CONTRIBUTIONS

TOWARD A

MONOGRAPH OF THE GENUS « CREPIDOTUS »

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RESUMEN

Contribuciones a una monografía del género « Crepidotus ». — Se trata del primer estudio monográfico sobre el género *Crepidotus*.

Entre los caracteres taxonómicos de importancia en este grupo, se citan las irregularidades del episporio, el tipo de tabicamiento de las hifas (con o sin hebillas), la forma relativa de las esporas y su capacidad de gelatinización y la pigmentación del estroma (pigmentos cristalizables o no).

El autor presenta la descripción de las especies de *Crepidotus* conocidas hasta ahora, en base al estudio de los tipos. Describe además dos nuevas especies e incluye en su trabajo una clave del género.

The genus *Crepidotus* has never been monographically studied. The characters separating the species have never been evaluated. Consequently, a large number of species has been described more than once by the authors.

The most striking character within the genus *Crepidotus* is the ornamentation of the spores. In some species the spores are not ornamented at all, with the walls definitely homogeneous when seen under oil immersion whereas in others the wall is partly, i.e. in the episporium, heterogeneous whereby the outer surface of the spore is either smooth or slightly warty-spiny. The episporium in these species is interrupted at rather regular intervals by imbedded spines which do not project beyond the episporium, and project very little. These spines are very short and cylindric, and when seen from above, i.e. when the upper

surface of the spore is focussed upon, the spores look punctate. This is a form of ornamentation also found in one species of *Tubaria, T. thermophila* Sing. from Florida, and in some Strobilomycetaceae. It had not been adequately described before the analogous spores of the Strobilomycetaceae and the *Tubaria* were mentioned and illustrated in the author's previous papers. However, outside the Agaricales proper, *i.e.* in the genus *Ganoderma*, Heim and others have observed similar types of ornamentation.

Another important character usable for the intrageneric taxonomy of *Crepidotus* is the septation of the hyphae. In both the group with punctate and with non-punctate spores, there is a subgroup with clamp connections, and a subgroup without clamp connections. This character is very precise, and either distinctly positive or distinctly negative. A good organ to take the tissue from, in order to obtain results fast and with confidence, is the basal tomentum which is usually found at the line of attachment of the pileus-surface to the substratum.

Another character of importance, not neglected so much as the two characters previously mentioned, is the relative shape of the spores. Even though the quotient of length and breadth of the spores may vary considerably in a single carpophore, especially in certain species such as *C. sphaerosporus*, the shape of the spores is of importance in the taxonomy of Crepidotus. It becomes very decisive in the case of the small species with punctate spores and clamp connections, formerly separated under the name *Dochmiopus* or *Conchomyces*. In the smooth-spored group, all species have the quotient $Q\left(\frac{\text{length}}{\text{breadth}}\right)$ smaller than 2, and the single species sometimes confused with *Crepidotus*, viz. *Pleurotellus herbarum* (Peck) Sing., which has the spores more elongate, differs also in various other characters, and is now considered to be generically different from though closely related to *Crepidotus*.

In one group of species, i.e. in those species with non-punctate spores, many species are partly gelatinized. This is another important distinctive character in the genus *Crepidotus*. The gelatinized zone is immediately noticeable in good sections in a

medium of 10% KOH, and occupies the upper portion of the trama of the pileus, sometimes one third of the diameter of the trama, and sometimes reaching more than one half of it. In other species the gelatinosity of the trama is weak or lacking, or at least not clearly localized in layers.

Another character of interest is the pigmentation. In one species from Florida, *C. roseus* Sing., the pigment is found to be crystallized in the hyphae of the trama. In other species, even deeply colored ones such as *C. cinnabarinus*, the pigment is not so distinct. It is rather a membrana pigment of melleous color under the microscope. In the majority of the species, the pigmentation is restricted to the spores. The fulvous color of the scales of some species is due to an incrusting, epicellular pigment.

The cheillocystidia are present in all species though they are of varying conspicuousness; at times they are similar to the basidioles, and therefore not immediately recognized. They provide a distinctive character in a few cases especially on the immediate specific level, e. gr. between *C. applanatus* and *C. nephrodes*.

One species has a well developed stipe. This same species, *C. nyssicola* Murr., has also round punctate spores and clamp connections, thus making it quite clear that the stipitate species are closest to the genus *Ripartites* where the spores are also small and round and rough, the pileus stipitate, and the hyphae clamped.

TYPE STUDIES ON THE *CREPIDOTI*

(omitting the excluded species)

Tremellopsis Antillarum (Pat. *apud* Duss). The type is undoubtedly a holobasidial, moderately gelatinous agaric, and, as the spores show, a typical representative of the Crepidoti with elongate, non-punctate spores. It has indeed been described by Murrill as a *Crepidotus* but his specific name is more recent than Patouillard's.

It was A. M. Donk who first called my attention to the fact that *Tremellopsis* is an agaric. More data about this species

than can be derived from the type specimen in the Patouillard Herbarium, were secured by studying the type of *Crepidotus cinchonensis* Murr. and some fresh material collected by myself in South Florida.

Summing up the data obtained from these three sources, one will attribute to **Crepidotus antillarum** (Pat. apud Duss) Sing. comb. nov. (*Crepidotus cinchonensis* Murr.) the following microscopical characters:

Spores (8) 8.2-10.5 (11) × 5.2-6.8 µ, smooth, non-punctate, with homogeneous spore wall, brownish melleous, ellipsoid, with the inner side flatter but without a suprahilar applanation; basidia (16) 20-37 × (5)-7.5-10.3 µ, either 2-spored or 4-spored [1]; cheilocystidia ventricose in the middle or below, or ventricose both below and above and constricted in the middle, the upper ventricosity often appearing as if the cheilocystidia were capitate, hyaline, making the edge subheteromorphous or heteromorphous, 33-51 × 5.5-10.3 µ; hymenophoral trama consisting of hyaline hyphae with clamp connections, of varying size and direction in mature specimens, hyaline; trama of the pileus rather thin, subgelatinous (not truly gelatinous in the manner of *C. mollis* or *C. uber* but the hyphae all slightly gelatinizing in the manner of the boleti), with thin and thick hyphae side by side.

C. alabamensis Murr.

The majority of the carpophores in the type collection and all the specimens of an authentic collection from Florida have all the characters of *C. mollis*; the species should therefore be considered as a synonym of the latter species.

C. albidus Ellis & Everh.

The type has globose, subglobose, or short-ellipsoid spores (5-6.8 × 4.8-6 µ) which are palepale brownish and smooth, non-

[1] The Florida collection (Matheson Hammock, Dade Co., Nov. 9, 1942, *Singer F 1472* on indeterminable frondose log) was entirely bisporous; the other collections are predominantly tetrasporous.

punctate and with homogeneous walls; the basidia are 4-spored, 28-36 × 6.8-7.5 µ; the cheilocystidia were not observed in the type; the hyphae of the irregular hymenophoral trama are varying in size and shape, and provided with clamp connections.

The combination of smooth and short spores is almost unique, and proves that *C. albidus* is a good autonomous species.

C. alveolus (Lasch) Karst. *sensu* Britz.

Apparently no type specimen has been preserved from the original collection described by Lasch. It is obvious enough, however, tha the earliest clear emendation of the name is that of Britzelmayr who described and illustrated it with all the characters of *C. calolepis* excepting the scales on the pileus.

The large spores and the narrow but very distinct gelatinized zone in the pileus characterize both this species and *C. calolepis*.

This is also the *C. applanatus* of Sydow (Mycoth. March. 3420) and the *C. mollis* of Ricken (Blätterpilze 1:231; 2: Pl. 61, fig. 1). It apparently occurs mainly in Europe.

C. amarus Murr.

The type has very short spores (6.5-7.3, rarely up to 8.3 × 5.5-6.3 and rarely up to 6.6 µ) with a small central oil droplet, smooth, non-punctate, with homogeneous wall, without suprahilar applanation; basidia 21 × 6.5 µ, 4-spored; cheilocystidia claviculate with flexuous narrow portion, or broad at the base and just below the apex which is cylindric, or any combination between these two extremes, rather long but very narrow, hyaline 32-54 × 4-5.7 µ; hyphae with clamp connections; the cuticle is made up of thin repent hyphae about 3.3-3.6 µ thick.

This species is as remarkable for its spores as is *C. albidus*. But the two species are not synonyms in my opinion.

C. Antillarum (Pat.) Sing.

See species preceding *C. alabamensis* Murr.

C. applanatus (Pers. ex Fr.) Quél. sensu Josserand

This seems to be the generally accepted concept of *C. applanatus*, and probably rightly so. There is, as far as I know, no earlier type available. Josserand's specimen is preserved in Lyon, France; I have not seen it, but Josserand's description is clear anough and contains all the most essential details to

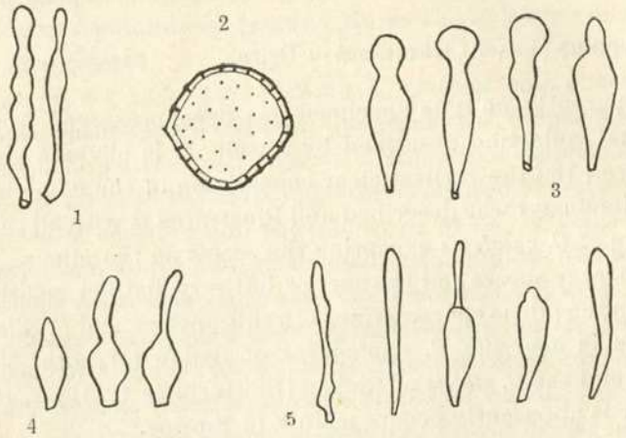

Fig. 1. — 1, *Crepidotus amarus* Murr. Cheilocystidia × 250 ; 2, *Crepidotus crocophyllus* (Berk.) Sacc. Spore in optical section × 1250; 3, *Crepidotus nephrodes* (Berk. & Curt.) Sacc. Cheilocystidia × 250 ; 4, *Crepitodus praelatifolius* Murr. Cheilocystidia × 250 ; 5, *Pleuroflammula chocoruensis* Sing. Cheilocystidia × 250.

dispose of it within the framework of a modernized taxonomy of *Crepidotus*.

Josserand's concept is certainly not isolated, even before his time. In Hoehnel's herbarium, *C. applanatus* is understood in the sense of Josserand, the same is true for the American species determined with the help of *North American Flora*. In all these specimens, I find all the microscopical and macroscopical characters approximately identical with those indicated by Josserand (see *Bull. Soc. Myc. Fr.*, 53 : 221. 1937).

Considering this consent of the mycologists, one is led to recommend the typification of *C. applanatus* with Josserand's specimen as lectotypical material. Spegazzini's *A. applanatus* (*An. Soc. Cient. Arg.*, 9 : 1662. 1880) is not a *Crepidotus*.

C. aquosus Murr.

The characters of this species (type from Rose Hill, Jamaica, preserved at N. Y.) are the same as those of *C. cuneiformis* Pat. which has the priority.

C. Betulae Murr.

The type is preserved at the N. Y. Botanical Garden. The spores are smooth non-punctate, and with homogeneous wall, brownish melleous, one side (the inner) flatter but not always with a true suprahilar applanation, 6.8-8.2 × 4-4.8 µ; basidia 2-spored or 4-spored (in a single preparation), very variable in size and shape (but not depending on the number of sterigmata), 16-28 × 4-7.5 µ; cheilocystidia basidiomorphous, often with a mucronate apex, often longer than the basidia, often thinner than the basidioles (subfilamentous-subclavate), hyaline, not always crowded, reaching 40 µ in length, and in an average 4-5 µ thick; hyphae of the trama thin (4.5-5 µ in diameter), regularly arranged in the lamellae, not visibly gelatinized in the trama of the lamellae but more or less gelatinous in the trama of the pileus; all hyphae with clamp connections.

Young specimens are pure white, even when dried. *C. Betulae* is well defined by the smooth, elongate spores and the presence of clamp connections. It is the only species of that category in temperate North America. It comes closest to *C. fragilis* Joss. of Europe which differs in many characters, especially its habitat (mostly on rotten coniferous wood and on the earth), its non-gelatinous trama and slightly larger (especially broader: 4.8-5.5 µ) spores.

C. Brunswickianus Speg.

The type is preserved at the Instituto Spegazzini in La Plata, Argentina. It is not in a condition to serve for macroscopical comparison, but some important microscopical characters can be drawn from it. The macroscopical description given by Spegazzini must be accepted at face value.

The spores are conspicuously punctate (they look either

smooth or echinate when seen in KOH, 15%), with heterogeneous wall as in *C. sphaerosporus* Pat. and *C. Cesatti* which are closest, the imbedded spines somewhat ferruginous and darker than the imbedding layer of the episporium in many spores especially in the rounder ones, in others the imbedded spines less constrasting in color, some with and some without a small suprahilar depression, 7.5-9.5 × 5-7 µ. Hyphae with clamp connections.

Since the surface is described as glabrous and the stipe as papillate-tomentosulous, this species seems to be only slightly different from *Crepidotus sphaerosporus*.

This species is geographically far remote from all related species, occurring in Patagonia on Antarctic beech and *Maytenum magellanicum*.

C. calolepioides Murr.

The type has ellipsoid non-punctate spores 8.8-11 × 6-7 µ; cuticle strongly developed, with portions of it rather bright fulvous because of an incrusting (epicellular) pigment, its elements of variable size and shape, some very broad; trama of the pileus consisting of two about equally thick layers, the upper one immedately soaked and glassy-hyaline in KOH because of the lack of air bubbles, gelatinized, its elements loosely arranged and running an all directions, the lower half remaining white for a while, consisting of interwoven irregular, non-gelatinized hyphae; hyphae of the dorsal tomentum hyaline, with 0.7 µ thick wall, with a diameter of about 3.8-4.2 µ, without clamp connections.

This is different from all other species of this group in having the peculiar covering of the pileus as described microscopically above, and macroscopically by Murrill.

C. calolepis (Fr.) Karst.

The type is not known to have been preserved. The Swedish tradition points clearly to the only species in Europa that fits Fries' description more or less satisfactorily, *i. e.* the *C. calolepis* as understood here (= *C. fulvotomentosus* Peck). A specimen

determined by Romell, and one determined by Beardslee, both collected in Sweden, have exactly the same characteres the upper third of the trama is gelatinized with a sharp limiting line between this and the lower, nongelatinized layer; the spores are comparatively very large (9-10 µ in average); basidia 20-24 × 7.2-8.2 µ, 4-spored; cheilocystidia basidiomorphous or ventricose with an irregular ampullaceous tip, about equally frequently ampullaceous filamentous with claviculate apex, or filamentous-capitate; about 30-55 × 6-8.3 µ hyaline or pale melleous, not always straight and upright but frequently oblique or appressed to the edge; hyphae without clamp connections; upper third of the trama of the pileus strongly gelatinized; carpophores rather stout.

This is a good species but perhaps too close to *C. alveolus*, yet always readily separable because of the fulvous scales on the pileus.

C. cesatii (Rab.) Sacc.

The type is the collection distributed in Rabenhorst's exsiccata set and published in 1851. The portion of it that is preserved at the Farlow Herbarium is not in good shape. Only a few spores could be secured from it, but this is sufficient, together with the host, to be sure that the original *C. Cesatii* is the same species that R. Maire distributed in *Mycotheca Boreali-Africana*, also from the Mediterranean region, on *Platanus acerifolia, n°* 235. This, in turn, is identical with «authentic» material of *Dochmiopus sphaerosporus* (Pat.) Pat. (collected by Cofino «on wood» in Italy, determined by Patouillard). The spores in these collections are 7-9.8 + 5.8-8.2 µ, punctate, with heterogeneous wall, subglobose; basidia 31 + 7.5-9.3 µ, 4-spored; cheilocystidia present but not distinctive and variable; hymenophoral trama subregular to almost irregular, consisting of densely packed filamentous hyphae with clamp connections; macroscopically, the non-tomentose, sessile pileus of sordid (not pure white) appearance is characteristic.

This species is very close to *C. Brunswickianus* and *C. sphaerosporus*. Both these species have similar spores but differ in

being not entirely glabrous; *C. Eucalypti* is also very close but persistently pure white and not quite glabrous. It grows on *Eucalyptus*.

C. cinchonensis Murr.

See under *C. Antillarum*.

C. cinnabarinus Peck

The type and other material in American herbaria, all from the Middle West, is well preserved. The pileus remains cinnabarinous in dried condition, and the hyphae of the uppermost layer of the pileus are still faintly pink in thick preparations and melleous-incrusted for some distance inwards; they are all filamentous and not forming a palisade; the pink pigment is rather indistinct, dissolved; the melleous pigment is a membrana-pigment or epicellular; all hyphae are without clamp connections; spores are of the same type as those of *C. sphaerosporus*, strongly punctate, with heterogeneous wall and sometimes with a small suprahilar depression but usually with a distinct suprahilar applanation, 8.3-8.8 + 5-6 μ, rarely some more globose (6.8 × 6.5 μ); basidia 4-spored, 27-34 + 8-8.3 μ; cheilocystidia not examined, as for size, but definitely present, versiform.

This species is very different from all others by its bright persistent red color and the lack of clamp connections. It occurs mainly on *Tilia* and *Populus*.

C. Citri Pat.

The type of this species consists ot several small, somewhat pressed carpophores with broad, distant lamellae and a small mat of mycelium around the point of attachment of the carpophores to the substratum (dead wood of citrus). The spores have rather thick but homogeneous walls without germ pore; they are very short ellipsoid, 7-8.2 × 5.5-6.8 μ; the hyphae are without clamp connections.

These data seem to make it a synonym of *C. uber*.

C. croceotinctus Peck.

The type is in good condition. The spores are melleous brownish, 6.2-7 × 4.8-5.3 μ, punctate and with heterogeneous wall, guttiform when seen in frontal view, short-ellipsoid when seen in profile, with a very small suprahilar depression or a large suprahilar applanation; basidia 4-spored; cheilocystidia present; hyphae with clamp connections.

Some of the spores have a non-terete outline when seen with their longitudinal axes pointing upward toward the objective but the six angles are very strongly rounded.

This species differs from other species with similar spores in the color of the pileus which is (according to my notes on fresh material which has been carefully compared with the type collection) « light ochraceous « buff » (Ridgway), the dorsal part often « ochraceous tawny », velvety.

It occurs in North America, in the East, from New York south to Florida, always on hardwood.

C. crocophyllus (Berk.) Sacc.

This species is absent in the Curtis Herbarium. There may be specimens at Kew, England.

However, Lloyd states in a letter (*ined.*) to Peck that this fungus is identifiable from collections made near the type locality where he found it common. He sent a sample of it to Peck, and this sample is described as differing from *C. dorsalis* in having yellow lamellae rather than orange colored ones, and smooth instead of striatulate margin. Morgan also sent specimens to Peck, also from Ohio, representing what he thought was Berkeley's species.

A critical study of both Lloyd's and Morgan's material shows that these fungi are identical with each other as well as with *C. dorsalis*. The flimsy differences pointed out by Lloyd will not hold. The margin is sometimes striatulate in *C. dorsalis* when the trama happens to be thinner than normal and the weather is wet; the lamellae of *C. dorsalis* are « salmon orange » (Ridgway) or « capucin yellow » when quite young and

fresh; when quite mature they become «avellaneous». While maturing, they may assume colors ranging all the way from sordid orange to light yellow.

The microscopical characters of both Lloyd's and Morgan's material are identical with those of *C. dorsalis*. Unless — quite unexpectedly — the type at Kew should reveal *C. crocophyllus* to be something different from what the mycologists of Ohio thought it was, *C. dorsalis* will fall in synonymy with *C. crocophyllus*.

I have not seen material from Kauffman's herbarium, and therefore ignore Kauffman's interpretation of *C. crocophyllus*. He states that the spores have suprahilar depression (or descriptive words to that effect) in spite of the fact that they are globose. Nothing like this has been observed in either Lloyd's or Morgan's material, or, for that matter, in *C. dorsalis*.

C. cuneiformis Pat. (see after *C. dorsalis*)

C. dorsalis (Peck) Sacc.

The type at Albany and authentic material from Vermont as well as numerous collections under this name all compared with the type (two from Virginia, and two from Florida) are identical with the Morgan-Lloyd-conception of *C. crocophyllus* which is probably the correct one (see above). The round punctate spores are similar to those of *C. nephrodes* and so are the cheilocystidia and the hyphae with clamp connections.

C. cuneiformis Pat.

The type of *C. cuneiformis* Pat. is represented at the Patouillard herbarium. The spores are punctate and their walls heterogeneous, subglobose or globose, 6.8-8 × 5.7-6.8 μ, or rounder; hyphae with clamp connections.

Better material has been collected in other regions. *C. aquosus* Murr. from Jamaica is the same plant. More material was gathered by me in Florida and the spores were found to be 7-8.5 μ in diameter in that collection. The pileus is «cinnamon buff» when fresh.

This is undoubtedly a good species.

Claudopus Eucalypti Torrend

The specimens distributed by Torrend under this name are also preserved at the Farlow Herbarium. They are remarkable by their pure white color, small size, and subglobose, punctate spores; the surface of the pileus is strongly woolly; the lamellae and spores are not pink but cream-yellowish ocher. It is true that the pale color of the lamellae does not suggest a *Crepidotus* but rather a *Clitopilus* or *Pleurotellus* but the color of the spores themselves as well as their ornamentation is fully typical of *Crepidotus*.

Another specimen, not authentic, but determined by Bresadola as *C. sphaerosporus* is published in *Mycotheca Ital. n° 1408*. This has spores as the authentic material (6.8-8.8 × 5.8-7.3 μ); basidia 23-30 × 8.2 μ; cheilocystidia often capitate, ventricose in the middle and very irregular, hyaline, 19-30 × 6-8.2 μ; clamp connetions present. This specimen comes from the Botanical Garden in Pisa where Archangeli collected it on the cortex of *Eucalyptus*, Nov. 1903. Bresadola's determination can be explained with the fact that he did not yet have knowledge of Torrend's species.

C. Eucalypti is closely related to *C. sphaerosporus*, *C. Brunswickianus*, etc.

C. Forsteri Speg.

The type has not been found at La Plata.

C. fragilis Josserand

This species is well known to the author who has collected it in various European countries. The type is in Lyon. Josserand's description is fully adequate. *C. autochthonus* Lange is identical.

C. fraxinicola Murr.

The type of this species is preserved at the New York Botanical Garden. It has micro-and macroscopical characters of *C.*

mollis. In fact, there is material of *C. mollis* collected by Peck on *Fraxinus*, well preserved at Albany, N. Y. and undoubtedly correctly determined as *C. mollis* or *C. haerens*.

C. fulvifibrillosus Murr.

The type is identical in all regards with *C. applanatus*, except for the scales which remind one of *C. calolepis*. It is to *C. applanatus* exactly what *C. calolepis* is to *C. alveolus*. In both cases, further observations must establish the specific value of the scales.

C. fulvotomentosus Peck

The type is identical with two Swedish collections of *C. calolepis*. The micro-and macroscopical characters are the same in European as well as in American specimens. Murrill was right in putting *C. fulvotomentosus* in synonymy with *C. calolepis*.

C. haerens (Peck) Sacc.

The type at Albany is identical in every regard with *C. mollis* as known in Europe as well as in America. The differences pointed out by Kauffman do not hold. Murrill seems to consider the large specimens as *C. mollis*. I think that *C. haerens* is a plain synonym of *C. mollis*.

C. hygrophanus Murr.

The type exhibits all characters known to occur in *C. nephrodes* (B. & C.) Sacc. It is small form of the latter.

C. latifolius Peck

The box inscribed *C. latifolius* at the N. Y. State Museum in Albany contains nothing but descriptive notes on the type. There are no specimens preserved. Under these circumstances, it is impossible to consider *C. califolius* as a valid species unless specimens are preserved at the Lloyd Herbarium. Peck's description suggests a large form of *C. praelatifolius* Murr. but as long as this cannot be proved, the latter name must be considered as valid for the species concerned (see under *C. praelatifolius* Murr.)

C. leucochrysus (Berk. & Curt.) Sacc.

The type has the same kind of spores as *C. nephrodes*. Other microscopical details and the descriptive data (which are very fragmentary) do not contradict the suggestion made previously tha *C. leucochrysus* is nothing but a form of *C. nephrodes*.

C. luteolus (Lambotte) Sacc.

I have not seen the type. However, a collection by Mazalongo near Verona on herbaceous stems is certainly in line with Lambott's description and with the publications of other European authors on this species. Favre gives a good description in Schweiz. *Zeitschr. f. Pilzk.* 13:7 (reprint pagination), 1935, under the name *Dochmiopus terricola* (Britz.) Favre. Though I do not think that the differences between this species and Britzelmayr's *Agaricus (Claudopus) terricola* are negligible, the reader is referred to Favre's account since my specimens of *C. luteolus*, those collected in Europe by myself and those studied later, especially the exsiccatum mentioned above, fit into Favre's description in every important detail including color and spore size.

The spores are extremely weakly punctate, and the heterogeneity of the wall may escape those observers who do not use good oil immersion lenses for their investigations. The spores are applanate at the suprahilar portion's inner outline, rather large and often very narrow; in some collections twice as long as broad, in others reaching a maximum of 12.2×5.5 µ.

The same fungus is represented in *Jaap 538* under the name *C. cesatii*. The host is *Sarothamnus coronarius*. This collection is not uniform. In the specimen preserved at the Farlow Herbarium, carpophores of *C. variabilis* are mixed in.

Another Jaap-specimen, called *C. Cesatii* var. *versatus* is nei-

ther *C. Cesatii* nor *C. versutus* but *C. luteolus*, *i.e.* the same fungus as *n° 538 p.p.* It grows on *Betula* (twigs, leaves) and grasses.

The hyphae are provided with clamp connections, as in all other collections.

The same species is represented in Thümen's exsiccata set *n° 401*, as *Agaricus variabilis*. It was collected on «*virgulata sicca*» which seem to be fallen twigs of *Rosa* sp. It has the same characters as the other collections mentioned above.

As for *Crepidotus pubescens* Bres. see under *C. submollis* Murr.

Favre believes that this species should be separated, along with *C. sphaerosporus*, *C. variabilis*, and perhaps some other species, under the generic name *Dochmiopus*. I have formerly held the same view, but a special study of the species inolved convinced me that there are no characters on the generic level distinguishing *Dochmiopus* from *Crepidotus*. *Dochmiopus* is a synonym of *Crepidotus*.

C. malachius (Berk. & Curt.) Sacc.

This species is commonly cited in American literature, and numerous specimens are deposited under this name in the herbaria. However, *C. nephrodes* has essentially the same characters as *C. malachius*, and was described much earlier. For more data see under *C. nephrodes*.

C. malachius var. **plicatilis** Peck.

The characters of the type specimens are essentially the same as these of type form, and also these of *C. nephrodes*.

C. Molfinoi Speg.

The type has not been found at La Plata.

C. mollis (Bull. ex Fr.) Quél.

The best information that can be had is drawn from a specimen in the Curtis Herbarium, called *Agaricus mollis*, and determined by Broome, the collaborator of Berkeley. It can safely

be assumed that this represents the interpretation of the British school. Since there is only one more species with gelatinous layer in *Crepidotus* — as far as Europe is concerned — *viz. C. alveolus* which was recoginized by Fries together with *C. mollis*, it may be concluded that Broome's interpretation is the correct one. This interpretation is also in line with the concepts of nearly all modern European authors.

This species is very common in Europe as well as in other parts of the northern temperate zones. It has been redescribed under the name *C. haerens*, *C. alabamensis* and *C. fraxinicola* by American authors, and has been misnamed *C. applanatus* by Ricken.

The specimens called *C. mollis* and collected in the tropics usually turn out to be *C. uber*. In one case, a *Melanotus* sp. was determined as *C. mollis* by Patouillard, and an interesting small species of *Gymnopilus* = *Fulvidula* was called so by Spegazzini as shown by specimens from Paraguay preserved at La Plata.

There is, in all these specimens, as far as they refer to the true *C. mollis*, a strongly developed gelatinous layer in the upper half of the trama of the pileus. The lower half of the pileus is non-gelatinized. The cuticular layer is a trichodermium, rather thin, consisting of slender irregular hyphae, some of them forked but never forming a true palisade, much thicker than in *C. uber*.

C. nephrodes (Berk. & Curt.) Sacc.

The type of the species, preserved at the Curtis Herbarium, is not really different from what is commonly called *C. malachius* in North America.

The spores are globose (6-8 × 5-7 μ), punctate, with heterogeneous wall, the basidia and cheilocystidia are partly destroyed but some are still recognizable. The cheilocystidia are characteristic because of their shape which, though, variable, is in the majority of cases much like that of certain Tubarias, a genus closely related to *Crepidotus*. The apex is typically capitate and the lower portion is ventricose; between these thickened portions, there is usually constriction. A few cheilocystidia are

always aberrant, *viz.* either merely clavate or vesiculose, or ampullaceous. They measure 23-50 × 8-12 (17) μ. The hyphae have clamp connections. *C. nephrodes* differs from *C. applanatus* in broader, less close lamellae and the shape of the cheilocystidia.

Pleuropus nyssicola Murr.

The type specimen, preserved at the Herbarium of the Agricultural Experiment Station of the University of Florida in Gainesville shows all characters of a typical *Crepidotus*. The species is however unusual in having a well developed stipe. The spores are punctate and have heterogenous wall; they measure 6.3-7.2 (9.3) × 5-6.2 (8) μ, and are nearly globose. The basidia are 28-32 × 7.8-8 μ and 4-spored. The cheilocystidia are remarkable for their size (49-80 × 9-13 μ), but otherwise, they are very variable (ventricose in the middle, or clavate, or capitate, sometimes with irregularly located prongs or ramifications near the apex, but always rounded above), hyaline but occasionally yellowish. The hyphae are provided with clamp connections.

C. palmularis (Berk. & Curt.) Sacc.

The type from the Curtis Herbarium, collected on the Bonin Islands is good only for the examination of the spores. These are about 7 μ in diameter and globose, punctate as in *C. nephrodes* with which this species seems to be identical. Bonin-Island-material has been re-collected by Imay, and his recent description does not indicate a single character at variance with the description of *C. nephrodes*. I have little doubt but that *C. palmularis* is merely another synonym of *C. nephrodes*.

C. parvulus Murr.

The type shows all characters of *C. quitensis* and is certainly a synonym of the latter.

C. praelatifolius Murr.

The spores of the type, preserved at Gainesville, Fla., have heterogeneous wall and are punctate, globose, brownish melleous, 6.5-7.5 × 5-6 μ; cheilocystidia mostly ampullaceous (but some cylindric, fusoid, or clavate), 30-35 × 6.5-10.8 μ; hymenophoral trama subregular; hyphae of the cuticle 3-3.5 μ thick; all hyphae with clamp connections.

This species is characterized by the comparatively large size of the lamellae, while the sterile portions are strongly reduced in mature specimens. Another distinguishing character is the small size of the carpophores, reaching 3 mm whereas *C. latifolius* is said to be 3-6 mm in diameter.

C. putrigenus (Berk. & Curt.) Sacc.

The type, or rather the portion of the type preserved at the Farlow Herbarium, Curtis Herbarium, is not in very good condition; however, there are numerous spores, and these are exactly as in *C. nephrodes* and *C. malachius*, globose, and punctate. Specimens later determined as *C. putrigenus* by Peck and others, are preserved at the N. Y. State Museum, and they are certainly not specifically different from *C. nephrodes*.

I have never found anything that has all the characters attributed to it, as well as the characters demonstrable from the type specimens, and still different from the other known species of *Crepidotus*, especially *C. nephrodes*.

Consequently, *C. putrigenus* is here considered has a form of *C. nephrodes*.

C. quitensis Pat.

The type is in good condition. It is preserved in the Patouillard Herbarium (Farlow Herbarium). The spores are small, globose, 4.8-5.5 μ in diameter, punctate, with heterogeneous wall; basidia 13-15.5 × 6 μ; cheilocystidia not examined; hyphae with clamp connections.

This species is easily recognizable because of its small spores.

C. reniformis (Berk. & Rav. apud Berk. & Curt.) Sing. (*Paxillus reniformis* B. & R.)

Large fungus on oak rails in North Carolina, with clamps. See Farlowia 2:544.1946.

C. sepiarius Peck

The type has been lost.

C. sphaerosporus (Pat.) = *Agaricus variabilis* var. *sphaerosporus* Pat.

At the Farlow Herbarium (Patouillard Herbarium), no specimens are preserved. The only «authentic material» is, I am sure, an erroneous determination.

What I used to call *D. sphaerosporus* Pat. in my previous papers is the same species that is described at length, under this same name, by Favre, (l. c.), and comparing the original diagnosis and the figures published by Patouillard, one is led to think that this must also be Patouillard's original concept.

This same fungus is represented in Westendorp & Wallays Courtrai, Herbier Cryptogamique, *n° 1283*. It is named *Agaricus variabilis*. The spores are 8.2-12 × 6.8-9.8 µ, rather variable but decidedly longer and much broader than in the true *C. variabilis*. This species is villous to tomentose in its dorsal part (not subglabrous to glabrous like *C. Cesatii*) and grows on various decaying branches, twigs, stems, foliage, etc.

A similar form, perhaps not fully identical but certainly not more than a mycoecotype within the specific limits of *C. sphaerosporus* is a specimen called *C. Cesatii* by Bresadola, collected on *Robinia* wood in Italy. The spores are perhaps less strikingly punctate because the spines imbedded in the episporium are not deep and rusty colored in many otherwise mature-looking spores.

Another similar form is *C. versutus* in the sense of Burt. The so-called authentic specimen collected by Burt in Vermont, sent to Peck and authenticated by the latter, was divided by Peck who kept half of it under the name *C. versutus* Peck (it is still

at the N. Y. State Museum at Albany), and the other half went with the Burt Herbarium to the Farlow Herbarium. Actually, this is not identical with the original *C. versutus* (see there) but rather a race or mycoecotype within the specific limits of *C. sphaerosporus*, probably differing merely in the spores which are very slightly narrower, viz. 8-11 × 5.7-7.2 (mostly 9.2-10.5 × 6.2 µ). The same form was observed by the author in Florida on grape vines. The Vermont material was collected on *Ostrya*.

Another form or race may be represented by the specimen collected by Romell in Sweden on coniferous wood. Its spores measure (7) 8.2-8.7 (10.2) × (4.8) 6.5-6.8 µ; the spines are strongly marked and deeper rusty then the imbedding episporium. Favre may have had the same form, since he indicates specimens from *Pinus* wood in Switzerland.

What Karsten considered as the type variety of *Claudopus variabilis* (not his new variety which is *Clitopilus pleurotelloides*) is also actually *C. sphaerosporus*. This is evidenced by the specimens distributed by him in *Myc. Fenn. n° 511*.

C. submollis Murr.

The spores of the type are punctate and possess a heterogeneous wall, but the punctation is so faint, it can scarcely be seen, exactly as in *C. luteolus*. The spores measure 0.2-10.4 × 5.3-6.5 µ. They are thus similar in shape to the spores of the short-spored specimens in Jaap's exsiccata representing *C. luteolus* but determined as *C. Cesatii*. The basidia are 4-spored, 25-34 × 9.5 µ; cheilocystidia filamentous and flexuous, ventricose in the lower part (7-9 µ broad), more rarely with the ventricose part in the middle or near the apex, obtuse or acute above, numerous, making the edge of the lamellae heteromorphus, 7.0-8.3 µ long; hymenophoral trama subirregular, consisting of hyphae of variable size and shape, with clamp connections; carpophores rather robust for a *Crepidotus* of the *Luteolus* group, and sordid white in the herbarium.

This is distinguished from *C. luteolns* mainly by the white pileus, the somewhat larger average size, and perhaps the more constantly shorter spores. It occurs on *Alnus*. *C. pubescens* Bres. is undoubtedly the same species though with smooth pileus.

C. sulcatus Murr.

The type shows the same macro-and microscopical characters as *C. uber,* and is undoubtedly synonymous with it.

C. uber (Berk. & Curt.) Sacc.

The type differs from *C. mollis* which is most closely related, by having a scarcely differentiated cuticular layer above the gelatinized zone of the trama, often brown, striate margin when dry, and broader, less close lamellae. It is the southern vicariant form of *C. mollis* which it replaces in the tropics (Florida and West Indies, west to the Bonin Islands; in North Florida however *C. mollis* is more common).

The spores are often rather short, but always with homogeneous, rather thick wall without germ pore. The gelatinization of the trama is more variable than in *C. mollis*, at times not very strong, and often occupying a larger zone than the non-gelatinized trama beneath it. All hyphae have clamp-less septa.

It grows on dead twigs and wood of such hosts as palms, *Ficus*, *Artocarpus, etc.*

C. variabilis (Pers. ex Fr.) Quél.

The specimen which should be considered as the lecto-type of this species is the oldest exsiccatum published. This is Desmazières, *n° 407* under the name of *Agaricus variabilis* Pers., distributed shortly after Fries validated Persoon's name, and determined, according to Maire, by Persoon himself.

This specimen is microscopically exactly the same as the *Dochmiopus variabilis* described by Favre. It is also Buchholtz's *Derminus variabilis* as shown by his specimens at the Farlow Herbarium. It is also Patouillard's *Dochmiopus variabilis* as can be proved by one of his specimens from France.

The small and narrow spores with distinct punctation characterize this species sufficiently. However, the color and structure of the spores, as well as all the other anatomical characters are those of *Crepidotus*, or at least essentially so, and there is no reason to separate the smaller species under another generic name.

Conchomyces verrucisporus Van Overeem

Donk has seen the type and considers it as a *Crepidotus*, sect. *Echinosporae.*

C. versutus (Peck) Sacc.

The type of this species as preserved at Albany is very peculiar and not common in the Eastern States of this continent. It differs from all species except *C. luteolus*, *C. submollis*, and their synonyms, in *faintly* punctate spores with very finely spinose episporium. The heterogeneous character of the latter is scarcely noticeable unless it is studied with special attention in a suitable medium under a good oil immersion lens. *C. versutus* differs from the two species with likewise faint punctation in having no clamp connections.

I found the spores of the type brownish melleous, 9.8-10.5 × 5.3-5.8 µ; the basidia 23-31 × 7-10.3 µ, 4-spored; the cheilocystidia were not found in the type specimens; the subhymenium is very irregular, consisting of very broad, nearly subisodiametric, small elements which look subcellular when examined superficially; all hyphae without clamp connections.

This species is undoubtedly the one among the Crepidoti that is closest to the genus *Pleurotellus*. It differs in deeper spore color, less narrow and less punctate spores.

EXCLUDED SPECIES

During the examination of the types, it became obvious that many of the species now listed in *Crepidotus* by their authors and by Saccardo, are by no means congeneric with the type species of *Crepidotus*. According to the scheme introduced by Fries, any agaric with colored spores is either *Crepidotus* or *Claudopus*. The latter contained several true Crepidoti because the lamellae of some of the smaller species of *Crepidotus* sometimes assume a slightly salmon color shade before becoming brownish, but the spores themselves are never pink. Patouillard

distinguished a genus *Melanotus* from *Crepidotus*; however, it is strange to note that he described several species which, according to his own diagnosis, should go into *Melanotus*, as new species of *Crepidotus* proper. Bresadola and Peck described one species each in *Crepidotus* which undoubtedly belongs in *Phaeomarasmius*. Andseveral more species belong in a genus recently described by the author as *Pleuroflammula*. One species ist he type of another recent genus, closely related to *Gymnopilus*, — *Pyrrhoglossum* Sing. And finally, at least one species is *Naucoria* (*sensu stricto*) as has been pointed out in a previous paper. Only one species enters a genus really close to *Crepidotus*, viz. *Pleurotellus* Fayod. The other *species excludendae* are rather scattered misdeterminations and do not affect the generic concept of *Crepidotus*, or any other genus.

C. Bruchii Speg.

Spores of the type with deep ochraceous episporium and pallid endosporium, with germ pore, smooth, 8.8-9.8 × 6.3-7.3 µ; basidia 27-28 × 8.2-9 µ, tetrasporous; cheilocystidia on the heteromorphous edge crowded, versiform, narrow, usually with capitate-clavate, more rarely fusoid, or ampullaceous apices, sometimes assuming the character of chrysocystidia (having a yellow body in the widest portion, when seen in NH_4OH, just as in the genus *Naematoloma* or *Pholiota*), otherwise hyaline and « empty », 30-45 × 3.5 - 4.8 µ; hymenophoral trama regular, hyaline; epicutis consisting of repent hyphae, but some isolated dermatocystidioid bodies which are terminal members of epicuticular hyphae can be observed; they are incrusted with a resinous melleous substance; all hyphae with clamp connections, without a bright yellow soluble pigment.

This species, together with *P. puberula* (Peck) Sing., *P. chocoruensis* Sing., *P. Dussii* (Pat.) Sing., and *P. flammea* (Murr.) Sing., belongs in the genus *Pleuroflammula* Sing. which is closer to *Pholiota* and *Melanotus* than to *Crepidotus*.

C. cacaophyllus (Berk. & Curt.) Sacc.

This is a puzzling small fungus, not at all a *Crepidotus*. I have published (*Lloydia* 9 : 130-131. 1946) on the type collection, or rather the portion of the type preserved at the Curtis Herbarium. It is probably an inhibited form of *Gymnopilus* where a hypertrophic development of resinous incrusting matter has suppressed normal spore production to a comparatively low level.

C. distans Peck

The spores are smooth, with a callus at the apex, rusty colored, with rather thick double wall, 11 - 13.7 × 6.8 - 9.3 µ; cheilocystidia present; basidia large, 4-spored; hyphae with clamp connections; hymenophoral trama regular; hairs of the epicutis thick-walled, brown, with a subhyaline, crystalline, ridge-like incrustation, forming a trichodermium or palisade; there is a distinct eccentric stipe present.

This species is evidently a *Phaeomarasmius*. The new combination *Phaeomarasmius distans* (Peck) Sing. is proposed.

C. Dussii Pat.

I have published on the type of this species (see Singer *apud* Singer & Smith, *Mycologia* 38 : 521. 1946); it is the *species typica* of the genus *Pleuroflamula*.

C. flammeus Murr.

C. flammeus is another species of *Pleuroflammula*. It differs from *C. Dussii* in the size of the spores and the shape of the cheilocystidia.

C. herbarum (Peck) Sacc.

This species has often been misunderstood, perhaps also by Peck himself. The type specimens are in excellent condition. They are undoubtedly identical with *Claudopus commixtus*

Bres., a species which I have discussed in *Beih. Bot. Centralbl.* 46 (II) : 92. 1929 (authentic specimens).

Claudopus commixtus and *Crepidotus herbarum* are identical with the type species of the genus *Pleurotellus* Fayod, viz. *Pleurotus hypnophilus* (Berk.) Sacc. sensu Fayod = *Pleurotellus graminicola* Fayod. These species are often put in synonymy with such Friesian species as *Pleurotus chioneus* (Pers.) Gillet or *Pleurotus septicus* (Fr.) Quél., or else with such Quéletian species as *Calathinus dictyorhizus* Quél., or *Calathinus pubescens* Sow. ex Quél. There is doubt about the identity of all these older species, and Konrad & Maublanc, Icon. Sel. 6 : 360. 1937 [1938] who use the Friesian names, admit that « Les espèces de *Pleurotellus*... décrites par les anciens auteurs sont difficiles à définir exactement en l'absence de données sur les caractères microscopiques ; aussi ont-elles diversement interprétées ». This is also valid for the species *Pleurotus perpusillus* (Fr.) Gillet, interpreted as representing the same species as *Claudopus commixtus* Bres. by R. Maire but it is actually, as Konrad & Moublanc say (*loc. cit.*, p. 352) « Espèce diversement interpretée ». Under these circumstances, it appears to be desirable to base the type species of *Pleurotellus* on a species which is well enough defined, and whose type epecimens are easily accessible and in good condition. This species is *Crepidotus herbarum* Peck. All the species published before the time this was published by Peck (1873), are dubious since no type specimens have been preserved. Anybody who has even a little experience in the taxonomy of these small *Crepidotus*-like fungi, will readily admit that a description of the macroscopical characters alone is just not enough to be sure of the genus, not to mention the species.

Consequently, the new combination *Pleurotellus herbarum* (Peck) Sing. (*Agaricus herbarum* Peck 1873) is proposed.

C. laceratus Pat., see *C. pyrrhus* (Berk. & Curt.) Sacc.

C. puberulus Peck

The type specimen proves that this species belongs in *Pleuroflammula*. The spores are yellowish brown under the microscope (not as deep and rich rusty as in *Pleuroflammula flammea*), with distinct germ pore, with moderately thick epi-and endosporium, the latter hyaline, the former smooth, 8.2-10.2 × 5.3-6.3 µ ; basidia 4-spored ; cheilocystidia long, filamentous, sligtly thickened in the middle (4.2-6.2 µ in diameter), with cylindric or somewhat capitate apex, hyaline ; there is no deep yellow pigment dissolving in ammonia and coloring the whole preparation, — as there is in *P. flammea* ; hymenophoral trama regular, wall hyphae with clamp connections.

McClatchie determined this a «*Crepidotus? tiliophilus* Peck», but Peck recognized it as a new species, unfortunately in the same wrong genus — *Crepidotus*. The new combination *Pleuroflammula puberula* (Peck) Sing. is proposed.

C. pyrrhus (Berk. & Curt.) Sacc.

I have published on the type of this species in a previous paper (*Mycologia* 36 : 367. 1944) where it was proposed as the type species of a new genus, *Pyrrhoglossum*. *Crepidotus laceratus* Pat. is identical.

C. rufolateritius Bres.

The spores of the type are 11.5-11.7 × 6.7-6.8 µ i. e. smaller than those of *Phaeomarasmius distans* (Peck) Sing.; the hairs of the epicutis are incrusted with the ordinary rusty-chestnut brown resinous incrustation; the basidia are likewise 4-spored, and the hyphae clamped ; the cheilocystidia are versiform rather large, and hyaline.

Specimens from the type collection have been distributed in Rabenhorst, *Fung. Eur. n° 3941* but the species is a native of the southern states of the U. S. A. The new combination *Phaeomarasmius rufolateritius* (Bres.) Sing. is proposed.

C. substipitatus Murr.

The type has the same characters as *Pyrrhoglossum pyrrhus* (Berk. & Curt.) Sing.

C. subversutus Peck nom. nud. in Reid, *History of Pasadena*, p. 621. 1895.

Two collections exist, one, the type collection, preserved at Albany N. Y., the other, an authentic collection (i. e. collected and named by the same collector) with notes accompanying the specimens, preserved at the New York Botanical Garden. Both come from Pasadena, Calif.

The strange thing is that the two collections are not identical, and their common name — *C. subversutus* Peck has never been validly published. As for the type, this name would have been valid if published, since it is indentical with *Clitopilus pleurotelloides*, a Fungus which did not have a valid name in Peck's time. However, Peck must have seen the « authentic » material also, and must also have agreed with its determination since, in his unpublished note book, he adds, obviously long after the entry of the notes he made on the original specimen: *C. herbarum*. This note is understandable only if one knows that the second collection actually is *Pleurotellus herbarum* (Peck) Sing. Thinking that the first parcel also contained *P. herbarum*, Peck decided to refrain from publishing McClatchie's species.

This is why *C. subversutus* Peck remains a *nomen nudum*.

C. tigrinus Speg.

No type material has been preserved. Four authentic collections from Argentina are in existence, one being a *Clitopilus* (May 16, 1919); another is a *Pleuroflammula* (Feb. 5, 1925, Bruch [1]); another is identical with the first collection, and a fourth one is a *Marasmiellus* sp. (La Plata, 1907). One is impressed by the fact that Spegazzini recognized his species in three different fungi, each belonging in another family of the *Agaricales*. The species *C. tigrinus* must be abandoned.

[1] This may be the same as *P. Bruchii* (Speg.) Sing. with less developed stipe.

C. tiliophilus (Peck) Sacc.

This species has been studied by the author (*Mycologia* **35**: 163. 1943), and as a result has been transferred to *Naucoria*.

C. xerotoides Speg.

The type is the same as *Anthracophyllum discolor* (Mont.) Sing. (*Xerotus discolor* Mont.).

C. eccentricus Murr.; **C. flavolivens** (Berk. & Curt.) Sacc.; **C. fumosifolius** Murr.; **C. haematites** (Berk. & Curt.) Sacc.; **C. mollis** sensu Pat. non Fr. (from Guadeloupe); **C. musaecola** (Berk. & Curt.) Sacc.; **Claudopus proteus** (Kalch Obrenner) Sacc.; **C. Psychotriae** Pat.; **C. subcuneiformis** Murr.; **Agaricus Crepidotus variabilis** Pers. sensu Mont. (from Chile).

All these species form a group of closely allied forms consisting perhaps of fewer species than one might assume considering the small number of distinguishing characters, except for the host.

All the species cited above belong in the genus *Melanotus* The *Crepidoti haematites, flavolivens, musaecola, proteus,* and *Psychotriae* were transferred to *Melanotus* in a previous paper (Singer in Lloydia **9**: 130. 1946). The new combination *Melanotus eccentricus* (Murr.) Sing. (*Crepidotus eccentricus* Murr.) and the combinations *Melanotus fumosifolius* (Murr.) Sing. (*Crepidotus fumosifolius* Murr.) and *M. subcuneiformis* (Murr.) Sing. (*Crepidotus subcuneiformis* Murr.) are now proposed in addition to these mentioned above, and *Melanotus bambusinus* Pat.

NEW SPECIES

Crepidotus roseus Sing. sp. nov.

Pileo roseo, in parte dorsali pubescente, marginen versus subsericeo vel subglabro, pube albo, sicco, ostreato, convexo vel applanato,

4-6 mm lato ; colore « Congo pink » vel « Light Congo pink» Ridgwayi gaudente. — Lamellis roseis dein testaceis, subconfertis vel subdistantibus 1-1.5 mm latis, ad punctum excentricum concurrentibus ubi aut attenuatae aut rotundatae sunt ; colore primum « Coral pink » vel « Japan rose», dein « testaceous » vel «pecan brown» Ridgwayi gaudentibus ; sporis subglobosis, echinulatis membrana heterogenea causa, brunneolis, 6.5-7 × 5.3-5.8 µ ; basidiis 15-22 × 7.5 µ, plerumque tetrasporis ; cheilocystidiis versiformibus, ad apicem semper rotundatis, hyalinis, numerosissimis 30-48 × 7.5-13 µ ; tramate hymenophorali hyalino, regulari, sed hyphis nonnullis pigmento lilacino crustulino ornatis ; hyphis omnibus fibuligeris ; epicute ex hyphis jacentibus, filiformibus, breviusculis consistente ; hyphis illis 2.5-8.5 µ latis, perpaucis usque ad 20 µ incrassatis.

Ad lignum emortuum « Fici *sp.* » *in dumeto tropicali ; fructificationes gregariae, sessiles, pulcherrimae, inodorae, autumnales. In « Matheson hammock » prope Miami, Florida, U. S. A. Octobri 30, 1942 legit R. Singer. Typus in « Farlow Herbarium » conservatus est.*

Pleuroflammula chocoruensis Sing. spec. nov.

Pileo leonino, cremoricolori ad marginem, subfibrilloso, margine involuto in juvenilibus, proratione crassiere, convexo, 6-8 mm lato ; epicute ex hyphis jacentibus pigmento castaneo-ferrugineo incrustatis, fibuligeris, 2.7-3.5 µ in diametro consistente. Lamellis obscure lateis, 1.7 mm latis, attenuato-subadnatis, subdistantibus aciebus cremeo flocculosis ; sporis maturis 6.8-9 × 5.3-7 µ, poro angusto indistincto instructis, latissimis saepeque subovoideis, levibus, intense obscureque pigmentatis, ferrugineo-brunneis ; basidiis tetrasporis, clavatis vel capitatis, 18.4-26 × 5.5-7 µ ; cheilocystidiis versiformibus, plerumque longe-clavatis vel filamentosis, rarius ventricosis vel capitatis et ventricosis deorsum (capitulo angustiore parte ventricosa), vel subampullaceis, interdum castaneo-incrustatis ad apicem 33-56 × 3.5-7.5 µ ; aciebus heteromorphis e cheilocystidiis ; cystidiis ad latera lamellarum nullis ; hymenio toto pigmento laete intenseque luteo-citrino solubili (NH_4OH) imbuto. Stipite subconcolori cum pileo, parte inferiore leonino sed pallidus quam pileus, parte superiore cremolicolori, aequali vel subtus incrassato, excentrico, a pileo libero, curvato, pallide strigoso ad basin, velo apicali pallide flavido praedito, velo causa apice fibrilloso, annuloque indistinctissimo fibrolloso saepe instructo, solido, exiguo, 4-6 × 1.3-1.6 mm. Carne carnoso-molli, cremea ; sapore odoreque haud notatis.

Ad ligna. Mt. Chocorua, New Hampshire, U. S. A. (Nova Anglia septentrionalis) Sep. 21, 1905, legit Krieger (et Farlow ?). Krieger carpophora viva pinxit et colores Ridgwayi correspondentes sunt « tawny » in pileo, nonnullum pallidores quam « cream color» ad marginem ; paulum sordidius quam « Mars yellow » lamellae colorotae sunt. Typus cum icone in Farlow Herbarium conservatus est.

KEY TO THE SPECIES OF *CREPIDOTUS* [1]

A. Spores punctate (even if noticeable only with oil immersion).
  B. Clamp connections present.
    C. Tramal hyphae with bright colored (lilac) crystallized pigment. *C. roseus*
    C. Tramal hyphae hyaline, or almost so.
      D. Stipe strongly developed, eccentric ; cheilocystidia very long and rather broad (49-80 × 9-13 µ) ; pileus 40-50 mm broad. *C. nyssicola*
      D. Stipe usually indistinct at least when seen from above, or absent, at least in mature specimens ; cheilocystidia rarely reaching the size indicated above ; pileus rarely larger than 40 mm.
        E. Spores virtually globose, *i. e.* length less than 1 µ larger than breadth, or just one µ longer than breadth [*].
          F. Lamellae narrow and close. Temperate species.
            G. Pileus with appressed fibrillose scales formed by strands of parallel hyphae with fulvous incrustations. *C. fulvifibrillosus*

[1] Species incompletely studied as for spore ornamentation and clamp connections are excluded.

[*] Dubious cases with an average quotient just above 1, i. e. making the spores between subglobose and very short ellipsoid, are handled so they key out in both subdivisions.

G. Pileus naked. *C. applanatus*

F. Lamellae broad and/or subdistant.

H. Lamellae initially salmon orange ; pileus about 20-40 mm broad, comparatively fleshy behind. North American species. *C. crocophyllus*

H. Lamellae not initially salmon orange, or else minute species, not occurring in North America.

I. Pileus cinnamon buff to watery brown in fresh condition, striate or sulcate, 10-25 mm broad ; spores strictly globose or subglobose. Tropical North and Central America. *C. cuneiformis*

I. Pileus some other color, at least when young and fresh and not too watersoaked, often smaller than indicated above, and then spores about 1 μ longer than broad.

J. Spores globose and smaller than 5.7 μ. South and Central America. *C. quitensis*

J. Spores larger than 5.7 μ.

K. Carpophores minute (1-3 mm with enormously broad lamellae. Florida. *C. praelatifolius*

K. Carpophores usually much larger, always larger than 3 mm and usually larger than 6 mm.

L. Large non-resupinate carpophores (8-45 mm broad) occurring in North America ; cheilocystidia with broadly capitate apices.

M. Pileus « vinaceous cinnamon » to « pinkish cinnamon», delicately fibrillose at the margin. *C. sp.*

M. Pileus white to yellowish, not delicately fibrillose at the margin. *C. nephrodes*

L. Usually much smaller than

indicated above, often attached with the surfe of the pileus; uncommon in North America ; cheilocystidia capitate or some other shape (see «N»).

E. Length of the spores more than 1 μ larger than the breadth, at least in a large number of the spores of a print.

N. Spores, at least the broader ones, with very distinct punctation which is obvious even under high dry objective.

O. Spores longer than 7 μ and broader than 4 μ.

P. Dried specimens pure white ; spores almost subglobose 6.8-8.2×5.8-6.8 μ. On *Eucalyptus* in the Mediterranean region and on the Azores Isles. *C. Eucalypti*

P. Dried specimens usually not strikingly white ; spores as above or different ; not on *Eucalyptus* in the area indicated above.

Q. Spores 6.2-7×4.8-5.3 μ ; pileus « light ochraceous buff », dorsal portion often «ochraceous tawny», 10-42 mm broad. North America. *C. croceitinctus*

Q. Spores, at least their majority, longer and broader pileus not colored as indicated above ; smaller, or larger, or within the measurements given above.

R. Pileus villous or tomentose in the dorsal portion in most carpophores ; on various hosts herbaceous and otherwise, not or rarely on *Platanus*. (cf. *C. cinnamomeus*)

S1. Pileus white, pubescent, small. *C. sphaerosporus*

S2. Pileus pale melleous to fulvous-yellowish, glabrous ; on Antarctic beech and *Maytenum*. *C. Brunswickianus*

S3. Pileus brownish pallid, tomentose. *C. reniformis*

R. Pileus entirely glabrous even in the dorsal portion. On *Platanus* in Southern Europe. *C. Cesatii*

O. Spores smaller, narrower: 5.5-6.8×3.3-3.5 μ. *C. variabilis*

N. Spores very indistinctly, faintly to slightly punctate.

T. Pileus yellow, especially near the dorsal portion, but fading in age, not sulcate-plicate; Europe. *C. luteolus*

T. Pileus white, later often discolored, usually striate to sulcate-plicate; on *Alnus* in Europe and Western North America. *C. submollis*

B. Clamp connections absent.

U. Carpophores cinnabarinous: spores 8.2-8.8×5-5.5 μ, to (rarely) globose (*e. gr.* 6.8×6.5 μ). American Middle West. *C. cinnabarinus*

U. Carpophores white or hearly so; spores 9.8-10.5 × 5.3-6 μ, slightly punctate. New York. *C. versutus*

A. Spores not punctate.

V. Clamp connections present.

W. Spores up to 1 μ longer than broad (subglobose to globose).

X. Spores 5-6.7×4.8-6 μ. American Middle West. *C. albidus*

X. Spores 6.5-7.3 (8.3)×5.5-6.3 (6.6) μ. Florida. *C. amarus*

W. Spores more elongate (short-ellipsoid, ellipsoid, apple-seed shaped, or subellipsoid with mucronate apex).

Y. Spores up to 8.5×5.2 μ; trama of the pileus strongly gelatinous; on wood of frondose trees in the temperate part of North America. *C. Betulae*

Y. Spores larger, or trama little gelatinized. Tropical North America, Central America, South America; and Europe and Asia

Z. Pileus with an upper layer of appressed delicate fibrils which crack eventually, showing the hygrophanous context; spores 4.8-5.8×7-9 μ; on the earth and on coniferous hosts (very decayed wood) in the temperate regions of the eastern hemisphere. *C. fragilis*

Z. Pileus with a somewhat different covering; spores somewhat larger (8) 8.2-10.5 (11) × 5.2-6.8 μ. Tropical America, on frondose trunks. *C. Antillarum*

V. Clamp connections absent.

AA. Dorsal part of the pileus beset with spiny erect small scales. Tropical America. *C. calolepioides*

AA. Scales, if present, always inconspicuous or strictly appressed.

BB. Spores (8) 8.8-11 × 5.3-7 μ (rarely smaller); only a comparatively thin upper layer of the context (about one third) gelatinous. Always occurring in the temperate zones.

CC. Pileus with ochraceous to rusty appressed fibrillose squamulae; cheilocystidia versiform. Temperate zones of Europe, Asia, and North America. *C. calolepis*

CC. Pileus without squamulae; cheilocystidia rather constantly predominantly slender-clavate. Europe. *C. alveolus*

BB. Spores smaller, usually 7-10 μ long; gelatinous layer occupying one half to two thirds of the trama of the pileus.

DD. Lamellae usually rather broad and even ventricose, subdistant to close, the constantly strongly striate to sulcate margin often brown to deep brown; cuticle in section so thin it usually appears almost non-differentiated. Subtropics and tropics of North America, Central and South America, Oceania and Asia. *C. uber*

DD. Lamellae always rather narrow and close to crowded; pileus with subconcolorous to yellowish olive margin, if striate; cuticle well developed forming a layer of denser hyphae than those of the subjacent layer and the contents of these hyphae more abundantly protoplasmatic. Temperate species. *C. mollis*

SECTIONS AND SUBSECTIONS OF CREPIDOTUS

Pilat (1926) has first divided the genus *Crepidotus* in two sections, *Echinosporae* Pilat and *Laevisporae* Pilat. In spite of the fact that Pilat erroneously implies that *C. variabilis*, *C. applanatus*, *C. scalaris*, *C. putrigenus*, and *C. versutus* enter the smooth spored group while actually the types or else the accepted interpretations of these species belong in the group with punctate spores, the author believes that Pilat's sections are

basically acceptable. The type species of the section *Echinosporae* is logically *C. carpaticus,* and the type species of the *Laevisporae* is *C. mollis.*

Within the *Echinosporae,* I propose to distinguish two subsections, one characterized by the presence of clamp connections, *Porpophorini* Sing. subsect. nov. [1] and another characterized by the absence of clamp conections, *Aporpini* Sing. subsect. nov. [2], Within the *Laevisporae,* I distinguish two subsections, one *Fibulatini* Sing. subsect. nov. [3] with clamp connections, and one without clamp connections, *Defibulatini* Sing. subsect. nov. [4].

Within the *Porpophorini*, a stirps *Roseus* (with crystallized pigment), a stirps *Nyssicola* (with well developed stipe and large carpophores and cheilocystidia), a stirps *Applanatus* (large or small, more often large, with round spores) and a stirps *Variabilis* (large or small, more often small, with ellipsoid to short-ellipsoid spores) can easily be distinguished.

Within the subsection *Aporpini*, a stirps *Versutus* and a stirps *Cinnabarinus* might be distinguished if it is considered worth while to do so as long as only two species are known.

Within the subsection *Fibulatini* a stirps of short-spored species, *Albidus* and one of long-spored species, *Antillarum* can be distinguished.

The *Defibulatini* seem to be homogeneous enough to be considered as a single stirps coinciding with the subsection.

Summing up these proposals, we arrive at the following classification of the species of the genus *Crepidotus*:

[1] **Porpophorini** subsect. nov. Sing. *Sporis punctatis; hyphis fibulatis.* Species typica: *C. applanatus* (Pars. ex Fr.) Quél.

[2] **Aporpini** subsect. nov. Sing. *Sporis punctatis; hyphis defibulatis.* Species typica: *C. cinnabarinus* Peck.

[3] **Fibulatini** subsectio nova Sing. *Sporis haud punctatis; hyphis fibulatis.* Species typica: *C. albidus* Ell. & Ev.

[4] **Defibulatini** subsect. nov. Sing. *Sporis haud punctatis; hyphis fibulis destitutis.* Species typica: *C. mollis* (Bull. ex Br.) Quél.

A. ECHINISPORAE Pilat

I. PORPOPHORINI Sing. (stirpes *Roseus, Nyssicola, Applanatus, Variabilis*)

II. APORPINI Sing. (stirpes *Versatilis, Cinnabarinus*)

B. LAEVISPORAE Pilat

I. FIBULATINI Sing. (stirpes *Albidus, Antillarum*)

II. DEFIBULATINI Sing. (stirps *Mollis*)

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