hesitation in concluding that Fries's emendation fully covers at least *P. subarcularius*, which occurs in Sweden, where I collected it.

The above conclusion agrees with that of Kreisel (1963: 130), who in addition pointed out that as far as Germany is concerned the meaning of the specific epithet 'brumalis' supports the present interpretation. The forms that have been confused with the true *P. brumalis* start forming fruitbodies in the spring.

It is not surprising that for a long time there was confusion with similar species; the result was often a very broadly interpreted species that became a dumping ground for all the other species closely or more remotely resembling *P. brumalis* sensu stricto.

It is evident that at an early stage Bresadola started to restrict his conception of *P. brumalis* to what Fries called *P. lepideus* (*q.v.*). He was followed by Bourdot & Galzin, who referred the true *P. brumalis* (as emended by Fries) to a broadened interpretation of *P. arcularius*, to which species it seems in fact to be more closely related than to *P. lepideus*. In more northern countries the name *P. arcularius* has quite often been used to designate typical *P. brumalis*, e.g. by Lundell (1937: 14 No. 438; &c.).

calceolus. — *Boletus calceolus* Bull. 1787: pl. 360 (devalidated name); *Boletus calceolus* (Bull.) per St-Am. 1821; *Polyporus calceolus* (Bull. per St-Am.) Balbis 1828.

Boletus calceolus Bull. is an extremely troublesome name because the taxon to

which it was given was not satisfactorily described. It is important to discover the correct identity of the species with which the name will have to be kept associated. Its name was revalidated at an early date and should be seriously considered in connection with the species that is here called *Polyporus badius* (*P. picipes*).

It was introduced on Bulliard's plate 360. The tuft of fruitbodies depicted on it is here considered to be its type. Bulliard's original conception of his species presumably included at least two distinct species. Persoon (1801: 523) made of *Boletus calceolus* a variety of *Boletus badius* (*Polyporus picipes*).

According to the data furnished by the figure on Plate 360 the type collection is remarkable through a combination of several features: its big size, the strongly streaked surface of the cap, and the lack of black on the stalk. It makes on me the impression of representing exceptionally big fruitbodies of *Polyporus varius*, except that its surface is too dark. The complete lack of a black skin on the stalk is easier to reconcile with *P. varius* than with *P. badius*. In the former species it is not unusual that only the base of the stalk is black, while I have seen slender-stalked and smaller forms with no sign of black on the stalk at all. The information contained in the letterpress on the plate also suggests *P. badius*. It is likely that Bulliard mixed up the two species from the start, which makes the choice of a type specimen (in this case the depicted tuft of fruitbodies selected above) desirable. (It is not altogether unlikely that Bulliard blended characters of the two species on the plate.)

The size of the largest fruitbody on Plate 360 is 14 cm across the cap; according to the accompanying text its size is only average: "Ce champignon est représenté ici dans sa grandeur moyenne, il y en a qui ont jusqu'à quinze pouces de diamètre." These bigger dimensions would be almost absurd for *P. varius*, but not for *P. badius*; they were presumably taken from collections of the latter species; this is also suggested by the mention of the substratum as being usual (hollow willows). However the strongly streaked (virgate) surface of the cap, the general shape, and the lack of any indication of a wavy margin (appearing upon drying) of the tuft depicted on Plate 360 in my opinion point rather to *P. varius*.

According to the text on a later plate (Bulliard, 1789: pl. 455 f. 2) and to the final account in the "Histoire", Bulliard (1791: 338) eventually found this species on very diverse substrata; it also ranged widely in colour, size, and shape. He finally decided that *Boletus elegans* Bull. (q.v.) and *B. calceolus* of the earlier plate were merely different expressions of the same species. This second account also contains sufficient evidence to justify the conclusion that he confused at least two species, *P. badius* and *P. varius*.

Summarizing, I think that the original *Boletus calceolus* is a mixtum compositum of two species, one of which is *P. varius*, and that this is presumably represented by the type, the other element being *P. badius*.

It looks as though in the main Quélet's description of *Polyporus calceolus* (1888: 404, under *Leucoporus*) is in agreement with this identification of Bulliard's species with *P. varius*: "Peridium . . . crème puis chamois ou canelle et rayé de brun . . ."

ciliatus. — *Polyporus ciliatus* Fr. 1815: 123 (devalidated name), not *P. ciliatus* Hornem. 1806 (devalidated name); *Polyporus ciliatus* Fr. per Fr. 1821: 349.

Polyporus lepidus Fr. 1818: 253 (devalidated name), 1821: 352 (incidental mention); *Polyporus lepidus* Fr. per Steud. 1824: 347, Fr. 1832: 146, 1838: 430.

Kreisel (1963) combined all the minute-pored forms of *Polyporus* subgen. *Leucoporus* occurring in Europe into a single species and several other authors now follow him. He calls the broadly conceived species *Polyporus ciliatus* and divides it into two taxa, viz. forma *ciliaris* and forma *lepidus*. The former corresponds to *P. ciliatus* Fr., the latter to *P. lepidus* Fr. A third form belonging to this complex is *P. vernalis* q.v.

It should be pointed out that Bourdot & Galzin (1928: 530) had come to nearly the same conclusion, but they called the species *P. brumalis*. With this name they accepted Bresadola's interpretation of it, but while Bresadola clearly restricted it only to *P. lepidus*, Bourdot & Galzin gave it a much wider scope, without, however, mentioning the name *P. lepidus*, and without describing a form exactly agreeing with *P. ciliatus*, another name they did not mention. Yet I think that Kreisel would have included a good portion of their *P. brumalis* in his forma *ciliatus*; this *P. ciliatus* further includes *P. vernalis*; and finally I would suggest that what they called *P. brumalis* f. *crassior* and f. *rubripes*² is referable to *P. lepidus*. *Polyporus brumalis* as redefined by Kreisel was treated by Bourdot & Galzin as a variety of *P. arcularius*; it corresponds to *P. brumalis* f. *subarcularius* Donk = *P. subarcularius* (Donk) Bond. Further observations on this matter are still urgently needed.

For a correct interpretation of *P. ciliatus* (sensu stricto) it may be useful to point out that Fries, when he first published the species (1815), did not definitely include *Boletus ciliatus* Hornem., although he borrowed its epithet. His phrase is followed by "Disp. Bol. msc." (apparently referring to a manuscript by Fries that was never published under this title); and he added the remark, "An distinctus ab *B. ciliato* Fl. Dan., qui ad hunc l. *P. circularium* [= *arcularium*] pertinet." In the "Systema" (1821) he listed *Boletus ciliatus* Hornem. ("Fl. Dan.") as synonym under *P. brumalis*.

coriaceus Huds., see *lobatus*.

coronatus. — *Polyporus coronatus* Rostk. 1848: 33 pl. 17.

It is evident that *Polyporus coronatus* belongs to the same section as *Polyporus squamosus*, which is characterized by rather long spores. The original plate shows the stalk to be short and thick, with the tube-layer decurrent right down to the very base, so that it is impossible to decide whether or not the stalk may develop a black base (*P. squamosus* group sensu stricto) or produce spiny, hyaline hairs (*P. floccipes*). However the text states that the stalk is black at its base and, moreover, that the fruitbody develops "an in Fäulniss übergehenden Buchenstämmen"; these

² Identified with *Polyporus rubripes* Rostk., which certainly is something different because of its big pores.

features, combined with the plump fruitbody (as drawn), as well as with the rather distinctly scaly cap, for which no strigose hispidity is mentioned, rule out *P. floccipes* (= *P. lentus*) and refer *P. coronatus* to *P. squamosus*.

It is likely that in the main the species was correctly interpreted by Bourdot & Galzin (1928: 525; as a subspecies of *Melanopus squamosus*): no hispidity on cap or stalk, distinct scales, short stalk "réticulé par les pores jusqu'à la base ordinairement noirâtre"; the habitat however, is different from that of Rostkovius's fungus: "sur branches mortes, tenant à l'arbre, hêtre . . ." Bourdot & Galzin regarded their subspecies as "évidemment une forme de *M. squamosus* réduite dans ses dimensions par son habitat sur branches mortes d'un petit diamètre . . ." If this is true *P. coronatus* does not deserve even the rank of a subspecies or variety.

Malençon (1952: 41) came to a different conclusion. He thought that *P. coronatus* formed part of the *P. lentus* [= *P. floccipes*] complex which he, therefore, started to call *Melanopus coronatus*. This is in partial agreement with Bourdot & Galzin, who remarked: "[*M. coronatus*] passe aux formes suivantes [*M. forquignonii*, *M. lentus*] par des spécimens qui ont même aspect et même taille, mais à écailles plus étroites, à 1-3 pointes hyalines redressées, avec bords du chapeau subciliés et décurcurrence des pores ciliée-plumeuse sur le stipe." If these forms are really intermediate between *P. coronatus* and *P. floccipes*, then Malençon's point of view would prevail. It is still possible, however, that they are only seemingly intermediate and in reality ought to be referred to *P. floccipes*. In any case they do not agree with the original plate of *P. coronatus*.

cristatus. — *Boletus cristatus* Schaeff. 1774: 93 [pls. 316, 317] (devaluated name), not *B. cristatus* Gouan 1765 (devaluated name), not *B. cristatus* Gmel. 1792 (devaluated name); *Polyporus cristatus* (Schaeff.) per Fr. 1821, not *P. cristatus* Fr. 1838; *Albatrellus cristatus* (Schaeff. per Fr.) Kotl. & P. 1957.

[*Boletus cristatus* Schaeff. sensu Pers. 1801: 522]; *Polyporus cristatus* Fr. 1838: 447, not *P. cristatus* (Schaeff.) per Fr. 1821.

There are two taxa of the name *Polyporus cristatus*. The first is *P. cristatus* (Schaeff.) per Fr. 1821. When Fries published this name he had compiled his conception of the taxon from literature, not having seen any collections himself. He indicated that he had seen figures ("v. ic."): these were "Schaeff. t. 316, 317", reproduced in part by "Nees syst. f. 217" (as *Boletus cristatus*), and "Schaeff. t. 113, mala" (as *Boletus flabelliformis*). The type, therefore, is the same as that of the devaluated basionym, *Boletus cristatus* Schaeff., the protologue of which includes the two plates 316 and 317. The specimens depicted on plate 316 are herewith selected as type. This is done in view of the exclusion of plate 317 ["17"] by Secretan (1833: 74).

Then Fries changed his mind. Under his new conception of *Polyporus cristatus* he stated: "Postquam tam in Scania austr. quam in duc. Mecklenburg copiose legerim mox perspexi differentiam *B. cristati* Sch." Although he referred back to the "Systema" (1821) he excluded (1838: 447) Schaeffer's taxon, only to fuse it with his erroneous conception of *Boletus lobatus* Gmel. (q.v.) under the name *Polyporus*

lobatus. In this way the second taxon with the name *Polyporus cristatus* came into being. Fries indicated that it agreed with "*B. cristatus* Pers. syn. non Schaeff." and also stated "Hic verus *Fung. cristatus* Bocc. et Vet." Persoon (1801: 522) in his turn referred back to a previous publication (Persoon, 1800: 125 & cf. his *Corrigenda*) in which he gave a revised phrase. The theoretical type of Fries's second *P. cristatus*, herewith selected, is a collection studied by Persoon before 1800 (presumably collected in Germany). It must be understood, however, that the type of *Boletus cristatus* "Pers., Syn. Fung. 522. 1801" itself was not changed; Persoon merely applied *B. cristatus* Schaeff. The citation of 'Pers.' without the simultaneous exclusion of 'Schaeff.' must be taken as an indirect reference to 'Schaeff.'

Several later mycologists started replacing the author's citation 'Schaeff.' by 'Pers.'; others continued to ascribe the epithet to 'Schaeff.' Inevitably still others got things mixed up. When the recombination *Albatrellus cristatus* was introduced its authors wrote "*Albatrellus cristatus* (Pers. ex Fr.) n.c. = *Polyporus cristatus* (Pers.) ex Fr., Syst. myc. 1: 356. 1821." In this case 'Pers.' should be renounced in favour of the more complete reference to Fries, 1821. This makes the basionym the name pertaining to the 'first' *P. cristatus*.

The question to be answered is, what is *Boletus cristatus* Schaeff. as represented by Plate 316? The plate suggests a 'fasciculate' fruitbody with deformed pilei of what is currently called *Polyporus* [*Albatrellus*] *cristatus*; the colours of the plate support this conclusion. It should be pointed out that the accompanying text (Schaeffer, 1774: opposite pl. 316) describes the species as "& solitarius & fasciculosus", and mentions neither the consistency nor the substratum. In the "Index primus" (pages numbered) the binomial *Boletus cristatus* was published with a different description ("... solitarius, lignosus ... ad truncos arborum ...") which does not really suggest *P. cristatus*; however there is a reference to the one previous description by Schaeffer himself; this accompanies the Plates 316 and 317. After some hesitation I think that after all the plate (316) selected as type does represent the modern conception of *P. cristatus*.

It was Secretan (1833: 55) who noted that the second description published by Schaeffer did not match the fungus that he (Secretan) called *Polyporus flabellatus* and which is now regarded as belonging to *P. cristatus*. He excluded Plate 317 from his conception of *P. cristatus* and applied this name to what might well be a form of *Laetiporus sulphureus*, which species is indeed suggested by Schaeffer's second (and erroneous) description. As already pointed out by Secretan, the piece of wood added to the fruitbody in the figure that Nees von Esenbeck copied from Schaeffer's work was a concession to the substratum mentioned by Schaeffer in his second description. There can be little doubt that Secretan's remarks induced Fries to exclude Schaeffer's plates (hence also including the type) from his new conception of *P. cristatus*. It may be mentioned that Secretan described *P. cristatus* under two names: *P. flabelliformis* and *P. subsquamosus*; the second was misapplied. His description of *P. subsquamosus* strongly suggests a fasciculate group of fruitbodies of *P. cristatus* (modern sense) as depicted on Schaeffer's plate 316;

compare also Fries's description of his second *P. cristatus*, "ramosus . . . imbricatis . . . Valde versiformis."

cyathoides. — *Boletus melanopus* var. *cyathoides* Sw. 1810: 10 (devaluated name); *Polyporus melanopus* var. *cyathoides* (Sw.) per Fr. 1821; *Polyporus cyathoides* (Sw. per Fr.) Quélet 1872, misapplied.

The original description of *Boletus melanopus* var. *cyathoides* is as follows: "... pileo infundibuliformi striato-radiato, fasciis obsoletis; stipite excentrico, . . . minor. / Stipes excentricus, uncialis, niger. Pileus centro depressus striis radiatis fasciis obscurioribus versus marginem. . . Afarten är mindre med excentrisk fot och hatten prydd med cirlära ringar, rostfärgad eller grå." This rather strongly resembles a description of *Boletus melanopus* Pers. and Fries (1821: 348; and onwards) identified the two without restrictions.

Quélet (1872: 270) raised this variety to specific rank as *Polyporus cyathoides*, but misapplied the name to a form of the *P. ciliatus* group, an error corrected by Quélet himself and by Fries; they called Quélet's fungus *P. vernalis* (*q.v.*).

durus, see *perennis* Batsch.

elegans. — *Boletus elegans* Bull. 1780: pl. 46 (devaluated name), not *B. elegans* Bolt. 1788 (devaluated name), not *B. elegans* Schum. 1803 (devaluated name) per Fr. 1838; *Polyporus elegans* (Bull.) per Trog. 1832, misapplied; *Melanopus elegans* (Bull. per Trog) Pat. 1887 (nomen nudum), apud Rolland 1890.

[*Boletus elegans* Bull. sensu Fr. 1838: 440 (as *Polyporus*)]; *Polyporus varius* subsp. *elegans* Donk 1933: 139 ["Fr. . . (non Bull.)"]; *Melanopus elegans* Konr. & M. 1935: pl. 426 f. 2 ["(Fries) . . . non Bulliard"], not *M. elegans* (Bull. per Trog) Pat. apud Rolland 1890.

The identity of *Boletus elegans* Bull. is not easily assessed. It is possible that the fruitbodies depicted on the original plate were old and had undergone some chemical treatment which had changed their colour; compare, "comme [ce Bolet] . . . est un Mets friand pour les insectes il faut l'exposer à différentes fois à la vapeur du soufre". Donk (1933: 139) refused to recognize in it the form of *Polyporus varius* which Fries described under this Bulliardian name; in this Fries assimilated Bulliard's fungus as "var. saturator".

In later work Bulliard considered his *B. elegans* to be a mere form of *B. calceolus* (*q.v.*) and the name disappeared for some time before being restored by Trog (1832: 553), perhaps for *Polyporus badius* (*P. picipes*): "Der Hut ist glatt, kastanienbraun . . ." Fries (1838: 440) followed, but this time the name was applied to typical *P. varius* (*q.v.*): "pileo . . . pallido"; this application became widely used.

I find it difficult to make up my mind about the fungus Bulliard depicted, but after all I cannot see in it either *P. badius* (as presumably Trog did) or *P. elegans* sensu Fr. Hence I am again (cf. Donk, *l.c.*) forced to decide in favour of *P. varius*,

particularly the big, dark coloured form, rather than the form with pale cap and more slender stalk for which Fries took it. Figure B of Bulliard's plate 46 is chosen here as representing the lectotype.

Authors who have been aware of the discrepancy between Bulliard's fungus and the one to which Fries applied the name, retaining Fries's conception with the explicit exclusion of Bulliard's fungus, introduced a new taxon according to the present "Code": *Polyporus varius* subsp. *elegans* Donk, *Melanopus elegans* Konr. & M. Authors who wish to continue to distinguish between Fries's fungus and what is currently called *Polyporus varius* should, in my opinion, adopt the denomination *P. varius* (Pers.) per Fr. sensu stricto for it.

floccipes. — *Polyporus floccipes* Rostk. 1848: 25 ("floccopes") pl. 13 ("floccopus").

So far the correct interpretation of *Polyporus floccipes* Rostk. does not seem to have been settled satisfactorily. Bresadola (1903: 72) ascribed medium-sized spores to it (cylindrical, $7-9 \times 3-3.5 \mu$). Afterwards he included this conception in what he first called *P. agariceus* (q.v.) and then *P. boucheanus* (q.v.). A look at Rostkovius's plate suggests not only the species Bresadola had in mind but also some forms that North American authors have included in their conception of *P. arcularius*: compare for instance Overholts 1953: pl. 36 fs. 215, 216.

However, meticulous inspection of Rostkovius's plate with a hand lens and careful perusal of the text raise doubts; compare: "Der Hut ist . . . mit Haaren besetzt, die ihm ein schuppenartiges Ansehen geben. Der Rand . . . ist . . . gefranzt. . . Der Stiel ist . . . schuppig wie der Hut. Unten an der Wurzel ist er mit weissen, abstehenden, 3''' langen Haaren besetzt." This last character even suggested the specific epithet. On the plate the hairs on the cap and base of the stalk are shown to be coarse and white. The general habit and robust appearance of the depicted fruitbodies come very close to the original figure of *P. lentus*. This in combination with the above-quoted passage from Rostkovius's description has convinced me that *P. floccipes* belongs to the *P. lentus* complex.

globularis. — *Polyporus globularis* Pers. 1825: 44 \equiv *Polyporus exiguus, coriaceus, albus, lignis adnascens* Mich. 1729: 130 pl. 70 f. 7.

Polyporus globularis Pers. is a name given to a fungus described and depicted by Micheli. The description is too short for certainty: besides the phrase cited above, Micheli also wrote "Fungus porosus, minor, candidus, siccioris substantiae, . . . D. Breynii, ex libro depicto a Clarissimo Sherardo communicato." The type locality is presumably northern Germany or Poland; J. Breyne (1637-1697) lived in Danzig, now Gdansk. The figure shows a single slender-stalked fruitbody with central, half-globular cap, growing from a thin branch.

This may be some form of the *Polyporus brumalis* complex or, rather, a 'numularius' form of *P. varius* in weathered, bleached condition (such as is depicted by Konrad & Maublanc, 1935: pl. 428 f. 1), but no black base of the stalk was mentioned or drawn. Somewhat of a nomen dubium.

lateralis. — *Boletus lateralis* Bolt. 1788: 83 pl. 83 (devalidated name) per Hook. 1821, not *Boletus lateralis* Bundy 1883 (n.v.); *Polyporus varius* var. *lateralis* (Bolt. per Hook.) Pers. 1825.

Shape and colour as appearing on the plate and the remark that "the root . . . is black" (a colour not indicated on the plate) assign this fungus to the synonymy of *Boletus varius* Pers.; Persoon himself listed it accordingly. Bolton said "I have seen old specimens elsewhere, of a dark dusky brown colour, and of a substance as hard and firm almost as oaken wood". Might these specimens perhaps have been *Polyporus badius*?

lentus. — *Polyporus lentus* Berk. 1860: 237 pl. 16 f. 1.

Polyporus lentus Berk. was originally described from branches of *Ulex*. For some time mycologists did not know precisely what to do with it, whether to associate it with the group of *P. squamosus* (long spores) or with the ample-pored forms of the *P. brumalis* complex (medium-sized spores). Bourdot & Galzin made it a subspecies of *P. squamosus* and a study of Berkeley's material by Bresadola and Malençon has shown that it had indeed the long spores of this species. Separation of *P. lentus* from *P. forquignonii* has proved to be untenable. However I cannot agree with Malençon that *P. coronatus* (*q.v.*) must also be included in a broadened conception of *P. lentus*.

Bourdot & Galzin (1928: 525–527) included the *P. lentus* complex in *P. squamosus* as two subspecies. The link between them would be certain forms of *P. coronatus*. According to Bourdot & Galzin the latter "passe aux formes suivantes [*P. forquignonii*, *P. lentus*] par des spécimens qui ont même aspect et même taille, mais à écailles plus étroites, à 1–3 points hyalines redressées, avec bords du chapeau subciliés et décurrence des pores ciliée-plumeuses sur le stipe." Malençon (1929: pl. 34, as *Leucoporus forquignonii*) depicted a form apparently closely approaching such specimens; they may be referred provisionally to the *P. lentus* complex. Later on he (Malençon, 1952: 42) also defended the specific autonomy of the *P. lentus* complex from *P. squamosus* and I have followed him, without, however, calling it *P. coronatus*. This assignment of specific rank to the *P. lentus* complex and, perhaps, also to *P. coronatus* is strongly recommended for future research.

So far the correct name for *P. lentus* has not been convincingly settled. I am inclined to refer the earlier published *P. floccipes* (*q.v.*) to this complex. The possibility that *P. boucheanus* (*q.v.*) is a still earlier name should not as yet be completely excluded. Compare also the discussion on *P. tiliae*.

lepideus, see *ciliatus*.

leptocephalus. — *Boletus leptocephalus* Jacq. 1778: 142 pl. 12 (devalidated name); *Polyporus leptocephalus* (Jacq.) per Fr. 1821; *Melanopus varius* f. *leptocephalus* (Jacq. per Fr.) Bourd. & G. 1925.

Boletus leptocephalus Jacq. was well described and depicted. The picture shows comparatively short-stalked fruitbodies growing on rather thick branches. The colour of the cap ("cervinus") indicates that it had a rather distinct and only slightly torn pellicle. Persoon and Fries (who knew the species from the original account alone) upheld it because the stalk lacked black. Even so I have little reason to hesitate to refer *B. leptocephalus* to *Polyporus varius* and to compare it especially with the form that has been called *P. numularius*. Bourdot & Galzin (1928: 528) reported that, "D'après les déterminations de Quélet, ce serait une forme de *M[elanopus] elegans* ou *numularius*, selon la taille, à stipe unicolore, assez allongé, qui se rencontre quelquefois."

lobatus. — *Boletus lobatus* Gmel. 1792: 1435 (devalidated name); *Polyporus lobatus* (Gmel.) per Fr. 1838: 448, misapplied; = *Boletus coriaceus* Huds. 1778: 625 (basionym), not *B. coriaceus* Scop. 1772 (devalidated name), not *B. coriaceus* Batsch 1783 (devalidated name), not *B. coriaceus* Batsch 1786 (devalidated name).

Fries (1838: 448) ascribed the name *Polyporus lobatus* to "Gmel. — Schrad. sp. p. 162 excl. syn. (inclusive *P. imbricato*)" and re-introduced it to replace *Polyporus cristatus* (Schaeff.) per Fr. 1821 ("Schaeff. t. 315, 316"). In so doing he apparently committed two errors. First, *P. cristatus* (Schaeff.) per Fr. 1821 (*q.v.*) and *P. cristatus* Fr. 1838 are the same species. Secondly, the basionym (*Boletus lobatus* Gmel.) taken up by Fries is a synonym of *Laetiporus sulphureus* (Bull. per Fr.) Murrill.

The history of *Boletus lobatus* Gmel. is briefly as follows. The taxon to which the name was given was originally called *Boletus coriaceus* Huds.: "acaulis coriaceus convexus lobatus flavus laevis, poris tenuissimis." The phrase in itself is not quite adequate for determining the fungus, but this is remedied by the two synonyms and the other references cited and by the habitat ("in truncis arborum"). The name was accepted by Willdenow (1787: 392). Gmelin changed it into *Boletus lobatus*, with retention of the original phrase; his only (indirect) reference is to Willdenow. Hence *Boletus lobatus* Gmel. = *Laetiporus sulphureus*.

It is evident that Fries did not apply *Polyporus lobatus* in this sense. Apparently he had something abnormal before him so that Bresadola (1897: 69) dismissed Fries's fungus as *Polyporus cristatus* "status vetustus, induratus". I am not sure whether he was correct but can offer no alternative opinion.

montagnei. — *Polyporus montagnei* Fr. ("in litt.") ex Mont. 1836: 341; Fr. 1838: 434, not *P. montagnei* Bres. 1916; *Coltricia montagnei* (Fr. ex Mont.) Murrill 1820.

[*Polyporus montagnei* Fr. ex Mont. sensu Quél. 1872: 269 *pl.* 17 *f.* 4, exclusive of type]; *Polyporus montagnei* Bres. 1916: 240, not *P. montagnei* Fr. ex Mont. 1836.

The correct identity of *Polyporus montagnei* has become a puzzle that needs special attention because of the conflicting views published about it. The following is a brief review of them. *Polyporus montagnei* Fr. was published by Montagne at an

early date (1836) and ascribed to Fries, "in litt."; type locality, "dans la Garenne de Sedan" in northern France. At a later date Montagne determined a collection from Algeria in the same way; no description was given but a coloured figure of a fruitbody was published (Durieu & Montagne, 1846-9: pl. 33f. 2). In my opinion it represents *Coltricia cinnamomea*. The next important step was taken by Quélet (1872), who published a new description of his own. It must be stipulated from the outset that he did not describe a new species under a homonymous name; he gave the author as "F." without more and remarked that the fungus was "d'abord trouvé dans une forêt des Ardennes par Montagne."

Lloyd (1908a: 7) concluded that there were two species involved. In connection with *Polystictus cinnamomeus* he remarked that the author of this name, Jacquin,

"... gave such a correctly drawn colored picture that I do not see how his work can be ignored, and this is the only plant known in Europe that agrees with it in any respect. Fries never referred any plant to Jacquin's picture, and carried it as a doubtful species through all his works. He balked at the one word 'fragilis' in Jacquin's description, as Persoon had done before, and he called the plant when he received it from France *Polyporus Montagnei*. The co-types in Montagne's herbarium are the same as our American plant [that Lloyd called *Polystictus cinnamomeus*]. Bresadola has given a very good figure of it in Fung. Trident. not as bright however as our American plant. The coloring of Quélet's figure (T. 17) is too yellow and the plant too obese. I think it must be some other species but know no plant that agrees with it in any degree."—Lloyd (1908a: 7).

From accompanying descriptions and figures I conclude that Lloyd interpreted *Coltricia cinnamomea* correctly and in the same sense as Bresadola; that he was the first to assume that two species were involved, of which one was referred to *C. cinnamomea*; and that he did not examine the specimen from Montagne that Fries has studied.

Very soon afterwards Lloyd issued a special Letter (1908b: 1) in which in some respects he altered his conclusions as quoted above:

"There are in Fries' herbarium the original types, sent by Montagne, and also collections by Quélet which are the same plant, and as soon as we saw them we recognized that they can not possibly be our American plant, referred to above [*C. cinnamomea*]. Whether or not the co-types in Montagne's herbarium are the same as found in Fries' herbarium, we prefer not to say until we re-examine them, but from our recollection, they are not."—Lloyd (1908b: 1).

Bresadola (1916: 240) came to conclusions similar to those expressed in Lloyd's first note: "Typus ex Montagne in Herbario parisiensi idem est ac *Polyporus perennis* (L.) Fr.; typus vero Queletii, a Queletio in 'Champignons de Jura et des Vosges' depictus, species est diversa..." He proceeded to distinguish between two homonymous species, of which the one he ascribed to Quélet he accepted identifying it with *Polystictus obesus* Ell. & Ev. and *Polyporus lignatilis* Britz.

As pointed out at the beginning of the present note it is not correct to accept a species *Polyporus montagnei* 'Quélet' that differs from *P. montagnei* 'Fr. ex Mont.' simply because Quélet did not introduce a new species but merely applied the latter name. By his exclusion of the type of *P. montagnei* Fr. ex Mont. it was Bresadola

himself who in fact published a later homonym (*P. montagnei* Bres.) based on *P. montagnei* sensu Quéf.

Montagne's material in his herbarium (PC) was also inspected by Gilbertson (1954: 231 f. 2), who concluded that it "agrees with the current American concept [of *P. montagnei*] and differs markedly from *Polyporus perennis*, particularly in the spores and context hyphae."

From the above discussion it follows that Montagne's collection in Paris was determined as belonging to three different species: as *Polystictus cinnamomeus* by Lloyd, as *Polyporus perennis* by Bresadola, and as *Polyporus montagnei* sensu auct. by Gilbertson. What is needed is a careful analysis of the protologue to see whether it is possible to decide who was correct. Such an analysis brings to light three conclusions: (i) that the name came from Fries, but that the validating description was Montagne's; (ii) that Montagne's material was already scanty when he drew up the description; and (iii) that his description clearly points to *P. montagnei* as currently understood.

Ad (i). What Fries wrote to Montagne the latter rendered thus: "Proximus *P. tomentosus* (Rostk. . . sub. nom. *Polypori rufescentis*) et *P. perenni* Fr., sed abunde diversus Fr. in litt." There is no description.

Ad (ii). Montagne also wrote, "Ayant adressé au professeur Fries mes échantillons les plus complets, on en trouvera sans doute une bonne description (meilleure surtout que je ne pourrais le faire avec ceux qui me restent), dans l'Építome regni mycologici [= *Epicrisis* 1838]."

Ad (iii). Montagne's description runs: "pileo suberoso molli azono, tomento leproso secedente tecto stipitique deformi ferrugineis, poris rotundis ampli integris obtusis." This clearly excludes *Coltricia cinnamomea* and *C. perennis* but it agrees well with *Polyporus montagnei*, current sense.

The improved description that Montagne expected from Fries (1838: 434) did not materialize; Fries's phrase is a copy of that of Montagne, with a few brief observations appended. Thus, *Polyporus montagnei* "Fr. 1838" is technically based on the same material as *P. montagnei* Fr. ex Mont. 1836, viz. the material that remained in Montagne's herbarium. The material in Upsala must be rated as an isotype.

numularius. — *Boletus "numularius"* Bull. 1782: pl. 124 (devaluated name); *Polyporus varius* var. *numularius* (Bull.) per Fr. 1821; *Boletus numularius* (Bull. per Fr.) Mérat 1821; *Polyporus numularius* (Bull. per Fr.) Pers. 1825; ≡ *Boletus ramulorum* Gmel. 1792 (devaluated name).

The original plate and description of *Boletus numularius* Bull. are excellent and leave no shadow of doubt about the fungus the author had in mind. It is the small, slender form of *Polyporus varius*, with rather dark coloured cap (but very often soon weathered to white) and growing on small branches: "il ne vient jamais que sur le bois mort, et seulement sur de menus branchages que l'on trouve par terre."

It has long been in doubt whether this taxon deserves independent specific

status; at present it is usually referred to as a form, variety, or subspecies of *Polyporus varius* sensu Fries (that is, the big form with similarly coloured and streaked cap). I have collected it many times and studied quite a number of herbarium specimens and no longer doubt that it is merely an extreme growth form of *P. varius*, as other mycologists had conclude earlier.

perennis. — *Boletus perennis* Batsch 1783: 103 & 1786: 182, 184 pl. 25 f. 129 (devalidated name), not *B. perennis* L. 1753 (devalidated name); ≡ *Boletus durus* Timm 1788 (devalidated name); ≡ *Boletus batschii* Gmel. 1792 (devalidated name).

As stated under 'badius', Persoon referred *Boletus perennis* Batsch to *P. badius* (*P. picipes*) and I do not hesitate to follow him in this. Batsch's second and amplified description (1786: 182, 184) contains, *inter alia*: "Der Hut ist glatt, rostfarben, und mit zarten unscheinbaren dunkeln Linien überzogen . . . [Der Rand] ist von einer mehr rothbraunen Farbe. . . . [Der Stiel] ist von einer grauen ins nussbraune schielende Farbe, am Unterende aber Schwarz berust. . . . Ich fand dieser Art . . . in hohlen Weiden, allemahl schon trocken und hart."

Polyporus varius (big form) is fleetingly called to mind, for instance in connection with the "zarten unscheinbaren dunkeln Linien" on the cap, but there is too much other evidence (in particular Batsch's coloured figure) to counterbalance this supposition.

The name *Boletus perennis* being preoccupied, it was replaced by *B. durus* Timm and *B. batschii* Gmel.

picipes. — [*Polyporus* sp., unnamed, Fr. 1821: 353]; *Polyporus picipes* Fr. 1838: 440; ≡ *Polyporus picipes* Rostk. 1848.

As explained in the discussion on *Boletus badius* Pers., Fries overlooked the identity of his *Polyporus picipes* with the Persoonian species. The latter he originally included under *Polyporus varius*. When he excluded both *P. picipes* and his conception of *P. elegans* from this broadly conceived taxon, he left *Boletus badius* attached to the residue as a synonym and it has since remained there. In this way Fries committed two errors, (i) the name *Boletus badius* should have remained associated with the segregate *P. picipes*, and (ii) the name *P. varius* retained for the residue should have been applied as the correct name of the segregate Fries called *P. elegans*.

These errors have caused many European authors to fail to distinguish between *P. badius* and *P. varius* sensu Fries 1838 (discussed under 'varius') until Pilát restored *P. badius* to the status of an independent species, which it fully deserves. He first called it (erroneously) *P. varius* but soon adopted the name *P. picipes* for it.

In later work Fries cited the "Systema" as the place of publication of the name *Polyporus picipes* and his reference has been consistently copied by later authors. What actually happened, however, was that Fries described the species in a note in the "Systema" (1821: 353) without giving it a name. This he did only in 1838,

thus a considerable time after *Boletus badius* Pers. was re-validated and had become available as *Grifola badia* (Pers.) per S. F. Gray in 1821, which I accept as basionym for the correct name. In view of another name validly published earlier, in the year 1821, viz. *Boletus calceolus* Bull. per St-Am. (*g.v.*) it is only with some hesitation that I do this. This name I now consider to be a synonym of *P. varius* sensu lato.

Polyporus picipes Rostk. (1848: 39 pl. 20) was published as a new species, "Rostkovius" being given as the author's citation. Fries (1874: 535) wrote of this "singulare errore s.n. *P. picipedes* ut nova species descriptus, sed mea diagnosis [Fries, 1838: 440] veri verbatim transcripta". This being the case, *P. picipes* 'Rostk.' must stand as a typonym of *P. picipes* Fr. The accompanying plate is a rather good picture of Fries's species.

subarcularius. — *Polyporus brumalis* f. *subarcularius* Donk 1933: 133, 134; *Polyporus subarcularius* (Donk) Bond. 1953: 470 f. 121.

This taxon was introduced while *Polyporus brumalis* was still a poorly defined and variously interpreted species from which *P. ciliatus* Fr. emend. Kreisel (including *P. lepideus* Fr.) had not yet been removed. Forma *subarcularius* was designed to receive the element that is here called *P. brumalis* (sensu stricto).

subsquamosus. — *Boletus subsquamosus* L. 1753: 1178 (devalidated name); *Polyporus subsquamosus* (L.) per Fr. 1821.

[*Boletus subsquamosus* L. sensu Wulf. 1789: 342; *Boletus carinthiacus* Pers. 1801: 514 (devalidated name); *Polyporus carinthiacus* (Pers.) per Roques 1832.

In my opinion it is rather evident what species Linnaeus (1755: 453) had in mind when he published *Boletus subsquamosus*: *Albatrellus ovinus* (Schaeff. per Fr.) Kotl. & P., a common species in many parts of Sweden.³ Compare: "Pileus magnus convexus carnosus albido-flavescens margine acutus, nec glaber nec viscidus, sed saepe subsquamosus. Pori difformi nivei. Stipes brevis glaber aut venoso-reticulatus." It would be quite a coincidence if, among the few species of pore-fungi described by Linnaeus *Boletopsis griseus* (Peck) Bond. & S. had been hidden away in a misleading description. *Boletopsis griseus* seems to be very rare in Sweden—if it actually occurs in that country at all.

When Fries (1815: 122) accepted Linnaeus's species⁴ he added an extensive description. The phrase runs: "pileo carnosio albido subsquamoso, poris oblongis

³ *Albatrellus similis* Pouz. (1966: 274 pls. 5, 6) differs in having amyloid spores. When, quite recently, I was collecting fungi in Carinthia (from where *Polyporus carinthiacus*, mentioned below, was described) I could not distinguish satisfactorily between the two species [?] in the field. The fungus recently described may also occur in Sweden.

⁴ Which he undoubtedly considered to be an integral part of his conception. Fries (1838: 428) even added a note of exclamation to the reference "Linn. Succ. 1250!" [= 1755: 453].

flexuosis niveis, stipite brevi centrali", which reads almost like an extract from Linnaeus's description; in any case it does not readily suggest a different species. In the main the description supports the conclusion that Fries was also describing *A. ovinus* ("pileus . . . forma varia . . . pallidus sordide albus l. subflavescens") from big fruitbodies ("2-5 unc. latus"), soon with a rather strongly broken-up surface of the cap ["pileus . . . glaber sed in squamulas discedens (*Hydno imbricato* subsimilis)"]. Compare also his remark, "*Bolet. carinthiacus* Pers. . . (Wulf. . .) si non idem, saltem varietas." To me the fungus that was fully described by von Wulfen as *Boletus subsquamosus* and subsequently renamed *Boletus carinthiacus* Pers. is quite certainly *Albatrellus ovinus* (or the very closely related species *A. similis* Pouz.). In any case I cannot detect the slightest indication that a species of *Boletopsis* was admixed in Fries's conception of 1815. The flesh ("caro dura alba crassiuscula immutabilis") certainly does not agree with that genus. (In *A. ovinus* the flesh is firm but fragile and may become yellowish when old.)

It was this conception that was entered in the "Systema" (Fries, 1821: 346), hence I can see no reason why the epithet 'subsquamosus' could possibly be taken up for a species of *Boletopsis* Fayod. On the other hand it is true that on this occasion Fries started to associate *Polyporus subsquamosus* with *Boletopsis* by appending two varieties which belong to that genus. The description ("pileo cinereo fibrilloso . . . Stipes saepe squamosus. Pileus . . . margine villosus") and the reference to "Mich. t. 70. f. 2", figuring a form of *Boletopsis leucomelaena* show that variety " β . *P. repandus*" very probably belongs to *Boletopsis*. Variety " γ . *P. leucomelas*", of which Fries had not seen any specimens, is *Boletopsis leucomelaena* itself.

Still later Fries (1863-4: 33 pl. 53) published under the name *Polyporus subsquamosus* a plate which is most probably why European authors started to call *Boletopsis grisea* by the name *P. subsquamosus*. I am almost convinced that the plate represents giant fruitbodies of *B. leucomelaena* that are paler than usual rather than old ones of *B. grisea*. It is still not certain that *B. grisea* really occurs in Sweden; I have searched recent Swedish literature in vain for clearly recognizable records of it.

Lundell (1946: 5 No. 1309) noted:

"*P. subsquamosus* L. ex Fr. is probably only a large and pale form of *P. leucomelas*. Fries reports in Stürp. agri femsjon. (p. 58) *P. subsquamosus* (but neither its β *repandus* nor its γ *leucomelas*) as growing ('passim') in Femsjö. I sought for it there in the years 1937, 1939, 1940 and 1943, but in vain, finding *P. leucomelas* in some localities. I also found *P. leucomelas* in that wood near Uppsala from which O. Rob. Fries (Ark. f. Bot. 6: 15 p. 28) reports *P. subsquamosus*. It should be admitted, however, that I have never seen so pale and giant specimens as those described and illustrated by Fries in Sv. ätl. svamp. (p. 33, pl. 53) under the name of *P. subsquamosus*. Another interpretation of this species should perhaps also be taken into consideration, viz. that it may represent an unusually large and thick form of *P. melanopus* Sw. ex Fr."—Lundell (*l.c.*).

I am inclined to think that Lundell meant "a large and pale form of *P. leucomelas*" literally and that *Boletopsis griseus* did not occur to him.

tiliae e. — *Polyporus tiliae* S. Schulz. 1866: 42 (nomen nudum) apud Fr. 1874: 528, 747.

Polyporus tiliae S. Schulz. presents another problem. The following is a description compounded from those published by Fries and Kalchbrenner, both of which were apparently based on portions of the type collection:

Fruitbody vividly ochraceous, solitary. Cap orbicular, $1\frac{1}{2}$ –2", flat, slightly depressed above stem, glabrous, not scaly, thin-fleshy, gradually thinner toward margin; margin acute, often lobed. Hymenophore concolorous, somewhat decurrent; pores large, irregular; walls becoming lacerate. Stalk somewhat excentric, narrowed at the base, firm, not black, short, $\frac{1}{2}$ – $\frac{3}{4}$ " \times 3–5", solid. Flesh soft, coriaceous-tough, a little less coloured. Spores big, oblong-ovoid, smooth, with an oil-drop, white. — On rotting branches of *Tilia*.⁵

The well-developed stalk lacking a black rind even at its base together with the lack of scales on the cap would exclude *P. squamosus* and *P. coronatus*; the complete lack of coarse, hyaline hairs (if these had not disappeared or been overlooked) would exclude *P. floccipes*; finally it is difficult to reconcile the ample-pored forms with the medium-sized spores of the *P. brumalis* group with the description. Until some other acceptable suggestion has been made the only alternative is to admit *P. tiliae* as an autonomous species. A possibility might be: old specimens of *P. floccipes* in which the disappearance of the scales on the cap and the hyaline, soft, bristle-like hairs were caused by a combination of adverse weather conditions, handling, and poor drying. It is not entirely out of the question that *P. intermedius* Rostk. represents a similar condition of the same species.

Another reason for maintaining *P. tiliae* tentatively is that a species answering to its description seems to exist in North America. Relying on published descriptions I would suggest the identity of *P. tiliae* with *P. pennsylvanicus* Sumstine (1907: 137, n.v.), the original description of which fully agrees: rather small cap (2–6 cm in diam.) without scales, similar colour, short, non-blackening stalk, and habitat (fallen branches). Overholts (1914: 108) and Lowe (1934: 29) supplied redescrptions with microscopical details which agree with those of *P. floccipes* (*P. lentus*) and *P. squamosus* (long spores). Sumstine gave "fallen branches" as the substratum in the original description; Overholts stated, "growing on old logs", and Lowe, "on the wood of deciduous trees". *Polyporus pennsylvanicus* was reduced to the synonymy of *P. squamosus* var. *glaber* Graff [= *Agaricus squamosus glaber* Batt.] by Graff (1936: 165); in this he was followed by Lowe (1942: 28). For various reasons I prefer to leave Battara's species out of consideration.

Another North American equivalent may be *P. fagicola* Murrill (1906: 35), redcribed by Lowe (1934: 30) as a species distinct from *P. pennsylvanicus*. More recently Overholts (1953: 258) made *P. pennsylvanicus* a synonym of *P. fagicola*.

⁵ Omitted, "pileus... una alteraque zona, parum conspicua notatus", a character emphasized by Fries, and "... pileo subzonato a tribu [*Polyporus* I. *Mesopus*] recedens". I regard this zonation as accidental and of no diagnostic significance.

The revised descriptions of *P. fagicola* reminds me of *P. floccipes* (= *P. lentus*) (*q.v.*): compare, "stem . . . conspicuously hispid, especially near the base" (Lowe, *l.c.*). On the other hand the lack of coarse, hyaline hairs on the cap might be a significant difference with the latter species.

It is interesting to note that an American author thought that he (almost) recognized the American fungus in a European collection: "*Polyporus melanopus* **P. hisingeri* [P. Karst.], Hedwigia 35: 173. 1896. The type [from Finland] is a fine specimen of the same or a very similar plant which has been called *Polyporus fagicola* Murr. in America, differing in being a much larger specimen."—Lowe (1956: 117).

Overholts (1953: 259), in discussing *P. fagicola*, also mentioned some collections that might point to a closer relationship of this species to *P. squamosus*. He also wrote that *P. boucheanus* (*q.v.*) "seems to be a similar species—in fact, it would appear to be identical, but I have seen no specimens." This suggestion would seem to be not too far-fetched, but Klotzsch stated "pileo . . . nonnunquam squamoso" and gave the habitat as "in truncis emortuis *Betulae*" for his *Favolus boucheanus*; his species disagrees in both characters from *P. tiliae*.

u m b i l i c a t u s. — *Boletus umbilicatus* Scop. 1772: 466 (devalidated name); Fr. 1832 Ind.: 64 ("umbilicus"; as synonym), not *B. umbilicatus* Schrank 1789 (devalidated name); *Boletus umbilicatus* Scop. per Spreng. 1827; *Polyaporellus umbilicatus* (Scop. per Spreng.) P. Karst. 1889.

Fries (1821:348) referred this species to *Polyporus melanopus* var. *cyathoides* = *P. melanopus* (Pers.) ex Fr. sensu stricto. If this had been correct, it would have been logical if before the introduction of later starting points for fungi were introduced the name had been taken up as an earlier published name for *P. melanopus*. This was actually done, for instance by Sprengel (*Boletus*), P. A. Karsten (*Polyaporellus*) and Romell (*Polyporus*), apparently solely on the strength of Fries's identification.

Scopoli's protologue does not support the identification of his species with *Polyporus melanopus*. His diagnosis and description run:

"DIAGN. Pileus absque fasciis, et glaber, vertice umbilicato, fusco; porulis albis. / Habitat in ramulis aridis. / Solitarius, persistens; pileo diametro lin. (7); tubulis tenuissimis, albis; stipite longo, tereti, pileo concolore, basi crassiore."—Scopoli (1772: 466).

Because the description states that the stalk is of the same colour as the cap ("fuscus") identification with *Polyporus melanopus* is practically out of the question. In view of the incomplete description it is difficult to advance another suggestion. Stressing the words "tubulis tenuissimis" as well as the habitat the following species come to mind: *Polyporus varius* (the form with not blackening stalk, see *P. leptocephalus*), *P. ciliatus* (specimens without bristles, viz. small forms referable to *P. lepidus q.v.*), and perhaps *P. tubarius*.

Being unable to make a choice, I suggest that *Boletus umbilicatus* be treated as a nomen dubium.

varius. — *Boletus varius* Pers. 1796: 85 (devaluated name); *Polyporus varius* (Pers.) per Fr. 1821.

I firmly believe that the original conception of *Boletus varius* Pers. completely overlaps that of Fries's interpretation of *Polyporus elegans* (q.v.). Persoon's original description clearly points in this direction: "pileo . . . ochraceo . . . ; colore primo dilute ochraceus subnitidus, demum obscurior margine subrufescens." The colour and the features of the stalk ("stipite sublaterali elongato ad dimidio deorsim nigro") separate it from *Polyporus badius* (*P. picipes*). "Ad truncos ut plurimum fagineos."

In order to form an accurate opinion about the fungus Persoon had in mind the following points may be mentioned. Taken in combination they will easily remove all doubt. The cap is pale ochraceous and somewhat shining (while no streaking is mentioned). The stalk is rather long ('elongate'). The cap is rather small, ("1½–3 unc. latus" ⁶) and thin ("4 lin. in medio crassus" ⁷). Moreover, *Boletus lateralis* Bolt. (q.v.) is listed as a synonym.

The modern conception of *P. varius* is not in accordance with the above conclusion; it pictures the typical species as having a bigger fruitbody with often (though not invariably) a darker coloured cap, "usually with radiate narrow streakings or fleckings of a lighter color" (Overholts, 1953: 265). In my opinion these differences are only gradual and the two forms ('varius' and 'elegans' of modern authors) merely extremes of variation within a single plastic species; these are not really separable even as varieties. A third extreme variation, or, rather, modification, received the name *P. numularius* (q.v.).

Many authors have badly confused *Polyporus varius* with *P. badius*. Fries (1821: 332) at first combined the two under the former name, as Bulliard had previously done under the name *Boletus calceolus* (q.v.). Later on Fries (1838: 440) excluded most of the typical *P. varius* element as *P. elegans*, retaining the name for an ill-defined group which in the main would seem to coincide with the modern conception of the big, darker form with streaked cap. Bourdot & Galzin (1928: 527) did not distinguish between *P. badius* and *P. varius*; it was left to Pilát to separate *P. badius* (*P. picipes*) again, but not before he had miscalled it *Polyporellus varius* (reserving the name *P. elegans* for the 'varius' complex in a broad sense, inclusive of the big form) (Pilát, 1936: 66). ⁷ Soon afterwards he took up the name *Polyporellus picipes* (Pilát, 1937: 99).

vernalis. — [*Polyporus cyathoides* (Sw. per Fr.) Quél. sensu Quél. 1872: 270]; *Polyporus vernalis* Fr. 1874: 527;

≡ [*Polyporus vernalis* Fr. sensu Quél. 1880: 195 pl. 3f. 13]; *Polyporus queletianus* Sacc. & Trav. 1911: 490, apud Sacc. & Trav. 1912: 258.

⁶ This measurement reads "1½–2 unc." in Persoon's next description (1801: 524), thus still smaller. The thickness is not mentioned on this occasion.

⁷ This explains *inter alia* his use of the name *Polyporellus varius* instead of *P. picipes* in his discussion of 1937 on page 101.

When Fries introduced the name *Polyporus vernalis* for *P. cyathoides* sensu Quél. he indicated that he had seen a picture of it. I assume that this was a copy of the one Quélet published in 1880 in connection with "[*Polyporus*] *vernal*is. Q. . . . In litt. ad E. Fries, 1873. *P. cyathoides*, Jura et Vosges, I. p. 243. *P. vernalis* Fr., Hym. p. 527. var. de *brumalis* P." From the quotation it may be concluded not only that Quélet claimed the authorship of the name (hence, *P. vernalis* Quél. apud Fr. 1874), but also that *Polyporus vernalis* as published by Fries and by Quélet are one and the same taxon. Although the descriptions by these authors show some discrepancies, there seems to be insufficient reason to base a new species (*P. queletianus* Sacc. & Trav.) on the figure that Quélet published in 1880. The discrepancies can easily be explained if it is assumed that Fries made some errors in translation, viz. "stipite . . . squamoso-fibrilloso" for "stipe . . . hérissé de fibrilles ou d'écaillés", and "pileo . . . sericeo-striato" for "chapeau . . . hérissé de soies raides".

It also appears from the published figure that *Polyporus cyathoides* sensu Quél. ≡ *P. queletianus* does not belong to *Polyporus* trib. *Pleuropus* where Quélet placed his species while he was still identifying it with the *Polyporus melanopus* subsp. *cyathoides* (Sw. per Fr.) Fr. that Fries had placed in that tribe. Compare Quélet's remark of 1872, "Ressemble au *Brunalis*" (which from Quélet's description is identifiable with the *P. brumalis* of the present paper).

Although there is a strong resemblance between Quélet's first description (as *Polyporus cyathoides*; 1872) and his more elaborate later one (as *Leucoporus brumalis* var. *vernal*is; Quélet, 1888: 403) it may be significant that there are also a few noteworthy differences: "Eté. Souches" became "Printemps. — Sur les ramilles . . ." The figure cited above shows the fruitbody arising from a twig. Fries's description (the one by which the name *P. vernalis* was validly published) is in any case merely a translation of Quélet's first description (with some errors, as indicated above, and with the addition of "[pileo] e carnosio coriaceo").

Polyporus vernalis has often been reduced to *P. brumalis* (*g.v.*) as either a variety or a form; it must not be confused with *P. brumalis* "b. vernalis" Fries (1821: 348), which is a nomenclatively different taxon.

As to the identity of *Polyporus vernalis* I have no other suggestion than that it is based on a small form of *P. ciliatus* with an indumentum on both cap ("hérissé de soies raides") and stalk ("hérissé de fibrilles ou d'écaillés"). The pores are small (Quélet: "petits"; Fries: "minutis") in contradistinction to those of *P. brumalis*, which Quélet (1872: 268) called "oblongs, anguleux".

Kreisel (1963: 134) concluded: "*P. vernalis* Fr. 1874 ist jedoch ein kahler Pilz, anscheinend eine Form von *P. varius* Fr. (vergl. Bresadola 1931, Tafel 952)." From what is said above this conclusion can in my opinion not be correct. As to Bresadola's plate (1931) cited by Kreisel, it looks different from the fungus depicted by Quélet, but I would not refer it to *P. varius*.

RECAPITULATION

The following recapitulation embodies most of the names discussed in this paper. Where no generic names are mentioned the epithets actually form combinations with '*Polyporus*'. Where in the right-hand column no author's citations are given, it will be possible to find these by looking up the name (epithet) in the left hand column.

- agariceus* (König) ex Berk. An *Polyporus umbilicatus* Jungh.
 — sensu Bres. p.p. = *Polyporus anisoporus*
anisoporus Del. & Mont. apud Mont.
arcularius (Batsch) per Fr. = *Polyporus anisoporus*
 — sensu auctt. nonn.
badius (Pers. per S. F. Gray) Schw. = *Polyporus badius*
batschii Gmel., *Boletus*
boucheanus (Kl.) Fr. (nomen dubium) = *Polyporus floccipes*
 — sensu Lloyd = *Polyporus anisoporus*
 — sensu Bres.
brumalis (Pers.) per Fr. = *Polyporus ciliatus*
 — sensu Bres. = *Polyporus varius*
calceolus (Bull. per St-Am.) Balbis = *Albatrellus ovinus* (Schaeff. per Fr.) Kotl. & P.
carinthiacus (Pers.) per Roques (or *A. similis* Pouz.)
ciliatus Fr. per Fr. = *Laetiporus sulphureus* (Bull. per Fr.) Murrill
coriaceus Huds., *Boletus* = *Polyporus squamosus*
coronatus Rostk. = *Polyporus floccipes*
 — sensu Malenç. = *Albatrellus cristatus* (Schaeff. per Fr.) Kotl. & P.
cristatus (Schaeff.) per Fr. 1821 = *Albatrellus cristatus* (Schaeff. per Fr.) Kotl. & P.
cristatus Fr. 1838 = *Polyporus melanopus* (Pers.) ex Fr.
cyathoides (Sw. per Fr.) Quél. = *Polyporus ciliatus*
 — sensu Quél. = *Polyporus badius*
durus Timm, *Boletus* = *Polyporus varius*
elegans (Bull.) per Trog An *Polyporus badius*
 — sensu Trog. = *Polyporus varius*, forma or var.
floccipes Rostk. = *Polyporus anisoporus*
 — sensu Bres. 1903 An *Polyporus varius*
globularis Pers. = *Polyporus varius*
lateralis Bolt. per Hook. = *Polyporus floccipes*
lentus Berk. = *Polyporus ciliatus*, forma
leptideus Fr. per Steud.: Fr. = *Polyporus varius*
leptocephalus (Jacq.) per Fr. = *Laetiporus sulphureus* (Bull. per Fr.) Murrill
lobatus (Gmel.) per Fr. = ?
 — sensu Fr.
melanopus (Pers.) per Fr.
montagnei Fr. ex Mont. = *Coltricia montagnei* (Fr. ex Mont.) Murrill
 — sensu Dur. & Mont. = *Coltricia cinnamomea* (Jacq. per S. F. Gray) Murrill
montagnei Bres. = *Coltricia montagnei* (Fr. ex Mont.) Murrill
numularius (Bull. per Fr.) Pers. = *Polyporus varius*
perennis Batsch, *Boletus* = *Polyporus badius*
picipes Fr. = *Polyporus badius*
queletianus Sacc. & Trav. = *Polyporus ciliatus*
ramulorum Gmel., *Boletus* = *Polyporus varius*
subarcularius (Donk) Bond. = *Polyporus brumalis*

- subsquamostus* (L.) per Fr. = *Albatrellus ovinus* (Schaeff. per Fr.) Kotl. & P.
 — sensu Wulf. ≡ *Polyporus carinthiacus* q.v.
- tiliae* S. Schulz. apud Fr. (nomen dubium) An *Polyporus floccipes*
- umbilicatus* Scop., *Boletus* (nomen dubium)
- varius* (Pers.) per Fr. = *Polyporus badius*
 — sensu auctt. nonn. = *Polyporus ciliatus*
- vernalis* Quél. apud Fr.

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NOTES ON CANTHARELLUS SECT. LEPTOCANTHARELLUS

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Cantharellus sect. *Leptocantharellus* Peck is an earlier name for *Cantharellus* subgen. *Phaeocantharellus* Corner. The European species fall apart in two groups (*Lepto-Plicati* and *Lepto-Phlebini*) on the basis of the hymenophoral configuration. Most of the older names provided in profusion for the few European species of the section are scrutinized for the correctness of their application. The author prefers the name *Cantharellus tubaeformis* Fr. 1821 for what is often treated as two (or more) species, *C. tubaeformis* and *C. infundibuliformis*; he selects the name *C. xanthopus* (Pers.) Duby for *Craterellus lutescens* sensu Fr. Attention is drawn to what may appear to be a distinct species, viz. *C. melanoxeros* Desm.

The following is not a thorough taxonomic treatment of the section mentioned above. A more correct title for this paper would perhaps have been, 'Notes on the correct interpretation of most of the specific names proposed for European species of *Cantharellus* sect. *Leptocantharellus* Peck.' These notes form a kind of precursor to another paper now in preparation.

CANTHARELLUS SECT. LEPTOCANTHARELLUS Peck

Cantharellus subtrib. *Phlebini* Fr., Elench. 1: 50. 1828, in part. — Lectotype: *Cantharellus lutescens* (Pers.) per Fr. sensu Fr., Syst. mycol. 1: 320. 1821.

Cantharellus sect. *Leptocantharellus* Peck in Bull. New York St. Mus. 1 (2): 35, 40. 1887. — Lectotype: *Cantharellus infundibuliformis* "Scop." [sensu Peck].

Cantharellus sect. *Infundibuliformes* Konr. & M., Ic. sel. Fung. 6: 504. 1937 (lacking Latin description). — Lectotype (Heinemann in Bull. Jard. bot. Brux. 28: 421. 1958): *Cantharellus tubaeformis* "Fr. ex Bull." [sensu Konr. & M.].

Cantharellus sect. *Tubaeformes* Sm. & Morse in Mycologia 39: 500. 1947 (lacking Latin description; "*Tubaeformis*"). — Lectotype: *Cantharellus tubaeformis* Fr.

Cantharellus subgen. *Phaeocantharellus* Corner, Monogr. canth. Fungi 30, 60. 1966. — Holotype: *Cantharellus tubaeformis* Fr.

The few European representatives of this section belong to the most common mushrooms and it is therefore not very surprising, that they have been so badly confused that digging into their history and nomenclature drives even an old hand at such matters to utter despair. Not willing to accept defeat I have tried to bring some order out of the chaos, but I am not convinced that I have succeeded satisfactorily.

The section embraces the 'thin' cantharelles, viz. those in which the stalk of the fruitbody soon becomes hollow and the fruitbody itself more or less tubiform and usually perforated above the stalk. The species have been placed there and back

in *Cantharellus* [Adans.] Fr. and *Craterellus* Pers. In one of them the hymenium varies from almost smooth to more or less strongly radially veined but the veins never become really broad and gill-like. Fries placed this species in *Craterellus* and it has since served as a magnet that has attracted other, obviously related, species to the genus. These, the other species of the section, have the strongly folded hymenium of the same type that is found in the well-known *Cantharellus cibarius* Fr., the type species of the genus *Cantharellus* and of *Cantharellus* sect. *Cantharellus*. In the latter section the stipe (as a rule) remains solid (or may become softer-spongy within) and the cap does not become perforated. Section *Cantharellus* shows precisely the same variation in hymenial configuration. For a long time most authors have placed the species of section *Leptocantharellus* with the strongly folded hymenophore alongside *C. cibarius* in the genus *Cantharellus*.

Corner (1966: 30, 60) recently raised section *Leptocantharellus* to the rank of a subgenus which he called *Cantharellus* subgenus *Phaeocantharellus* Corner. In my opinion the epithet he preferred is not an improvement upon Peck's, not only because the prefix 'Phaeo-' is usually associated with dark-coloured spores, but also because some species or forms lack the pigments that render the surface of the cap "brown, grey, fuscous, fuliginous, or black". These colours are lacking in *Cantharellus melanoxeros* and may occasionally be absent in the other species in which cases the cap is nearly always yellow.

I considered treating this group as a distinct genus. For the present, however, there are enough unanswered objections for remaining conservative. For instance, I have found it difficult to fit *Cantharellus subramosus* (Bres.) Britz. into the above scheme. This was originally described as a mere variety of *C. tubaeformis* (Bresadola, 1887: 87 pl. 97, as "*Cantharellus infundibuliformis* Scop. var. *subramosus* Bres.") and the closely related (but perhaps not specifically distinct) *C. ianthinoxanthus* (Maire) Kühner.

The European species can easily be divided into two stirpes on the basis of the hymenial configuration. I prefer to call them Lepto-Plicati and Lepto-Phlebini in order to keep them apart from the corresponding stirpes of *Cantharellus* sect. *Cantharellus* (Eu-Plicati and Eu-Phlebini). In the former group the hymenium is thrown into the well differentiated, almost gill-like, and rather distant folds that are typical of *Cantharellus cibarius*. An example of the Lepto-Plicati is *Cantharellus tubaeformis* Fr., often also called *C. infundibuliformis* (Scop.) per Fr. The Lepto-Phlebini have a hymenium that may remain almost smooth, though it is usually thrown into much more irregular and always low, vein-like (rather than gill-like) folds. This latter hymenial configuration is found in "*Craterellus*" *lutescens* sensu Fr. It is not my intention to establish these 'stirpes' as taxonomic subdivisions of sections *Cantharellus* and *Leptocantharellus*; here they are distinguished merely for the sake of convenience in order to make it possible to indicate briefly the two hymenophoral types.

In the present paper the following European species are taken into consideration:

1. Hymenium becoming strongly folded, the principal folds resembling thickish and obtuse gills comparable with those of *Cantharellus cibarius*. **Lepto-Plicati**.—*Cantharellus tubaeformis* Fr., *C. melanoxeros* Desm., *C. cinereus* Pers. per Fr.
1. Hymenium remaining almost smooth or usually becoming strongly wrinkled by vein-like folds. **Lepto-Phlebini**.—*Cantharellus xanthopus* (Pers.) Duby [= *Craterellus lutescens* (Pers. per Fr.) Fr. sensu Fr.].

aurora. — *Agaricus aurora* Batsch, Elench. Fung. 94, 175 pl. 9 f. 36. 1783 (devalidated name); = *Merulius aureus* Pers. 1825.

This was originally published as *Agaricus aurora* Batsch; the protologue is sufficiently detailed to identify it with Fries's "*Craterellus*" *lutescens* (= *Cantharellus xanthopus*). The figure is very poor and in Persoon's copy of Batsch's book it is so strongly reddish coloured on stalk and hymenium that it is not really surprising that Persoon did not venture to identify it with his own *Merulius xanthopus* (q.v.). This difference in colour is really impressive if Persoon's figure of *Merulius xanthopus* is compared side by side with that of *Agaricus aurora*. By contrast, however, Batsch's description is to the point; for instance, "Der Adern sind wenig, und sie haben mehr die Gestalt von Runzeln". Moreover, "*Craterellus*" *lutescens* does vary in colour. Many freshly collected specimens often show the golden yellow hymenium as though Dawn with her rose-tinted hands had lit it. Compare also Fries (1838: 532, sub *Craterellus lutescens*): "Hymenium luteum; in rubellum [!], aurantium l. caesium vergens".

Persoon maintained Batsch's species under a slightly altered name without having seen any specimens.

aureus, see aurora.

cantharelloides. — *Helvella cantharelloides* Bull., Herb. Fr. pl. 473 f. 3. 1789 (devalidated name); *Agaricus cantharelloides* (Bull.) Sow. 1796 (devalidated name), not *A. cantharelloides* Bull. 1790 (devalidated name); *Merulius cantharelloides* (Bull.) per Purt. 1821; *Craterellus cantharelloides* (Bull. per Purt.) Quél. 1896.

Below, this taxon is mentioned repeatedly. Persoon (1801: 489) cited it in the synonymy of his *Merulius lutescens* (see p. 270); I have tried to demonstrate that it is a yellowish form of *Cantharellus tubaeformis* Fr. 1821. As pointed out on p. 271, Fries (1821: 320) at first cited Bulliard's species as representative of his conception of *Cantharellus lutescens* (Pers.) sensu Fr. (= *C. xanthopus* Pers.), where it clashes with Fries's description under that name. Therefore, it is not surprising that Fries (1838: 366) later on listed it as representative of his new taxon *Cantharellus tubaeformis* **C. lutescens*, where it appears to fit in rather well.

cervinus. — *Merulius *cervinus* Pers., Mycol. europ. 2: 20. 1825.

The protologue indicates, "Pileus in unico specimine hactenus a me reperto, non bene explicatus fuit, vix unc. 1 latus." No material under this name could be located in Persoon's herbarium, but there is a specimen (consisting of a single

fruitbody the cap of which is poorly developed) labelled thus: "*Merulius lutescens* ? var. / *Merulius tumidulus*: Species propria ? / *Merulius gilvus*. Mycol. Europ." (L 910.255-36). The name *Merulius gilvus* was not published in Persoon's "Mycologia europaea"; from general evidence I conclude that Persoon eventually rejected the epithet 'gilvus', replacing it with 'cervinus', and that the specimen mentioned represents the type of the name *Merulius cervinus*. The description and the rest of the protologue closely agree with it. The specimen represents Fries's "*Craterellus*" *lutescens* (= *Cantharellus xanthopus*).

In the original publication the epithet 'cervinus' was preceded by an asterisk. Authors have often taken this sign as an indication of a subspecies or variety, but in Persoon's publications, for various reasons (cf. Rogers & al., 1942: 3) it seems to denote instead a species difficult to insert at the correct place.

cinereus. — *Cantharellus cinereus* Pers. in Neues Magaz. Bot. 1: 106. 1794 (devalidated name); *Merulius cinereus* (Pers.) Pers., Icon. Descr. 10 pl. 3 fs. 3, 4. 1798 (devalidated name); *Cantharellus cinereus* (Pers.) per Fr. 1821.

The species is well known and has seldom been confused. It is the same species that Bulliard (1789: pl. 465 f. 2; 1791: 292) published as *Helvella hydrolips* Bull.

Persoon (1798: 10 pl. 3 fs. 3, 4) depicted a tuft of fruitbodies of which the central one was well-developed and much bigger than the others. It is likely that this big fruitbody has been lost, but that the small ones are among those glued to a sheet in Persoon's herbarium (L 910.255-14) bearing his own label, "*Merulius cinereus* Syn. fung." (Persoon, 1801: 490).¹

There are two other sheets in his herbarium with specimens that he assigned to this species. Judging by the handwriting, one (L 910.255-61) was sent by Raddi, "Espèce de *Merulius* très rare chez nous"; Persoon added, "*Merulius cinereus*, Syn. fung." The other (L 910.255-27) is labelled in Persoon's handwriting, "*Merulius cinereus*. *Helvella Hydrolips*. Bull."

All these specimens belong to the species in its current sense.

hispidulus. — *Merulius hispidulus* Scop., Fl. carn., Ed. 2: 462. 1772 (devalidated name); Fr., Epicr. 366. 1838 ("*hispidus*"; as synonym); *Merulius hispidulus* Scop. per O.K., Rev. Gen. Pl. 2: 862 ("*hispidus*"); 3 (2): 494. 1898 (corrected).

Careful reading of the protologue does not readily suggest a species of section *Leptocantharellus*. I still hesitate to make up my mind about this. I would prefer

¹ European mycologists who have paid attention to clamp connections agree about the absence of clamps in *Cantharellus cinereus*; on this account it has even been transferred to *Pseudocraterellus* Corner. This and another specimen of Persoon's show the correctness of the current interpretation. No clamps were to be found either in the subhymenium or at the base of the basidia. *Cantharellus cinereus* of Corner (1966: f. 24) seems to be something else in view of the presence of clamp connections. I would conclude from the description that *Cantharellus fuliginosus* Corner (1966: 65) from Borneo agrees more closely with the European conception of *C. cinereus*.

to enter the name as a nomen dubium. If it is assumed that there can be no doubt that a species of section *Leptocantharellus* is involved it could suggest Fries's "*Craterellus*" *lutescens* (= *Cantharellus xanthopus*), had not the hymenophore been described in precisely the same words as that of *Merulius cantharellus* (L.) Scop. = *Cantharellus cibarius* Fr. Thus Fries (1821: 319; 1874: 457, "*hispidus*") might have been correct in referring it both to *Cantharellus tubaeformis* Fr. 1821 and to his later interpretation of this name (which is now often held to be the same as *C. tubaeformis* Fr. 1821). Kunze (1891: 862) re-introduced Scopoli's name for the Friesian conception of 1874, viz. Fries's second interpretation of *C. tubaeformis*, on the basis of Fries's disposition of Scopoli's name.

hispidus, see *hispidulus*.

infundibularis, see *infundibuliformis*.

infundibuliformis. — *Merulius infundibuliformis* Scop., Fl. carn., Ed. 2, 2: 462. 1772 (devalidated name); *Cantharellus infundibuliformis* (Scop.) per Fr., Epicr. 366. 1838; *Craterellus infundibuliformis* (Scop. per Fr.) Quél. 1888; = *Merulius infundibularis* O.K. 1891.

The devalidated protologue is of interest in so far as it contains a very early, although brief, account of the development of an 'agaric' fruitbody:

"In prima aetate est stipes subulatus, flavus, parvulus gerens pileolum. Hic sensim crescens flavescit, marginem inflectit, in media deprimitur; adultus vero marginem elevat, lobatum facit."

The hymenophoral configuration is described in precisely the same words as that of *Merulius cantharellus* (L.) Scop. = *Cantharellus cibarius* Fr.: ". . . lamellis venosis, ramosis . . .".

The concise description of the various stages of development of the fruitbody certainly suggests a species of section *Leptocantharellus* and the characterization of the hymenophore, just as the citation of Vaillant's plate 11, figures 9, 10, tend to exclude Fries's "*Craterellus*" *lutescens* (= *Cantharellus xanthopus*). The description in the first edition of Scopoli's flora (as reproduced in Scopoli's protologue) states, "*Agaricus* . . . luteus . . .", while the passage quoted above calls the cap 'flavescens'; no other colour indications are included. When Fries (1838: 366) accepted Scopoli's name as *Cantharellus infundibuliformis* he called the cap of the taxon to which he applied it "fuligineo-flavido" and evidently assumed that the yellow colour mentioned by Scopoli was restricted to the stalk and underside of the cap. The most convenient expedient, not positively contradicted by the scanty information available in Scopoli's account, is to agree with Fries's interpretation.

At first Fries (1821: 319) suppressed *Merulius infundibuliformis* and made it a synonym of *Cantharellus tubaeformis* Fr. Subsequently he re-introduced the name and distinguished between *C. tubaeformis* (re-defined) and *C. infundibuliformis* (Fries, 1838: 366) as follows:

Cantharellus tubaeformis, "pileo . . . flocculoso subfusco . . . , stipite . . . aurantio-fulvente . . . , lamellis . . . multifido-ramosis luteis fulgineisve nudis".

Cantharellus infundibuliformis, "pileo . . . floccoso-rugoso fulgineo-flavido . . . , stipite . . . flavo, lamellis . . . dichotomis flavis cinereisve, demum pruinatus".—Italics are as in the original.

From then on mycologists have tried to distinguish between the two. Notwithstanding opinion to the contrary, with Konrad (1929: 74-77) as its most energetic exponent, that only one species was involved, the two 'species' survive in many recent publications by European mycologists.

As it proved not really feasible to keep the two (or at least the fungi identified with them) apart according to the features emphasized by Fries (colour of stalk and pruinosity of the hymenophore) several other features have been introduced. Thus Ricken (1910: 3) believed that in *C. tubaeformis* the cap is never pervious, that the stalk is "fuchsgelb" (apparently a translation of 'aurantio-fulvens') and at first stuffed, and that it grows exclusively in frondose woods, while in *C. infundibuliformis* the cap is typically umbilicate-pervious, the stalk vividly yellow, and that it is to be found especially in coniferous woods. He also described the spores of *C. tubaeformis* as much narrower than in the other species. Konrad (*l.c.*) reviewed these as well as other so-called differences indicated by various authors and concluded that they were worthless, or non-existent, as in the case of the narrower spores claimed for one of the 'species' by Ricken. Konrad had the courage to recognize only a single species, which he called *C. tubaeformis*. Donk (1933: 9) pointed out that what Fries had originally called *C. tubaeformis* (1821) later became his *C. infundibuliformis* (1838) and that *C. tubaeformis* had been given a new meaning. He agreed with Konrad that the correct name for the common species was *C. tubaeformis* (1821) rather than *C. infundibuliformis* (1838).

For some further remarks on *C. tubaeformis* sensu Fr. 1838, see 'tubaeformis (bis)'.

lutescens. — *Merulius lutescens* Pers., Syn. Fung. 489. 1801 (devalidated name); *Cantharellus lutescens* (Pers.) per Fr., Syst. mycol. 1: 320. 1821 & Elench. 1: 51. 1828, misapplied, not *Cantharellus lutescens* (Fr.) Kickx 1867; *Merulius tubaeformis* var. *lutescens* (Pers. per Fr.) Pers., Mycol. europ. 2: 17. 1825; *Craterellus lutescens* (Pers. per Fr.) Fr., Epicr. 532. 1838, misapplied.

As will be shown below, Fries interpreted this species incorrectly when he revalidated the name as *Cantharellus lutescens* (Pers.) per Fr. What then did Persoon (1801: 489) describe as *Merulius lutescens*? His phrase runs, "pileo umbilicato glabro lutescente, venis cinereo-rutilis, stipite cavo luteo." The colour of the cap in combination with that of the hyphemophore at once rules out Fries's "*Craterellus*" *lutescens* (= *Cantharellus xanthopus*). Little is said about the exact nature of the veins (although it is worthy of note that these were called 'veins' rather than 'folds'). In his synonymy Persoon cited both *Helvella cantharelloides* Bulliard (1789: pl. 473f. 3) and *Agaricus cantharelloides* (Bull.) Sowerby (1796: pl. 47); these illustrations belong to the very best of those of *Cantharellus tubaeformis* Fries 1821. Persoon's citations

as well as his description of the hymenophore as "cinereo-rutilus" have convinced me that Persoon's fungus had the folds of the *Lepto-Plicati*.

This is not all, however. Persoon kept a specimen in his herbarium (L. 910.255-37) annotated in his own handwriting, "*Merulius lutescens* Syn. fung. p. [489]. Decand. Syn. p. 26 / Automno in Sylvis." It clearly shows the gill-like folds of the *Lepto-Plicati*. In later work Persoon (1825: 17) subordinated his species to *Merulius tubaeformis* sensu Bull., which is incontestably characterized by gill-like folds ("plicis rectis lutescente-cinereis pruinatis"). Taken together all this evidence leads to the conclusions first, that the original *Merulius lutescens* Pers. is conspecific with, or at least close to, *Cantharellus tubaeformis* Fr. 1821, and secondly that there can be no doubt that Fries misinterpreted the Persoonian species when he revalidated the name by associating it with a description of a species with the vein-like folds of the *Lepto-Phlebini*, viz. *Cantharellus lutescens* sensu Fr. 1821 (= *Cantharellus xanthopus*).

The next step is to agree on precisely what form Persoon had in mind. The protologue states that the cap is 'lutescens'. This might point to *Cantharellus melanoxeros*, but in my opinion the references to the published coloured plates indicate rather that Persoon had before him the brown-capped species (*Cantharellus tubaeformis* Fr. 1821) suffused with a yellowish tinge such as occurs in forms (when young) that have a more brightly yellow hymenophore and stalk than is usual. Thus it was the same form that Fries was later to call *Cantharellus lutescens* Fr. 1838 (*q.v.*) and which I interpret as merely an insignificant form of *Cantharellus tubaeformis* Fr. 1821. The above closely agrees with Persoon's own conclusion (1825: 17), in which he finally reduced his *Merulius lutescens* as a variety to *M. tubiformis*, citing *Helvella cantharelloides* Bull. (1789: pl. 473 f. 3) under the variety with the remark "var. luxurians".

Fries's revalidating description (1821) of the name *Cantharellus lutescens* leaves nothing to be desired in so far as the fungus he had in mind can be recognized immediately; his only error was that he associated it with the wrong name. His description is of a species now also known as "*Craterellus*" *lutescens*, which has the vein-like hymenophoral folds of the *Lepto-Phlebini*, and which I now call *Cantharellus xanthopus* (*q.v.*), whereas the name he selected for it (*Merulius lutescens* Pers.) is that of a species of the group with gill-like folds, the *Lepto-Plicati*. His references are more ambiguous; a few represent the species he had in mind, others disagree and refer to an element with gill-like folds, as is the case with the citation of *Helvella cantharelloides* Bulliard (1789: pl. 473 f. 3). It was this foreign element that Fries (1838: 366) later excluded as *Cantharellus lutescens* 1838 (*q.v.*).

When Fries (1838: 366) transferred his conception of *C. lutescens* 1821 to *Craterellus* he elaborated one of his original references ("*Mer. lutesc.* Pers. syn. p. 489") into "*Mer. lutesc.* Pers. syn. ex ips[o] determin. et Alb. et Schwein. p. 234. eximie!" And compare under *Cantharellus* (not *Craterellus*) *lutescens* Fr. in the same work (p. 366): "*Merulius lutescens* Vulgo, non Pers.!, [nec] Alb. Schw.! [nec] Fr." This implies that Fries had seen an unspecified collection named *Merulius lutescens* [sensu Fr. 1821] by Persoon. Considering Persoon's real conception of his own *Merulius*

lutescens (as discussed above) this must have been a misnamed specimen sent to Fries, perhaps by one of Persoon's correspondents. I have reason to conclude that Fries had not seen any such specimen when he wrote the "Systema", volume 1; at that time he was guided by what von Albertini & von Schweinitz (1805: 234) had written about *Merulius lutescens* Pers. A free translation of the pertinent Latin passage reads:

"*Merulius lutescens* [Pers., Syn.]. This species has true *veins* which are swollen, vaguely decurrent, flexuose, and crowded, in contrast to the following species [*M. tubiformis*], which has thickish *folds* that are straight and distant. This is (. . .) a completely satisfactory diagnostic character for distinguishing between the two species. . . ."

The conclusion that Fries misapplied the name *Merulius lutescens* Pers. is not novel. For instance Quélet (1896: 619-620) already commented on this when he remarked about Persoon's species, "je le rapporterais plutôt à la variété *lutescens* de *cantharelloides* [= *Cantharellus tubaeformis* var. *lutescens* (Fr.) Gillet], à cause de la couleur grise „venis cinereo-rutilis" que Persoon donne à l'hymenium".

As discussed here elsewhere, Fries admitted from the start that his *Cantharellus tubaeformis* was not the same as Schaeffer's fungus named *Helvella tubaeformis*. He cited *Helvella tubaeformis* Schaeff. as a synonym of his *C. lutescens* (1821); it would certainly have been the preferable name (basonym) for the species. Quélet (1896: 619) tried to redress this arbitrary elimination of Schaeffer's name by adopting it again for Fries's "*Craterellus*" *lutescens* (= *Cantharellus xanthopus*). On that occasion Quélet also identified Bulliard's plate 461 "f. A." (viz. *Helvella tubaeformis* var. *lutea* Bull.) with Schaeffer's fungus; this is the same conclusion defended here.

The next problem is to decide on the correct name for "*Craterellus*" *lutescens* sensu Fr. The epithet of the name *Helvella tubaeformis* Schaeff. may not be restored in the form of '*Cantharellus tubaeformis* (Schaeff. per Mérat) John Doe'; as a later homonym this would clash with '*Cantharellus tubaeformis* Fr. 1821', which must be regarded as technically a new name (discussed on p. 280).

The following epithet to be weighed is 'lutescens' itself. As pointed out above, when Fries revalidated *Merulius lutescens* Pers. as *Cantharellus lutescens* he misapplied the name, but at the same time he firmly believed he was right about the species and he ascribed the name to Persoon unequivocally; he cited it in the index to the "Systema", volume 1 (p. 515) as "*lutescens* (Mer.) P." and as "*Mer. lutesc.* Pers. syn. p. 489" in synonymy (p. 320). In all his later work he explicitly defends Persoon's name as the correct one; compare for instance the reference "*Merulius lutescens* Vulgo, non Pers.!" when he introduced a second name *Cantharellus lutescens* (1838) for what was almost certainly the correct interpretation of *Merulius lutescens* Pers. Others were wrong, not he. This evidence shows that Fries was firmly convinced that his conception was correct, or, to put it otherwise, that his conception included the type of the devaluated name. To my way of thinking Fries's view should be respected. If the type is to be regarded as differing specifically from Fries's conception it must still be retained as basis for the correct use of the name.

In accepting this view, the name *Cantharellus lutescens* (Pers.) per Fr. sensu originario

becomes a name published simultaneously with *Cantharellus tubaeformis* Fr. 1821 for the same species. It is to be dropped because it was the name first reduced to the synonymy of the other (Persoon, 1825: 17).

Another school of thought will not hesitate to re-typify Fries's name by selecting as type a hypothetical Swedish collection Fries had studied when he drew up the description of his misapplication, or else a neotype answering to that description. Hereby attention is drawn to a specimen named by Fries himself and described and depicted by Petersen (1969: pl. 12 f. 2). This reasoning would make '*Cantharellus lutescens* Fr. 1821 (non *Merulius lutescens* Pers.)' the correct name for the species with veins (Lepto-Phlebini). Even those to whom this reasoning appeals will perhaps concede that a Babylonian confusion of tongues is unavoidable when "*Craterellus*" *lutescens*² is returned to the fold of the genus *Cantharellus* in which two other species bearing the name *Cantharellus lutescens* have been flourishing. The two names I have in mind are (i) *Cantharellus lutescens* (Fr. 1838) Kickx used in at least four or five different applications³ and (ii) *C. lutescens* (Pers.) per Fr. in its original sense. For situations of this kind the "Code" has provided the escape provision that such a name can be made impriorable by considering it a nomen ambiguum. The two opinions about the correct typification can thus point to the "Code" for rejecting the further use of the name *Cantharellus lutescens* [(Pers.) per] Fr. 1821.

The last step is to select the correct name for Fries's conception from three simultaneously published ones: *Merulius aureus* Pers. (q.v.), *M. cervinus* Pers. (q.v.), and *M. xanthopus* Pers. (q.v.). Since none of the three has as yet been reduced to the synonymy of any one of the others I herewith select *Merulius xanthopus* as basionym and accept as the correct name for *Cantharellus lutescens* sensu Fr. 1821 *Cantharellus xanthopus* (Pers.) Duby (basionymum, *Merulius xanthopus* Pers., Mycol. europ. 2: 19. 1825; synonyma, *Merulius aureus* Pers. et *M. cervinus* Pers.).

lutescens (bis). — *Cantharellus tubaeformis* [subsp.] *C. lutescens* Fr., Epicr. 366. 1838; *Cantharellus lutescens* (Fr.) Kickx 1867, not *C. lutescens* (Pers.) per Fr. 1821; *Cantharellus tubaeformis* var. *lutescens* (Fr.) Gillet 1867, not *C. tubaeformis* var. *lutescens* J. E. Lange 1940.

² It would even seem that *Cantharellus lutescens* sensu Fr. has been misapplied. I find it difficult to identify *C. lutescens* sensu Smith (1968: 158 f. 10) from North America with the European species. Although the American fungus belongs to the Lepto-Phlebini, the colours of the cap and a few other items are not consistent with those of the normal European fungus.

³ *Cantharellus lutescens* Fr. 1838, sensu originario = *C. tubaeformis* Fr. 1821 (forma); sensu Secretan (as *Merulius*) & sensu Konrad & Maublanc (as *C. tubaeformis* var. *lutescens*) = *C. melanoxeros*; sensu Smith (1953: 55 pl. 2), perhaps an unnamed (North American) species, which Smith (1968: 157 fs. 12, 14) now calls *Cantharellus minor* Peck, another name he misapplied. (The true *C. minor* belongs to section *Cantharellus*!). What Smith now calls *C. lutescens* (see preceding foot-note) is a member of the Lepto-Phlebini. In his observations he failed to compare *C. lutescens* sensu A. H. Sm, 1953 with *C. lutescens* sensu Peck (1900: 157 pl. 56 fs. 1-8), which might or might not appear to be still another species incorrectly named *C. lutescens*. No doubt still more misapplications of this name can be unearthed.

Cantharellus tubaeformis var. *lutescens* J. E. Lange, Fl. agar. dan. 5: ii ("Lange n. var."), 85 ["(Bull.) Lange"] pl. 198 f. K. 1940, not *C. tubaeformis* var. *lutescens* (Fr.) Gillet 1876.

The introduction of a new taxon of this name, distinct from both (i) *Merulius lutescens* Pers. and (ii) Fries's misinterpretation of this species under the name *Cantharellus lutescens* (which Fries later on transferred to *Craterellus*) has unfailingly led to almost inextricable confusion among all three. This point, however, will not be pursued at any length as it is not essential to a correct understanding of the taxa scrutinized here. (But compare under the preceding discussion; it would seem that the name *Cantharellus lutescens* Fr. 1838 has been misapplied, *inter alia* to the taxon below called *Cantharellus melanoxeros*.)

The protologue of *Cantharellus lutescens* Fr. 1838 was appended to the treatment of *C. tubaeformis*. The binominal name was preceded by an asterisk which is now often taken, perhaps incorrectly so, as indicating a subspecies. For this reason it will sometimes be found cited as *Cantharellus tubaeformis* subsp. *lutescens*. Some authors have considered that the asterisk indicates a variety, so that the form *C. tubaeformis* var. *lutescens* is also encountered. The taxon itself Fries considered intermediate ("Præc. cum sq. jungit") between *C. tubaeformis* ("pileo . . . flocculoso subfusco . . .") and *C. infundibuliformis* ("pileo . . . floccoso-rugosa fuligineo-flavido . . ."): it was characterized as "pileo convexo-umbilicato, laeviusculo subregulari, lamellis minus divisis." There is no indication that it ought to have a yellow cap lacking brown colours! The evidence points to the contrary. Fries gave several references, one of which ("*Merulius lutescens* Vulgo, non Pers.!") may indicate that other mycologists had correctly interpreted Persoon's species, although Fries remained convinced that the error he himself had made was not his own. The citation of "Desmaz. ! Exs. n. 365" (rather than of No. 409, see under *Cantharellus melanoxeros*) confirms that a form with a brown (rather than pale yellow) cap was involved. Desmazières's distribution is here selected as type.

Desmazières was one of the mycologists who adhered to the original conception of *Merulius lutescens* Pers. (cf. Fries's remark "*Merulius lutescens* Vulgo . . ."). He called the material that Fries regarded as typical of his new taxon "*Cantharellus lutescens*, Fries Syst. Myc. . . *Merulius lutescens*, Pers. syn." It may be recalled that he was in close contact with Persoon himself and had repeatedly sent collections to him for determination.

Lange (1936: 40; 1940: 85 pl. 198 f. K) also conceived the present Friesian taxon as brown-capped; he considered it distinct from Konrad's interpretation (see under *Cantharellus melanoxeros*). The publication of Lange's conception of *Cantharellus tubaeformis* var. *lutescens* in 1940, after his death, as a new variety is apparently due to an editorial slip of the pen.

The author's citation of the name *Cantharellus lutescens* Fr. 1838 is often given as "Bull." This error is due to the fact that after the phrase defining the taxon, Fries merely cited "Bull. t. 473. f. 2 [= 3]" and failed to mention the name Bulliard

had given to the species he depicted, viz. *Helvella cantharelloides* Bull. (not *Agaricus cantharelloides* Bull.). The fruitbodies depicted are consistent with the other citations and support my conclusion about what Fries had in mind: a fungus with yellow stalk and hymenophore and a brown cap, not the pale yellow cap of *C. melanoxeros*.

As to the taxonomic status of *Cantharellus lutescens* Fr. 1838, I am not prepared to rate it very high. In occasional but ample collections of *C. tubaeformis* fruitbodies that have a rather brighter yellow hymenophore and stalk than others of the same size are often found. The fruitbodies that Bulliard depicted under the name *Helvella cantharelloides* (taken by Fries as typical of his taxon) are an example. Eventually, however, the colour changes according to the typical pattern of the species. Some populations may have a bigger amount of yellow colouring matter; the brown colour of the cap then also becomes suffused with yellow. Pouchet & Josseland (1957) observed in *Cantharellus lutescens* sensu Fr. 1821 (= *C. xanthopus*) that the yellow pigment could vary independently of the other colours (schizochroism); they even observed a collection in which the yellow pigment was absent and the colour of the normally yellow parts milk-white. *Cantharellus lutescens* Fr. 1838 appears scarcely worth maintaining as a distinct taxon; I am inclined to regard it as nothing but a condition with a higher content of yellow pigment that may remain unmasked or unchanged for a longer period than usual, but hardly remains predominant in the hymenophoral surface until the end.

melanoxeros. — *Cantharellus melanoxeros* Desm., Pl. crypt. N. Fr. No. 409. 1829; Desm. *apud* Duby, Bot. gallic. 2: 799. 1830.

As the result of its being reduced to the synonymy of *Cantharellus tubaeformis* by Fries (1838: 366, "var. ?") this species is now completely forgotten. The name was validly published and the type distributed by Desmazières (1829: No. 409); next year Duby (1830: 799) once more validly published the name *Cantharellus melanoxeros* Desm. "ined. in litt."

Desmazières sent material to Persoon with the following notes:

"No. 1. / *Cantharellus melanoxeros*, Desmaz. (Vid: icon. 1.) / La consistance de cette espèce est un peu coriace. Son pédicule est plein, souvent aplati, d'un jaune assez vif, et long de 3 à 4 centimètres, il s'évase au sommet en un chapeau concave, comme satiné et d'une couleur nankin en dessus un peu plus foncé en dessous, c'est à dire d'un nankin tirant sur le lilac. Ses bords sont ondulés, velus à la loupe et paroissent un peu plus épais que le reste du chapeau. Les sporules contenues dans les thèques sont ovoïdes. Ce champignon croit en 8bre dans un bois près de Lille. Ses individus sont solitaires ou réunis deux à quatre par la base des fascicules. Il noirsit [!] promptement par la dessiccation d'ou lui vient le nom spécifique que je lui ai donné / H.D."—Herbarium Persoon (L. 910.262-774). — I have been unable to locate the illustration mentioned at the beginning of this quotation.

Further material communicated by Desmazières is in Splitgerber's herbarium (L. 910.22-3856).

A study of the above-mentioned material has convinced me that it belongs to the *Lepto-Plicati*. The yellow colours even of the surface of the cap, and the

pronounced blackening of the drying (rotting?) specimens suggest at once the fungus that Secretan (1833: 466) described as *Merulius lutescens* Pers. (var. A) and that Konrad (1929: 77; 1930: 152) described and depicted (Konrad & Maublanc, 1930: pl. 500 f. 2) under the name *Cantharellus tubaeformis* var. *lutescens* "Fries". Still another name for this fungus may be *Cantharellus tubaeformis* var. *pallidus* Gillet. The names used by Secretan, Konrad, and Konrad & Maublanc are evidently misapplications since Fries's taxon had a cap that was not essentially different in colour from what at that time he considered to be typical *Cantharellus tubaeformis*, 'subfuscus expallens' (Fries, 1838: 366), as discussed here on p. 274. The autonomous status and correct rank of the taxon described by Desmazières and Konrad is open to discussion, but because the taxon appears distinct and to the best of my knowledge indications are lacking that it intergrades into typical *C. tubaeformis*, I can see no objection to accepting it as a species, the correct name of which is then *Cantharellus melanoxeros*. It seems to have a distribution area of its own; it is now known (presumably) from the north of France and Switzerland.

It is of interest to note that Smith (1953: 55 pl. 2) concluded that in North America a species occurs that he considers distinct from "*C. tubaeformis*, *C. infundibuliformis*" and that he calls "*Cantharellus lutescens* Fries".⁴ Its spore deposit is "ochraceous salmon", the colour of the cap is "bright orange yellow ('capucine yellow' and fading to 'pale yellow orange'), in age in faded caps often near 'cinnamon-buff' and, when dried, grayish"; it grows "on barren sandy soil in open oak and pine woods. . . . *Cantharellus tubaeformis* [sensu A. H. Smith] lacks the conspicuous orange-yellow colour, grows in bogs (frequently under larch), and has a white spore deposit." Smith was convinced that it represents an easily recognizable species. Although it is tempting to connect the European fungus with the one from Michigan, very likely the two do not belong to the same species. Konrad (1929: 77) stated about his 'lutescens' that the spores form a white deposit and the caps are "jaune-pâle" with the stalk "jaune plus ou moins vif". It seems to agree more closely with *Cantharellus infundibuliformis* var. *luteolus* Peck (1887: 41) from North America, presumably New York State; this was described as having a dingy-yellow cap, very distant gills, and a yellow stalk, tinged with red or orange.

ocreatus. — *Craterellus ocreatus* Pers., Mycol. europ. 2: 5 pl. 13 f. 2. 1825.

The original figure published shows a completely smooth hymenium and, like Persoon, subsequent authors have referred this species to *Craterellus*, either as a species near to, or as a variety of, *Craterellus cornucopioides* (L. per Fr.) Pers. On the

⁴ That is, *Cantharellus lutescens* (Fr.) Kickx 1867 (original sense), not *Cantharellus lutescens* (Pers.) per Fr. 1821, a prior name. The latter species, as interpreted by Fries in 1821, is what Fries later on called *Craterellus lutescens* (= *Cantharellus xanthopus*). If the fungus described by Smith should prove to be a distinct species it is likely that it has no current name. Smith (1968: 157 fs. 12, 14) now calls it *Cantharellus minor* Peck, in my opinion incorrectly so. (See also foot-note 3).

same plate *Merulius xanthopus* Pers. (see below) is depicted; in general the resemblance between size and shape of the fruitbodies of the two species is rather striking. Might this be an extreme variation of "*Craterellus*" *lutescens* sensu Fries (= *Cantharellus xanthopus*)?

Exploration of Persoon's herbarium failed to disclose any specimen named *C. ocreatus*, but to one sheet some specimens were glued that showed that at least one group of fruitbodies had served as the model of the left hand figure of *C. ocreatus*; there can be no doubt that it was the type collection of *C. ocreatus* that was found. It is labelled, "*Craterellus melanopus* [!]. / Gallia (Versaliis)" (L 910.256-1379). The blackening of the stalks may be natural but it is quite likely that a process of rotting and the evident activities of maggots contributed to this colour. The specimens represent *Craterellus cornucopioides*, or a closely related taxon.

In this connection I am thinking of *Craterellus konradii* R. Maire & Bourd. apud Konrad & Maublanc (1930: pl. 500 f. 2). It has been reduced by Imbach (1936) to *Craterellus cornucopioides*; he maintained that Konrad himself had come to share his view. I am not at all sure that Konrad (1932: 87) was really correct when he rejected identification with *Craterellus ocreatus*: "La même plante à été recoltée autrefois dans la région de Besançon par M. Bataille, qui l'avait déterminée sous le nom erroné de *Craterellus ocraceus* [!] Persoon." Corner's suggestion (1966: 251) that *C. konradii* is a species of *Podoscypha* Pat. can scarcely be correct.

It is interesting to note the following observation by Maire (1932: 226): "Le Champignon [*C. konradii*] tout entier noircit par fermentation à l'humidité; ce noircissement commence par la base du pied, mais ne s'observe que sur des spécimens altérés; les spécimens bien vivants ne noircissent pas par la dessiccation." This would well explain Persoon's herbarium name *Craterellus melanopus*.

pruinatus. — *Agaricus pruinatus* Batsch, Elench. Fung. 175 pl. 9 f. 35. 1783 (devalidated name); *Merulius pruinatus* (Batsch) per Secr., Mycogr. suisse 2: 467. 1833.

The description and figure show *Agaricus pruinatus* Batsch to be *Cantharellus tubaeformis*. Persoon (1825: 17) also referred it to *Cantharellus tubaeformis* [sensu Persoon], "mala", and Fries (1838: 366), under *Cantharellus infundibuliformis*, remarked, "Batsch f. 35, ipso in Myc. Eur. concedente, hujus var." The leading feature referred to in the specific epithet is, "lamellis . . . pruinatis".

Secretan's description (1833: 467) agrees closely with Batsch's account.

tubaeformis. — *Helvella tubaeformis* Schaeff. Fungi Bavar. nasc. 4: 104 [pl. 157]. 1774 (devalidated name); *Merulius tubaeformis* (Schaeff.) Pers., Comment. Schaeff. Ic. pictas 62. 1800 (devalidated name); *Merulius tubaeformis* (Schaeff.) per Mérat, Nouv. Fl. Paris, 2c Ed., 1: 47. 1821; *Craterellus tubaeformis* (Schaeff. per Mérat) Quéf. in C.R. Ass. franç. Av. Sci. 24 (2): 619. 1896, not *C. tubaeformis* (Fr.) Quéf. 1888.

There can be no doubt about the identity of the species originally described under this name; it is the one Fries (1821: 320) described under the misapplied

name *Cantharellus lutescens* (Pers.) and later transferred to the genus *Craterellus*, which I now call *Cantharellus xanthopus*. It would seem that Persoon (undoubtedly under the influence of Bulliard) prepared the way for the transfer of the name from the original taxon to the one later to be called *Cantharellus tubaeformis* Fr. 1821. At first, when he redefined Schaeffer's species (Persoon, 1800: 62), there was little wrong, but the statement "non raro in fagetis" is an indication that his conception did not accord completely with that of Schaeffer. It is clear that the following year (Persoon, 1801: 489) his conception had changed into a mixtum compositum: compare "plicis rectis flavo-subcinereis" [*Cantharellus tubaeformis* Fr. 1821] and "Venae nunc flavae, nunc auranticae, aut incarnato-flavae [*Helvella tubaeformis* Schaeff. sensu stricto] ut plurimum cinereo-flavae [*Cantharellus tubaeformis* Fr. 1821]." The accent had shifted very far in the direction of *C. tubaeformis* Fr. 1821. That this was Persoon's final interpretation is shown by several collections in his herbarium. It should be remembered that, surprisingly enough, Persoon did not know the one common European species of the Lepto-Phlebini (or at least did not recognize it as distinct) until late in his life (1825, see under 'xanthopus'). It was left to von Albertini and von Schweinitz clearly to define it (see p. 272). Fries's first treatment of *Merulius tubiformis* (1815: 97) shows that he had already excluded Schaeffer's species from his conception and that he was then following Persoon's later interpretation.

When Fries again separated the two species, he caused new confusion by reserving the epithet 'tubaeformis' for the misnamed fungus and misapplying the epithet 'lutescens' of *Merulius lutescens* Pers. to what Schaeffer had originally called *Helvella tubaeformis*.

It was left to Quélet (1896: 619) to re-instate *Helvella tubaeformis* Schaeff. as *Craterellus tubaeformis* for Fries's "*Craterellus*" *lutescens* (= *Cantharellus xanthopus*), but this correction has found little following. At the same time he replaced the name *Craterellus tubaeformis* Fr. 1821 by *Craterellus cantharelloides* (Bull.), basionym, *Helvella cantharelloides* Bull. [not *Agaricus cantharelloides* Bull., which is *Hygrophoropsis aurantiacus* (Wulf. per Fr.) Maire apud Mart.-Sans].

Helvella tubaeformis Schaeff. sensu Bull.—Much of the misunderstanding as to the correct interpretation of '*Cantharellus tubaeformis*' is due primarily to Bulliard. The puzzle about what he was depicting (1789: pl. 461) and describing (1791: 294) under the name *Helvella tubaeformis* is not easily solved. It must be stressed from the start that he took the name from Schaeffer; he cited "*Elvela tubaeformis* Schaeff. . . . Tab. 157" in his synonymy (1791: 294).⁵ As concluded above it is beyond any possible doubt that Schaeffer's species is the species that is now often known as the "*Craterellus*" *lutescens* of Fries (= *Cantharellus xanthopus*). This is significant.

Bulliard depicted two forms on his Plate 461. In his text he differentiated these

⁵ On the plate the reference is an indirect one: *L'Helvella en trompette*. Fl. Fr., which stands for Lamarck [1779: (123)], '*Helvella en trompette*. Schaeff. t. CLVII.'

into *Helvella tubaeformis* var. *lutea* Bull., represented by the top figures (fs. A, C) and *H. tubaeformis* var. *fulva* Bull., represented by the lower figures (fs. B, D). In my opinion a cursory inspection of the plate without reference to the text could easily lead to the conclusion that only a single species was involved. Both varieties have a zoned cap and the hymenium is shown as being thrown into a regular kind of folds dichotomizing regularly like in not too old fruitbodies of the *Lepto-Plicati*. More careful examination of the drawings of the halved fruitbodies, however, leaves one completely in the dark as to whether these folds are low and flat or almost gill-like. The text at the bottom of the plate and the text of the "Histoire" reads "nervures . . . ordinairement peu saillantes" (text on plate) and "Les nervures . . . ont quelquefois une telle ressemblance avec les feuillets de certains agarics, que si l'on n'est pas prevenu, on la placera nécessairement parmi les espèces de ce dernier genre . . ." However, it is not made clear which of the figures of the plate is to be associated with the low and which with the gill-like folds. In any case this is more than sufficient to justify the suspicion that perhaps two species are involved.

Bulliard himself came to the same conclusion: he annotated his variety *lutea*, "An-ne species distincta." The shape of the fruitbodies (stalks definitely tapering downwards) of this 'variety', as well as the colour of the hymenophore ("subtus luteus seu aurantiacus" and "surface inférieure jaune ou orangée") suggest Fries's "*Craterellus lutescens* (= *Cantharellus xanthopus*), and I am now convinced that variety *lutea* (fs. A, C) really belongs to that species, even though not only were the folds of the hymenophore drawn too schematically, even to such a degree as to render them strongly misleading, but the bright colour of the hymenophore and the stalk were also rendered too dull. The "nervures . . . ordinairement peu saillantes" apparently go with this variety.

The other form, variety *fulva*, has a more inflated stalk, not gradually tapering downwards, and the colour of the hymenophore is stated to be "cinereo-cervinus" and "fauve clair, ou d'une légère teinte rose". If these features are associated with the gill-like folds then this variety emerges as a species distinct from the former variety, viz. as *Cantharellus tubaeformis* Fr. 1821! That this association is legitimate is underlined by Bulliard's remark that in his species the veins at the underside may sometimes so strongly resemble the gills of certain agarics that it is easy to err and to place specimens in the genus *Agaricus*, "comme j'avois cru le devoir faire moi-même, lorsque j'en ai publié [*Agaricus cornucopioides*], pl. 208". This plate he cited under *A. tubaeformis* var. *fulva*! In this connection it is worth mentioning that Bulliard indicated no difference between his *H. tubaeformis* and *H. cantharelloides* Bull. (= *Cantharellus tubaeformis*) other than the zoned surface of the cap in the former.

Bulliard considered this second taxon, variety *fulva*, which answers only imperfectly to Schaeffer's *Helvella tubaeformis*, to be the typical form; this follows from the remark added to the other variety, "An-ne species distincta." Fries's later conclusion (1874: 458), under *Cantharellus infundibuliformis*, comes close to the one amplified here: "Bull. t. 461 hic potissimum, sed e texta confusa species." However, he did

not definitely identify variety *lutea* with his "*Craterellus*" *lutescens* (= *Cantharellus xanthopus*).

The identification of variety *fulva* with *Cantharellus tubaeformis* Fr. 1821 should not be made too quickly. Some objections are still valid. Bulliard kept his compound interpretation of *Helvella tubaeformis* separate from his *H. cantharelloides* (quite readily recognized as a form of the true *Cantharellus tubaeformis*) because of the zonate surface of the cap in his *H. tubaeformis*. It is not easy to get around this feature except by assuming that Bulliard emphasized too strongly a faint zonation that may sometimes be observed, especially upon drying, in which case he entered it in highly stylized figures to the point of exaggeration.

The conclusion that the 'typical' part of *Helvella tubaeformis* sensu Bull. is *Cantharellus tubaeformis* Fr. 1821 is of importance in connection with the typification of the following name.

tubaeformis (bis). — *Cantharellus tubaeformis* Fr. Syst. mycol. 1: 319, 515; *Craterellus tubaeformis* (Fr.) Quél., Fl. mycol. Fr. 36. 1888, not *C. tubaeformis* (Schaeff. per Mérat) Quél. 1896.

The preceding notes make it necessary to decide about the identity of what Fries (1821: 319) described under this name in the starting-point book. First, it should be pointed out that he explicitly excluded from his conception the species for which the name was introduced (*Helvella tubaeformis* Schaeff.): in synonymy he cited "*M. tubaeformis* Pers. syn. 489 (nec Schaeff.)" (p. 320) and "*Elv. tubaeformis* Schaeff. t. 157" (p. 320) re-appears as a synonym of *Cantharellus lutescens* sensu Fr. 1821 = "*Craterellus*" *lutescens* (= *Cantharellus xanthopus*). Secondly, he explicitly ascribed the name to Bulliard: he cited "*Helv. tubaeformis* Bull. t. 461" (p. 319) in the synonymy; and in the index of the volume (p. 515) he entered the name as "[*Cantharellus*] *tubaeformis* (Hlv.) Bull." Thirdly, except for one or two at least partially erroneous citations and the exclusion of his variety β , both his description and the numerous other citations are consistent with what Fries (1838: 366) later on was to call *Cantharellus infundibuliformis*. I wonder why in 1821 he added the comment "*Huc potissimum* Sowerb. t. 47. *A. cantharell.*" and without more confidently entering the citation as belonging to his *C. tubaeformis*.

The question now is: to whom must the authorship of the name be ascribed. As stated above, Fries attributed the name to Bulliard, who did not introduce a new name but applied one of Schaeffer's; Bulliard (1791: 294) cited "*Elvela tubaeformis*, Schaeff. fung. tom. II. Tab. 157" in his synonymy.⁶ Since Fries excluded the type the admission of a 'new' name, viz. *Cantharellus tubaeformis* Fries, is required. This name, I would add, should be based on a specimen collected by Bulliard in France, which amounts to selecting as type of *Cantharellus tubaeformis* Fr. 1821 the specimens

⁶ This reference is followed by ". . . Mich. gen. Tab. 82. Fig. 2 ?" It is not clear whether the question-mark also refers to Schaeffer's name, but in this case this is immaterial. Compare also footnote 5.

depicted on Bulliard's plate 461 figures B and D. It might perhaps be preferable to select the type from the material represented in Fries's protologue by the indication "v.v.", thus a hypothetical Swedish collection agreeing with Fries's description, but I am not sure whether this would be correct. As long as the lectotype suggested here (Bulliard's fs. B, D) is accepted as representing what Fries described under *C. tubaeformis* in 1821 there will be no need to deviate from this choice.

As to the conception of *C. tubaeformis* that Fries introduced in 1838, when he started to call his conception of 1821 *Cantharellus infundibuliformis* (q.v.), it was tentatively admitted by Donk (under the influence of Bresadola's interpretation, 1929: pl. 477) as a closely allied species with more intensely coloured stalk and hymenophore (it had been described as "aurantio-fulvus aut fere flammens demum aliquantum expallens"). At the same time Donk thought it might have to be identified with *Merulius villosus* Pers. This opinion was tentative because he had not seen fresh or other material of the hypothetical species. Recently Corner (1966: 60, 70, 74) was still maintaining two taxa which he distinguished in his key thus: "stem tawny orange. Gill-folds orange, then yellow", *C. tubaeformis*, and "Stem and gill-folds (at first) clear yellow", *C. infundibuliformis* (q.v.). His *C. infundibuliformis* is in any case the species that Fries called *C. tubaeformis* in 1821.

I now believe that *Merulius villosus* represents merely *C. tubaeformis* (Fries, 1821), as discussed below. The colours of the stalk on the hand-coloured plates, at least in certain copies of Persoon's figure (1798: pl. 6 f. 1) and even more in that of Ditmar (1804: pl. 30, as *Cantharellus*), were either exaggerated from the first and suggested by vividly coloured specimens such as are sometimes encountered, or in the course of time they may have altered. Other citations, such as of *Helvella tubaeformis* var. *lutea* Bulliard (1789: pl. 461 fs. A, C; 1791: 294; see in this paper p. 279) simply refer to Fries's "*Craterellus*" *lutescens* (= *Cantharellus xanthopus*) with the folds so poorly rendered that they suggest the distant, but much more regularly dichotomized gill-like folds of *C. tubaeformis* Fr. 1821. Bresadola's interpretation remains an enigma to me, but in any case I strongly doubt whether he had come across the true *Cantharellus tubaeformis* of Fries's later work.

villosus. — *Merulius villosus* Pers., Ic. Descr. Fung. 17 pl. 6 f. 1. 1798 (devaluated name); *Cantharellus villosus* (Pers.) Ditm. in Deutschl. Fl. (ed. Sturm), Pilze 1: 61 pl. 30. 1814 (devaluated name); *Merulius villosus* Pers. per Pers., Mycol. europ. 2: 18. 1825.

Investigation of the identity of a taxon of *Cantharellus* sect. *Leptocantharellus* makes it necessary first to decide whether it belongs to the *Lepto-Plicati* or the *Lepto-Phlebini*. The devaluated protologue of *M. villosus* leaves little doubt on this point, "plicis distantibus cinereo-pallidis . . . Plicae non valde decurrunt, pruinatae." The figure renders it incontrovertible that indeed *M. villosus* has gill-like folds. The colour of the stalk is given as 'lutescens'. These features, in combination with the habit depicted, lead to the conclusion that *Merulius villosus* is conspecific with *Cantharellus tubaeformis* Fr. 1821, or at least very closely related to it. The main

feature, seen in the picture and indicated in the specific epithet, is in the surface of the cap, which is stated to be 'squamoso-villosus'. I have seen fully annotated material from France in which this feature was clearly depicted in the accompanying watercolour drawing, but in the dried fruitbodies the 'squamules' were no longer clearly distinguishable. I refer the collection to *Cantharellus tubaeformis* Fr. 1821. In my opinion this is also the correct disposition of *M. villosus*. No material was to be found in Persoon's herbarium.

Quélet (1896: 619) came to practically the same conclusion. He reduced *M. villosus* to the rank of a variety of what he called *Craterellus cantharelloides* (Bull.) Quélet. [= *Cantharellus tubaeformis* Fr. 1821], "caractérisé par un peridium un peu laineux et ordinairement brun, ce qui le fait ressembler à *tubaeformis* Schaeff. [= "*Craterellus*" *lutescens* of Fries 1821 = *Cantharellus xanthopus*]."

xanthopus. — *Merulius xanthopus* Pers., Mycol. europ. 2: 19. 1825; *Cantharellus xanthopus* (Pers.) Duby, Bot. gallic. 2: 799. 1830.

The type collection has been preserved in Persoon's herbarium (L 910.255-535); it consists of a few fruitbodies depicted in the published figure. They were sent to Persoon by de Chaillet (who collected in the neighbourhood of Neuchâtel, Switzerland). It was accompanied by the following annotations:—

"*Merulius flavipes* Pers.: marginatus ou fimbriatus. vix (?) aureus, quoique la difference ne soit pas considerable seche, elle etoit frappante frais par une belle couleur - Jaune d'Or, je n'en ai trouvé que deux touffes sans aucun melange. / Pinetis 8bre celui ci est le plus marqué pour le fimbriatus. / 1822 = 22."

Persoon labelled this collection "*Merulius xanthopus* Myc. Europ. 2. p. 19 t. XIII. t. 1." There is a second sheet (L 910.255-520) that he also labelled, "*Merulius xanthopus* M. Europ." The two fruitbodies on this sheet are not among those depicted in "Mycologia europaea". In addition there is a watercolour drawing (L 910.255-521) annotated thus by de Chaillet:

"*Merulius flavipes* Pers.: / Je l'ai trouvé abondamment cette année, il ne me paroît pas differer de celui que je vous ai envoyé en 1818. Sous un No. 34: il me paroît que fries en fait son *Cantharellus lutescens*. Venae flavae il me paroît differer beaucoup. / Pinetis 8bre." — Persoon added "*Merulius xanthopus* Myc. Europ."

The two sheets with the material mentioned above clearly show that *Merulius xanthopus* belongs to the same species that Fries called "*Craterellus*" *lutescens*. The drawing just mentioned is poor and without any further knowledge I would scarcely have referred it to the same species with any confidence. It shows the yellow colour that remains in dried specimens (without pinkish or orange tints) as excessively pale.

The reasons for choosing the name *Merulius xanthopus* as basionym for the correct name of what Fries called "*Craterellus*" *lutescens* are discussed on page 273.

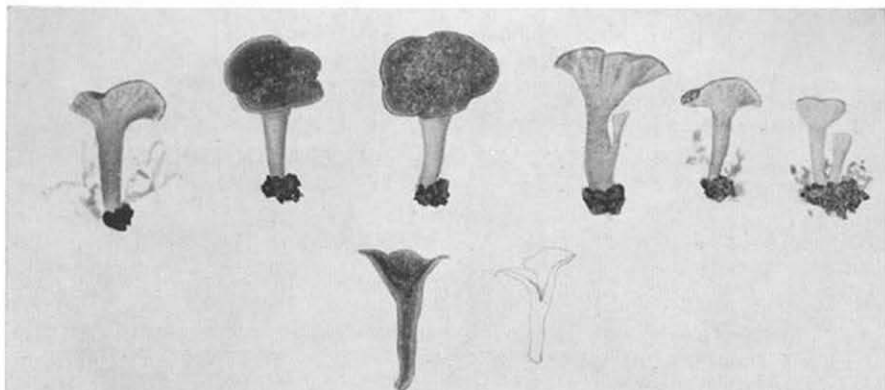
RECAPITULATION

<i>aurora</i> , <i>Agaricus</i> , Batsch (d.n.)	= <i>Cantharellus xanthopus</i>
<i>auroreus</i> , <i>Merulius</i> , Pers.	= <i>C. xanthopus</i>
<i>cantharelloides</i> , <i>Helvella</i> , Bull. (d.n.)	= <i>C. tubaeformis</i> Fr. 1821
—, <i>Merulius</i> , (Bull.) per Purt.	= <i>C. tubaeformis</i> Fr. 1821
<i>cervinus</i> , <i>Merulius</i> , Pers.	= <i>C. xanthopus</i>
<i>cinereus</i> , <i>Cantharellus</i> , Pers. (d.n.)	= <i>C. cinereus</i> Pers. per Fr.
<i>dilatatus</i> , <i>Merulius</i> , Pers.	= <i>C. tubaeformis</i> Fr. 1821
<i>hispidulus</i> , <i>Merulius</i> , Scop. per O.K.	= <i>C. tubaeformis</i> Fr. 1821 ?
<i>hispidus</i> , see <i>hispidulus</i>	
<i>hydrolopsis</i> , <i>Helvella</i> , Bull. (d.n.)	= <i>C. cinereus</i>
—, <i>Merulius</i> , (Bull.) per Mérat	= <i>C. cinereus</i>
<i>infundibuliformis</i> , <i>Merulius</i> , Scop. (d.n.)	= <i>C. tubaeformis</i> Fr. 1821
—, <i>Cantharellus</i> , (Scop.) per Fr.	= <i>C. tubaeformis</i> Fr. 1821
<i>infundibularis</i> , <i>Merulius</i> , O.K. ≡	
<i>Merulius infundibuliformis</i> Scop., q.v.	
<i>luteolus</i> , <i>Merulius</i> , O.K. ≡ <i>C. lutescens</i>	
Fr. 1838 q.v.	
<i>lutescens</i> , <i>Merulius</i> , Pers. (d.n.)	= <i>C. tubaeformis</i> Fr. 1821
— sensu Secr. (var. A)	= <i>C. melanoxeros</i>
—, <i>Cantharellus</i> , (Pers.) per Fr. sensu	
orig. 1821 (nomen ambiguum)	= <i>C. tubaeformis</i> Fr. 1821
<i>lutescens</i> , <i>Cantharellus</i> , sensu Fr. 1821	= <i>C. xanthopus</i>
<i>lutescens</i> , <i>Cantharellus</i> , Fr. 1838 (subsp.),	
Kickx	= <i>C. tubaeformis</i> Fr. 1821
— sensu Konr.	= <i>C. melanoxeros</i>
<i>lutescens</i> , <i>C. tubaeformis</i> var. ~, J. E.	
Lange	= <i>C. tubaeformis</i> Fr. 1821
<i>melanoxeros</i> , <i>Cantharellus</i> , Desm.	= <i>C. melanoxeros</i> Desm.
<i>ocreatus</i> , <i>Craterellus</i> , Pers.	= <i>Craterellus</i> cf. <i>cornucopioides</i> (L. per Fr.) Pers.
<i>pallidus</i> , <i>Cantharellus tubaeformis</i> var. ~,	
Gillet	= Cf. <i>C. melanoxeros</i>
<i>pruinatus</i> , <i>Merulius</i> , Batsch per Secr.	= <i>C. tubaeformis</i> Fr. 1821
<i>tubaeformis</i> , <i>Helvella</i> , Schaeff. (d.n.)	= <i>C. xanthopus</i>
—, <i>Merulius</i> , (Schaeff.) per Mérat	= <i>C. xanthopus</i>
— sensu Bull., in part (var. <i>lutea</i>)	= <i>C. xanthopus</i>
— sensu Bull. in part (var. <i>fulva</i>)	= <i>C. tubaeformis</i> Fr. 1821
<i>tubaeformis</i> , <i>Cantharellus</i> , Fr. 1821	= <i>C. tubaeformis</i> Fr.
<i>villosus</i> , <i>Merulius</i> , Pers. per Pers.	= <i>C. tubaeformis</i> Fr. 1821
<i>xanthopus</i> , <i>Merulius</i> , Pers.	= <i>C. xanthopus</i> (Pers.) Duby

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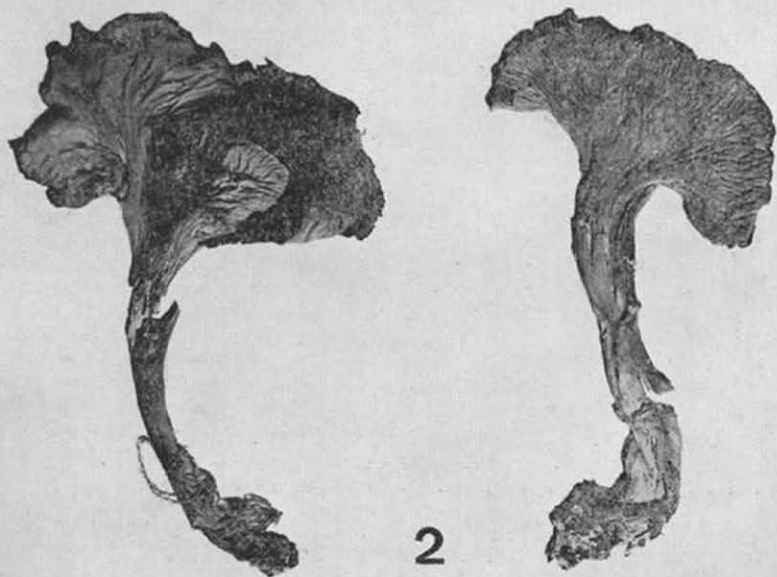
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Crataellus pupillus Fr. 1

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