A MONOGRAPHIC STUDY

OF THE

GENERA « CRINIPELLIS » AND « CHAETOCALATHUS » *

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RESUMEN

Estudio monográfico de los géneros «Crinipellis» y «Chaetocalathus». — El autor estudia sistemáticamente todas las especies de los géneros citados, describiendo las siguientes nuevas entidades y combinaciones : *Crinipellis* sect. *Psilopus*, sect. *Eu-crinipellis*, subsect. *Stipitarinae*, subsect. *Grisentinae*, subsect. *Iopodinae*, subsect. *Excentricinae*, subsect. *Heteromorphinae*, *Grinipellis chrysochaetes* (Berk. et Curt), *C. subtomentosa* (Peck), *C. septotricha*, *C. pseudostipitaria* subsp. *occidentalis*, *C. p.* subsp. *orientalis*, *C. Patouillardii*, *C. carecomoeis* (B. et C.), *C. c.* var. *subelata*, *C. c.* var. *litseae*, *C. hirticeps* (Pk.), *C. campanella* (Pk.), *C. setipes* (Peck), *C. dipterocarpi*, *C. Mirabilis*, *C. perniciosa* (Stahel), *C. siparunae*, *C. tomentosa* (Quél.), gén. *Chaetocalathus*, sect. *Oligocystis*, sect. *Meristocystis*, sect. *Holocystis*, *Ch. craterellus* (Dur. et Lév.), *Ch. fragilis* (Pat.), *Ch. niduliformis* (Murr.), *Ch. pachytrichus*, *Ch. bicolor* (Pat. et Demange), *Ch. congoanus* (Pat.) *Ch. africanus* (Pat.), *Ch. cornelioruber*, *Ch. liliputianus* (Mont.), *Ch. galeatus* (B. et C.), *Ch. asperifolius* (Pat.).

1. INTRODUCTION

For phytopathologists, the genus *Crinipellis* is one of the most important genera of Agarics. It will be shown in this paper that *Marasmius perniciosus*, described by Stahel (22) as the only fungus responsible for the witchbroom disease of Cacao, actually belongs to *Crinipellis*. Another species, *C. stipitaria*, widely distributed in Europe and the United States grows not only on

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dead but also on the living roots and green parts of Gramineae within which order it has been observed as a parasite on *Secale* and other cereal plants. The same is true of *C. pseudostipitaria* and allied tropical forms which have been collected on *Andropogon*, *Panicum*. The tropical species *C. siparunae* is the only member of Agaricales that is able to attack living twigs of trees in which it forms fruit bodies up to 10 feet above the ground.

The genus is also interesting from a taxonomic point of view, since in spite of its potential and actual economic significance it has never been studied monographically and the knowledge of its anatomy and chemical reactions has been rather meager. Many species have been described in other genera (*Collybia, Marasmius, Lentinus,* etc.), and only recent type studies carried out by the writer, have shown their relation to *Crinipellis*.

The genus was founded in 1889 by N. Patouillard who characterized it by the long, tough, thick-walled hairs which cover the pilei. Patouillard originally ranged in *Crinipellis* three species of *Collybia : C. stipitaria* Fr., *bisulcata* Pat. et Gaill., *excentrica* Pat. et Gaill.; two species of the resupinate group of *Marasmius : M. nidulus* B. et C. and *M. galeatus* B. et C.; and finally one new species *Crinipellis asperifolia* Pat., the last three largely different from the others by general appearance. (The question concerning the gender of the name *Crinipellis* has been decided according to the rules; Patouillard first used it in the feminine gender although he later preferred the masculine form which is incorrect.)

More species were described and transferred by Patouillard in the following years: *C. atrobrunnea* Pat., *C. Eggersii* Pat., *C. myrti* Pat., *C. stupparia* (B. et C.) Pat., *C. zonata* (Pk.) Pat., *C. minultula* (Henn.) Pat., *C. bambusae* Pat. *C. trichialis* (Lév.) Pat., *C. sepiaria* Pat. et Dem., *C. rubiginosa* Pat., *C. rubida* Pat., et Heim; *C. calospora* Pat., *C. craterellus* (Dur. et Lév.) Pat., *C. bicolor* Pat. et Dem., *C. congoana* Pat., *C. africana* Pat., *C. fragilis* Pat. (the last six species again belonging to the group of resupinate forms).

Most other authors did not directly contribute to the knowledge of the genus *Crinipellis*, partly because of defective study, and partly because Patouillard's genus was not yet generally

recognized by the more conservative taxonomists. While a few new species of *Crinipellis* were described within the stipitate group — *C. sublivida* Murr. (the other species of this author do not belong to *Crinipellis*), *C. iopus* Sing.. *C. piceae* Sing. — the non-stipitate group has been separated from *Crinipellis* by *Murrill* (11) and Earle (5) who placed it in the genus *Pleurotopsis*. The rest of the species has been described as *Collibia* or *Marasmius* (*M. chrysochaetes* B. et C., *M. subtomentosus* Pk., *C. carecomoeis* (B. et C.) Sacc., *C. hirticeps* Pk., *C. campanella* Pk., *M. perniciosus* (Stahl.) or *Pleurotopsis* (*P. niduliformis* Murr.).

While principally rejecting genera which are based merely on whether or not the carpophores have a central stipe, the author thinks that in this case the two groups should be separated. Not only has the stipe in all specimens studied proved to be either consistently attached to the substratum, and then central or eccentric, or constantly not attached to the substratum. Furthermore the anatomy of the lamellae also is different in the groups considered. The non-stipitate group has thick-walled, pseudoamyloid cystidia, or if these are lacking, the spores produced by the basidia are pseudoamyloid in their majority. The stipitate group, or *Crinipellis* proper, has cheilocystidia, rarely cystidia which never are pseudoamyloid, neither are the spores pseudoamyloid except a minority of old spores laying on the lamellae or the hairs of pileus and stipe (see later about the development of the spores in *Crinipellis*), and that only in some species (e. g. *C. zonata*). Nevertheless there can be little doubt that the non-stipitate group is derived from the stipitate one, as is true of most non-stipitate Agarics. In the case of *Crinipellis* it is quite obvious that the highly differentiated non-stipitate forms are adaptations to certain conditions and that the starting point of the whole group is to be sought among the eccentric *Crinipellis* though no known living species may be interpreted as a transition. On the other hand some species of the genus *Acanthocystis* have slightly or distinctly pseudo. amyloid cystidia while lacking the characteristic hairs on the surface of the pileus. Consequently the two groups of *Crinipellis* sensu late (Pat.) are considered as closely related but distinct genera.

Naturally, the name *Crinipellis* has to be preserved for the stipitate group. Whether or not Earle's name, *Pleurotopsis,* can be used for the non-stipitate group, depends entirely on the position of the type species, *Marasmius spodoleucus.* The authentic material of this species, collected by Broome in England, and preserved at the Farlow Herbarium, was studied by the writer and found to show non-pseudoamyloid hairs, tiny allantoid spores and tiny basidia which form their four striking sterigmata all at the same time. Consequently this fungus is neither a *Marasmius* nor a non-stipitate *Crinipellis,* but it belongs to *Plicatura* where it is rather closely related to *Plicatura crispa* (Pers.) Rea (= *Trogia crispa* Fr.). Because the type of *Pleurotopsis* belongs in *Plicatura,* the new combination *Plicatura spodoleuca* (B. et Br.) becomes necessary, and a new generic name must be created for the non-stipitate species of *Crinipellis.* The writer proposes the name *Chaetocalathus* (see p. 459 lin. 19).

2. THE CHARACTERS OF THE GENUS « CRINIPELLIS »

One can observe thick-walled hairs on the pileus of many Agarics. As these hairs were characterized by Patouillard, they might occur not only in *Crinipellis,* but in *Xerula, Lentinus, Pseudohistuala,* and even *Phaeomarasmius, Rhodophyllus* and *Plicatura.* But the hairs of *Crinipellis* have one particularity which has been mentioned already in two earlier papers, 1939 (**20**, **21**): They are colorable with iodine (Melzer's reagent), where they turn dark rufous-bay, or sometimes almost violet (the latter reaction being very close to « amyloid »). It is very important for a satisfactory effect to treat the preparations previously with ammonia. The pseudoamyloid to almost amyloid hairs are found only in *Crinipellis* and *Chaetocalathus.* Beside, these hairs are mostly very long without any septa, and even if they are septate they are not or only exceptionally constricted at the septa. I have tried to use the shape of the hairs not only as a generic but as a specific character within the genus *Crinipellis.* In fact, in some cases the apices of the hairs seem to be rather constant in their shape and structure, at least if they are taken

from adult specimens and either always from the margin, or always from the center. Also, the diameter of the hairs is sometimes useful for determination but varies within wide limits; this is still more true for the color of the hairs which only in two subsections is of some use. Sometimes the septa of the hairs are frequent and crowded near the top and give a ladder-like impression. This character can be found on some single hairs in many species, but is predominant in others, and in this case it often is usable either as a specific or varietal character. Only in one very isolated species (*C. mirabilis* Sing.) are the hairs colored gray with alkalies (*Koh,* etc.). The wall of the hairs is more or less distinctly polystratous.

Much more valuable for intrageneric taxonomy are the characters of the hymenium. Only in three species have the sterile bodies on the edge of the lamellae been properly described: in *C. stipitaria, campanella,* and *setipes.* Virtually all species of *Crinipellis* were found to have cheilocystidia, and some even have (pleuro-) cystidia which differ very little from the cheilocystidia, except in *C. minutula.* It sometimes appears rather difficult to find these organs on old dried material, but after some experience one will find it easier to discover them because of a very slight difference in color between them and the absolutely hyaline basidia under a low power objetive, and also as seen under immersion lens, by means of the slightly thickened walls when compared with those of the basidia, basidiols, and cystidiols. In many species the cheilocystidia are extremely variable, in others reasonably constant. They are neither amyloid nor pseudoamyloid, nor are they imbedded in a crystalline covering. In some species they have very much the shape of the cheilocystidia of *Hemimycena semiusta, H. purpurea, H. pigmentata,* and *H. pseudoconidiophora,* or *Mycena pseudopicta,* whereas in others they are almost identical with the cheilocystidia of *Mycena rubromarginata* (sens. Kühner), and finally they may be entirely undivided, as described in *Crinipellis stipitaria,* thus showing all transitions between the latter type and the type called « en brossé » (broom like) by the French authors, characterized by the upper half or apex that appears echinate — or beset with finger — or branch-like projections. The shape of

the cheilocystidia, therefore, can be used for the distinction of species. The existence of cystidia « en brossé » in *Crinipellis* shows that this genus must have close relations to *Marasmius, Hemimycena,* and related genera and actually, there is one species of *Marasmius, M. chrysochaetes,* where although no hairs are observed, the elements of the epicutis, short, diverticulate, somewhat irregular thick-walled bodies, are distinctly pseudoamyloid. This species is apparently intermediate between *Marasmius* and *Crinipellis,* and shows where the antecedants of the genus *Crinipellis* must be sought, and can be considered as a *Marasmius,* that is anatomically a *Marasmius* and chemically a *Crinipellis.* I prefer to consider *Marasmius chrysochaetes* as a *Crinipellis.*

The remaining anatomical characters, except those of the spores, are less important. The spores, however, are unique among the Higher Basidiomycetes, al least in a few species. They are thin-walled and neither amyloid nor pseudoamyloid when young, like the spores of *Marasmius, Hemimycena,* and other allied genera. When they are discharged they are still thin-walled, but then many of them instead of collapsing, stay on the lamellae or among the hairs of pileus and stipe, and in most species finally become thick-walled; in some species they even become pseudoamyloid, but not all of them. In other species the spores form a septum in the thick-walled stage, thus becoming bicellular. The septum which is at right angles to the longitudinal axis of the spore or more or less oblique, is initially thin and gradually becomes thicker. It is mostly near the middle of the spore, although in one species, *Crinipellis Mirabilis,* the septum is near the tip of the spore, where it cuts off a small cell that remains thin-walled, while the septum and the larger, lower part of the spore becomes thick-walled, so that the spore eventually appears nearly rectangular.

One of the most troublesome factors in determining representatives of the genus *Crinipellis,* as in *Marasmius* and other tough forms, is the frequent absence of spores. Yet, the identification of a *Crinipellis* depends in a high degree upon the establishment of the spore measurements. Not only are the absolute figures indispensable for correct determination of many species,

but the quantity of Q, the quotient resulting from a fraction with the average spore length as numerator and the average spore width as denominator, is highly specific in almost all species studied. If no spores are found on the lamellae, one frequently will succeed in finding plenty of them on the pileus or surface of the stipe. However, care must be taken not to confuse foreign spores with those of the specimen being studied. This danger is particularly great when the determiner is not yet familiar with the various types of spores that occur in *Crinipellis.*

The basidia are mostly 4-spored, the basidiols exactly of the fusiform type occurring in *Marasmius,* but the mature basidia are very frequently irregular, deformed, or sterile. The gill trama is almost regular and consists of rather slender to very slender and always thin-walled hyaline hypae. The trama is not much different from that of the pileus and the stipe. Between the trama of either the pileus or stipe and the hair-zone, there is a zone of partly thick-walled, often colored (by an incrusting membrane pigment) and irregularly interwoven hyphae which make up the subcuticular layer which I call hypotrichium. At a certain septum the hyphae become pseudoamyloid and more or less abruptly transformed into hairs. The hyphae of all parts of the carpophores of all species of *Crinipellis* — without exception — bear distinct and frequent clamp connections, as is true of *Marasmius* in which genus all species except one possess clamp connetions, while they constantly lack in *Pseudohiatula* and probably in *Oudemansiella.*

Macroscopical characters are rather uniform in the different sections or subsections. Beside the size of the fruit bodies, the presence or absence of an umbilicus, an umbo, or a papilla is of some importance. It is also important to determine whether or not the disk or possibly a ring around the disk is naked or hairy. The general shape of the pileus is also characteristic in a few cases (*C. Mirabilis, C. campanella*). Frequently concentric furrows surround the disk (*C. bisulcata,* and other species). The color, frequence and width of the lamellae can be used for differentiating otherwise related species. The stipe shows little variety within the subsections except its length. But as cha-

racters for sections and subsections the color of the carpophores, the presence or absence of hairs on the stipe, the central or eccentric attachment of the stipe, and the quantity of hairs on the pileus have been used. In all species of *Crinipellis* the general appearance is that of a *Marasmius* or *Collybia,* and in all species the lamellae are free or narrowly adnexed. In but few species has the color of the spores been determined from the spore deposit on white paper, although whenever it has been done, the spore prints have been pure white. Odor and taste of *Crinipellis* is rarely remarkable. Solely *C. zonata* is said to have a characteristic odor and taste.

3. HABITAT AND DISTRIBUTION OF « CRINIPELLIS »

The habitat of the majority of the species of *Crinipellis* furnishes as good a criterion for the separation of species as any morphological one. Few species develop fruit bodies on a woody substratum as well as on herbaceous debris or foliage. The parasites of the genus (except for the facultative grass parasites) are to be found in the subsection *Iopodinae.* The relation between the habitat and the taxonomic units will be shown by the following table :

On living parts of trees	On dead wood (stumps, planks branches, twigs)	On robust dead leaves of evergreen trees [1], on needles of conifers [2], on fallen foliage of deciduous trees [3] and on decaying fruits of trees [4].	On roots, culms, and leaves of Graminaceae (also bamboo [5]), rarely on other herbaceous plants.
C. perniciosa	*C. campanella*	*C. carecomoeis* [3]	*C. atrobrunnea*
C. siparunae	*C. carecomoeis* v. *litseae*	*C. carecomoeis* var. *subelata* [1]	*C. bambusae* [4]
	C. Eggersii	*C. chrysochaetes* [4]	*C. bisulcata*
	C. excentrica	*C. dipterocarpi* [3], [4]	*C.* « *caulicinalis* » Clel.
	C. hirticeps	*C. Patouillardii* [1]	*C. pseudostipitaria*
	C. iopus	*C. piceae* [2]	*C. sepiaria* [1]
	C. minutula	*C. pseudosplachnoides* [4]	*C. stipitaria* var. *graminealis*
	C. Mirabilis	*C. setipes (?)* [2], [3]	*C. subtomentosa*
	C. myrti	*C. stupparia* [4]	
	C. Patouillardii	*C. zonata* [4]	
	C. rubida		
	C. septotricha		
	C. setipes		
	C. stipitaria v. *corticalis*		
	C. zonata		

C. rubiginosa is reported on humus and undefined vegetable debris, but this species needs further study in more than this one respect.

The geographic distribution of the species is very interesting in this genus. While for instance in most of the genera of *Boletineae,* and likewise in *Russulaceae* many more species are observed in the temperate zone of the Western Hemisphere than in the same zone of the old world, yet many more species are known from the tropics of the Old World than from the Neo-Tropics. In *Crinipellis* the majority of species belongs to the Western Hemisphere. The tropics seem to be considerably richer in representatives of this genus than the temperate zones. In all continents a few or many species are found, but there are no species occurring in all of them. Most species seem to occupy a rather definite area. Particularly remarkable is the distribution of *C. stipitaria* which hitherto has been observed in

two separated areas, one in Europe and North Africa, and one occupied by the hardly aberrant American form which inhabits grassy places in North Carolina, Kansas, North Dakota, and Ohio. *C. pseudostipitaria* occurs in two subspecies, one occupying the Western Hemisphere where it is found through the Caribbean area, and the other, *ssp. orientalis,* has been collected in Africa and Southern Asia, although in the westernmost islands of America and in the Niger valley in West Africa, an intermediate form has been observed. Another species, *C. piceae,* is common to the Pacific Coast States of the U. S. A. and Siberia, while *C. Patouillardii* occupies the subtropical and tropical regions of the Pacific Ocean, from the Bonin Islands east to Mexico. The following table shows the distribution of the species of *Crinipellis.* The non-endemic species have been indicated with (η).

It is to be expected that some more species will be discovered in the tropics, and that the area of others will be enlarged in the future. Nevertheless the most convenient way of determining the species and varieties at present is to use a key based principally on geography and ecology (see our key, p. 457, lin. 10).

4. SURVEY OF THE CLASSIFICATION AND KEY FOR EASY DETERMINATION OF THE SPECIES OF « CRINIPELLIS »

Crinipellis Patouillard, *Journ. de Botan.* **3** : 336. Oct. 1889, sensu strictu Earle, *Bull. N. Y. Bot. Gard.* **5** (18) : (414), Feb. 1909.

Sect. I. Psilopus *Sing. sect. nov. Pileus with an epicutis of diverticulate, pseudoamyloid bodies but without actual hairs. Stipe naked.*

One species..... 1. *C. chrysochaetes* (Berk. et C.) c. n.

Sect. II. Eu-Crinipellis *Sing. sect. nov. Pileus with more or less elongate pseudoamyloid hairs. Stipe likewise with hairs, never entirely naked in all stages.*

Temperate North America	Tropical America	Australia and Pacific Islands	Asia and Europe [1]	Africa
C. campanella	*C. bambusae*	*C. carecomeis* (τ)	*C. atrobrunnea*	*C. minutula*
C. hirticeps	*C. bisulcata*	« *C. cauticinalis* » *sens. Clel.*	*C. dipterocarpi*	*C. pseudosplachnoides*
C. piceae (τ)	*C. carecomoeis* (τ)	*C. Patouillardii* (τ)	*C. iopus*	*C. pseudostipitaria ssp. orientalis* and *ssp. occidentalis* var. *mesites* (τ)
C. setipes (τ)	*C. chrysochaetes*	*C. mirabilis*	*C. piceae* (τ)	*C. rubiginosa*
C. stipitaria (τ)	*C. Eggersii*		*C. pseudostipitaria ssp. orientalis* (τ)	*C. stipitaria* (τ)
C. subtomentosa (τ)	*C. excentrica*		*C. sepiaria*	*C. subtomentosa* (τ)
C. zonata	*C. myrti*		*C. setipes* (τ)	
	C. Patouillardii (τ)		*C. stipitaria* [1] (τ)	
	C. perniciosa		(*C. subtomentosa* [1]) (τ)	
	C. pseudostipitaria ssp. occidentalis		*C. trichialis*	
	C. rubida		(*C. siparunae* [1])	
	C. septotricha			
	(*C. siparunae*)			
	C. stupparia			
	C. sublivida			

Subsect. 1. Stipitarinae Sing. subsect. nov. Edge of gills heteromorphous or subheteromorphous; if it is heteromorphous, there are no *pleurocystidia* at all. Stipe normally long or very long, always or almost always central. *Cheilocystidia* with echinate apex or with branched appendices, or forked, or simple: subfusoid to bottle shaped. Pileus not bright colored, i. e. pale buff to tan, straw, bister, dark brown, brownish cinnamon, tawny or subfulvous, rarely with a slight tinge of olivaceous, with the center darker or not. Hairs acute or rounded at the tips, hyaline, honey color, subolivaceous, or light brown under a microscope, with KOH not turning greenish gray. Spores of various shapes, but never rectangular with a thin-walled smaller upper loculus. On dead wood, living or dead grass roots, fallen leaves, etc.

Stirps subtomentosa: Pileus and stipe without a thick layer of curly-undulate hairs, but merely subtomentose. Spores 9-11.8 μ long or even longer, and 4.5-6.0 μ broad (Q = around 2). Medium or large carpophores, growing on grass roots. *Cheilocystidia* almost simple or with short appendices. 1 species:

2. *C. subtomentosa* (Pk.) Sing. c. n.

Stirps zonata: Pileus and stipe strongly hairy. Spores small (5-8 μ long), and broad (Q = much less than 2); some of them are decidedly pseudoamyloid. Large carpophores, growing on wood. *Cheilocystidia* either simple or a part of them forked, or with 3 branches, or with 1-3 appendices, many of them rather broad (up to 13 μ). 1 species:

3. *C. zonata* (Pk.) Pat.

Stirps stipitaria: Pileus and stipe strongly hairy. Spores medium (rarely less than 7 μ long when mature, and never more than 10.5 μ long), broad or narrow. Small species, growing on *Gramineae,* or more rarely, on wood. *Cheilocystidia* either simple, or forked, or branched, and no *pleurocystidia* observed except very close to the edge. 6 species:

A. Fungi never combining the characters of a dark brown pileus and medium broad spores (Q = about 2), neither are they characterized by numerous subglobose spores and, at the same time, bluntly rounded ladder-like septate hairs on the pileus. Not on bamboo in Asia.

I. Hairs acute or blunt, ladder-like, septate. On wood. Spores narrow (Q = > 2). 4. *C. septotricha* Sing. sp. n.

II. Hairs only exceptionally as above. Fruit bodies only exceptionally developping on wood. Spores narrow or broad.

a. Acute hairs on pileus rather exceptional, *or* spores not broad. Tropical species. (Temperate species with large fruit body, growing on wood, see. *Stirps setipes).*

1. Pileus tan or pale ferrugineous to dirty cinnamon honey color when dry, umbilicate or more often papillate without distinct concentric furrows around the center, merely sometimes with a flat or depressed zone around the papilla. Acute hairs on pileus rather exceptional.

* Spores narrow (Q = > 2)

5*a*. *C. pseudostipitaria* Sing. ssp. *occidentalis* Sing. ssp. n.

** Spores broad (Q = 2 or less).

5*b*. *C. pseudostipitaria* Sing. sp. n. ssp. *orientalis* Sing. ssp. n.

2. Pileus grayish straw color or very pale grayish brown when dry, umbilicate with a very small papilla in the umbilicus, with 1-3 concentric furrows around the center. Hairs of pileus very often more or less acute.

6. *C. bisulcata* (Pat. et Gaill.) Pat.

b. Acute or acuminate but subobtuse tips of hairs numerous on the pileus. Spores broad (Q = less than 2). In temperate zones.

7. *C. stipitaria* (Fr.) Pat.

B. Fungi combining either the characters of a dark brown pileus and medium broad spores (Q = around 2), or numerous subglobose spores among other broad ones and bluntly rounded, ladder-like, septate hairs on the pileus. Growing on *Bambusa* or on grass stems or roots, in Asia.

I. Spores about half as broad as long. 8. *C. sepiaria* Pat. et Dem.

II. Spores broad to subglobose. 9. *C. atrobrunnea* Pat.

Stirps stupparia: Pileus and stipe strongly hairy, but disk of pileus typically smooth and darker than the hairs, the papilla occasionally with a tuft of hairs. Spores broad (Q = 1.3-1.8). Very small fruit bodies, never broader than 7 mm in dried condition, never growing on *Gramineae*. Cheilocystidia simple or branched or echinate, and if simple, pleurocystidia are present though scattered. Two species, both tropical.

A. Only a part of the cheilocystidia forked or with a few irregular branches or projections. Pleurocystidia present, simple and entire, few. West Pacific Islands. 10. *C. Patouillardii* Sing. sp. n.

B. Cheilocystidia echinate, most of them with upright, fingerlike projections or appendices. Central and South America.

11. *C. stuparia* (B. et C.) Pat.

Stirps carecomoeis: Pileus and stipe strongly hairy, at least with thick strands of undulate hairs, but among the strains sometimes the white context of the pileus is evident. Spores narrow (Q = > 2), and very long, (10)-12-14-(20) µ. Small to very small carpophores; occasionally the stipe is extremely elongate. Cheilocystidia branched or not. On leaves of trees, and on small twigs. One tropical rather polymorphous species, possibly collective.

12. *C. carecomoeis* (B. et C.) Sing. c. n.

Stirps setipes: Pileus and stipe strongly hairy, but disk of pileus typically smooth and darker than the hairs, rarely uniformly hairy *(C. hirticeps)*. Spores narrow (Q = 2-2.9), more rarely medium broad (in *C. campanella*). Fruit bodies never attached to bamboo nor to grass, but growing on fallen leaves (needles), fruits, or branches of trees, more rarely on stumps, in Asia and temperate America. Cheilocystidia truly echinate, rarely more inconstantly branched or forked *(C. hirticeps* and sometimes *C. campanella)*. 5 especies:

A. Pileus more than 15 mm in diameter, without a smooth disk. Cheilocystidia often branched or forked, but not or only exceptionally echinate. 13. *C. hirticeps* (Pk.) Sing. c. n.

B. Pileus smaller, always with a smooth disk or umbilicus. As the hypotrichium mostly appears black, the smooth parts are distinctly darker than the hairy portions of the pileus. On wood, fruits, leaves, needles, etc.

I. Pileus campanulate, at last convex-umbonate, never fully expanded, with a fulvous tawny tinge; when young there is a smooth flat disk in the center from which a papilla projects, and often a black ring surrounds the disk. Cheilocystidia forked or branched, but not constantly echinate. On branches and twigs, and on other kinds of wood in temperate North America.

14. *C. campanella* (Pk.) Sing. c. n.

II. Pileus not as above. Cheilocystidia as above. On grass culms (or small twigs) in tropical America (see stirps *Stipitaria*).

III. Shape and colors of the pileus not as above. Cheilocystidia more constantly echinate like the cheilocystidia in *Hemimycena semiusta* and related species. Carpophores growing on wood, or on needles, or on leaves or fruits of frondose trees, in temperate North America and in Asia.

a. Stipe rather long (30-130 mm). Umbilicus very deep, with a

papilla in the umbilicus. On branches of deciduous trees in temperate North America and East Asia.

15. *C. setipes* (Pk.) Sing. c. n.

b. Stipe shorther. Umbilicus, if present, moderately deep, with or without a papilla in the umbilicus. On leaves and fruits of *Dipterocarpus* in French Indo China, or on needles of spruce in Siberia and Pacific Coast of North Ameriea.

1. Disk of the pileus mostly surrounded by a black circle, mostly without a papilla. Hairs mostly without ladder-like disseepiments. On needles and perphaps occasionally on very small twigs of *Picea obovata* and other species of spruce in Siberia (Altai) and from Washington to California. 16. *C. piceae* Sing.
2. Disk of the pileus not surrounded by a black circle, mostly with a small papilla in the umbilicus. Hairs mostly with ladder-like dissepiments. On fruits and leaves of *Dipterocarpus crispatus* in Tonkin.

17. *C. dipterocarpi* Sing. sp. n.

Subsect. 2. Grisentinae Sing. subsect. nov. Characters of subsect. 1, but hairs turning greenish gray in KOH or NH_4OH, and spores at last appearing rectangular with a thin-walled smaller upper cell, and the wall of the lower cell including the septum thick. Pileus chestnut brown when dried in the only species known, New Caledonia.

18. *C. Mirabilis* Sing. sp. n.

Subsect. 3. Iopodinae Sing. subsect. nov. Characters of subsect. 1, but pileus brightly colored: pink, red, lilac, violet, rubiginous when young and fresh. Stipe sometimes short or curved, but only exceptionally eccentric. On the pileus and stipe the hairs are not always long enough to show macroscopically: the pileus appears (macroscopically) hairy or scaly or naked. 7 species, all (except one *C. iopus)* tropical.

A. Saprophytes. Pileus becoming pale whitish in age, *or* spores very narrow, or hairs lilac.

I. Pileus with rubiginous margin and papilla, or sometimes violaceous, only 5-7 mm broad. *Lamellae* either light reddish brown or very light violet. Hairs (¼ macroscopically) bright ochraceous red in the rubiginous form. Spores 8 × 4 μ (according to Patouillard). Stipe relatively long: 60-70 × about 1 mm. On humus and vegetable debris in woods, Madagascar. 19. *C. rubiginosa* Pat.

II. Pileus, *lamellae* and stipe not combining the characters indicated above. Hairs never ochraceous red. Stipe always considerably shorter than in *C. rubiginosa*. Never growing on humus, but always on wood. In Asia or America.

a. Pileus not pale whitish in age. South and Central American species.

1. Pileus intensely pink when fresh, and vinaceous in dried material. Spores 5 × 2 μ. 20. *C. rubida* Pat. et Heim.

2. Pileus not intensely pink when fresh, but some shade of lilac or livid.

α. Spores 5.5-6.3 μ. Lamellae white. 21. *C. Eggersii* Pat.

β. Spores 3.5-5 μ broad. Lamellae pale lilac.

22. *C. sublivida* Murr.

b. Pileus pale whitish in age. Spores 9-11 × 4-5.5 μ. Stipe lilac or violaceous lilac, in dried condition white at apex, and fuliginous-gray downwards. In Central Asia (Kazakhstan).

23. *C. iopus* Sing.

B. Parasites. Pileus crimson red, becoming pale whitish in age, or lilac to brownish lilac, bleaching. Spores always with a Q = 2 or less. Hairs not lilac. Tropical species.

I. On various parts of *Theobroma*. Pileus crimson red, becoming pale whitish in age. Spores up to 9 μ long.

24. *C. perniciosa* (Stahl.) Sing. c. n.

II. On various parts, especially living twigs of *Siparuna*. Pileus lilac to brownish lilaceous, at last bleaching and only the hairy scales remaining darker. Spores 9 μ long or longer (up to 14 μ).

25. *C. siparunae* Sing. sp. n.

Subsect. 4. Excentricinae Sing. subsect. nov. Pileus not brightly colored. Stipe normally short, frequently more or less eccentric. Cheilocystidia mostly much branched. Center of the pileus darker than the margin. Spores broad. Two species, or perhaps three.

A. Stipe central. Hairs often more than 5 μ broad, attenuate-obtusate without appendix. On *Bambusa* in South America.

26. *C. bambusae* Pat.

B. Stipe eccentric. Hairs often different from the above characterization. Not on *Bambusa*.

I. Basidia 5-7 μ broad, rarely a little broader.

27. *O. excentrica* (Pat. et Gaill.) Pat.

II. Basidia considerably broader (see species incertae sedis).

Subsect. 5. Heteromorphinae Sing. subsect. nov. Cystidia always present on the sides of the lamellae; the edge heteromor-

phous with a different type of cheilocystidia. In most other respects like subsection 1. 1 species from Africa.

28. *C. minutula* (Henn.) Pat.

Species incertae sedis :

29. *C. pseudosplachnoides* (Henn.) Pat. c. n.
30. *C. trichialis* (Lév.) Pat.
31. *C. myrti* Pat.
32. *C. caulicinalis* (Bull.) sens. Cleland.
33. *C. tomentosa* (Quél.) c. n.

KEY FOR EASY DETERMINATION OF THE SPECIES OF « CRINIPELLIS »

I. *Species occurring in Europe.*

* Species growing on living trees in greenhouses. 25. *C. siparunae*
** Species growing on *Gramineae,* allegedly also on *Equisetum* and other herbaceous plants. 7 *a. C. stipitaria* var. *gramineali*s
*** Species growing on wood of *Syringa.* 7 *b. C. stipitaria* var. *corticalis*
**** Species growing on twigs of *Picea* or *Pinus* (see note p. 477, lin. 22).

II. *Species occurring in Africa.*

* Species growing on humus and plant débris in Madagascar (if in North Africa see **). 19. *C. rubiginosa* (compare also note p. 449, lin. 26).
** Species growing on Gramineae, in North Africa and in West Africa.
A. Pileus 10-20 mm in diameter, grayish. Lamellae distant. Spores 9-11.8-(13) × 4.5-6 μ. 2. *C. subtomentosa*
B. Pileus 4-14 mm in diameter, never grayish. Lamellae rarely distant. Spores 7-10.8 × 4-8 μ.
I. Species occurring in North Africa. 7 *a. C. stipitaria* var. *gramineali*s
II. Species occurring in West Africa. 5. *C. pseudostipitaria*
*** Species growing on twigs in West Africa. 28. *C. minutula*
**** Species growing on leaves of trees in West Africa. 29. *C. pseudosplachnoides*

Species occurring in Continental Asia and in Dutch East Indies.

* Species growing on Gramineae (all in Southeastern Asia).
A. Hairs of the pileus acute and with close septa, ladder-like. Pileus very small (4-6 mm) with fasciculate hairs on the disk. On bamboo in Java. 30. *C. trichialis*
B. Hairs mostly blunt and rounded or attennate and rounded at their apex. Pileus mostly larger than 6 mm when nature ; hairs on its disk never fasciculate. In Indo-China, on bamboo and on grass.

I. Pileus light colored. Spores mostly rather broad (Q = 1.5-1.8). Hairs mostly without close ladder-like septa. On grass.
5 *b*. *C. pseudostipitaria* ssp. *orientalis*

II. Color of the pileus bister or dark brown. Either spores narrower than above, or hairs generally with close septa (ladder-like).

a. Spores about half as broad as long. (Q = ± 2). Hairs without close septa. 9. *C. atrobrunnea*

b. Spores very broad (Q = < 2) sometimes nearly globose. Hairs mostly with close septa (ladder-like). 8. *C. sepiaria*

** Species growing on decaying or decayed wood.

A. Stipe initially lilac. In Central Asia (Kasakhstan). 23. *C. iopus*

B. Stipe never lilac. East Asia (China). 15. *C. setipes* (var. ?)

*** Species growing on leaves of trees, also on fruits.

A. On leaves and fruits of *Dipterocarpus crispatus* in Tonkin.
17. *C. dipterocarpi*

B. On needles of *Picea obovata* in Siberia. 16. *C. piceae*

Species occurring in Australia, Bonin, Philippine, New Caledonian and probably other Pacific Islands.

* Species growing on Gramineae in Australia.
32. *C. caulicinalis* (Bull.) sensu Clel.

** Species growing on wood or on leaves of trees on the Pacific Islands.

A. Hairs turning greenish gray in KOH. Pileus dark reddish brown.
18. *C. Mirabilis*

B. Hairs not turning greenish gray in KOH. Pileus not dark reddish brown.

I. Spores more than 10 μ long and narrow (Q = 2), *or* if no spores are formed, stipe extremely elongated and thin.

a. Stipe short and stout. On twigs of *Litsea*, Philippines.
12 *c*. *C. carecomoeis* var. *litseae*

b. Stipe medium long. On leaves, New Caledonia.
12 *b*. *C. carecomoeis* var. *subelata*

c. Stipe extremely elongate and thin. Pileus tiny. Among foliage in New Caledonia (abnormal form of the former).

II. Spores up to 10 μ long. 10. *C. Patouillardii*

Species occurring in Tropical America (Incl. Bermudas).

* Species growing on parts of herbaceous plants (mostly Gramineae), also on *Bambusa*, but neither on leaves of trees nor on wood.

A. Spores with Q less than 2. On *Bambusa* in South America.
26. *C. bambusae*

B. Spores with Q = 2 or more.

I. Pileus tan or pale ferrugineus to dirty cinnamon-honey color when dry, umbilicate or more often papillate, without distinct concentric furrows around the center. 5. *C. pseudostipitaria*

II. Pileus grayish straw color or very pale grayish brown when dry, umbilicate with a very small papilla in the umbilicus, with 1-3 concentric furrows around the center. 6. *C. bisulcata*

** Species growing on fallen leaves of trees.

A. Stipe naked, shining. Pileus without true hairs.
1. *C. chrysochaetes*

B. Stipe and pileus hairy.

I. Lamellae broad, ventricose. Pileus pure white with appressed rufous brownish undulate-curly strands of hairs. Spores larger than 10 μ. Majority of cheilocystidia not truly echinate.
12 *a*. *C. carecomoeis*

II. Lamellae narrow. Pileus pale brown with floccose hairy scales formed by dense hairs which converge towards their tops, leaving no white areas among them. Spores smaller than 10 μ, mostly broader than one half of their length. Cheilocystidia truly echinate. 11. *C. stupparia*

*** Species growing on decayed wood.

A. Pileus brightly pink when fresh. 20. *C. rubida*

B. Pileus not brightly pink when fresh.

I. Pileus with lilaceous shades, sublivid, etc.

a. Spores 5-6.3 μ broad. 21. *C. Eggersii*

b. Spores 3.5-5 μ broad. 22. *C. sublivida*

II. Pileus without bright colors.

a. Pileus with an eccentric short stipe.

1. Basidia 5-7 μ broad, exceptionally broader.
27. *C. excentrica*

2. Basidia broader. 31. *C myrti*

b. Pileus centrally stipitate; stipe rather long.

1. Q of the spores = 2, or less.

α. Cheilocystidia echinate. 11. *C. stupparia*

β. Cheilocystidia not echinate, simple or scarcely branched. 10. *C. Patouillardii*

2. Q of the spores = 2, or more.

α. Dried pileus grayish straw color or very pale grayish brown. Hairs without close septa, not ladder-like. On very thin twigs.
(see note p. 474, lin. 24).

β. Dried pileus more tan color, etc. Hairs generally with close septa, ladder-like. On twigs, branches, stumps, and manufatured wood.
4. *C. septotricha*

**** Species growing on parts of living trees, or on very fresh fallen parts of them, destroyed by their action.

A. On various parts of *Theobroma*. Pileus crimson red, becoming pale whitish in age. Spores up to 9 μ long. 24. *C. perniciosa*

B. On various parts, especially living twigs of *Siparuna*. Pileus lilac to brownish lilaceous, at least bleaching and only the hairy scales remaining darker. 25. *C. siparunae*

Species occurring in temperate North America.

* Species growing on Gramineae.

A. Pileus 6-13 mm. Lamellae not distant.

7ª. *C. stipitaria* var. *gramineali*s

B. Pileus 12-24 mm. Lamellae distant. 2. *C. subtomentosa*

** Species growing on fallen leaves of trees.

A. On spruce needles. Umbilicus not very deep. Pileus small (3-7 mm). Stipe moderately long (up to 40 mm). 16. *C. piceae*

B. On other leaves (see *** species growing on wood).

*** Species growing on wood.

A. Pileus large (more than 12 mm in diameter). Disk not naked and glabrous.

I. Spores small to medium, never pseudoamyloid, Q = 2 or more. 13. *C. hirticeps*

II. Spores small, some of them pseudoamyloid, Q = < 2. 3. *C. zonata*

B. Pileus small : less than 13 mm in diam., or when larger, with a smooth umbilicus or a smooth disc in the center.

I. Pileus campanulate, at last convex-umbonate, never fully expanded, with a fulvous-tawny tinge ; when young, there is a flat disk in the center from which a papilla projects, and a black ring often surrounds the disk. Cheilocystidia forked and branched, but not constantly echinate. 14. *C. campanella*

II. Pileus convex-expanded, with a deep umbilicus already in early stage, with the papilla in the umbilicus. Cheilocystidia more constantly echinate like the cheilocystidia of *Hemimycena semiusta* and related species. 15. *C. setipes*

5. DESCRIPTIONS OF THE SPECIES AND VARIETIES OF « CRINIPELLIS »

Section **PSILOPUS** Sing

Pileo strato epicuticulari, consistente e corpusculis diverticulatis, pseudoamyloideis gaudente, depilato. Stipite nudo, nitente.

1. Crinipellis chrysochaetes (Berk. et Curt.) Sing. comb. nov.

Syn. : *Marasmius chrysochaetes* Berk. et Curt., *Jour. Linn. Soc.* **10**: 297. 1868.

Pileus white, sulcate, umbilicate, depressed around the umbo, convex, 2 mm broad. Epicutis consisting of a layer of diverticulate or entire, clavate or vesiculose, sometimes digitate, pseudoamyloid bodies, 14-28 × 7-9 μ, sometimes thinner, the finger-like projections mostly 2-3 μ thick, the walls 0.7-3.5 μ thick. *Lamellae* pure white, few, rather broad, collariate. Spores hyaline, ellipsoid, nonamyloid, 8-9 × 3.5-4.2 μ. Cheilocystidia rather indistinct in the specimens studied, irregularly clavate, with 0-2 points, not pseudoamyloid. *Stipe* fulvous, shining, insititious, glabrous, smooth and naked, 22-25 × 0.2 mm in dried condition. No hairs whatever can be discovered with aid of the microscope. *Context* extremely thin. Hyphae of the trama of the pileus and the lamellae hyaline, thin, rather thin-walled, with clamp connections, non-amyloid, even not pseudoamyloid (sometimes the lower part of the epicutis-bodies is still yellowish while the diverticulate part is fulvous-brown); hyphae of the stipe light reddish crown in NH_4OH, and reaction with iodine not clear, though hardly amyloid nor pseudoamyloid, straight, parallel.

Habitat.—Subcespitose on dead leaves of the evergreen type.

Distribution. — Cuba.

Material studied. — Type (Wright 162), (FH*).

Section **EU CRINIPELLIS** Sing.

Pileo piloso, crinibus elongatis, pseudoamyloideis. Stipite piloso numquam omnino nudo.

Subsect. **Stipitarinae** Sing.

Pileo haud laete colorato, centro obscuriore vel concolori. Crinibus acutis vel rotundatis hyalinis vel melleis vel dilute

* Abbreviations cited in parenthesis are those listed in Chronica Botanica **5**: 143-150, 1939, and are used in order to obtain uniformity in the citation of specimens.

brunneis sub microscopio, numquam grisentibus in KOH. Lamellarum acie heteromorpha vel subheteromorpha ; pleurocystidiis nullis vel rarius paucis et a cheilocystidiis non vel vix distinctis. Cheilocystidiis simplicibus integrisque vel appendiculatis, ramulosis, echinatis. Sporis versiformibus sed numquam rectangularibus, numquam partim tenuitunicatis, partim crassotunicatis. Stipite longiusculo et constanter fere centrali. Ad lignum emortuum, aut ad radices, culmos, folia, acus, numquam ad arbores vivas.

This subsection contains the most familiar forms of *Crinipellis* i. e. all species from temperate North America and from Europe, but also many exotic species. In stirps *Subtomentosa* the hairy covering is still poorly developed, and shows primitive features, while most species of stirps *Stipitaria* and stirps *Setipites* seem to be rather young formations.

The species of this subsection are best classified in six stirps *Subtomentosa, Zonata, Stipitaria Stupparia, Carecomoeis, Setipes.*

Stirps subtomentosa

The scattered shorter hairs, the distant lamellae, and the relatively large spores as well as the almost simple cheilocystidia remove this stirps from the following ones and mark it as a rather primitive form which at least stirps *Stipitaria* and *Carecomoeis* might have been derived. The remarkable geographic distribution — Kansas, U. S. A., and Loango, West Africa — can be explained as a consequence of regression from a formerly wide area of distribution, characteristic ef phylogenetically old forms. It must not necessarily be concluded that this species is strictly confined to the two minor areas mentioned, inasmuch as the probable identity of *C. mauretanica* extends its distribution to North Africa and possibly even Europe. It would not be surprising if it has been overlooked in some other regions, because of its external resemblance with *Marasmius oreades* in dried condition. Another possibility is that *C. subtomentosa* originated fron either North America or Africa, and has been transported involuntarily together with seeds or other material from one place to another, the same way as the species

of *Suillus* (« *Boletus* » *elegans*, *granulatus* et aff.) follow the conifers in cultivation from continent to continent.

2. **Crinipellis subtomentosa** (Peck) Sing. comb. nov.

Syn. : *Marasmius subtomentosus* Peck, *Bull. Torr. Club* **22**: 487. 1895.

Marasmius tomentosus Peck apud Ell. et Ev. *Sec. ser.* 3403 (ex errore), non Quélet.

? *Crinipellis mauretanicus* Maire, *Bull. Soc. Myc. Fr.* **44** : 42. 1928.

Pileus gray or reddish gray (according to Peck) when dried very pale and dirty tan or buff, radially subtomentose-fibrillose, subtomentose on the center, subcampanulate or nearly plane, often with an obtuse umbo, thin or subfleshy, 10-20 mm in diameter. Hypotrichium consisting of very interwoven smooth, long hyphae. Hairs not very long in comparison with the hairs of the following species, approximately 175 × 6 µ, most of them bluntly-rounded at their ends, subhyaline, distinctly pseudoamyloid. *Lamellae* almost concolorus, rather broad and more or less ventricose, free or almost free, distant. *Spores* hyaline, ellipsoid, non-amyloid, 9-11.8 (-13 according to Peck and Saccardo) × 4.5-6 µ; Q = around 2 (single measurements: 9.4 × 4.5, 10 × 5, 10.8 × 4.8, 11 × 5.3, 11.5 × 5.8-6, 11.8 × 4.8-5.5 µ etc.). *Basidia* 35-40 × 7.7-9 µ. Cheilocystidia more or less basidiomorphous, but irregular and with short cornicle-like projections, 15-40 × 7-9 µ. *Stipe* gray or gray brown, concolorous in dried condition, silky-tomentose, equal or somewhat thickened downwards, 25-30 × 2-3.5 mm. *Context* white. Hyphae with clamp connections.

Habitat. — On old grass roots in sandy pastures. April (Africa); July (America). The stipes are subfasciculate and directly attached on the roots.

Distribution. — Kansas, U. S. A.; West Africa; North Africa (?); Spain (?).

Material studied. — Type (Kansas Fungi 1735) coll. E. Bartholomew in Rockport, Kansas, July 1, 1885 (FH); Ellis and Everhart, N. A. F. sec. ser. n° 3403, coll. E. Bartholomew (authentic) (FH); material, collected by Dybowsky in Loango,

French Equatorial Africa, 1891, and determined by N. Patouillard *(C. stipitaria)* (FH).

Observations. — The African form is a litte smaller than Bartholomew's types but not much. As for the strange geographic distribution of this species see p. This question is still more complicated because of the probable identity of a species described by Maire from North Africa, and recollected by Heim in Spain. Since I have not seen any fresh nor dried material

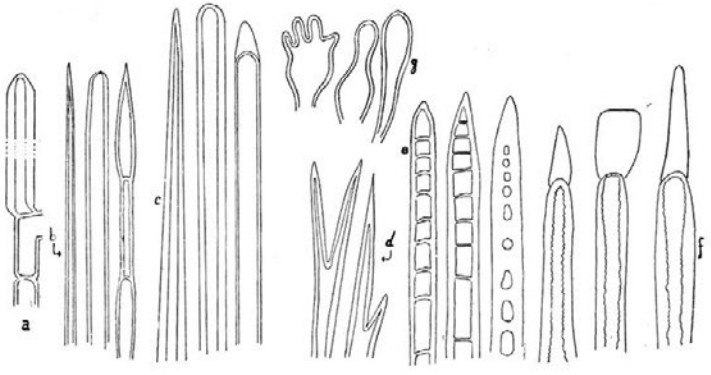

Fig. 1. — Showing the hairs of the pileus of 7 species of *Crinipellis*, × 500 : *a*, *C. stupparia*. Base of hair in connection with the hyphae of the hypotrichium, and upper part of a hair ; *b*, *C. mirabilis*. Upper part of three hairs of the pileus ; *c*, *C. carecomoeis* var. *litseae*. Upper part of three hairs from the pileus ; *d*, *C. stipitaria* var. *gramineali*s. Upper part of two forked hairs from the margin of the pileus ; *e*, *C. septotricha*. Upper part of three ladder-like hairs of the pileus ; *f*, *C. excentrica*. Upper part of three appendiculate hairs of the pileus ; *g*, *C. chrysochaetes*. Pseudoamyloid bodies of the epicutis of the pileus.

belonging admittedly to *C. mauretanicus,* I prefer to reproduce the translation of Maire's description (in the order adapted in this paper):

Pileus gray-yellowish, partly becoming cinereous, sometimes somewhat zonate, the cuticle separable from the disk, adpressedly villous, with an incurved margin that becomes light fulvous, convex then flattened, 15-20 mm. Hairs very long, adpressed, flexuous, thick-walled, with bluntly rounded or acute ends (ex. ic.). *Lamellae* white, more or less intervenate, arcuate then ventricose, rather thick, ½ broad (5 mm ex ic.), rounded-free or subadnexed, not crowded ; lamellulae often connected with the

lamellae. Spores white in a spore print, hyaline, almond shaped, 9-11 × 4.5-6 µ. Basidia 36-40 × 6-7 µ, 4-spored. Cheilocystidia filiform. Pleurocystidia none. Subhymenium rather thick (about 30 µ), ramose. Trama subintricate, consisting of inequal hyphae. *Stipe* whitish at apex, somewhat fulvous below, the base fuscous-blackish, villous, solid or stuffed, subequal, 20-30 × 1.5-2 mm. *Context* white, only in the cortex of the stipe fulvous, thin in the pileus. Odor feeble. Taste mild.

Habitat. — On buried plant débris. Autumn. Solitary or gregarious, more rarely subcespitose.

Distribution. — North Africa. Heim (6) indicates this species in his list of fungi of Iberia from Catalonia under *Quercus suber*, mixed with *Cistus*, but does not indicate the exact substratum.

Observations of Maire: Related to *C. stipitaria*, from which it differs by its larger size, and its larger and more elongated spores. Compare the illustration given by Maire, *l. c.* Pl. 2, fig. 6-8 and Pl. 3, fig. 25-28.

Stirps zonata

3. **Crinipellis zonata** (Peck) Pat., Ess. Tax. Hym. p. 143. 1900.

Syn. : *Agaricus (Collybia) zonatus* Peck, *Ann. Rep. N. Y. St. Mus.* **24** : 61. 1872.
Collybia zonata Sacc., *Syll.* **5** : 216. 1887.
Collybidium zonatum Murr., *Mycologia* **4** : 4. 1912.
Marasmius zonatus Atk. et House, *Bull. N. Y. St. Mus.* **205-206** : 65. 1919.
Lentinus pulcherrimus Sumstine, *Torreya* **7** : 60. 1907.
Illus. : Murrill, *Mycologia* **4**, Pl. 56, fig. 8. 1912.
Lloyd, *Mycol. Notes* **1** (5) : 43. 1917 (photo).
Hard, *Mushrooms*, p. 111, fig. 81 (photo).
White, E. A. *Conn. St. Geol. Nat. Hist. Surv. Bull.* **15** : Plate 9. 1910 (photo).
Coker & Beardslee, *Journ. El. Mitch. Sci. Soc.* **37** : Pl. 21, 23 (photo and spores) 1921.

Pileus «tawny», «amber brown» (R), sometimes with faint darker zones or with a darker zone in the center, «cinnamon buff» with a slight flush of «honey color» or «Buckthorn

brown », « amber brown », « Sudan brown » (R.) on the margin of the dried plants, the center being concolorous or a little darker and frequently with a shade of « cinnamon brown » (R.), with numerous curly-undulate hairs giving the pileus a fibrillose-tomentose and radially corrugate appearance, subglobose, with or without an umbo, then convex, and finally plane or even concave at least around the convex ring which surrounds the umbilicus; constantly umbilicate, either in the umbo or in a narrow and frequently acute depression which is equally hairy, often with concentric furrows, especially when dried, with inflexed, later straight margin, 12-24 mm, sometimes still larger (up to 45 mm). Hairs of the center typically more or less acute in their majority, and ladder-like, multi-septate, although in other parts of the pileus and in some forms, bluntly rounded and non-septate hairs prevail; their diameter is 3.5-8.5 (-9) μ with a distinctly polystratous pseudoamyloid wall of 1-1.8 μ (when hair diameter is 5-7.5 μ), and up to 2.2 μ (when hair is 8.5 μ thick).

Lamellae pure white or whitish with a white subflocculose but entire edge, finally sometimes pale dirty yellowish, narrow (mostly 1.5-2 mm), rarely rather broad, subcrowded to very close, rarely moderately distant, emarginate-free or attenuate free. Spores hyaline, ellipsoid to shortly ellipsoid, some of them (a minority) distinctly pseudoamyloid, 5-8 × 3-5.3 μ, Q = 1.5-1.6, thick-walled in age. Basidia 25-28 × 6-7 μ. Cheilocystidia hyaline, 20-42 × 6-15 μ, broadly fusoid, bottle-shaped, subclavate, entire or mostly with one straight or obliquely projecting appendage, ocasionally with two, rarely with three appendages, which are up to 10 μ long in some forms while they appear more button-like and shorter, mostly not over 4 μ long; pleurocystidia lacking. *Stipe* concolorous or sometimes slightly more brown, tomentose-strigose, the hairs pointing obliquely downward as in most species of this and the following stirpes of *Stipitarinae,* solid at last often hollow, equal, 20-50 (-90) × 1.5-2.5 mm. *Context* white, about 1 mm thick at a point half way between umbilicus and margin, fleshy when fresh but «reviving after drying» according to Kauffman, more fibrous and firm in the stipe. Hyphae with clamp connections. Taste disagreable, and odor

remarkable, or strong, somewhat resembling the fishy smell around old wharves, only more acid (according to Coker and Beardslee), or fetid, especially in drying, finally disappearing somewhat like the odor of *Claudopus nidulans* according to Sumstine. *(Claudopus nidulans* refers to *Phyllotopsis nidulans* (Pers.) Sing. which smells like overripe melons).

Habitat. — On decayed stumps and sticks, also on buried sticks in mixed and open deciduous woods, subcespitose or solitary. Coker indicates *Fagus* (twigs, rootlets, fruits), *Hicoria ovata* (hull) as hosts of *C. zonata* in North Carolina. Mostly in July and August, also in June and September-October. A generally rare, but locally often rather frequent and widely distributed species.

Distribution. — U. S. A., New England to Alabama, and west to Indiana; China?

Material studied. — Type from Albany, New York (NYS); authentic material of *Lentinus pulcherrimus* from Pennsylvania (CM); other materials: New Hampshire: D. R. Sumstine (CM): Vermont: coll. Burt, det. C. H. Peck (FH); New York: C. O. Smith from Ithaca (FH); H. S. Jackson, from Enfield Ravine (FH); Pennsylvania: coll. Michener, det. Curtis *(A. stipitarius)* (FH); D. R. Sumstine *(Lentinus pulcherrimus)* (CM); Ohio: C. G. Lloyd (FH); Michigan: E. B. Mains (Mich); Alabama: coll. Peters, det. Curtis *(A. stipitarius)* (FH).

Observations. — This species is rather distinct because of its size, spore characters, broad cystidia, and habitat. It is rather isolated from the following stirps, but appróaches, in some regards, the tropical *C. sepiaria* and *C. septotricha.* Schweinitz had *C. zonata* in his Herbarium, under *Lentinus,* and gave a new name to it, half a century before Peck, but never published his species. This is proved by a specimen from Schweinitz's Herbarium, preserved in Curtis Herbarium (FH) and a short note written by Lloyd (1889), who found the same plant is Schweinitz's Herbarium. Höhnel (7) compares his *Collybia vindobonensis* with *C. zonata*, but after communication with W. A. Murrill thinks that these species are specifically distinct. One may suppose that *Collybia vindobonensis* belongs to *Crinipellis* but the type of this species (FH), does not belong to this genus.

Consequently, *Collybia vindobonensis* and *C. zonata* are not related, and I should not even call them similar in their external appearance. *Collybia zonata* Peck has been reported from China (Yunnan and Honan, coll. H. Handel Mazzetti, det. Bresadola), on *Clematis* and other wood, also on twigs. These specimens are preserved in Vienna (W, WU ?), but have not recently been studied by me. The determination needs confirmation.

Stirps stipitaria

This stirps is richer in species, and its representatives are more variable than in any other group of closely related species of *Crinipellis*. The species are morphologically very similar one to another and sometimes split into subspecies or varieties. *C. stipitaria* and *pseudostipitaria* may very well be pathogenic on cultivated Gramineae, as *Secale, Andropogon, Panicum*, etc.

4. **Crinipellis septotricha** Sing. spec. nov.

« Pileo » diluta brunneo, fulvo-alutaceo, pubescente-piloso, convexo, dein centro depresso, papillato (f. « papillata » forma nova) aut umbilicato (f. « umbilicata » forma nova), 3-12 mm lato. Crinibus dissepimentis confertis instructis. « Lamellis » albis, confertis vel mediocriter confertis, mediocriter latis, subventricosis, emarginato-liberis. Sporis angustis, 8.8-10.5 × 3.5-5.2 µ. Cheilocystidiis fusoideis vel ampullaceis, raro apice furcatis. « Stipite » concolori, piloso, aequali, tarcto, dein cavo, 16-30 × 1-2 mm. « Carne » alba tenui. « Hab. » : Ad ligna.

Pileus light brown, fulvous-tan, pubescent-hairy, convex, then with depressed disk, or flat, papillate or umbilicate, sometimes with inconspicuous concentric furrows, sometimes terraced, 3-12 mm, mostly 5-8 mm in diameter. Hairs acute or bluntly rounded, almost constantly ladder-like because of close septa, especially near the tip, sometimes with appendix, exceptionally without the ladder-like structure, the distance of the septa being between 5 and 11 µ; wall 1.5 µ thick when hair diameter is about 5 µ, about 2.5 µ when hair diameter is about 8.5 µ, the

diameter of the hairs varying between 4 and 10.5 μ, the wall often much thinner near the end, mostly hyaline but occasionally honey color or light brown. *Lamellae* white, crowded to medium crowded, medium broad, subventricose, emarginate-free. Spores hyaline, ellipsoid, 8.8-10.5 × 3.5-5.2 μ, Q = > 2, never or only exceptionally -2 or less. Basidia 22-32 × 5.5-8.5 μ. Cheilocystidia 25-35 × 4.2-7 μ, fusoid or bottle shaped, the « neck » rarely somewhat capitate or forked, the wall slightly thicker than in the basidia, sometimes with small bosses all over, but in general quite like the cheilocystidia of *C. stipitaria*. *Stipe* concolorous, hairy, equally thin, stuffed then hollow, 16-30 × 1 2 mm. *Context* white, thin. Hyphae with clamp connections.

Habitat. — On wood. December to August.

Distribution. — In the Caribbean area (Porto Rico, Cuba, Guadeloupe), and north to the Bermuda Islands.

Material studied. — Type, collected by Duss at Basse Terre, Guadeloupe, July 14, 1901, on a small board of white rotted wood (sapwood of fir), N° 513, determined by N. Patouillard *(C. stipitaria)* (FH). Co-types : Guadeloupe, coll. Duss, det. Patouillard *(C. stipitaria)* on completely decayed wood, N° 484 (FH); Guadeloupe, coll. Duss, det. Patouillard *(C. stipitaria)*, on half-rotten trunk of *Coffea*, N° 486 (FH); *Cuba*, coll. Wright, det. Berkeley & Curtis *(A. stipitarius)*, two samples, N° 46 (FH); Porto Rico, Bruce Fink, rather bad material, probably belonging here (FH); Bermuda, coll. B. and J. Dodge, det. Murrill *(C. stupparia)*, good material (NY).

Observations. — This species occurs in two forms, probably, according to the kind of substratum, the typical one papillate (f. *papillata*), on trunks, stumps and manufactured wood (the three specimens from Guadeloupe belong here, and so do the specimens from Bermuda); the other form, f. *umbilicata* f. n., has no papilla but a flat or abrupt umbilicus in the center of the pileus, and grows on smaller sticks and twigs (here belong the specimens from Cuba and Porto Rico, the former being the type of the forma, Wright N° 46, part, preserved in Curtis Herbarium FH.). The few collections studied do not furnish proof of the constancy of the relation between substratum and shape

of pileus; the two types of disk, however, are rather striking and deserve to be recorded as forms at least.

5*a*. **Crinipellis pseudostipitaria** Sing. spec. nov subsp. **occidentalis** Sing. subspec. nov. (subspecies typica).

« Pileo » coriicolori, piloso, convexo, umbonato vel umbilicato vel centro depresso, 3-13 mm lato. Crinibus plerumque obtusis vel obtusatis, dissepimentis dispersis vel nullis. « Lamellis » mediocriter latis, subventricosis, attenuato-adnexis vel liberis, moderate confertis vel subdistantibus. Sporis angustis 7.7-9.3 × 3.5-4.2 µ. Cheilocystidiis simplicibus vel furcatis. « Stipite » concolori, piloso, solido aequali, 13-38 × 1-2 mm. « Carne » alba tenui. « Hab. » : Ad herbas, plerumque gramina, rarissime ad ramulos minutissimos.

Pileus tan color, « cinnamon buff » to « Sayal brown » or « Mikado brown » (R.) when dried, almost uniform in color, hairy, subconical or hemispherical, then convex, with an umbo or, less frequently, umbilicate, or with a depressed center, 3-13 mm in diameter.

Hairs with bluntly rounded, more rarely bluntly acuminate. and very rarely with acute ends, not ladder-like, rarely with an ellipsoid appendix, hyaline or melleous, 4-7 µ thick, the wall about 2 µ thick when the diameter of the hair is about 5.5-6 µ. *Lamellae* probably white when fresh, medium broad, subventricose, attenuate-adnexed or mostly free, moderately crowded to almost distant. Spores hyaline, ellipsoid, 7.7-9.3 × 3.5-4.2 µ, Q always more than 2. Basidia 17.5-27 × 6.5-7.7 µ Cheilocystidia simple or more often forked, the two prongs being 3-12 µ long, more rarely with 3-5 branches and some (never all) may even be echinate (« en brosse »), 17-34 µ long and 4-6.5 µ broad below the ramification, or when simply fusoid on the thickest point, 7-12 µ broad if the whole ramification is calculated. *Stipe* concolorous, hairy, darker when the hairs are rubbed off, solid, equal, 13-38 × 1-2 mm. Hairs 5-7.7 µ thick, with mostly acuminate but obtusate apices and 1.8-2 µ thick wall when the diameter of the hairs is 5-5.5 µ. *Context* white. Hyphae with clamp connections.

Habitat. — On herbs, mostly grasses, very rarely on very small twigs among the heaped up grass.

Distribution. — Guadeloupe, and probably Cuba and other islands, of the Caribbean area.

Material studied. — Type coll. Duss, Plateau des Rivières. Guadeloupe, det. Patouillard *(C. stipitaria),* N° 492 (FH); Cotypes: Guadeloupe, Camp Sacal, coll. Duss, det. Patouillard. N° 1888 (FH); Guadeloupe, Mor e Hirondelle, on fragments of *Panicum maximum,* coll. Duss, N° 1765 p. p., det. Patouillard *(C. stipitaria)* (FH); Cuba, coll. Wright (N° 855), det. Berkeley and Curtis *(A. stipitarius* var. *pallidus* ined.), very probably belongs here (FH).

Observations. — The species *C. pseudostipitaria* is understood as the sum of two geographic races, one narrow-spored and the other broad-spored. There are transitions in a zone between their areas, around the Atlantic Ocean, where the spores are medium broad in some collections. The description is given separately for each of these subspecies. The race observed in the Western Hemisphere, ssp. *occidentalis* is considered the type of the species. The following variety, var. *mesites,* represents the transitional form.

var. **mesites** Sing. var. nov.

A typo differt sporis latiusculis quarum longitudo est plus minusve bis maior latitudine.

Pileus: Hairs mostly bluntly rounded, rarely bluntly acute or with a blunt appendix, or shortly attenuate but obtusate, not ladder-like, 4-7 µ thick with about 2 µ thick walls when the hair is 5.3-6.3 µ thick, hyaline, some honey color. *Lamellae:* Spores hyaline, ellipsoid, 7-10 × 4-6 µ (e gr. 7 × 4.8 µ, 8 × 4.2 µ, 8.4 × 4.2 µ, 8.5 × 4 µ, 8.5 × 4.4 µ, 9 × 5.5 µ, 10 × 5.2 µ etc.), Q varying around 2, never all single spores decidedly more than two times longer than broad, and never all single spores decidedly less than two times longer than broad. Basidia 22.5-25 × 6.5-7 µ. Cheilocystidia rarely simple and entire, mostly forked with two branches, but also branched with 3-5 branches, or a portion of them echinate («en brosse») 17-34 × 4-6.5 µ,

the breadth of the whole ramification being up to 7-12 μ. These cheilocystidia are very similar to the ones of the type, merely a little more branched in the specimens studied. *Stipe :* Hairs bluntly rounded or much more frequently acuminate but obtusate at the ends, 5-7.7 μ in diameter, wall 1.8-2 μ thick when the hair is about 5-5.5 μ thick.

Habitat. — Same as in the type, December to August.

Distribution. — From Martinique and Bermuda east to the west coast of Africa, Niger Valley.

Material studied. — Type collected : by Duss in the Parc du College de St. Pierre on Martinique, August 1900, N° 1877, det. Patouillard *(C. stipitaria)* (FH) ; co-types : Niger-Valley, Western Africa, on *Andropogon,* coll. Chevalier, det. Patouillard *(C. stipitaria)* (FH) ; Bermuda Islands, coll. S. Brown, N. L. Britton, F. J. Seaver, N° 1540, det. W. A. Murrill *(C. stupparius)* (NY).

5*b*. **Crinipellis pseudostipitaria** subspec. **orientalis** Sing. subsp. nov.

A subspecie typica, « C. pseudostipitaria ssp. occidentali », differt sporis latis, 7.5-10 × 5-6 μ. A « C. stipitaria » differt crinibus pilei obtusis. Hab. : Ad Gramineas.

Pileus umbonate, with or without a depression around the papilla. Hairs in the center and on the margin of the pileus bluntly rounded, sometimes in the ciliate part of the margin with short blunt projections which remind one of the shape of the cheilocystidia, hyaline or, less frequently honey color to fulvous-brown, on the disk of the pileus with a diameter of 4-7.3 μ, wall 1.7-2 μ thick when diameter of the hair is about 4.5 μ, up to 3.5 μ thick when the whole hair is 7.3 μ thick, often thinner-walled near the margin of the pileus. *Lamellae :* Spores hyaline, ellipsoid, 7.5-10 × 5-6 μ (single measurements : 7.7 × 5.2 ; 7.7 × 5.3 ; 7.5 × 6 ; 8 × 5 ; 8 × 5.3 ; 8.5 × 5.3 ; 8.5 × 5.5 ; 8.8 × 5 ; 8.8 × 5.5 ; 9 × 5 ; 9.5 × 5.2 ; 9.5 × 6 ; 10 × 5, the length between 8 and 9 μ being most frequent), Q exceptionally = 2, mostly decidedly lower than 2. Basidia 26.5-40 × 6-8.8 μ. Cheilocystidia simple, and then bottle-shaped or with a capita-

te top, or — and this is the majority — more or less forked or branched or even almost echinate (but mostly not only on the top, but all over or on the upper half) 22-30 × 6-7.5 μ, but the largest distance of the branches often up to 11 μ. Hyphae of the trama 2-4.3 μ in diameter, with clamp connections. *Stipe* about three times as long as the diameter of the pileus.

Habitat. — On Gramineae. February to July (February in French Congo), July in French Guinea, and in French Indo-China).

Distribution. — In the tropics of the Old World, hitherto collected in West Africa (French Congo and Guinea) and in South Asia (Tonkin).

Material studied. — Type, collected by Demange at La Pho, Tonkin, July 23, 1909, det. N. Patouillard *(C. stipitaria)* N° 275 (FH)[1]; Congo, Cap Lopez, coll. Dybowsky, det. Patouillard *(C. stipitaria)* (FH); Guinea, Camayenne, coll. Dupont, det. N. Patouillard *(C. stipitaria)*. This subspecies probably is widely distributed in tropical Africa and Asia, but has been overlooked because of its resemblance to *C. stipitaria*. Patouillard indicates *C. stipitaria* for Maromandia, Madagascar; his specimens are in Paris, and I have not recently studied them, so I am unable to tell if they belong to this species or to *C. pseudosplachnoides*, or to some undescribed species.

6. **Crinipellis bisulcata** (Pat. et Gaillard) Pat., *Journ. Botan.* 3: 336, 1889.

Syn. and Illus.: *Collybia bisulcata* Pat. et Gaillard, *Bull. Soc. Myc. Fr.* 4: 14, tab. 7, fig. 3, 1888.

Pileus when dried, grayish straw color or very pale grayish brown or between «tilleul buff» and «avellaneous» (R.) with the disk «wood brown» (R.) to almost black, apparently the darker the deeper the umbilicus is, strongly hairy except at the almost naked center, the center being the more naked the de-

[1] This collection is mixed up with a darker species without hairs and with pseudoamyloid hyphae, probably a *Mycena*. The paintings in Demange's unpublished album doubtlessly refer to this latter specimen.

eper the umbilicus is, umbilicate with a very small papilla in the umbilicus or with a shallow furrow around the papilla, with 1-3 more concentric furrows around the center, subglobose to convex for the rest but later flattened, 8-13 mm in diameter. Hairs pseudoamyloid, 3.5-9.7 μ in diameter, bluntly rounded or more often acute or subacute, the tops of the rounded ones sometimes slightly inflated and thin-walled (the inflated portion occasionally separated by a septum), the walls 3.5 μ thick when the diameter of the hairs is about 9.5 μ, correspondingly thinner in thinner hairs, hyaline, more rarely some of them hyaline-straw color. *Lamellae* initially probably white, concolorous with the margin of the pileus when dried (almost black in the type specimens (see « material studied »), moderately broad, medium distant to rather distant, almost free or very narrowly adnexed. Spores hyaline, ellipsoid, 6.3-8.5 × 3.1-3.8 μ, mostly 7-8.5 × 3-3.8 μ, Q = > 2. Basidia 35-41 × 6.5-8 μ. Cheilocystidia 27-56 × 4 7.5 μ, simple or with short protuberances up to 6.5 μ long on the top or all over, rarely with two or three longer branches up to 14 μ), never truly echinate. *Stipe* concolorous, strongly hairy, stuffed or at least more or less hollow, 12-55 × 1-2 mm. *Context* whitish or white, but bordered by a brown peripheric line in the pileus as well as in the stipe, and easily visible in the dried material. *Hyphae* with clamp connections.

Habitat. — On small stalks (of Gramineae ?). The type is said to grow on «brindilles et débris », while Lagerheim's material was found « in campis », on grass, March-April.

Distribution. — Venezuela and Ecuador.

Material studied. — Type, collected by A. Gaillard in the Orinoco-region, near Atures, Venezuela, April, N° 136, det. Patouillard (FH). The type collection is in much worse condition than the other material referred to here by the writer, because it has been preserved in alcohol, and then dried, and consequently all colors have darkened, and the lamellae are in rather bad shape. It is not surprising therefore, that Patouillard's description differs from the one given above. The umbilicus is really deeper and the stipe longer in the type collection which probably has been collected on a less open place. The second collection in Patouillard's Herbarium (FH) that cannot

be separated from the type, was collected on fields in Quito, Ecuador, March 1891, by Lagerheim, and determined by Patouillard *(C. stipitaria)*.

Observations. — This species is intermediate between the stirps *Stipitaria* and the stirps *Setipes*. The more or less naked disk and the narrow spores recall the *Setipes*-group, while its close affinity to *C. pseudostipitaria* and the mostly simple cheilocystidia suggest its classification within the stirps *Stipitaria ;* this relation in confirmed by its habitat (if it is really always on Gramineae) and geographic distribution.

7*a*. **Crinipellis stipitaria** (Fr.) Pat., *Journ. Botan.* 3 : 336, 1889. var. **gramineal is** Lasch *(Agaricus), Linnaea* 3 : 386, 1828 (type variety).

Syn. : *Agaricus stipitarius* Fr. *Syst. Myc.* **1** : 138, 1821.
Collybia stipitaria Gill. *Champ. Fr. Hym.*, p. 319, 1878.
Marasmius stipitarius Atkinson et House, *N. Y. State Mus. Bull.* **205-206** : 65, 1919.
Agaricus caulicinalis Bull., *Champ. Fr.* Tab. 522, fig. 2, 1790.
Collybia caulicinalis Quél., *Ass. fr. av. Sci.* 1883, p. 498, 1883.
Marasmius caulicinalis Quél., *Flor. Myc. Fr.*, p. 315, 1888.
Crinipellis caulicinalis Rea, *Brit. Bas.*, p. 534, 1922.
Agaricus scabellus Alb. et Schwein., *Consp. Fung. Lus.*, p. 189, tab. 9, fig. 6, 1805.
Marasmius scabellus Morgan, *Journ. Mycol.* **11** : 202, 1905 (descriptione exclusa) ; *Bat. Flor. Mon. Mar.*, p. 23, 1919.
Crinipellis scabella Murr., *N. Am. Flor.* **9** (4) : 287, 1915.
Marasmius caulicinalis var. *scabellus* Quél., *Flor. Myc. Fr.*, p. 315, 1888.
Marasmius gramineus Pass., *Nuov. Giorn. Bot. Ital.* **4** : 111, 1872.
Marasmius epichloë Fr., *Hym. Eur.*, p. 479, 1874.
Androsaceus epichloë Rea, *Brit. Bas.*, p. 533, 1922.

Illus. : (Bulliard and Albertini and Schweinitz see above).
Berkeley, *Outlines Brit. Fung.* t. 5, fig. 6.
Bernard, *Champ. Roch.* tab. 10, fig. 1.
Cooke, *Illus. Brit. Fung.* Pl. 193 (149) lower fig. ; ? 1136 (1087) A.
Hussey, *Illus. Brit. Myc.* 1, tab. 48 (very good, the green pilei are overgrown by Algae).
Patouillard, *Tab. Anal.*, 2e sér., N° 525, 1886 (in black).
Lloyd, *Mycol. Notes* **5** : p. 42, fig. 15, 1900 (photo).
Ricken, *Blätterp.* **2** : tab. 108, fig. 6

Coker & Beardslee, *Journ. El. Mitch. Sc. Soc.* 1921, Pl. 23, fig. 21 (spores).
Konrad & Maublanc, *Icon. Sel.*, **3**: Pl 221 (very good).
Bresadola, *Iconogr.* **10**: tab. 496, 2.
Lange, *Flor. Agar. Dan.* **2**: tab. 49, fig. E (very good).

Pileus in all shades from white to «Isabella color» (R.) or even «Saccardo's umber» (R.) in some parts when old, sometimes with more reddish brown tints in the center («Mikado brown» or even «tawny») and pale or pale yellowish on the margin, sometimes unicolorous, sometimes rather abruptly darker, rarely paler on the disk, sometimes with darker zones (because of zonally connivent hairs), hairy curly, also in the center, campanulate to convex, then more or less flattened, umbonate or papillate, the papilla sometimes in an umbilicus which may be surrounded by shallow and not very striking concentric furrows, which are more evident in dried specimens, submembranaceous, sulcate on the margin of old and large specimens, 4-14 mm (mostly 7-12 mm) in diameter, exceptionally larger. Hairs bluntly rounded to needle-like-acute with all intermediates, the acute ones prevailing, but neither type is entirely absent, with few or none of them ladder-like; septate hairs intermixed, but not ladder-like in their majority, 4.5-8.8 μ in diameter, 6 μ thick hairs with about 0.8 μ thick walls, these hyaline or (especially near the center of the pileus) partly melleous, pseudoamyloid; some few hairs from the minutely ciliate margin of the pileus are forked or laterally spinose. *Lamellae* white or slightly cream color, broad or narrow (1-2 mm broad), rounded-free, sometimes attenuate-free or very narrowly adnexed, very often subventricose, subdistant, more rarely subcrowded. Spores hyaline, ellipsoid, not septate, 7-10.8 × 5-8 μ, mostly 8.8-9.5 × 5.5-6.8 μ when mature on lamellae; Q = 2. Basidia 28-42 × (5.5-) 7-10.5 (-12) μ, abortive ones up to 12.5 μ broad, 4-spored when fertile. Cheilocystidia 17-42 × 3.5-9 μ, mostly 33-39 × 5-7 μ, ordinarily simple or with 1-3 short (up to 3 μ) appendices or nodulose all over, only a minority (if any) of them forked (the two ends up to one third of the total length of the body and 2-4.2 μ thiick), rarely one or another divided almost at the base, or with 3 branches, the undivided portion of the branched ones and the simple ones

more or less fusoid or bottle shaped (the « neck » sometimes capitate). Pleurocystidia none. *Stipe* concolorous (with the margin of the pileus at the apex, with the center of the old pileus towards the base), hirsute-hairy-subsulcate, stuffed then hollow, seemingly insititious but often continued within the substratum, equal or slightly thickened downwards, 8-50 × 0.5-2.5 mm, mostly 20-30 × 1-2 mm. Hairs acuminate with a needle-like top, or distinctly attenuate but more or less bluntly rounded, often ladder-like-septate, or not, hyaline or melleous, 5-10.5 μ thick, wall about 3.2 μ-3.5 μ-4.2 μ thick when hair (accordingly)

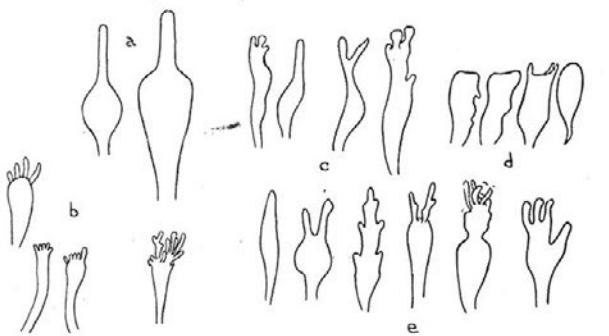

Fig. 2. — Showing different types of cheilocystidia in the genus *Crinipellis*, × 500 : *a*, *C. perniciosa* ; *b*, *C. stupparia* ; *c*, *C. Patouillardii* from New Caledonia ; *d*, *C. subtomentosa* ; *e*, *C. bambusae*.

is 7.7 μ-9 μ-10.5 μ thick. *Context* white, thin. Odor none. Taste mild. Hyphae with clamp connections.

Habitat. — On stems and roots of *Gramineae,* mostly on fields, prairies, meadows, etc. When the genus of the host has been determined it was most frequently *Dactylis glomerata, Ampelodesmos, Brachypodium, Secale, Agropyron caninum, Poa annua, Calamagrostis arenaria, Carex arenaria,* but probably on most genera of *Gramineae,* on dead and living parts, and therefore, no doubt, parasitic in many cases, although the damage done on cereal plants does not seem to be considerable. January-December, in mild climate preferring the winter months, in more northern regions June to September. Gregarious, sometimes cespitose or subfasciculate. Lange (**9**) reports finding it once on twigs of *Picea* in Denmark. As this is the only indication of a

substratum like that, yet made by a very strict observer, it might be assumed that his specimens on *Picea* belong either to another variety hitherto unknown, or, more probably to an American or Asiatic species of *Crinipellis*. In fact, the Danish coniferous plantations are all grown from plants or seeds which were introduced either during this or in the last part of the past century, and it is quite possible that *C. piceae* or *C. campanella* have been introduced with them. Beside Lange's claim there is another indication of *C. stipitaria* on dead parts of *Pinus pinaster* in Spain, collected by R. Heim near L'Escala, Catalonia. As R. Heim is an astute observer, there can be no doubt about the substratum, but further studies on Heim's specimens which I have not seen, must reveal if he had the real *C. stipitaria* or one of the allied forms or species which in 1934 (when Heim's determinations were made) virtually were undistinguishable. To be sure, the hypothesis of introduction (which works rather well in the case of Denmark) is much less probable in the case of Heim's specimens. In the old literature *C. stipitaria* or its synonyms mostly are indicated on grass, but Secretan (1833) mentions *Equisetum*, and Passerini (1872) *Robinia pseudacacia* (twigs) as substratum (?).

Distribution. — Europe, North Africa, and parts of North America.

Material studied. — Sweden: Upsala, E. P. Fries (son of E. M. Fries) as *A. cauticinalis* (FH); France: La Tour de Salvagny, Rhône, M. Josserand (Mich.); Caen, coll. Roberge, comm. Lenormand, det. Curtis (?) (FH); locality unknown, coll. Desmazières, conf. Patouillard (FH); Trompeloup, near Bordeaux, Gironde, coll. v. Hoehnel, det. Willi (FH); French North Africa: near Djidjelli, R. Maire (FH); Sbeilla to Kasserine, Tunis, on « souches d'alpha » (?), Patouillard (FH); Hungary: Puszta Kaposzhás Megyer, near Budapest, coll. V. Schiffner, det. v. Hoehnel (FH); Germany: Sohland, near Löbau, Oberlausitz, coll. A. Schultz, det. Bresadola (FH); *U. S. A.*: Kulm, N. D., J. F. Braenkle (*Marasmius* sp.) (Mich.); Rooks Co., Kan., E. Bartholomew (FH).

Sufficient data are at hand to confirm the occurrence of *C. stipitaria* in most European countries, and in North Carolina,

Ohio, North Dakota and Kansas. It will probably be found in most states west of the Rocky Mountains. I do not think it originally was imported to America with foreign seeds, but this point will be extremely hard to prove.

Observations. — The above synonyms can not belong to any other species occurring in Europe, and do not seem to be essentially different. *Marasmius scabellus* Morgan is a new combination for *Agaricus scabellus* A. et S., and belongs to *C. stipitaria* merely as such, but the short description given by Morgan *(l. c.)* proves that he misunderstood that species. Its description belongs to the species we are now calling *C setipes.* As for Murrill's description it does not seem to exclude the true *C. stipitaria,* inasmuch as the spore measurements rather belong to this species, but it evidently includes many species that do not belong here, consequently the conception in North American Flora is collective. What Kauffman describes as *C. stipitaria* is *setipes*, and the same is true for Peck's *stipitaria,* but feeling that his *stipitaria* does not entirely correspond to the European species, he made it a variety of the latter, var. *setipes.* The only American authors who had a definite idea of *C. stipitaria* in the correct sense were Lloyd (1900), Atkinson (1919), and Coker and Beardslee (1921). The possibility that both of them are mere adaptations to rather different conditions of living, cannot be denied at present. Experiments of cultivation of one variety on the others' habitat, and observation of the constance of their characters under the new conditions are very desirable. If these experiments should prove that the distinguishing characters, although not very striking, are hereditary, the two varieties must be considered as a subspecies in my definition; if not, they are simple forms.

7 *b.* **Crinipellis stipitaria** var. **corticalis** Desmaz. *(Agaricus) Ann. Sc. Nat. Bot.* 4 : 130, 1855.

Pileus brownish, pale tawny towards the margin, hairy, with brown hairs which are repent and more numerous on the center, and are arranged radially, convex, somewhat papillate, thin, 5-10 mm in diameter. Hairs more often acute than obtuse, more

often hyaline than brown under the microscope, the older ones always being more colored, 4.2-9 μ thick, the wall 2.5-3.5 μ thick for 9 μ diameter of the hair. *Lamellae* whitish, rather broad, free, medium crowded (about 30, the lamellulae included). Spores hyaline, ellipsoid, 8-8.8 × 5-5.3 μ; Q = < 2. Cheilocystidia fusoid or bottle shaped, mostly simple, but a few forked ones are always present, 28-38 × 5.5-7.5 μ. *Stipe* brownish, hairy, especially in the lower half, with shorter, brown hairs, almost always solid, equal, up to 20 mm long, 0.5-0.75 mm thick. Hairs either blunt or acute, with a very thick wall (4.2-4.5-5.5-7.5 μ, for, accordingly, 5.5-12 μ diameter of the hair) not ladder-like-septate, the inner layer of the wall directly beside the lumen is the most colored one (honey color). *Context* white, thin.

Habitat. — On trunks and branches of Lilac *(Syringa vulgaris)*. Practically the whole year.

Distribution. — France and Denmark.

Material studied. — Part of type, coll. and determined by Desmazières in France (FH).

Observations. — A rare variety, rather determined by the habitat, and by the hairs of the stipe which have, on an average, a thicker wall than in the tipe (var. *gramineali*s). Parts of Desmazières's original diagnosis have been used for the above description.

8. **Crinipellis sepiaria** Pat. et Dem. *Bull. Soc. Myc. Fr.* **26** : 36 1910.

Syn. : *Marasmius sepiarus* Sacc. et Trott., *Syll.* **21** : 112. 1912.

Pileus dark bister (darker than Ridgway's « bister »), the margin paler than the center, sometimes much paler all over, so the dried specimens are not darker than « sayal brown », « snuff brown » (both with a slight tinge of « wood brown » (R), fibrous-hairy, the hairs arranged radially, margin often ciliate, convex or irregular, mostly with a not very abrupt umbilicus, with some indistinct concentric furrows when dried, 10-21 mm in diam. [1]. Hairs brownish or hyaline, bluntly rounded or acu-

[1] Patouillard gives the diameter as 10-15 mm, but this is taken from the dried material. The type specimens were 13-21 mm in fresh condition.

minate but with the very top rounded, the majority or almost all hairs with ladder-like septa, 4-6.5 (-14) μ in diameter, very thick-walled, strongly pseudoamyloid. *Lamellae* white, becoming dirty brownish, starting from the margin of the pileus, moderately broad (2.5 mm), not ventricose, subdistant to medium crowded, rounded free or very narrowly adnexed. Spores hyaline, not pseudoamyloid (not even a minority), ellipsoid to subglobose (Q = 1.2-1.5), not septate, 5.6-9.5 × 4.5-6.5 μ. Basidia not seen. Cheilocystidia very much like the ones in typical *C. stipitaria,* but more indistinct in the specimens available. *Stipe* dark bister near the base, paler at apex, hairy-fibrous-squamulose or hirsute, solid, finally hollow, equal or slightly attenuate downwards, 12-22 × 1-2 mm. Hairs up to 11 μ thick, mostly bluntly rounded, brownish. *Context* white, rather rigid in the stipe. Hyphae with clamp connections.

Habitat. — In bamboo groves, on sticks and rootlets of *Bambusa* spec. September and March.

Distribution. — Tonkin.

Material studied. — Type, collected by V. Demange, prov. d. Hanoi, Tonkin, September 11, 1908, determined by N. Patouillard, n° 220 (FH). Other material, collected in spring (March 10, 1891) at Kien Khe, Tonkin, by Bon, det. N. Patouillard *(C. stipitaria)* (FH).

Observations. — Since size and color of Bon's collection is not as characteristic as in the type — more tender and paler — it will be necessary to make sure that the spores are of the extremely short type described above (to prevent confusion with *C. atrobrunnea*), and that the habitat is on bamboo. Bon's collection has been determined by Patouillard before he had seen the type collection, and therefore he inserted it under *C. stipitaria.* The type collection has been painted in fresh condition by Nguyen Manh Hoan, and this picture is part of an album of paintings of Tonkin Fungi, mentioned by Patouillard and Demange (16), and preserved at the Farlow Reference Library. The paintings are very natural and worthy of publication ; more than 130 plates with about double the quantity of forms are drawn in colors, and determined by Patouillard. *C. zonata* which may exceptionally have a similar color and size, has partly pseudo-

amyloid spores, and grows on wood, other than of *Bambusa*. Nevertheless, *C. sepiaria* has some other characters (spore, size, etc.) which are also present in *C. zonata*, and it is possible that these species have some natural affinity. On the other hand, however, *C. atrobrunnea* also seems to be closely related to *C. sepiaria*.

9. **Crinipellis atrobrunnea** Pat., *Bull. Soc. Myc. Fr.* 7 : 308. 1891.

Syn. : *Marasmius atrobrunneus* Sacc. *Syll.* 11 : 38. 1895.

Pileus rather dark brown, at least in dried condition, hairy, with straight or somewhat crenulate margin, convex, about 10 mm in diameter. Hypotrichium of the dried plant strongly colored by a brown membrana-pigment. interwoven. Hairs of the dried material hyaline with a yellowish tint and the pigment precipitated in the lumen and on the top as brown amorphous granulae, tips always bluntly rounded and a few of the hairs joined into fasciculate fibrils, especially on the disk, 5-10.5 μ in diameter, the wall 1.5 μ in a 5.5 μ thick hair, 3-3.7 μ in a 10 μ thick hair, only slightly pseudoamyloid, not connected by ladder-like dissepiments. *Lamellae* becoming brown, subdistant, or distant (12-29), the lamellulae included, rounded-free (?) « adnate » according to Patouillard, alternating with dimidiate ones and sometimes also with lamellulae of a quarter length, with anastomosing veins. Spores hyaline, ellipsoid, 8.5-9.5 × 4-4.5 (-5) μ, Q = 2. Basidia 23-30 × 7-7.7 μ. Cheilocystidia 19-45 × 3.5-6 μ, cylindric, or subfusoid or subclavate, often with very strongly sinuose-wavy outline but no branched ones seen, strongly agglutinate in the specimens studied. *Stipe* concolorous, roughly hairy-sulcate, equal or subequal, 10-30 × 0.5-1 mm. *Context* very thin. Hyphae with clamp connections.

Habitat. — On dead stems of Gramineae. September and May.

Distribution. — Tonkin.

Material studied. — Type and co-type, collected by Bon at Ke-So, province of Hanoï, May 31, 1890, n° 4362, det. Patouillard (FH); Authentic material from Báu háu, Cai kinh massive, Tonkin (Boutan, n° 341*b*), det. Patouillard (FH).

Observations. — This species does not occur in South America. The specimens, determined as *Marasmius atrobrunneus* by Rick, belong to *Heliomyces* sens. Sing., Maire next to the genus *Collybia)*, and not to *Crinipellis.*

Stirps stupparia

10. Crinipellis Patouillardii Sing. spec. nov.

«Pileo» dilute brunneolo vel intense rufulo-brunneo, piloso, discum nudum, planum, dein depressum et papilla saepe comata instructum exhibente, convexo, usque ad 7 mm in siccis. Crinibus acutis vel obtusis, multi-septatis vel aseptatis. Lamellis albis, mediocriter latis vel satis angustis, mediocriter confertis vel sat confertis, anguste adnexis vel subliberis. Sporis latis, 7-10 × 4-6.2 μ. Cheilocystidiis plerumque simplicibus integrisque aut multis nodulosis vel furcatis vel ramulosis intermixtis, perpaucis nonnumquam echinatis. Stipite subconcolori, insiticio, ± pilosos, solido, 7-12 × 0.5-0.8 mm in siccis. Hab.: Ad ramulos et folia semperviva.

Pileus light brownish to a rather rich reddish brown, the color change being nearly the same as in the different forms of *Lentinus crinitus,* hairy, the hairs radially arranged, making the margin of the pileus curly-grooved, initially with a naked, glabrous, flattened disk from the center of which a papilla sometimes projects, which sometimes is very long and prominent, the flat disk later becoming an umbilicus, the papilla more often than not glabrous on the sides but covered with a tuft of hairs, the zone around the disk sometimes echinate-hirsute, the general shape of the pileus conic, later with convex margin, but sometimes with a concentric furrow around the papilla and umbilicus, the papilla lower or higher than the border of the umbilicus, and if it is lower, the tuft on its top may be lacking; the margin finally almost flat, never broader than 7 mm in dried condition. Hairs acute or blunt, with or without a ladder-like structure, hyaline, honey color or tawny under a microscope, 3-9.5 μ in diameter, but sometimes at certain places, suddenly inflated, others thin and wavy, the wall 2-3 μ thick when hair is 5.5-7 μ thick. *Lamellae* white, at last becoming brownish-wood color,

medium broad or rather narrow, medium crowded or rather crowded, narrowly adnexed or almost free. Spores hyaline, ellipsoid, 7-10 × 4-6.2 μ, Q in some single cases about 2, but for the average spore decidedly less. Basidia 28.5-35 × 7-7.5 μ. Cheilocystidia either predominantly simple, merely with occasional irregular excrescences, and then fusoid or constricted in the middle, more rarely cylindrical as in the Bonin Island and Central American specimens, or a varying portion of them nodulose or forked or with a few (2-4) short cylindric or swollen branchlets, and then a small minority almost echinate but not as prominently as in *C. stupparia,* subhyaline or pale brownish, 23-50 × 5-10 μ, the branches 7-22 × 2-4 μ, or smaller, many of them with a viscose or resinous incrustation on the top. Pleurocystidia always present although not very numerous, of the same size and sometimes with the same incrustation as the cheilocystidia, but more uniformly simple, not branched. *Stipe* concolorous or somewhat paler, insititious, more or less hairy, the hairs obliquely directed downward, brown when the hairs have been removed, solid, 7-15 × 0,5-0.8 mm in dried specimens. *Context* thin, white. Hyphae with clamp connections.

Habitat. — On twigs and leaves of the evergreen type, often in shaded ravines. The Central American and Bonin Island specimens were collected in November and December. They grow in groups, on fallen branches of a tree that, according to Dr. I. W. Bailey, belongs to the *Piperaceae.*

Distribution. — Bonin Islands, New Caledonia, and east to Mexico.

Material studied. — Type. collected by Wright (U. S. Pac. Expl. Exp., n° 5, 25) on leaves on Bonin Islands, one collection (type specimens) preserved in the Wright collection, the other in Curtis Herbarium, both determined by Berkeley and Curtis *(A. stipitarius),* and preserved at Farlow Herbarium; co-types: New Caledonia, coll. Bernier at Nouméa, det. Patouillard *(C. stipitaria)* (FH): Jalapa, Mexico, coll. et det. *(C. stupparia)* W. A. Murrill, four collections (NY).

Observations. — This species differs from *C. stupparia* in having different cheilocystidia and more adpressed and less fasciculate hairs.

11. **Crinipellis stupparia** (B. et C.) Pat., *Ess. tax. Hyn.* p. 143. 1900.

Syn. : *Agaricus* (Collybia) *stupparius* Berk. et Curt., *Journ. Linn. Soc.* **10** : 285. 1868.
Collybia stupparia Sacc., *Syll.* **5** : 217. 1887.

Pileus light brown (color of the more light-colored pilei of *Lentinus crinitus*), very strongly and coarsely hairy-floccose, the hairs mostly fasciculate and agglutinate into long pyramidal but more or less curly-undulate strands, leaving however the

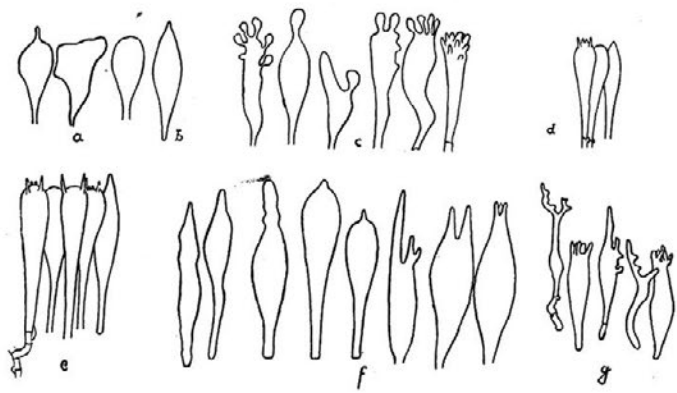

Fig. 3. — Showing different elements of the hymenium of *Crinipellis*, × 500 : *a*, *C. carecomoeis* var. *litseae*. Basidia, some of them deformed ; *b*, *C. carecomoeis* var. *litseae*. Basidiol ; *c*, *C. carecomoeis* var. *litseae*. Cheilocystidia. *d*, *C. excentrica*. The hymenium on the sides of the lamellae : basidia and basidiol ; *e*, *C. siparunae*. Basidia ; *f*, *C. minutula*. Eight pleurocystidia ; *g*, *C. minutula*. Five cheilocystidia.

blackish brown disk free, the latter more or less depressed and always furnished with a long and slender papilla in the center of this umbilicus, the papilla being naked or rather rarely covered on its top by a tuft of hairy tomentum, the general shape of the pileus hemispheric, then convex, and finally flat, never broader than 5 mm when dried. Hypotrichium consisting of rather thick, cylindric, sometimes branched, somewhat thick-walled hyphae colored brown with a membrana-pigment. Hairs thick-walled with bluntly rounded ends, 5-7.5 μ in diameter, almost amyloid. *Lamellae* white, at last becoming brownish-

wood-color, rather narrow, medium crowded (12-20 the lamellulae included), free. Spores hyaline, ellipsoid, 7-9.8 × 4.2-7 μ, Q in some exceptional individual spores about 2, but in average much less than 2. Basidia 19-26 × 8.5-10.5 μ. Cheilocystidia decidedly echinate above, or exceptionally all over the upper third, with 4-12 appendices which are 1-2 μ thick and mostly about 4 μ, but also up to 7 μ long, simple or more rarely some of them with secondary branchlets, the size of the whole cheilocystidia 16-35 × 5-9 μ (the appendices included). *Stipe* concolorous, hairy, mostly very strongly tomentose-pilose, equally thin, solid, then hollow, 3-25 × 0.3-1 mm. *Context* white under the dark cortex, thin, the hyphae with clamp connections.

Habitat. — On sticks, branches, small twigs and leaves of the evergreen type, gregarious. December to February.

Distribution. — From Cuba to Brazil, hitherto found only in these two countries, ond possibly in Venezuela.

Material studied. — Type, collected by Wright in Cuba, determined by Berkeley and Curtis (FH); other collections: Cuba, coll. Wright (part of n° 15), det, Berkeley and Curtis (*A. stipitarius* var.) (FH); Brazil, Sao Leopoldo, Rio Grande do Sul, coll. et det. Theissen, 1907 (*Marasmius Thwaitesii* Bk. et Br.) (FH); another collection or part of the same collection in Patouillard Herbarium (FH).

Observations. — This is not the real *Marasmius Thwaitesii* Berk. et Br., but it is what Rick and Theissen have called it. As a part of Curtis's *A. stipitarius* belongs here, it is quite possible that his citation « Venezuela » (in Cuban Fungi) refers to *C. stupparia,* but I have seen no material from that country.

Stirps carecomoeis

The various forms which belong to this stirps, doubtlessly forming a very natural group, are all referred to a single species. This single species may very well be collective but having only one collection of each of the forms I am unable to state that each collection actually represents an autonomus species. The solution of this question must be postponed until more material becomes available. The forms concerned have all basic charac-

ters of the typical *C. carecomoeis* (small carpophores, long narrow spores, etc.) and differ chiefly in minor macroscopical particularities, the density of the hairy covering, and the general appearance.

12*a*. **Crinipellis carecomoeis** (B. et C.) Sing. comb. nov. (var. **typica**).

Syn.: *Agaricus* (Collybia) *carecomoeis* Berk. et Curt., *Journ. Linn. Soc.* **10**: 284. 1868.
Collybia carecomis (sic) Sacc., *Syll.* **5**: 232. 1887.

Pileus with pale tawny («cinnamon buff» to «tawny olive» R.) undulate strands of curly hairs, and white between them, campanulate then umbilicate and plane between the umbilicus and a more or less distinct concentric furrow, declivitous behind the furrow, 4-5 mm broad in dried condition. Hairs of the center of the pileus hyaline, or slightly honey color, 5-10.5 μ thick, acute or bluntly rounded, with very unequally thick walls (for a hair with 7 μ diameter the wall was found to be around 3.2 μ, for 8.5-9 μ diameter it reached 5 and 5.5 μ, while on the opposite side the wall was much thinner. Some hairs have sudden thickenings. *Lamellae* white, broad, ventricose, rather crowded, free. Spores hyaline, subfusoid with the thickest part near one end, 10-20 × 4-6.3 μ, mostly 14-14.5 × 5.5-6.3 μ, inside granulose, wall finally thickened. Cheilocystidia versiform, mostly not or very little branched, clavate, fusoid or bottle-shaped, mostly bottle-shaped with a long thin neck, more rarely the neck is cristate or nodulose, and much more rarely there are 2-4 parellel «necks» or appendices which may reach 11 μ of length; the whole size of the cheilocystidia is 25-50 × 7-10.5 μ, their color is brownish hyaline. *Stipe* white or whitish above, brownish below, hairy-tomentose, equally thin, 24-40 × 0.7-1 mm when dried. *Context* white, thin. Hyphae with clamp connections.

Habitat. — On fallen leaves of trees; the tree probably belongs to the Leguminosae (according to D. H. Linder).

Distribution. — Cuba. This species may be distributed the same way as the preceding one (*C. stupparia*), because it is said to occur not only in Cuba but in Brazil (teste Berkeley

and Curtis); I have, however, seen no specimens from South America.

Material studied. — Type, collected by Wright and a part of it (type specimens) preserved en Curtis Herbarium (FH), another part in Wright's Fungi Cubenses (FH).

Observations. — This is one of the most striking forms of the tropical representatives of the subsection *Stipitarinae*. It differs from var. *subelata* by the thicker stipe and the incontinuous hairy covering of the pileus, and from var. *litseae* by the much longer stipe and the habitat on leaves.

12*b*. **Crinipellis carecomoeis** var. **subelata** Sing. var. nov.

Syn.: *Crinipellis elatus* Pat., *Bull. Soc. Myc. Fr.* **24**: 167. 1908. (*Marasmius elatus* (Pat.) Sacc. et Trott., *Syll.* **21**: 112. 1912) an abnormal sterile form.

Pileo *lignicolori, omnino piloso, convexo vel irregulariter applanato, usque ad 5 mm lato. Crinibus acutis vel rotundatis.* Lamellis *liberis vel adnexis (?). Sporis angustis, 10-12.8 × 4.2-6* µ. *Stipite concolori, perpiloso, subaequali vel basin versus subincrassato, normaliter 13-19 × 0.2-0.8 mm. Carne tenuissima.* Hab.: *Ad folia semperviva delapsa.*

Pileus « wood brown » with a slight tinge of « drab » in dried specimens, hairy all over, convex to irregularly flat, up to 5 mm in diameter. Hairs acute to bluntly rounded, 4-10 µ in diameter, often abruptly inflated, and sometimes more or less ladder like, septate, but mostly without close septa, the wall 2-2.8 µ thick when the diameter of the hair measures 6.3 µ, and 4.2 µ, when the hair is 9.7 µ thick. *Lamellae* probably white when fresh, in rather bad shape in the material available, probably broad and medium crowded, free or adnexed (?). Spores hyalines, subfusoid, 10-12.8 × 4.2-6 µ. Basidia and cheilocystidia not distinct. *Stipe* concolorous, probably whitish at apex when fresh, darker near the base, strongly hairy, nearly equally thin or slightly thickened downwards, in normal specimens 13-19 mm long, and 0.2-0.8 mm thick in dried condition. *Context* very thin. Hyphae with clamp connections.

Habitat. — On fallen leaves of the evergreen type.

Distribution. — New Caledonia.

Material studied. — Type, collected by Le Rat in a wood at Col d'Amien, New Caledonia, in 1907, determined by Patouillard, who thought it was a variety of *C. stipitaria,* n° 97 (FH); the type of *C. elatus* Pat. is an abnormal form, certainly a monstrosity. It must have grown on a leaf buried under foliage, or anyhow under abnormal physical conditions so that the stipe elongated and the lamellae stayed sterile. The stipes are 60-200 mm high in this form while the pilei remained much smaller than in the normally developed form (only about 1 mm in diameter when dried). I propose to call the species of Patouillard *forma (monstr.) elata* (Pat.) *c.n.* It was found by the same collector who discovered the normal stage of the variety, Le Rat, not far from the locality mentioned above: wood between La Foa and Col d'Amien, New Caledonia, 1907. n° 96 (FH).

Observations. — The normal form shows some relation to *C. subtomentosa* because of spore size and color, but is much smaller, more hairy, and on a different substratum.

12 *c.* **Crinipellis carecomoeis** var. **litseae** Sing. var. nov.

Pileo *cinnamomeo-alutaceo, argillaceo, fulvo-olivaceo, toto perpiloso, convexo-explanato, saepe umbilicato vel papillato, 3-4 mm lato. Crinibus vix acutis. Lamellis mediocriter confertis, latiusculis, adnexis vel liberis. Sporis angustis, 10.5-14.5 × 4.5-6.5* µ. *Cheilocystidiis plerumque 1-8 cornubus apicalibis instructis vel ramulis conidiiformibus ornatis. Stipite concolori, piloso, aequali vel basin versus subincrassato, 7-21 × 0.2-0.5 mm. Hab.: Ad ramulos emortuos Litseae.*

Pileus « cinnamon buff », « clay color », tawny olive » in dried condition, hairy all over, the hairs combined to strands and curly in the usual way, not leaving white intervals between them, initially mostly campanulate with a more or lees prominent papilla, later convex or flatttened with a flat disk or with an umbilicus or with a small papilla (the latter case being the most frequent one), 3-4 mm in dried condition. Hairs bluntly rounded or more often attenuate or with a rounded tip, not really acute, or exceptionally so, with ladder-like dissepiments or without

them, rarely with thin-walled appendices, hyaline or honey color, 4-9.5 μ in diameter, wall 1.7-2 μ thick when the hair is 6.5 μ thick. *Lamellae* probably white in fresh condition, medium crowded, rather broad, narrowly adnexed or free. Spores hyaline, fusoid, one end more acute, the other broadly rounded, with many droplets inside, 10.5-14.5 × 4.5-6.5 μ. Basidia very irregular, about 25 × 8.5 μ. Cheilocystidia about 29-33 × 4-8.5 μ, simple or forked but mostly ending with 1-8 obtuse conic horns, cylindric projections, or most commonly, with conidia-like appendices which are confined to the very top or

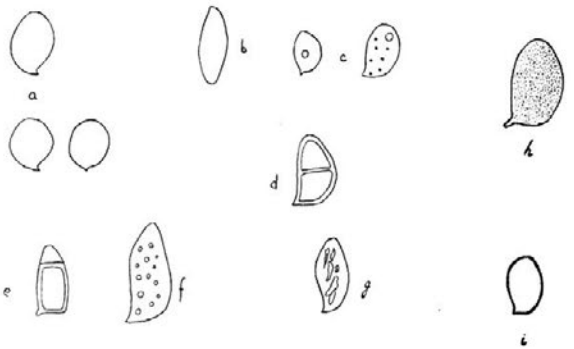

Fig. 4. — Showing spores of some species of *Crinipellis* and *Chaetocalathus*, × 1000 : *a*, *Crinipellis sepiaria* ; *b*, *C. dipterocarpi* ; *c*, *C. zonata* ; *d*, *C. campanella* ; *e*, *C. mirabilis* ; *f*, *C. carecomoeis* var. *litseae* ; *g*, *C. hirticeps* ; *h*, *Chaetocalathus carnelioruber* ; *i*, *C. pachytrichus*.

the upper half of the cheilocystidium and are subglobose with an attenuate connection with the main body of the cheilocystidium. *Stipe* concolorous when dried, hairy, more or less hirsute and somewhat grooved below, equal or very slightly thickened at base, 7-21 × 0.2-0.5 mm when dried.

Habitat. — On dead twigs of *Litsea Percottetii*. September. Gregarius, the stipes although very crowded, not touching each other at the bases.

Distribution. — Philippine Islands.

Material studied. — Type, collected by N. Catalan at Mt. Makiling, Laguna, P. I., September 5, 1917, no. 4464, det. N. Patouillard (*C. stipitaria*), (FH).

Observations. — This variety has the same color as the type

variety, but the hairy covering is dense and continuous as in var. *subelata,* it is much shorter (average length of the stipe little above 1 cm) than both the type variety and var. *subelata.* the cheilocystidia seem to be different but variable, and the habitat is on wood instead of leaves.

Stirps setipes

This is a very natural group of northern (except *C. dipterocarpi*) forms, and very closely related one to another. The most isolated species are *C. hirticeps* and *C. campanella.*

13. **Crinipellis hirticeps** (Pk.) Sing. comb. nov.

Syn. : *Collybia hirticeps* Peck, *Bull. Torr. Bot. Cl.* **34** : 98. 1907.

Pileus « Isabella color » to « light brownish olive » when dried, 25 mm in diameter, hairy, especially towards and on the margin which is incurved in young and dried individuals, the hairs arranged radially in curly strands, thin towards the margin but thick and fleshy under the coarse, broad umbo which is slightly umbilicate on its top, several concentrie furrows surrounding it when dry ; the general shape of the pileus is convex. Hypotrichium consisting of interwoven, mostly not incrusted, thin-walled hyphae. Hairs of center of pileus decidedly acute, non-septate or distantly septate, strongly pseudoamyloid (5)-6.5-7-(8.5) µ in diameter, the wall 2 µ thick when the hair is 6.5 µ in diameter, 2.5 µ thick when the hair is 7 µ in diameter, but very often unequally thick on both sides of the optical section ; hairs of the margin of the pileus acute or more often bluntly rounded, in the other respects much like the hairs of the center of the pileus. *Lamellae* white, rather crowded, narrow, rounded-emarginate-free or almost free. Spores hyaline, never pseudoamyloid, ellipsoid oblong, subfusoid to subcylindrical, 5.6-10.5 × 3-4.5 µ, Q with few exceptions decidedly above 2. Basidia 23.5-31 × 7-7.8 µ. Cheilocystidia with a few exceptions divided into branches or with 2-3 appendices which again may be divided into 2-3 secondary branches, and which diverge laterally up to 31 µ, the general shape of the cheilocys-

tidia being clavate, more rarely cylindrical or fusoid, 50 μ long, 8.5-10 μ in diameter at the undivided portion, but including the appendices which average 7 μ in length. *Stipe* concolorous with the pileus or a little paler, hairy, solid or stuffed, equal or, at least in dried condition, thickened at the base and at the apex, 75 × 2-3 mm and up to 6 mm at the base, also occurring smaller, according to Peck. *Context* white. Hyphae with clamp connections.

Habitat. — On decaying wood. August.

Distribution. — Pennsylvania, U. S. A., and probably also Ontario, Canada ; seems to be rare and likely to have been overlooked in other parts of the eastern part of North America.

Material studied. — Co-type, collected by D. R. Sumstine in Fern Hollow, Allegheny Co., Pa., U. S. A., August 16, 1906.

Observations. — This species is rather isolated from the remaining species of this stirps, and its general appearance reminds one of *C. zonata* which, however, differs microscopically and in color, mummy brown according to Sumstine and Peck (but hardly as dark as Ridgway's « mummy brown ».)

14. **Crinipellis campanella** (Pk.) Sing. comb. nov.

Syn. : *Collybia campanella* Peck, *Bull. N. Y. St. Mus.* **116**: 19. 1907.
Marasmius campanella Atk. et Horse, *Bull. N. Y. St. Mus.* **205-206** : 65. 1919. (non Holtermann 1898).
Collybia stipitaria var. *robusta* Lloyd, *Myc. Not.* nº 5 : 43. 1900. Illus. : Lloyd, *l. c.*, fig. 16 (photo).

Pileus 6-18 mm in diameter, dark tawny or ferrugineous brown, between « auburn » and « russet » (R.), the same color when dried, strongly hairy, the hairs arranged more or less radially and in curly strands as usual, leaving uncovered a smooth naked disk in the middle of which a prominent papilla projects, disk and papilla almost black, the general shape of the pileus conical-campanulate, expanding much later than most other species of this group, and never becoming fully flattened : Hairs more often acute than bluntly rounded, melleous, 4 8 μ thick. *Lamellae* whitish, rather crowded, rather narrow, initially ascending, free. Spores hyaline, ellipsoid, finally transversely

septate, 7-9.5 × 3.7-5.5 μ, Q = 2, sometimes a little less. Basidia 23-33 × 6-7 μ, 4-spored. Cheilocystidia fusoid or clavate, with one to many appendices or branches at top, often even with secondary branchlets, very variable but always one type of cheilocystidia prevailing, most often the forked one. Subhymenium about 15-17 μ thick, consisting of short, ramose elements but not pseudoparenchymatic. *Stipe* concolorous, hairy, solid, equal, insititious, 20-42 × 1-1.5 mm. *Context* white, thin in the pileus.

Habitat. — On twigs and branches, mostly of coniferous trees, e. g. *Thuja*, but also on branches of frondose trees. August-September.

Distribution. — Northeastern part of North America.

Material studied. — Ontario, Canada, L. Temagami, coll. et det. H. S. Jackson (FH) ; Michigan, U.S.A., west of Marquette, coll. et det. A. H. Smith (Mich.).

Observations. — Atkinson who has studied Peck's material preserved at New York State Museum, Albany, N.Y., came to the same conclusions as I did, and his data coincide with mine.

15. **Crinipellis setipes** (Peck) Sing. comb. nov.

Syn. : *Collybia stipitaria* var. *setipes* PECK, *N.Y. St. Mus. Rep.* **38** : 109. 1885.

Marasmius setipes Atk. et House, *Bull. N.Y. St. Mus.* **205-206** : 65. 1919.

Pileus yellowish gray, « pinkish buff » to « tawny olive » (R.), in dried condition, radially hairy and becoming rugose when dry, excepting for the naked deep umbilicus which is black, papillate in the umbilicus, margin convex, eventually plane, 5-13 mm in diameter. Hairs without exception or sometimes with a few exceptions acuminate or needle-like in the American specimen or blunt in Chinese specimens, with or without a few very thin distant dissepiments but with no ladder structure, 5.3-7 μ thick, walls thick but of rather inconstant diameter, although about equally thick in the opposite walls of the optical section, brownish-hyaline on the center of the pileus. *Lamellae* white, rather narrow, not ventricose, crowded or more rarely moderately distant, emarginate-free, Spores ellipsoid,

hyaline, 5-9.5 × 3.2-4.5 μ, Q = 2 + (although in some individual small spores it might be found a little lower). Basidia 23-25 × 6 μ or a little larger. Cheilocystidia on and near the edge, echinate, 17-32 × 6.5-8 μ, the appendices 3-4.5 × 1.2 μ. No real pseudocystidia found, but the cheilocystidia often form a broad ribbon up the edge and become more and more intermixed with basidia or basidiols the farther they are from the edge. *Stipe* reddish-black when moist, whitish when dry (according to Kauffman), « drab » or slightly paler, also near « woody brown » (R.) in dried condition, hairy, insititious, equal or very slightly thickened downwards, solid or stuffed, later hollow (20)-30-130 × 0.7-1.7 mm. *Context* white, very thin. Hyphae with clamp connections.

Habitat. — On twigs, more rarely on trunks, acorns, sometimes found on leaves of frondose trees or on pine needles (?), never on spruce needles. June-October. Frequent.

Distribution. — Northeastern part of North America.

Material studied. — Canada, Ontario: Bear Island, L. Temagami T. F. R., coll. et det. H. S. Jackson *(Collybia stipitaria)* (FH); U. S. A. Vermont: Lake Dunmore, coll. Farlow (FH); New York: Ithaca, coll. et det. H. S. Jackson *(Collybia stipitaria)* (FH); Oneida, coll. Warne (FH); Iowa: Decorah, coll. E. W. Holway (allegedly on fallen pine leaves which is possible but not proved by the exsiccatum n° 1201 of North American Fungi), det. Ellis (FH); Michigan: Au Train, coll. Mains, det. A. H. Smith *(Collybia stipitaria)*, (Mich.); China: Su tchuen, coll. Abbé Farges, det. N. Patouillard *(C. stipitaria)* (FH).

Observations. — This species commonly is determined *Collybia* or *Crinipellis stipitaria* by American mycologists (e. g. Ellis, Peck, Kauffman, Morgan). The results of my independent studies on this species and *C. stipitaria* in the sense of the European authors coincide perfectly with the results of Atkinson's paper (1). The isolated occurrence of this species in China is rather remarkable since it has not yet been found in the region west of the Rocky Mountains. It is possible that the Chinese plant is different from the American type since the hairs of the latter are more constantly needle-like, while the Chinese specimens show acuminate but nevertheless obtusate apices. This

however being the only discoverable difference, the Chinese form is left for the present within this American species.

16. **Crinipellis piceae** Sing., *Revue d. Mycol.* 4: 64. 1939.

Pileus brownish-white, more brownish towards the center, more grayish-pale towards the margin, between « tawny olive » and « wood brown » (R.) when dried, tomentose-fibrose-squamulose, hairy, with a black disk which is naked and shining, and from which rarely a low papilla arises, the disk surrounded by a black circle which, however, sometimes is lacking, the disk on the level of the surrounding hairy portions of the pileus, or somewhat depressed, but never as deeply umbilicate as the preceding species (more so in dried condition, but always less than in *C. setipes*), the rest of the pileus convex, the very margin often ciliate, the diameter of the pileus 3-7 mm. Hypotrichium consisting of irregularly inflated, intermixed hyphae, with incrusting dark membrana-pigment. Hairs brownish hyaline 4-7 μ thick, walls 0.7-2.2 μ thick, pseudoamyloid, apices acuminate but mostly obtusate. *Lamellae* white, narrow to medium broad, rarely broad, rather crowded, free. Spores hyaline, cylindric, 7-9.8 × 3-4.3 μ. Basidia 23-28 × 5.5-7 μ, 4-spored, rarely a few 2-spored. Cheilocystidiis echinate, 16.5-28 × 5-9 μ. the appendices numerous, 1.5-8.5 μ long, mostly about 4 μ long. *Stipe* brownish, darker when the hairs which cover it in variable quantity, are rubbed away, « drab » to « hair brown » (R.) in dried condition, the hairs more or less appressed, abundant or less numerous in some smaller individuals; stuffed, then hollow, equal or subequal, up to 40 mm long, and 0.2-0.5-(1) mm in diameter. Hairs acute with frequent dissepiments, or more rarely obtuse, 90-400 × 4-9 μ, the walls about 3 μ thick. *Context* white, very thin, tough in the stipe. Hyphae hyaline, thin, with clamp connections.

Habitat. — On fallen needles of *Picea*, gregarious in large numbers, in woods. August-October.

Distribution. — Altai Mts. in Central Asia, east to the west coast of North America.

Material studied. — Type, collected by Singer and Vassilieva,

near Kurai, Oirotia, U.S.S.R., on needles of *Picea abovata,* det. by Singer (LE); U.S.A., California: Crescent City, coll. A. H. Smith, det. R. Singer (Mich.).

Observations. — This species was among the material sent to me by A. H. Smith who was kind enough to add a few notes on his collections. The notes and the specimens show that this plant, which is very abundant in Washington, Oregon and California, agrees perfectly with my Siberian material.

17. **Crinipellis dipterocarpi** Sing. spec. nov.

Pileo *colore, pilositate, forma, magnitudine C. piceae simillimo, sed circulo nigro carente, plerumque minute obtuseque papillato in umbilico nigro, moderate depresso vel vix depresso, vix pallidiore ad marginem quam in centro, ubi hoc pilosum est. Crinibus rotundatis vel acuminatis et obtusatis.* Lamellis *moderate angustis, moderate confertis, liberis. Sporis subfusoideis, 8-10.5 × 3.5-4* μ. *Cheilocystidia echinatis. Stipite concolori, piloso, subequali, 14-18 × 0.3-0.5 mm.* Hab. *Ad folia fructusque Dipterocarpi delapsa.*

Pileus resembling the preceding species in size, shape, and hairyness, but differs in that the black circle which surrounds a hairy zone around the black disk is lacking, mostly with a small blunt papilla in the black umbilicus which is either very flat and indistinct or moderately deep, the margin hardly paler than the center in the dried material available. Hairs bluntly rounded, or tapering to a rounded point, more rarely with a thin-walled appendix, with rather thick to very thick pale brownish to hyaline walls, mostly with ladder-like structure because of the close dissepiments. *Lamellae* probably white in fresh condition, moderately narrow, moderately crowded, free. Spores hyaline, subfusoid, 8-10.5 × 3.5-4 μ, Q = 2.1-2.6. Cheilocystidia clavate, echinate, 15-27 × 7.5-8 μ, the appendices numerous, about 7 μ long. *Stipe* concolorous with the pileus, hairy, especially near the base, where it sometimes appears substrigose, almost equal or very slightly thickened downwards, 14-18 × 0.3-0.5 mm in dried condition. *Context* very thin.

Habitat. — On fallen leaves and fruits of *Dipterocarpus crispatus.*

Distribution. — Tonkin.

Material studied. — Type, collected by Eberhardt in Tonkin, det. Patouillard *(C. stipitaria)*, (FH).

Observations. — This species is very close to *C. piceae,* but distinct because of the structure of the hairs of the pileus, the lack of the black circle around the base, the concolorous stipe, and the different habitat.

Subsect. **Grisentinae** Sing.

Characteribus subsectionis *Stipitarinarum* gaudentes, sed pileo crinibus in KOH grisentibus obtecto, castaneo. Sporis demum 1-septatis, rectangularibus, loculo supero minuto, tenuitunicato et loculo infero maiore crassotunicato instructis.

18. **Crinipellis Mirabilis** Sing. spec. nov.

Pileo *castaneo, piloso, subnudo ad discum, nigricante actione KOH, conico, 4.5-5 mm lato. Crinibus rotundatis vel acutis, saepe inflatis infra vel supra dissepimenta, membrana 0.7-1.7* µ *tantum crassa, virescente-grisentibus in KOH.* Lamellis *albidis, moderate distantibus, moderate latis, liberis. Sporis 8.5-9* × *3.8-4.2* µ. *ut descriptae sunt in descriptione subsectionis.* Stipite *concolori, piloso, basin versus subincrassato, 30-45* × *0.3-0.8 mm.* Hab.: *Ad ramulos.*

Pileus chestnut brown, « carob brown », « chestnut brown » or « Mars brown » in dried condition, the center darker, the surface curly-hairy, nearly naked on the center, blackening with alkalis, conical, 4.5-5 mm when dried. Hairs unusual in shape, long, 2,5-5 µ in diameter, with bluntly rounded or acute ends, often changing their shape where septate, frequently the outline becoming straight after having been convex at the point where a septum joins the wall, the latter rather thin, 0.7-1.7 µ thick, strongly amyloid, greenish-gray in NH_4OH and KOH. *Lamellae* whitish, rather distant, moderately broad, free. Spores when mature eventually becoming almost subulate, 8.5-9 × 3.8-4.2 µ, appearing rectangular with a thin-walled smaller upper cell, and the wall of the lower cell, including the septum, thick,

the thick portions of the wall yellowish in iodine, the thin ones hyaline. Basidia and cheilocystidia not distinct in the specimens studied. *Stipe* concolorous, hairy, the hairs turned obliquely downwards, slightly thickened downwards, 30-45 × 0.3-

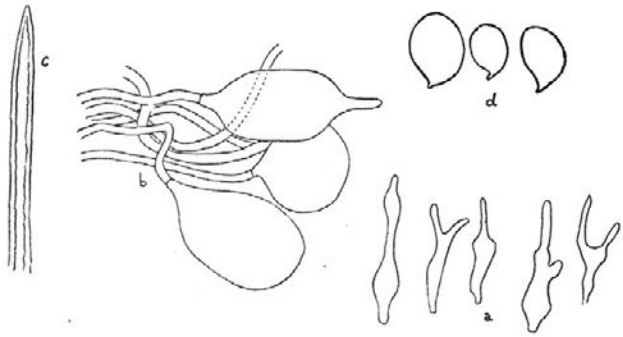

Fig. 5. — Showing the microscopical characters of *Chaetocalathus niduliformis* : *a*, Cheilocystidia, × 500 ; *b*, Trama with inflated hyphae, × 500 ; *c*, Hair of the pileus, × 500 ; *d*, Spores, × 1000.

0.8 mm when dried. *Context* thin. Hyphae with clamp connections.

Habitat. — On twigs.

Distribution. — As far as known, only on New Caledonia.

Material studied. — Type, collected by Le Rat between Col d'Amien and Mégropo, 1907, n° 101, det. Patouillard (*C. stipitarius* var. *castaneus*), (FH).

Subsect. **Iopodinae** Sing.

Characteribus subsectionis *Stipitarinarum* gaudentes, sed pileo juniore semper vivide laeteque colorato. Stipite nonnumquam brevi curvatoque, sed vix umquam excentrico. Crinibus pilei stipitisque haud semper sat longis, ut oculo nudo appareant.

Although the chief distinguishing character of this group is the color, which does not always mark natural groups, in this case the species reunited in the subsection *Iopodinae* seem to be actually related one to another. This is the most interesting

group, for the phytopathologist, because one of the most destructive parisitic fungi, *C. perniciosa,* belongs to it. *C. siparunae,* no less dangerous for the attacked plants, is less interesting from a practical point of view because, as far as I know, *Siparuna* is of little practical use. The way the fungus attacks the host is unique among the Agaricales, since no other species of that group of fungi is known to infect living twigs high on the tree, and killing them gradually while regularly forming numerous fruit bodies on them. The larger part of the subsection, however, lives saprophytically, mostly on wood. All species are tropical (except *C. iopus*).

19. **Crinipellis rubiginosa** Pat., *Mem. Acad. Malg.* fasc. 6: 24. 1927.

Pileus gray, then light red-ochraceous-brown, with a small more deeply colored papilla in the center, as if with a rubiginous fringe, with 1 or 2 concentric furrows, silky-striate, thin, convex then campanulate, typically 5-6 mm in diameter. Hairs very long, bright ochraceous red, 4-5 μ thick. *Lamellae* light reddish brown, bleaching, narrow, not crowded. Spores 8 × 4 μ. *Stipe* reddish-brown, lighter when young, velutinous-striate, central, equal, 60-70 × about 1 mm. *Context* thin, tough.

Habitat. — On humus and plant débris under wet wood. January.

Distribution. — Madagascar.

Material studied. — Only the type has been collected, and it is not available under the circumstances. It is preserved at Muséum National d'Histoire Naturelle, in Paris.

Observations. — The above description is compiled from Patouillard's original description. It seems to fit rather well into this subsection inasmuch as a more violet colored variety has been found: « In the vicinity of this plant, M. Decary has collected a smaller form (2 cm high) with a violet pileus (n° 516 of the color tables of Klincksieck), with depressed top, with very light violet (n° 0521) lamellae, and the stipe villose, scarcely violet above, fading to brownish below. This form is inseparable from the type.» Patouillard *l. c.*

20. **Crinipellis rubida** Pat. et Heim, *Ann. Crypt. Exot.* 1 (1): 272. 1928.

Pileus bright pink when fresh, vinaceous when dried with a dull center, scarcely concentrically zonate, with the radial ribs strigose-clothed, squamulose the margin incised-denticulated; convex-plane, or depressed, with a slight papilla in the center, reaching 20 mm in diameter. Hairs reddish, long, undulate, about 3 μ thick. *Lamellae* white when fresh, becoming russet-colored when dried. Spores hyaline, ellipsoid, attenuate at the base, 5 × 2 μ. *Stipe* concolorous with the pileus all over, strigose-hispid, central, equal, 40-60 × 1 mm. *Context* membranaceous, coriaceous.

Habitat. — On decayed wood of *Swietenia mahogani*. July.

Distribution. — Venezuela.

Material studied. — None available, type at Muséum National d'Histoire Naturelle in Paris.

Observations. — The authors of the species think it has some analogy with *C. rubiginosa* Pat.

21. **Crinipellis Eggersii** Pat. apud Pat. et Lagerh., *Bull Soc. Myc.* Fr. 9 : 125. 1893.

Syn.: *Marasmius Eggersii* Sacc., *Syll.* 11 : 37. 1895.

Pileus violet purplish, paler towards the margin, becoming blackish at the center, fibrillose, hardly sulcate, convex then expanded, 10 mm in diameter. Hypotrichium irregular, the hyphae incrusted by a lilac pigment. Hairs with bluntly rounded ends, and thick pseudoamyloid walls, 5-6.5 μ in diameter, relatively short, running in strands of parallel hairs, incrusted with a lilac pigment that becomes dirty-greenish in H_2SO_4. *Lamellae* whitish, straight, intermixed and with or without small cross-ridges, adnate, distant, rather broad. Spores hyaline, ellipsoid, (8)-10-13 × (5)-5.5-6.3 μ, mostly 11-12 × 5.5-6.3 μ, (Q = ± 2). Basidia 31-45 × 8.5-10.5 μ. Cheilocystidia fusoid or bottle-shaped or forked, in the latter case the branches 12 μ long or less, 25-35 × 8.5-11 μ. *Stipe* concolorous with the pileus,

whitish at apex, somewhat villose, 5 × 0.5 mm when dried. *Context* thin. Hyphae with clamp connections.

Habitat. — On dead wood. January.

Distribution. — Found only once, in Ecuador.

Material studied. — Type, collected by Eggers, January 26, 1892, at Balao, Ecuador, det. Patouillard (FH).

Observations. — The above description was drawn from Patouillard's original diagnosis but the microscopical details, and some additional notes taken from the types, are original. The main features of this species are the pigmentation, the white lamellae, the short stipe, the small stature, and the large, medium broad spores.

22. **Crinipellis sublivida** Murr., *N. Am. Flor.* **2** (4): 287. 1915.

Syn.: *Marasmius sublividus* Sacc. et Trott., *Syll.* **23**: 153. 1925.

Pileus «Indian red» to «ligth vinaceous lilac» and «pale vinaceous lilac» (R.), slightly tomentose, convex, margin striate, sulcate when dry, 20 mm in diameter. Hypotrichium hyphae incrusted by a (now) brown pigment. Hairs in minute tufts, often short and irregularly thickened, thick-walled, a part of them long, all pseudo-amyloid, all with rounded blunt ends. *Lamellae* pale lilac, rather narrow, distant, very narrowly adnexed or free. Spores hyaline, subcylindrical, 8.7-11 (-14) × 3.5-4 (-5) μ, some slightly curved (Q = > 2). Basidia 29-35 × 7.5 μ. Cheilocystidia clavate or with irregular projections all over or only at the apex, more rarely bottle-shaped or capitate, often forked, often asymmetric, 21-29 × 8-10 μ, walls thicker than the walls of the basidia, sometimes up to 1 μ in diameter. *Stipe* slightly paler than the pileus, hairy, white tomentose at base, and a white tomentum (the mycelium) coating the substratum, 20 × 1.5 mm. *Context* moderately thin. Hyphae with clamp connections, thin-walled.

Habitat. — On branches. January.

Distribution. — México.

Material studied. — Type, collected by W. A. and Edna L. Murrill in Motzorongo near Córdoba, México, in a moist virgin forest. January 15, 1910 (NY).

Observations. — The type of this plant looks very different from the species that seem nearest to it, *C. Eggersii*. *C. sublividа* is much larger than the latter, the spores are much narrower, and the colors are not identical in both species. The much longer stipe of *C. sublividа* distinguishes it from *C. Eggersii*, the stature of which is comparable with *C. bambusae*. Thus, *C. sublividа* certainly is a good species. The colors have been described according to a color sketch accompanying the type specimens.

23. **Crinipellis iopus** Sing., *Red. d. Mycol.* 4 : 63. 1939.

Pileus mostly bright lilac when young, but bleaching, whitish, mostly with pale fulvous-brownish striae and center when dried, sulcate up to the top, the margin initially incurved, convex-umbilicate, 6-12 mm in diameter. Hairs hyaline on dried material, pseudoamyloid, long, 60-200 × 4-10 μ, acute, wall up to 3.5 μ thick. *Lamellae* whitish, with one dimidiate and two very short lamellulae between every two normal lamellae, rounded and very narrowly adnexed, distant, not very broad, not anastomosing. Spores white in spore print, hyaline, ellipsoid-cylindrical, 9-11 (-12) × 4-5.5 (-5.7) μ. Basidia 50-53 × 8-8.5 μ. *Stipe* bright lilac when fresh, whitish at apex and brown-gray downwards when dried, pulverulent-velutinous, equal, the base scarcely thickened, insititious, 30-35 × 1 mm. Hairs of the stipe up to 220 × 15 μ, often with a fusoid apex, the wall up to 5 μ thick. *Contexť* white, rather thin, and tough. Hyphae with clamp connections, in the stipe long and parallel, a portion of them thick-walled, about 5 μ thick.

Habitat. — On twigs near a channel in the Botanic Garden. May.

Distribution. — Only known from the type locality in Central Asia (Kazakhstan). Since the specimens were collected in a Botanical Garden, the question arises whether or not they are to be considered as native in Kazakhstan. Actually all other species of this subsection were found in the tropics while the type of this species was collected on the only locality with nearly normal moisture amidst a flora typical for extremely dry

continental climates, surrounded by steppes, deserts and subalpine meadows, interrupted by some small coniferous forests.

Material studied. — Type, collected by Nevodovski, in the Botanical Garden of Alma Ata, Kazakhstan, U. S. S. R., May 1937, det. Singer (LE, together with a colored sketch showing the plant in fresh condition).

24. **Crinipellis perniciosa** (Stahel) Sing. comb. nov.

Syn. : *Marasmius perniciosus* Stahel, *Dept. Landbouw in Suriname, Bull.* **33**: 16. 1915.

Illus. : Stahel, *l. c.* Pl. 1-12 (photos and anat.)

Stahel, *Dep. Landbouw Suriname, Bull.* **39** : pl. 1-8 (photos). 1919.

Nowell, *Diseases of crop plants in the Lesser Antilles, fig. 53-55.* (photos showing diseased plants).

Pileus crimson red, generally faintly according to Stahel, later bleaching to whitish and dried material equally whitish, with a red-black spot in the center and with others which are radially arranged and have the same color and are visible on dried material, radially grooved, campanulate, later expanded and often with a concave margin and a convex but umbilicate center (ex ic.), or convex to flat with a depressed center 2-25 mm, mostly 5-15 mm in diameter. Hypotrichium consisting of thick-walled, non-amyloid hyphae. The hairs are scarce, most numerous in the center, whit a red, thick wall when fresh, hyaline when dried and old, always bluntly rounded on top, 80-150 × 4-12 µ. *Lamellae* white in dried material, rather thick (0.2 mm), medium broad to rather broad (1-2 mm), collariate, distant (8-20 entire lamellae, mostly 15). Spores in print pure white, hyaline, 7-9 × 4-4.8 µ (and up to 11 × 5 µ according to Stahel). Basidia 31-32 × 7 (-8.8) µ, 4-spored. Cheilocystidia rather regularly bottle-shaped, 35-50 × 9-14 µ. Pleurocystidia none. *Stipe* white, except at the thickened subbulbous base which is light lemon yellow, but later the stipe becomes lemon yellow to white above and dark brown to brown red below, almost naked, white pubescent from the mycelium at the base, 5-10 × 0.5-0.7 mm above, 0.7-1.1 mm at base, the lumen 0.3-0.4 mm wide. *Context* very thin (for instance 30-40 µ according to Stahel) in the pileus, reviving. Hyphae with clamp connections.

Habitat. — On decaying witch broom («krulloten») and pods of *Theobroma cacao, Th. bicolor,* and the wild species *Th. speciosum,* the mycelium infecting the living plant, but forming the fruit bodies mostly on dead «krulloten», also on indurated fruits, during damp weather.

Distribution. — Northern part of South America. Since 1928 the disease has also been observed in Cacao plantations of Trinidad, West Indies, in Ecuador and adjacent areas.

Material studied. — Authentic material collected by G. Stahel in Paramaribo, *Surinam*, comm. D. H. Linder, consisting of numerous mature fruit bodies (FH); abundant other material, authentic, showing the phenomena of the disease in Surinam (FH); other material: *British Guiana*, coll. et det. F. L. Stevens (FH).

Effect on the host. — *C. perniciosa* has done enormous damage in Surinam, especially when most plantations were specialized in Cocoa. As a consequence of the «krulloten disease» or «Surinam witch broom disease», the only cause of which is *C. perniciosa*, as has been established experimentally by G. Stahel, the cultivation of Cacao in Surinam became a failure, and as a result the culture of the Liberia coffee has been steadily increased. The sound shoots are infected by the basidiospores (no other forms of fruiting have been observed). In rain-water the spores germinate after 30-40 minutes. Stahel succeeded in infecting the buds of Cocoa with squeezed out spores, and obtained «krulloten» or «witches brooms» in 30-90 per cent of the cases. Stahel showed also that another disease, called «indurated pots» is caused by the same fungus. The fungus forms a parasitic intercellular mycelium which is initially white, but later assumes yellow and red tints. Clamps are only formed when the «krullot» is already dead, and in place of the destroyed cells there is a closely matted mycelium, composed of rather thick walled hyphae which bear no clamp connections. On about 50 per cent of the dead «krulloten» the fruit bodies are found during the rainy season.

Control measures. — (1.) Spraying with Bordeaux mixture. (2.) Clearing of the trees of diseased parts that are to be burned. (3.) Admission of more sun and air.

Observations. — The indications in the above description which refer to the fresh plant (color, measurements of the fruit body, etc.) and all information of biological and economic character have been taken from Stahel's papers, while additional data on the macroscopical characters and the microcharacters are original. For more details see text and figures of Stahel's articles (22, 23, 24, 25) or Newell's book (12).

25. **Crinipellis siparunae** Sing. spec. nov.

«Pileo» lilaceo, brunneolo-lilaceo, expallente, squamulis obscurioribus haud expallentibus obtecto, ad marginem sulcato, convexo, umbilicato vel umbonato, 7-22 mm. Crinibus subdispersis, 25-150 × 4-10 µ. «Lamellis» albis, latis, distantibus, collariatis. Sporis 10-14 × 5.5-8 µ. Cheilocystidiis clavatis vel fusoideis, nonnullis breviter echinulatis. «Stipite» brunneo, tomentosulo vel tomentoso-floccoso-squamuloso, praecipue sursum, solide, aequali, plerumque curvato, centrali, 7-14 × 1-2 mm. «Carne» alba, inodora, miti. «Hab.»: Ad ramulos «Siparunae» vivae in calidariis Horti Leningradensis.

Pileus lilac, brownish-lilac, very densely covered with small dark brown squamulae which are hairy-suberect at first, then adpressed, finally bleaching and only the squamulae remaining colored, the outer two thirds of the radius ribbed and sulcate radially, convex, umbilicate or umbonate, at least with turned up margin, or more rarely totally subplane, 7-22 mm. Hairs scattered, bluntly rounded or acuminate, sometimes suddenly thickened or difformed, the wall 1.7-2.7 µ thick, pseudoamyloid, 25-150 × 4-10 (-24) µ. *Lamellae* white, broad (up to 4 mm), indistinctly rugulose-anastomosing, distant, mostly 13-14 reaching the free collarium, some lamellulae intermixed, few forked. Spores pure white in print, hyaline, 10-14 × 5.5-8 µ, ellipsoid. Basidia 33-40 × 6.8-7.8 µ, mostly 4-spored, occasionally 2-spored in the same preparation. Cheilocystidia 20-27.3 × 4-9 µ, clavate or more rarely fusoid, some with 2-6 sterigma-like spines or appendices, 3-5.5 µ at the apex (the narrower ones without appendices). Trama subregular, consisting of cylindric, smooth hyphae of 5-10 µ diameter. *Stipe* brown, white only

inside the collarium, at the very apex, opaque, faintly tomentose, or tomentose-flocculose-squamulose, especially below, solid, equal, mostly strongly curved, central, or almost central, 7-14 × 1-2 mm. *Context* white, thin on the margin of the pileus but rather thick on the very center. Odor none. Taste mild.

Habitat. — On living trees of *Siparuna* spec., from Brazil, in a greenhouse of the Botanical Garden in Leningrad, U. S. S. R. The micelium develops in the living parts of the tissues in the trunk and cortex and especially in the branches and twigs up

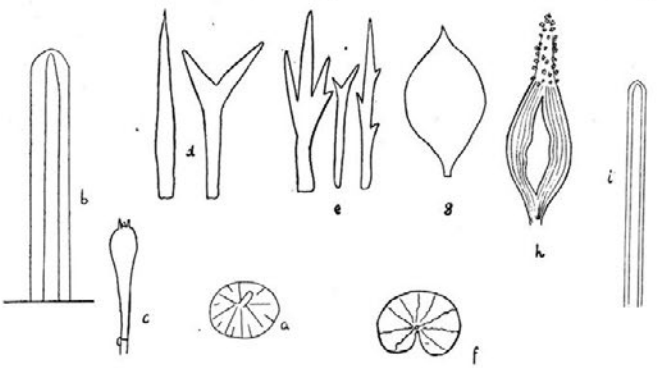

Fig. 6. — Showing some characters of *Chaetocalathus pachytrichus* and *Ch. carnelioruber*: *a*, Carpophore of *Ch. pachytrichus*, × 2; *b*, Hair of the pileus of *Ch. pachytrichus*, × 500; *c*, Basidium of *Ch. pachytrichus*, × 500; *d*, Cystidia of *Ch. pachytrichus*, the simple cystidium drawn from a specimen collected on Philippine Islands, the forked cystidium from the same source, × 500; *e*, Cystidia of *Ch. pachytrichus*, specimen collected in Tonkin, × 500; *f*, Carpophore of *Ch. carnelioruber*, × 2; *g*, Outline of a cystidium of *Ch. carnelioruber*, × 500; *h*, Optical section of a cystidium of *Ch. carnelioruber*, × 500; *i*, Hairs from the pileus of *Ch. carnelioruber*, × 500.

to 10 feet above the ground, and forming fruit bodies on the bark of the living tree and on the fading twigs. June (the fruit bodies appear very exactly every year on the same tree and in the same season). Gregarious.

Distribution. — This plant has probably been introduced, together with the host, from South America.

Material studied. — Type material, collected and determined by R. Singer, June 10, 1939 (LE).

Observations. — This and the preceding species are biologically and morphologically very closely related. They are, however, easily distinguished by such anatomical characters as the

shape of the cheilocystidia, size of the spores, and also by the differences in the color of the pileus and especially of the stipe.

Subsect. **Excentricinae** Sing.

Pileo haud laete colorato, centro obscuriore; lamellis cheilocystidiis plerumque ramosissimis praeditis. Sporis latis. Stipite constanter aut brevi (usque ad 3 mm longo in siccis) aut brevissimo atque excentrico, ad ramulos.

Two or may be three species belong here. All of them inhabit the tropics. They are similar to some species of the preceding subsection, especially *C. Eggersii*, *C. perniciosa*, and *C. siparunae*, but lack the bright colors. Furthermore none of the species belonging to subsection *Iopodinae* has eccentric stipes, and none grows on *Bambusa*. *C. bambusae* seems also to show rather close relations to *C. stipitaria* and the whole stirps *Stipitaria*.

26. **Crinipellis bambusae** Pat., *Bull. Soc. Myc. Fr.* 24 : 8. 1908.

Syn. : *Marasmius Bambusae* Sacc. et Trott., *Syll.* **21** : 113. 1912.

Pileus 1-2 mm in dried condition, whitish or pale tan, sericeous to hairy, convex, often with depressed center in dry material, the margin smooth or sulcate. Hairs hyaline, pseudoamyloid, slightly acuminate but the very top mostly obtusate, thick-walled, without any trace of ladder-like septa in the majority (3-) 5-7 µ in diameter. *Lamellae* white, narrowly adnexed, straight, subdistant. Spores hyaline, short-ellipsoid, becoming thick-walled, not pseudoamyloid, 8-8.8 × 6-6.6 µ. Basidia 35 × 7.5-8 µ. Cheilocystidia rarely simple, mostly with 2-4 finger-like branches or appendices, or with short projections giving them the profile of a fir tree, but mostly forked (the branches or appendices 7.5-17.5 µ long), 27-35 × 5.5-10.5 µ. *Stipe* whitish, faintly hairy, but darker when the hairs are scraped off, equal, central, 2-3 × 0.2-0.4 mm in dried condition. *Context* very thin. Hyphae with clamp connections.

Habitat. — On culms of *Bambusa*.

Distribution. — Brazil.

Material studied. — Type, collected by F. Noack in Campinas, Prov. São Paolo, Brazil, det. N. Patouillard, n° 34 (FH).

Observations. — This is a miniature of a *Crinipellis* of the subsection *Stipitarinae;* the spores are like those observed in *C. sepiaria* which is about 10 times as big, dark colored and found in Indo-China. *C. stipitaria,* which also has similar spores, is mostly about 5 times as large, the stipe still longer, the cheilocystidia less branched, never growing on *Bambusa,* etc. Notwithstanding, *C. stipitaria* is close to this species and the whole group probably has derived from the *Stipitarinae.*

27. **Crinipellis excentrica** (Pat. et Gaill.) Pat., *Journ. d. Bot.* 3: 336. 1889.

Syn. : *Collybia excentrica* Pat et Gaill., *Bull. Soc. Myc. Fr.* 4 : 15. 1888.

Illus. : Pat. et Gaill. *l. c.* Pl. 7, fig. 1 ; *Pat. Ess. Tax.* p. 143, fig. 70.

Pileus uniformly whitish, but with a black punctiform papilla in the center of a depression, the margin convex and hairy, later plane and subsulcate, 8-12 mm broad (Pat.). Hairs hyaline, mostly bluntly rounded but very often with a thin-walled rounded or acute appendix, the rest of the wall very thick or rather thick, pseudoamyloid (very strongly), the diameter of the appendix 2-5 μ. *Lamellae* white, rather crowded, intermixed, narrowly adnexed. Spores 8.5-9.5 × 5.5-6 μ, hyaline, ellipsoid, not pseudoamyloid. Basidia 23-25 × 5-7 μ, 4-spored. Cheilocystidia branched, with (1-) 2-5 branches of up to 12 × 3.5 μ, their total lenght 28-31 μ, their diameter at the un-branched part 3.5-8.5 μ. *Stipe* fuscous, the apex yellowish brown, pubescent (with hairs similar to those of the pileus), eccentric, curved, solid, very short, 4-6 × 2 mm according to Patouillard, 1-2 × 0.5 mm in dried condition. *Context* white.

Habitat. — On fallen branches, in groups, April.

Distribution. — Venezuela.

Material studied. — Type, collected by A. Gaillard, in Atures, Venezuela, det. Patouillard, n° 128 (FH).

Observations. — I have not seen the «projecting, fusiform cys-

tidia» mentioned by Patouillard; apparently they do not exist in this species. *C. excentrica* seems to be related to stirps *Stupparia* of the subsection *Stipitarinae* just as well as the preceding species tends toward the stirps *Stipitaria* of the same subsection.

Subsect. **Heteromorphinae** Sing.

Characteribus subsectionis «Stipitarinarum» gaudentes, sed pleurocystidiis praesentibus, quae a cheilocystidia distincta sunt.

Only one species is known to belong to this subsection, *C. minutula* from Africa.

28. **Crinipellis minutula** (Henn.) Pat., *Ess. Tax. Hym.* p. 143. 1900.

Syn.: *Lentinus minutulus* Henn., *Engler's Jahrb.* **23**: 547. 1897.

Pileus cinnamon according to Hennings, nearly «Argus brown» (R.) in dried condition, curly-radially-hairy, convex or finally expanded, umbonate in an umbilicus-like depression which is less hairy than the rest of the pileus, the umbo with a rather conspicuous (under a lens) hairy tuft, 4-7 mm in diameter when dried. Hairs under the microscope brown, not hyaline, slightly darker in iodine, with acute or bluntly rounded ends and very often with ladder structure, the septa being convex, close, thin, more scattered towards the base, the diameter of the hairs 2.8-4.8 μ. *Lamellae* yellowish-subalutaceous when dried, rather narrow, medium crowded, not or hardly connected attenuate-free or almost free with a few lamellulae intermixed. Spores 5.3-8.5 × 2-3.9 μ, hyaline, becoming thick-walled, narrowly ellipsoid. Cheilocystidia similar to those of *C. setipes*, but a portion of them more antler-like than echinate. Pleurocystidia somewhat numerous, rather thick-walled, fusoid, subfusoid, or clavate, also often bottle-shaped, the thickest part mostly in the middle, 29-45 × 5-10 μ, some like the cheilocystidia, but most of them mereley forked, twice-forked, or simple. *Stipe* concolorous, tomentose, central, somewhat curved, subequal, 4-5 × 0.5-0.8 mm in dried condition. *Context* white, thin. Hyphae thin-walled, with clamp connections.

Habitat. — On fallen branches.

Distribution. — Togo.

Material studied. — Part of the type (?), or at least authentic material, collected by Baumann in Togo, det. by Hennings and sent to Patouillard by Hennings (FH).

Observations. — This species has very much the stature of the species of the preceding subsection, but differs in the narrow spores, the pleurocystidia, and the color of the pileus. Hennings diagnosis is careless and misleading. The statement that this species is « related » to *Lentinus strigosus* (= *Panus rudis*) must not be taken seriously.

SPECIES INCERTAE SEDIS

29. **Crinipellis pseudosplachnoides** (Henn.) Pat. in herb. comb. nov.

Syn. : *Marasmius pseudosplachnoides* Henn., *Engler's Bot. Jahrb.* **30** : (1) 47. 1901.

Pileus colored like *C. stipitariae*, hairy, convex, center depressed, with an obtuse umbo in the center, « about 1 cm large » (Henn.). Hairs often acute, yellowish hyaline, strongly colored with iodine, almost amyloid, long, thick-walled, 2.5-5 μ thick. *Lamellae* probably white or whitish when fresh, medium crowded, medium narrow, rounded-free or almost free. Spores lacking in the material available. *Stipe* concolorous, hairy, fistulose (sec. Henn.), subequal, 40 × 1 mm in dried material. *Context* white, rather thin.

Habitat. — On fallen leaves of trees.

Distribution. — Cameroun.

Material studied. — Part of the type or at least authentic material collected by Zenker in Bipindi, Cameroun, det. Hennings, n° 2041 (FH).

Observations. — Since neither spores nor cheilocystidia are known, it is extremely difficult to locate this species. It probably belongs to the subsection *Stipitarinae*, and does not seem to be synonymous with any one of the other species.

30. **Crinipellis trichialis** (Lév.) Pat., *Bull. Soc. Myc. Fr.* **24**: 8. 1908.

Syn. : *Agaricus trichialis* Lév. *Ann. d. Science Nat.* 3me sér. **5** : 113. 1846.

Naucoria? trichialis Sacc., *Sill.* **5** : 853. 1887.

Pileus bay, hairy, the hairs fasciculate on the center like a crest or a brush, but more appressed and radially running in curly strands near the margin, convex, often papillate, the dried material often with one or two concentric furrows, 4-6 mm in diameter. Hairs very long, 6-11 μ in diameter, almost constantly acute, hyaline-brownish, strongly pseudoamyloid, with ladder structure, the wall 2.2 (when hair is 7.5 μ) to 3.5-4 (when hair is 10-11 μ thick) μ thick. *Lamellae* probably initially whitish, but now blackened in the type material (which has been dried from an alcohol-preparation), medium crowded. Spores not found. Basidia and cystidia not distinct. *Stipe* concolorous, hairy, solid, equal, up to 11 × 0.5 mm.

Habitat. — On culms of *Bambusa arundinaria*. In groups.

Distribution. — Java.

Material studied. — Type, collected by Zollinger, n° 2078., (FH).

Observations. — A very characteristic fungus, certainly not identical with any other species, well described by Léveillé from dried alcohol material, here redescribed from the type specimens.

31. **Crinipellis myrti** Pat. apud Pat. et Lagerh., *Bull. Soc. Myc. Fr.* **9**: 125. 1893.

Syn. : *Marasmius Myrti* Sacc. *Syll.* **11** : 37. 1895.

Pileus pale to pale brownish in dried condition, with appressed hairy squamulae, somewhat striate near the margin, convex with incurved margin which is rather villous than squamulose, with depressed center when adult, 3-6 mm in dried condition. Hairs hyaline, the thinner ones often brownish, bluntly rounded above, rarely with a subulate acute end, mostly with more or less distinct ladder structure, 4-8 μ thick, only slightly pseudoamy-

loid. *Lamellae* whitish, distant, intermixed with lamellulae, almost free, medium broad or rather narrow. Spores hyaline, broadly ellipsoid or subangular, 6-8.5 × 5-3-7.7 μ. Basidia 40 × 12.3 μ, without carminophilous granulation. Cheilocystidia echinate with short spines, clavate, 22 × 9 μ. *Stipe* dark chestnut brown when dried, with appressed silky fibers, short, eccentric, 1.5-2.5 × 0.3 mm in dried condition. *Context* thin. Hyphae with clamp connections.

Habitat. — On fallen branches and twigs of *Myrtus* spec.

Distribution. — Ecuador.

Material studied. — Two identical collections, one of them ought to be the type, both from Palulahua River in Ecuador, collected by Lagerheim, determined Patouillard (FH).

Observations. — The basidia are uncommon for a *Crinipellis*, and so are the rather feebly pseudoamyloid hairs. As for the spores I am not sure that they belong to this species. It is true that some of the species with never thickening spore walls have collapsing spores, so they appear subangular in a late stage before finally collapsing. The spores in the types were so scarce that I am unable to state that the possibility of confusion with *Rhodophyllus* — spores, coming from outside, is excluded. Patouillard's and my own description are drawn entirely from dried material, and as long as no data on fresh specimens with plenty of well developed spores are available, the position of this interesting species remains doubtful. Specimens from Brazil, determined by Rick *(Marasmius myrti)* do not belong here.

32. **Crinipellis caulicinalis** (Bull) Rea sens. Cleland, *Toadst Mushr Australia* 1 : 167, 1934, non al.

This species is considered as a transitory designation of the forms (apparently two different species), called *C. caulicinalis* in Australia. No material is available that could belong to Cleland's species, and therefore his description is given :

Pileus pallid brownish drying to a pale greyish brown or dead grass color, covered with intricate adpressed fibrils, edge sometimes slightly rugose, irregularly convex, 12 mm in diameter. *Lamellae* concolorous, apparently adnate or adnexed or attached

to an indefinite collarium, then seceding, moderately close. Spores elongated pear shaped, one end pointed, 10.5 × 5 μ. *Stipe* concolorous or sometimes deeper brown, densely pilose, solid, slender, usually attenuated downwards, up to 25 mm long.

Habitat. — On the ground, often attached to buried grass stems. Cespitose. April.

Distribution. — South Australia.

Observations. — Specimens from Neutral Bay, Sydney, March, have a tinge of purple on the pileus and stipe and spores 7-8.5 × 4.4-5 μ. The representation of *C. caulicinalis* in Bresadola's Iconographia Mycologia (which belongs to *C. stipitaria* Singer) does not give a good impression of the Australian plant that Cleland refers to that species.

33. **Crinipellis tomentosa** (Quél.) comb. nov.

Syn. : *Marasmius tomentosus* Quél., *Ass. Fr. Av. Sc.* **18** : 511. 1890.
Illus. : *l. c.* pl. 15 fig. 12.

Pileus initially ochraceous cream color, later grayish tan color or chamois, tomentose, then sericeous, convex, then umbilicate, 10 mm in diameter. *Lamellae* creamy white, rather distant, ventricose, sinuate, then free. Spores pruniform-oblong, 8-9 μ long, with granular contents. *Stipe* initially ochraceous cream color, becoming chamois below, tomentose, the tomentum often forming a network, fistulose, tapering downwards. *Contex* white, thin.

Habitat. — On roots of Gramineae in heaths and meadows. Summer and autumn.

Distribution. — West and north of France.

Material studied. — None.

Observations. — When reading the description one is inclined to believe that this is one more synonym of *C. stipitaria*. But the picture given by Quélet is extremely suggestive of Maire's *C. mauretanica*, and may eventually turn out to be the same as our *C. subtomentosa*, in which case Quélet's name has to replace the name chosen in this paper. It is however uncertain whether or not authentic material of Quélet's species exists. If there is none, it is doubtful if a type locality for his species is known in France, and if French mycologists will succeed in rediscovering

the fungus on the type locality, after more thant fifty years. In any case, it seems safer not yet to identify the American and African material with *C. tomentosa* because the reliability of Quélet's spore drawings and measurements is not very high. The above description is a compound of Quélet's original description and his notes in the 19th supplements (Ass. Fr. Av. Sc. **22**: 486, 1893).

SPECIES EXCLUDENDAE

Crinipellis africana see under *Chaetocalathus africanus*, p. 525.

Crinipellis alnicola Murr., *N. Am. Fl.* **9** (4); 288. 1915. This species has quite different hairs (composed of single members, separated by normal septa with clamp connections, incrusted by a membrana-pigment), pale honey brownish spores of 7.7-9.7 × 5.5-7.7 μ, some with callus, cheilocystidia polymorphous 28-52 × 5-10 μ. It evidently belongs to the *Cortinariaceae*, either to *Phaeomarasmius* or to *Naucoria*.

Crinipellis asperifolia see under *Chaetocalathus asperifolius*, p. 530.

Crinipellis bicolor see under *Chaetocalathus bicolor*, p. 254.

Crinipellis calosporus see under *Chaetocalathus liliputianus* p. 527.

Crinipellis congoana see under *Chetocalathus congoanus*, p. 524.

Crinipellis fragilis see under *Chaetocalathus fragilis*, p. 520.

Crinipellis echinulata Murr., *N. Am. Fl.* **9** (4): 288. 1915. Material from the type collection (only stipes) does not seem to belong to *Crinipellis*.

Crinipellis squamifolia Murr., *N. Am. Fl.* **9** (4): 288. 1915. The type specimens and the second collections belong to an interesting species of *Rhodophyllus*. The scales which cover the lamellae according to Murril, are the spores (nodulose, symmetric, 15.5-19 × 8.3-14 μ). The spores indicated by Murrill have not been found in the specimens. The hairs are composed of single members which are arranged like a chain, 35-120 × 17.5-31 μ, thin-walled or thick-walled. Basidia 48.5-63 × 16.5-20 μ, 4-spored, some 2-3-spored ones intermixed. Cystidioid bodies near the edge of the lamellae

subfusoid, brownish. Hyphae incrusted by a brown pigment. No clamp conections seen. Chester Vale, Jamaica, and Tepeite Valley near Cuernavaca. Mexico. The new combination *Rhodophyllus squamifolius* (Murr.) Sing. comb. nov. is proposed.

6. ANATOMY AND MORPHOLOGY OF THE GENUS «CHAETOCALATHUS»

The genus *Chaetocalathus* is characterized by the following diagnosis:

Pileus directly attached on the substratum, with pseudoamyloid or amyloid thick-walled hairs. Lamellae running together at an excentric point or towards a rudiment of a stipe which however has not connection with the substratum. Spores pseudoamyloid or not, always a majority pseudoamyloid when there are no pseudoamyloid cystidia or cheilocystidia, but pseudoamyloid cystidia or cheilocystidia are present in the majority of the species, integrous or divided, forked, spiny, etc., very strongly incrusted when entire. Small thin carpophores, normally on wood, mostly in the tropics.

The hairs have identical characters and are homologous with those of *Crinipellis*. They are rather long, give a distinct but somewhat variable (between pseudoamyloid and amyloid) reaction with iodine.

As for the stipe, my opinion is in opposition with most of the earlier authors, e. g. De Seynes (18*a*) [1] who thinks that the stipe rudiment «feigns» a stipe while the real stipe is the somewhat contracted, truncate-conical disk of the pileus, and thus the structure at which the lamellae meet in *Ch. craterellus* would not be homologous with the stipe of *Crinipellis*. There is however evidence that the structure mentioned above is a stipe that has lost its original function and as a result has become rudimentary, since the villosity which covers it is anatomically and che-

[1] In a later paper, however, he clearly expresses the opposite view that coincides with my own view, saying (18*b*), that «ce mamelon parait être le rudiment du pedicule» (p. 9).

mically the same as the hairy covering of the stipe of *Crinipellis*, as can be demonstrated in the case of *Ch. craterellus ;* the hairs are amyloid to pseudoamyloid as they were in an earlier stage of evolution in *Crinipellis.*

Parallel with the reduction of the stipe goes a tendency to form more seta-like cystidia which are pseudoamyloid and thick walled but more often hyaline than colored. Two species, lacking these cystidia are probably most related to the genus *Crinipellis.* Patouillard, erroneously, claimed the presence of « projecting, colorless » cystidia for the entire genus *Crinipellis* sensu lat. What Patouillard shows (15) as cystidia in the case of *Crinipellis exentrica* seems to be a basidiol rather than a cystidium or cheilocystidium.

As in *Crinipellis,* the shape of the spores and the hairs is very important for the classification of the species of *Chaetocalathus.* But more usable in this genus seem to be the cystidia, again in analogy with *Crinipellis.* I do not think that the cystidia of *Chaetocalatus* are radically different from the cheilocystidia and pleurocystidia of *Crinipellis,* in spite of the striking reaction of the former which constantly is missing in *Crinipellis.* In some species of *Chaetocalathus,* especially in *Ch. fragilis,* some of the cystidia are not yet pseudoamyloid, and even not yet quite thick-walled, while not otherwise distinc from the rest of them. The highest forms with numerous thick-walled cystidia seem to represent adaptations to certain conditions of the tropics. The colorless crystals in which they are imbedded are probably exudations of Calcium oxalate. Most of the other anatomical characters are rather similar en *Chaetocalathus* and *Crinipellis.*

The geographic distribution of the species is rather interesting here as well as in *Crinipellis.* The section with none or ambiguos cystidia has few representatives which are found in very different parts of the world. The two other sections are confined to certain large areas: the section with divided cystidia is only found in the Eastern Hemisphere, while the section with entire cystidia except for a single species, belongs to the Western Hemisphere. It seems that these two branches have developed independently within their geographic limits.

KEY OF THE SECTIONS AND SPECIES OF CHAETOCALATHUS

A. Pseudoamyloid sterile bodies in the hymenium mostly lacking, or if there are any, they are accompanied by non-amyloid or even more or less thin-walled cystidia. Spores, with a few exceptions, pseudoamyloid. Section **Oligocystis** Sing. sect. nov.

I. Stipe rudiment distinct, button-shaped, pseudoamyloid cystidia present. Europe-Africa. 1. *C. craterellus*

II. Stipe rudiment lacking. No pseudoamyloid cystidia present. Asia. 2. *C. fragilis*

III. Stipe rudiment reduced to a small cone or wart. Many cheilocystidia pseudoamyloid. America. 3. *C. niduliformis*

B. Pseudoamyloid sterile bodies present in the hymenium. Spores pseudoamyloid or not.

I. Majority of the cystidia or cheilocystidia forked or distinctly divided, mostly only on or near the edge of the lamellae, and only slightly incrusted. On branches of Angiospermae. African and Asiatic species. Section **Meristocystis** Sing. sect. nov.

a. Stipe white. Tropical Asia.

1. Hairs 5.5-12 μ thick. Philippine Islands. 4. *C. pachytrichus*
2. Hairs 2-3.5 μ thick, rarely thicker. Tonkin. 5. *C. bicolor*

b. Stipe colored or lacking. Tropical Africa.

1. Cystidia 18-29 μ long, only on edge which is heteromorphous. Hairs more frequently with blunt ends. Stipe lacking. 6. *C. congoanus*
2. Cystidia 25-47 μ long, occurring not only on edge. Hairs more frequently acute. Stipe rudiment distinct. 7. *C. africanus*

c. Stipe white. Madagascar (see note p. 523, lin. 31).

II. Majority of the cystidia entire, exceptionally a few forked ones intermixed, on edges and sides of the lamellae, very strongly incrusted by colorless crystals. American species (except for *C. liliputianus* ssp. *galeatus* which was found in Japan). Section **Holocystis** Sing. sect. nov.

a. Pileus red. 8. *C. carnelioruber*

1. Spores 7 × 4.5 μ. On wood of *Juniperus*. (3. *C. niduliformis*)
2. Spores broadly ellipsoid to ovoid : 7-11.5 × 5-7.7 μ. On wood of various trees and shrubs, not on bark of living *Murraya*, nor on wood of conifers.
   - α. Cystidia 31-51 × 7.7-12 μ. Carpophores reaching 6 mm. Pileus distinctly pubescent. 9. *C. liliputianus*
   - β. Cystidia larger : 40-84 × 10.5-16.7 μ. Carpophores reaching 10 mm in diameter. Pileus almost naked. 10. *C. galeatus*
3. Spores narrower : 9.5-10.5 × 5-5.5 μ. On bark of living *Murraya*. 11. *C. asperifolius*

7. DESCRIPTIONS OF THE SPECIES OF « CHAETOCALATHUS »

Gen. **CHAETOCALATHUS** Sing. gen. nov.

Pileo substrato vertice affixo, crinibus pseudoamyloideis vel amyloideis vestito. Lamellis concurrentibus excentricum disculum versus aut attingentibus stipitis rudimentum breve, quod cum substrato conexum non est. Sporis aut cystidiis aut ambobus pseudoamyloideis. Ad lignum.

Section **Oligocystis** Sing.

Elementis sterilibus crassotunicatis, pseudoamyloideis in hymenio aut absentibus aut consociatis cum cystidiis subtenuitunicatis inamyloideisve. Sporis pseudoamyloideis (interdum perpaucis exceptis).

Pseudoamyloid thick-walled bodies in the hymenium mostly lacking. In one species there are numerous pseudoamyloid thick-walled bodies in the hymenium, but they are accompanied by non-amyloid and even more or less thin-walled cystidia. Spores pseudoamyloid (sometimes with a few exceptions). Color of the fruit bodies white to pale. Area : Tropics and extratropical regions.

1. **Chaetocalathus craterellus** (Dur. et Lév.) Sing. comb. nov.

Syn. : *Agaricus craterellus* Dur. & Lev., *Explor. d'Algerie, Botan.*, 1850. *Atlas* tab. 31, fig. 5 (diagn. defic.) ; De Seynes, *Flore Mycol. Montpellier*, p. 132. 1863.

Pleurotus craterellus Quélet, *Ass. fr. Avanc. d. Scienc., Congr. d. Rouen*, p. 2. 1883.

Calathinus craterellus Quél., *Enchir. Fung.*, p. 48. 1886.

Pleurotellus craterellus Fayod, *Ann. Sci. Nat., Botan.*, 7me sér., **9** : 339. 1889.

Crinipellis craterellus Pat., *Ess., Tax. Hymen.*, p. 143. 1900.

Illus. : Durieu & Léveillé, l. c.

De Seynes, *Des Agarics à forme pezizoide. Ann. Soc. Linn. d. Maine et Loire*, **11** : 9, fig. 2. 1869.

Patouillard, *Hymen. d'Europe,* tab. 2, fig. 8; and *Tabulae Anal. Fung.*, n° 6 (anat.).

Pilát, *Atlas des Champ. d'Europe, Pleurotus Fr.*, Ser. A, fasc. 6, pl. 2, fig. 1-6. 1935; and fasc. 7-8: 22, fig. 60. 1935. (Good photos of dried material).

Pileus white, densely and minutely silky-pubescent, especially when young, margin entire, initially globose, the disk or the pileus attached to the substratum, «pezizoid» in shape, opening when mature, 2-12 mm in diameter. Hairs 3-5 μ thick, mostly bluntly rounded, thick-walled and long. sometimes even solid. *Lamellae* white or finally creamy white, moderately broad to rather broad (about 1 mm), moderately crowded to distant, free, intermixed. Spores hyaline, broadly ellipsoid, 7.7 × 5.3 μ, pseudoamyloid. Basidia about 30 μ long and 4-5.5 μ broad, 4-spored. Cystidia none. Subhymenium ramose with short members. *Stipe rudiment* white, villous, wart-like or conical, short; hairs forming the villosity, hyaline, smooth, irregular in shape and diameter, mostly filamentous, but sometimes strongly swollen, thin-walled or more often thick-walled, amyloid, sterile (but compare obser-vations). *Context* white, thin, consisting of thin (1.7-3.5 μ) interwoven, more or less thin-walled hyphae with clamp connections.

Habitat. — On dead branches and twigs, decaying wood, brushwood, in groups, sometimes in spirals or straight lines. Especially in spring (February-April) and fall (September-November), but also in winter. Hosts: *Rosa, Rubus, Clematis vitalba, Clematis cirrhosa, Lonicera nigra, Lonicera caprifolium, Cornus sanguinea, Smilax aspera.*

Distribution. — Southern Europe and North Africa, possibly also South Africa (see also observations).

Material studied. — North Africa: L'Alma, Maire 1908 (FH); Gorges de la Chiffa, Patouillard, 1897 (FH); Algier, Trabut, 1897 (FH); Yugoslavia: Zelenika near Castel Nuovo, v. Höhnel, 1903, (FH).

Observations. — Quélet and Patouillard report conidia in this species. They are said to originate on the tip of the hairs of the stipe rudiment. I was unable to find them in material studied, and I doubt if they actually are a constant character. Neither

of the authors who have observed the conidia indicates their size, but Patouillard's figures seem to prove that they are about the same size and shape as the basidiospores. As the hairs of *Crinipellis* and *Chaetocalathus* retain basidiospores which originated quite normally on the lamellae, it seems possible that these conidiospores were of the same kind. Pilát (17) says that *Pleurotus craterellus* « seems to be cosmopolite in the subtropical and tropical zones ». The only really tropical locality cited by him is New Guinea, but I do not think that the specimen studied by Pilát (C. Ledermann, Sepik Expedition no. 8233) belongs to *C. craterellus,* although I have not studied it. It would be the only case of a distribution like that in this genus. I have not seem the material in the Kew Herbarium from South Afeica, but Pilát's photo may well indicate *C. craterellus.* Pilát mentions more material from Portugal southern France, and Italy which he has studied and certainly is correct. The New Guinea fungus needs confirmaton, as it is highly probably that it rather belongs to *C. fragilis* or *C. galeatus,* or some hitherto unknown species.

2. **Chaetocalathus fragilis** (Pat.) Sin. comb. nov.

Syn. : *Crinipellis fragilis* Pat., *Philipp. Journ. Sci.* **10** : 97. 1915.
Marasmius fragilis Sacc. et Trott., *Syll.* : 153. 1925.

Pileus pale isabelline, faintly pubescent, subsulcate, resupinate, cup-shaped, 2-3 mm in dried condition, 2-4 mm according to Patouillard. Hairs blunt, 2-4 μ thick, hyaline, pseudoamyloid, scanty. *Lamellae* deeper in color according to Patouillard, broad, rather distant, attenuate free toward a central or almost central point that is not elevated. Spores about 7 × 4.5 μ, pseudoamyloid. Basidia and cheilocystidia not distinct in the specimen available. Cystidia none. *Stipe* absolutely none. *Context* very thin.

Habitat. — On fallen, decayed twigs. May.

Distribution. — Philippine Islands.

Material studied. — Type, Collected C. Sablau, 1913, comm. Baker, determined Patouillard, n° 2568 (FH).

Observations. — Close to *C. craterellus*, but certainly distinct.

3. **Chaetocalathus niduliformis** (Murr.) Sing. comb. nov.

Syn. : *Pleurotopsis niduliformis* Murr., *N. Am. Fl.* **9** : (4) 238. 1915.
Pleurotus niduliformis Sacc., *Syll.* **23** : 117. 1925.

Pileus white, floccose, smooth, with a concolorous subentire margin, which usually is inflexed on drying, at first resupinate, becoming inverted cupuliform, sessile, vertically attached, regular, about 2 mm broad. Hairs long, ordinarily attenuate with a rounded point, 3.3-6 (-7) μ thick, rarely partially inflated, pseudoamyloid. *Lamellae* white, relatively distant, medium broad, free of adnexed at the central button or cone which however is not elongate and does not remind one of the distinct stipe rudiments occurring in *C. pachytrichus* and *bicolor,* sometimes with venose interspaces, firm, undulate. Spores 6.5-9.5 × 4.8-7 μ, hyaline, rather broadly ellipsoid, distinctly pseudoamyloid. Basidia 25-32 × 8.5-8.8 μ, spored. Cystidia confined to a rather broad zone along the edge of the lamellae, many thick-walled, others thin-walled, not all of them distinctly pseudoamyloid, but more are slightly although distinctly pseudoamyloid, 29-43 × 4-7 μ, bottle-shaped or subfusoid, often forked or branched (never more than two branches of 5-25 × 2-4 μ present). Gill trama subirregular, with occasional inflated hyphae ends of 31-70 × 14-19 μ which recall the ampullae of the *Aphyllophorales. Context* very thin, the hyphae with clamp connections.

Habitat. — On fallen twigs of *Juniperus barbadensis.* November-December. Solitary to gregarious.

Distribution. — Bermuda.

Material studied. — Type, coll. 1912 by Brown, Britton and Seaver, n° 1350 (NY); other material, same time, same collectors, n° 1352 (NY)

Observations. — This species combines some ambiguous characters but can hardly be misunderstood. Murrill's type collection (1350) contains fragments of a larger fungus, probably a *Calathinus,* with cylindric spores, no hairs, though his description makes it clear enough that he did not take these fragments in consideration. The above description is original but a few macroscopical characters which are no longer visible in

the specimens are compiled from the description in North American Flora.

Section **MERISTOCYSTIS** Sing.

Elementis sterilibus crassotunicatis, pseudoamyloideis in hymenio constanter praesentibus, plerumque congregatis ad et prope aciem lamellarum, furcatis vel manifeste divisis, haud vel mediocriter incrustatis.

This section is characterized by pseudoamyloid, thick-walled divided bodies which can be called cheilocystidia, but look rather like setae when seen in iodine (hence the generic name *Chaetocalathus),* though they are hyaline or almost hyaline as a rule when studied in water or ammonia, while actual setae are ordinarily colored by a deep brown to red-brown pigment. A similar kind of setose cystidia but not confined to the edge of the lamellae only, and sometimes tinged yellowish, is known in the genus *Acanthocystis* or *Geopetalum,* and also in *Chaetocalathus* section *Holocystis,* where the cystidia are mostly simple and more incrusted.

4. **Chaetocalathus pachytrichus** Sing. spec. nov.

« Pileo » albo, demum albidogrisello, margine subsulcato vel costatulo, pubescente, resupinato et centro affixo, subovali, 2-5 mm lato. Crinibus inaequaliter tunicatis, rotundatis, amyloideis, crassis (5.3-12.5 μ diam.). « Lamellis » roseo-brunneolis, distantibus, vel subconfertis, mediocriter latis, non ventricosis vel subventricosis, intermixtis, adnatis vel subrotundato-adnexis, demum separantibus. Sporis 7-7.5 × 4.5 μ. « Stipite » rudimentario, sed manifestis simo, cum substrato non connexo, albo, cylindrico. « Carne » tenui, alba. « Hab. » : Ad ramulos et ligna putrescentia.

Pileus white, remaining so when dried, old specimen in fresh condition whitish-grayish, the margin finally subsulcate to faintly costate, the surface fibrillose-pubescent and separable, hairy under a lens, resupinate and attached with the center or a point near the center, the point of attachment often extracted and stem-like, almost oval in outline, 2-5 mm in diameter when

dried. Hairs often thick-walled on one side and moderately thick-walled on the opposite side, bluntly rounded, almost amyloid, very dark red-brown with a distinct lilac tinge in iodine, hyaline in ammonia, 5.3-12.5 μ in diameter, the wall about 6 μ thick when the hair is 12.5 μ thick. *Lamellae* pale pink-brown to almost pink in dried condition, distant to almost crowded, medium broad, not ventricose or subventricose, regularly intermixed with lamellulae, adnate or somewhat rounded and adnexed, finally separating. Spores hyaline, ellipsoid, finally often with a septum, 7-7.5 × 4.5 μ, not pseudoamyloid. Cheilocystidia setae-like, simple or much more frequently beset with shorter or longer spines or forked or branched (up to four branches with acute or occasionally almost blunt tips, up to 5.5 μ thick), the main body sometimes thicker than 5.5 μ, the entire length 20-70 μ, strongly pseudoamyloid, distinctly incrusted. *Stipe rudiment* relatively well developed, white, cylindric eccentric, not attached at the substratum, minute. *Context* very thin, white.

Habitat. — On twigs, often on winding plants, also on bark, for instance on bark of *Murraya exotica,* also on vine, always on fallen, dead material. Juanary to July. Gregarious.

Distribution. — Indo-China to Philippine Islands.

Material studied. — Type, Collected by C. D. Baker, at Mt. Makiling, P. I. July, 1916, n° 4356, det. N. Patouillard *(Crinipellis galeata)* (FH); co-types: Philippines: Mt. Makiling, near Los Baños, Laguna, May 24, coll. J. J. Mirasol, comm. C. D. Baker, n° 1178, det. Patouillard *(Crinipellis galeata)* (FH); Mt. Makiling, Juanuary 1916, coll. Copeland, n° 4140, det. N. Patouillard *(Crinipellis galeata)* (FH); Tonkin, Ke So, prov. Hanoi, June 28, 1890, n° 4438, coll. Bon, det. Patouillard *(Crinipellis asperifolia)* (FH).

Observations. — Since Patouillard called this species *Crinipellis galeata*, it may very well be that his Madagascarian form likewise belongs to *Chaetocatathus pachycystis,* but I have not recently studied his Madagascar material, neither have I had the chance to see any material from Africa, belonging to *C. pachycystis.* The type of *Agaricus galeatus* is quite different from what Patouillard called so. Likewise, Bon's specimens of « *Crinipellis asperifolia* » are different from what Patouillard origin-

ally described under this name, and it probably was the fact that both species grew on the same host that provoked Patouillard's error.

5. **Chaetocalathus bicolor** (Pat. et Demange) Sing. comb. nov.

Syn. : *Crinipellis bicolor* Pat. et Demange, *Bull. Soc. Myc. Fr.* **26** : 36. 1910.
Marasmius bicolor Sacc. et Trotter., *Syll.* **21** : 112. 1912.

Pileus rufous-chestnut-brown according to Patouillard, light brownish when dried, somewhat darker near the margin, resupinate, cup-shaped, then more expanded, macroscopically almost glabrous and naked, but under a lens very distinctly hairy-pubescent, 1.5-3.5 mm in diameter in dried condition. Hairs pseudoamyloid, blunt, 2-3.5 μ thick. *Lamellae* reddish brown when dried, subcrowded, rather thick with blunt edges, intermixed with lamellulae, adnexed to the stipe rudiment. Spores hyaline, pseudoamyloid, 7.7-8 × 5-5.5 μ, broadly ellipsoid. Basidia 24 × 6 μ, according to Patouillard. Cheilocystidia setose-ramose, 31-36 × 3.5 (below) μ, the 2-12 branches 1.5-2.5 μ thick and mostly blunt; the same type of cystidia occasionally occurs on the sides of the lamellae, but close to the edge. Besides there are numerous colorless, rhomboid, large crystals on the hymenium of the type specimen. *Stipe rudiment* button-shaped, pure white, small, central or somewhat eccentric. *Context* white, thin.

Habitat. — On dead branches. Gregarious.

Distribution. — Tonkin.

Material studied. — Type, collected by Demange in Su Yut, Tonkin, n° 96 (FH).

6. **Chaetocalathus congoanus** (Pat.) Sing. comb. nov.

Syn. : *Crinipellis congoana* Pat., *Bull. Soc. Myc. Fr.* **11** (2) : 85. 1895.
Marasmius congoanus Sacc. et Syd., *Syll.* **14** : 111. 1899.

Pileus russet, tomentose, glabrescent, finally sulcate, resupinate, attached with an umbo-like pseudo-stipe which is somewhat darker than the marginal portion of the pileus, 4-8 mm in diameter when dried. Hairs bluntly rounded, strongly pseudo-

amyloid, 3-4.8 µ thick. *Lamellae* paler than the pileus, concurrent towards an eccentric point, thin, distant, intermixed, medium broad to almost broad. Spores 7.7 × 5.6 µ, broadly ellipsoid, pseudoamyloid. Cheilocystidia ramose, diverticulate nodulose or broom-like, thick-walled, hyaline, mostly distinctly pseudoamyloid, 18-29 × 3.5-5.5 (below), 5-11 µ (above), branches mostly numerous, many with secondary branches, blunt. *Stipe rudiment* lacking.

Habitat. — On fallen twigs. January. Gregarious.

Distribution. — Coastal region of French Congo.

Material studied. — Type, collected by Dybowski, n° 48 (FH).

7. **Chaetocalathus africanus** (Pat.) Sing. comb. nov.

Syn. : *Crinipellis africana* Pat., *Bull. Soc. Myc. Fr.* **8** : 52. 1892.
Marasmius africanus Sacc., *Syll.* **11** : 38. 1895.
? Pleurotus germinans De Seynes, *Rech. Champ. Congo Fr.* **1** : 9. 1897. Tab. 1, figs. 18-20.
? Panus paradoxus Henn., *Engl. Jahrb.* **23** : 547. 1897.

Pileus russet according to Patouillard, « cinnamon buff » in dried condition, margin rather concentrically grooved than radially sulcate, but frequently almost smooth, macroscopically glabrous, resupinate, attached with a somewhat extracted eccentric point of the pileus, very frequently becoming bent off vertically to the surface of the substratum, reniform in circumference, 3-5.5 mm broad in dried condition. Hairs long, cylindrical, hyaline, 3.5-5.5 µ thick, pseudoamyloid to almost amyloid, most frequently acute, more or less parallel. *Lamellae* russet-brownish, close, thick with blunt edges, narrow, subadnexed to the stipe rudiment. Spores 6.5-8.5 × 4.8 µ, ellipsoid, hyaline, not pseudoamyloid. Cheilocystidia 25-47 × 3-9.5 µ thick, thick-walled and very tough, their tips rarely undivided and then acute, or commonly divided into 2-5 rather short (1-8 µ long) blunt or acute branches, mostly nearly fusoid, hyaline, strongly pseudoamyloid, very numerous and frequently totally displacing the fertile zone toward the inner part of the sides of the lamellae or even replacing the fertile hymenium so that the whole surface of the lamellae is covered by the « cheilocysti-

dia », and then the whole carpophore, except for a few intermixed and often amorphous trama-hyphae, consist of pseudoamyloid, thick-walled, tough elements. *Stipe rudiment* slightly, or more often strongly eccentric, initially whitish, later becoming concolorous, often hardly longer than thick, often slightly elongate. *Context* very thin to extremely reduced, the trama consisting of soft thin-walled, not pseudoamyloid hyphae, the covering hairy layer of the pileus and the lamellae of sterile specimens much tougher than the trama.

Habitat. — On dead wood, fallen branches, twigs, etc. Densely gregarious, June to August.

Distribution. — Tropical West Africa.

Material studied. — French Equatorial Africa: Congo: Loango, coll. Dybowski, type (FH); between Loango an Brazzaville, coll. Dybowski 1891, co-type (?) (FH); Tchibanga, coll. Le Testu 1907, det. N. Patouillard *(Crinipellis africana)* (FH); « Congo », coll. Bandon, n° 2223, det Patouillard *(Crinipellis africana)*, (FH); Liberia: Firestone Plantation n° 3, Du River, collected 1926 by D. H. Linder, n° 275, det. R. Singer (FH).

Section **HOLOCYSTIS** Sing.

Cystidiis membrana eximie crassa, pseudoamyloidea et incrustatione hyalina, crystallina, crassa densaque ex integro obtectis, integris vel subintegris, subaequaliter dispositis ad aciem et latera lamellarum.

The cystidia of this section are almost the same as in the genus *Acanthocystis* = *Geopetalum* where however no hairs are found on the surface of the pileus. All but one species belong to the flora of America. Four tropical or subtropical species.

8. **Chaetocalathus carnelioruber** Sing. spec. nov.

« Pileo » rubro, in siccis purpureo, tomentosulo, resupinato, sed maturitate deflexo, reniformi et inciso, 2-7 mm lato in siccis. Crinibus subobtusis obtusisve, amyloides pseudoamyloideisve, 3,5-5 μ crassis. « Lamellis » cremeo-alutaceis, perangustis, moderate distan-

tibus, attenuatis. Sporis 11 × 7 µ, elliptico ovoideis. Basidiis 34.8 × 8.8 µ. Cystidiis 38-100 × 13-32 µ, hyalinis vel flavidulis, pseudoamyloideis, fusoideis, acutis, fortissime incrustatis, crassissime tunicatis. «Stipite» subnullo. Carne subnulla. «Hab.»: Ad ramos.

Pileus «Carnelian red» when fresh, becoming a color between «Perilla purple» and «Mineral red» (R.) when dried, the margin paler, the surface subtomentose, strongly hairy under a lens, resupinate amd almost cup-shaped, mostly reflexed and vertical to the substratum when mature, reniform in circumference with a deep incision on the concave side, 2-7 mm in diameter when dried. Hairs rather obtuse or bluntly rounded, 3.5-5 µ in diameter, with thick, pseudoamyloid or almost amyloid walls. *Lamellae* cream buff when fresh, brownish when dried, very narrow, distant or moderately distant, attenuate toward the incision of the pileus. Spores 11 × 7 µ, ellipsoid-ovoid, with granular content, thin-walled. Basidia 34.8-8.8 µ. Cystidia 38-100 × 13-32 µ, fusoid, hyaline or yellowish, especially near the apex, pseudoamyloid or nearly amyloid, very thick-walled, the walls polystratous and 5-8.5 µ thick in larger cystidia. *Stipe rudiment* apparently lacking on very young carpophores, but present as a minute, verruciform, lilac brown, hirsute, button-like structure when seen under a lens.

Habitat. — On branches. December. Gregarious.

Distribution. — British Guiana.

Material studied. — Type, collected by D. H. Linder, Dec. 9, 1923, in Bartica, British Guiana (FH).

Observations. — This is the only species of *Chaetocalathus* with a bright pigment, and is easy to recognize. The dried specimens are somewhat suggestive of *Panellus violaceofulvus* but, naturally, not related to it.

9. **Chaetocalathus liliputianus** (Mont.) Sing. comb. nov.

Syn. : *Agaricus (Pleurotus) liliputianus* Mont., *Ann. Sc. Nat.* 4 me sér., **1** : 99. 1854.
Pleurotus liliputianus Sacc., *Syll.* **5** : 385. 1887.
Pleurotopsis liliputiana Murr., *N. Am. Flor.* **9** (4) : 293. 1915.
Marasmius nidulus Berk. et Curtis, *Journ. Linn. Soc.* **10** : 299. 1868.
Crinipellis nitidilus (sic.) Pat., *Journ. Botan.* **3** : 336. 1889.

Crinipellis calosporus Pat. apud Duss, *Flore Crypt. Ant. Fr., Champ.*, p. 255. 1904.
Marasmius calosporus Sacc. et D. Sacc., *Syll.* **17** : 47. 1905.
Plourotopsis calospora Murr., *N. Am. Flor.* **9** (4) : 238. 1915.

Pileus pure white, pubescent, smooth sulcate at the margin, resupinate, cup-shaped, later very frequently becoming free and bent off on one side, membranaceous, sometimes whith a slightly extracted point of attachment but more often truly sessile, 2-6 mm in diameter. Hairs obtuse or almost acute, thick-walled, 3.7-5.3 μ thick, hyaline, pseudoamyloid. *Lamellae* white or yellowish white, distant, relatively rather thick, broad, intermixed, free, concurrent towards a nearly central or eccentric point. Spores (7.7)-8.5-11.5 × (5)-6-7.5 μ, hyaline, broadly ellipsoid, inside guttulose, not pseudoamyloid, or a few of them very slightly pseudoamyloid. Basidia 30 × 7.7 μ. Cystidia fusoid, or fusoid-ampullaceous, 31-51 × (7.7)-8-12 μ, very strongly incrusted whit hyaline crystals, especially at apex, subacute or obtuse, strongly pseudoamyloid, thick-walled, wall 2-3 μ thick. *Stipe rudiment* apparently lacking, but consisting of a minute felty snow white wart when seen under a lens on young material. *Context* extremely thin.

Habitat. — On fallen branches, also on decaying sticks. As hosts are indicated : *Clibadium erosum. Richeria grandis.* In Ecuador in July. Gregarious.

Distribution. — Central-and tropical South America.

Material studied. — Cuba : coll. Wright, n° 78, co-type of *Marasmius nidulus* B. et C. (FH) ; Guadeloupe, coll. Duss n° 193, on *Richeria.* at Bains Jaunes, det. Patouillard *(Crinipellis nidulus)* (FH), coll. Duss n° 445, on *Clibadium,* at Bains Jaunes, det. Patouillard, type of *Crinipellis calosporus* (FH) ; Ecuador ; coll. Lagerheim, at San Jorge, det. Patouillard *(Crinipellis nidulus)* (FH).

Observations. — I have carefully studied the spores of the type of *Crinipellis calosporus*, but was unable to discover any coloration. The spores are as hyaline as in the other specimens cited. In the original diagnosis and in Murrill's key to *Pleurotopsis* the smaller size of the fruit bodies of *P. calospora* has been emphasized, yet the dried carpophores of the type speci-

mens still are 2-3 mm in diameter. Thus the identity of *Crinipellis calosporus* cannot be doubted. As for *A. liliputianus*, I have not seen any reliable material, other than was determined from Murrill's key. Since Montagne's original description fits ours rather well, and Murrill probably has seen authentic material before identifying it with *Marasmius nidulus*, the specific name used in North American Flora is accepted.

10. **Chaetocalathus galeatus** (B. et C.) Sing. comb. nov.

Syn. : *Marasmius galeatus* Berk. et Curt., *Proc. Am. Acad.* **4** : 119. 1858. *Crinipellis galeatus* Pat., *Journ. Botan.* **3** : 336. 1889 (speciminibus exclusis).

«*Pileus*» pure white, macroscopically glabrous, faintly fibrous under a good lens, cup-shaped, resupinate, later « helmet shaped » (B. et C.), up to 10 mm in diameter. Hairs 3.5-5.5 μ in diameter, rounded-blunt, hyaline, pseudoamyloid. *Lamellae* white or whitish, distant, broad, intermixed, free. Spores 7-11 × 5-7.7 μ, hyaline more or less pseudoamyloid, broadly, ellipsoid-ovoid. Basidia 28-35 × 7-7.7 μ. Cystidia mostly fusoid and acute, more rarely subobtuse, or clavate with a short tip, or very rarely forked, distinctly incrusted with hyaline crystals, especially at apex, hyaline, pseudoamyloid, 40-84 × 10.5-16.7 μ, wall 2.5-4.5 μ thick. *Stipe rudiment* apparently lacking, but in young stages a pure white tiny felty body can be seen, where the lamellae concur. *Context* extremely thin.

Habitat. — On dead twigs.

Distribution. — Japan (also indicated from Madagascar, but see under *Ch. pachytrichus).*

Material studied. — Simoda, Japan, type (FH).

Observations. — This species is very close to the preceding one. The cystidia are larger, and so are the carpophores, and the spores seem to be more constantly brownish in iodine. The surface of the pileus is considerably less hairy in this subspecies than in *Chaetocalathus liliputianus*. Most of Patouillard's specimens of *Crinipellis galeata* belong to *Chaetocalathus pachytrichus*.

11. **Chaetocalathus asperifolius** (Pat.) Sing. comb. nov.

Syn. : *Crinipellis asperifolia* Pat., *Journ. Botan.* **3** : 336. 1889.
Marasmius asperifolius Sacc., *Syll.*, **9** : 70. 1891.
Pleurotopsis asperifolia Murr., *N. Am. Flor.* **9** (4) : 239. 1915.

Illus. : Patouillard, *l. c.* p. 337.

Pileus light grayish leather brown, very slightly tomentose, but distinctly hairy under a lens, slightly striate from the point of attachment towards the margin, resupinate, later the upper part of the pileus reflexed, reniform, often with an incision on the concave side that reaches the stipe rudiment, 4-10 mm in diameter. Hairs ordinarily cylindric, thick-walled, incrusted, strongly, pseudoamyloid, bluntly rounded, 4-6.8 μ thick. *Lamellae* concolorous or paler, medium broad, attenuate, medium distant to subdistant, intermixed. Spores hyaline, ellipsoid to subfusoid, not pseudoamyloid, 9.5-10.5 × 5-5.3 μ. Cystidia projecting, fusoid, more rarely clavate, sometimes bottle-shaped or forked, acute or blunt, hyaline, 38-60 × 8-5-21 μ, thick-walled, the wall 2-7.7 μ thick. *Stipe rudiment* very small, hemispheric, hirsute, concolorous but paler or almost white, disappearing in old specimens. *Context* very thin.

Habitat. — On bark of living *Murraya exotica,* after heavy rains. Gregarious.

Distribution. — Martinique and Guadeloupe.

Material studied. — Martinique : type, collected by Duss, n° 35 (FH) ; Guadeloupe : coll. Duss, n° 67, det. Patouillard (FH).

Observations. — Certainly a good species because of its color, and the shape of its spores, and the habitat.

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