

A MONOGRAPH ON THE
GENUS GALERINA EARLE

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by

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PREFACE

By ALEXANDER H. SMITH

In taxonomic treatments a certain pattern must be maintained in order that the taxa concerned may be formally considered in a systematic manner. This final arrangement, which appears straightforward and logical, is very often the end result of years of study involving an evaluation of all available characters, and much arranging and rearranging of species. Close scrutiny of the finished work is often necessary to detect the areas in which uncertainty still exists.

It thus seems appropriate in this preface to dwell briefly on the history of the efforts, individual and mutual, which have led to the present monograph, in order that others, especially younger workers, may understand how such projects actually evolve.

One of the basic forces involved in the production of this monograph was frustration. When I first started to study *Galerinae* with the aid of Atkinson's (1918) and Kauffman's (1918) treatments of *Galera*, I put names on a lot of collections even though the process left me with a keen feeling of dissatisfaction. Soon I began to write up my own collections with an eventual monograph in mind, and actually had a small manuscript on the genus when Kühner (1935) published. I soon became aware of the limitations of Kühner's work as applied to North American *Galerinae*, and went ahead with the process of collecting and taking data. This was a sporadic process, being limited largely because of my interest in *Mycena*, *Cortinarius* and *Psathyrella*, rather than from a lack of *Galerinae* in the flora of the areas in which I was collecting. However, during the very dry season of 1952 at Mt. Rainier National Park in the state of Washington, the absence of other fungi made it necessary to concentrate on microhabitats in places ordinarily too wet for the fruiting of agarics, and literally a new world of *Galerina* was discovered. This one season showed clearly that *Galerina* was a large genus and that the problems of speciation were not materially different from those in such genera as *Inocybe* or *Cortinarius*, even though many of the characters involved were different. For a person with a fairly extensive previous knowledge of the genus, one such season was sufficient to bring out the pattern of speciation in a clear and convincing manner.

As a result of the field season of 1952, during which time my ideas on speciation crystallized, a revised preliminary manuscript was drawn up. Since many of the microscopic characters finally used in differentiation had been observed from dried material revived in ammonia or KOH, my

next plan was to check these characters in the field, on fresh material. At this time it was abundantly clear to me why the *Galerinae* could not be identified satisfactorily with the existing literature—there were about five times as many species in North America alone as had been previously recognized for the genus.

At this stage of the work, Dr. Rolf Singer returned from Tucumán, Argentina, and on the occasion of a visit to my laboratory commented on the amount of material he had uncovered in *Galerina*, and that he was thinking of doing a monograph of the genus for South America. I showed him my work and we decided to publish a monograph jointly, since it was clear that we had each independently discovered certain distinct groups and had arrived at similar conclusions in regard to speciation and evolution within the genus. We laid plans for spending a field season together in order to check our observations again on fresh material and the summer of 1953 we were together at the University of Michigan Biological Station on Douglas Lake, in Cheboygan County, Michigan. During the course of this season we were able to establish that the spore characters, upon which we placed great emphasis, could be ascertained easily and accurately from both fresh and dried specimens under the proper optical system. The season was warm and fairly dry, which was excellent for *Galerina*, and much new information was obtained, in addition to answers to the special problems being studied.

With the results of the 1953 season behind us we felt confident of the characters we were using and reassured in regard to our species concepts. We decided to publish even though we now realized, more than ever before, that we could not hope to write anything more than a preliminary world monograph.

The work has been full of surprises for both of us, and we wish it clearly understood that we claim only to have placed the genus in its proper perspective in regard to other genera of the gill fungi and to have demonstrated the occurrence of sufficient lines of evolution in the group to make it easier to correlate future discoveries. Since the species are largely moss-inhabiting, it would be presumptuous on our part to claim any degree of completeness for our treatment without first collecting intensively in Canada for many years. There are, of course, many other areas of the world where the moss flora is luxuriant and in which *Galerinae* must be abundant but have never been collected. We hope that the study of this genus in such areas will be facilitated by our work.

INTRODUCTION

HISTORY

The history of the genus *Galerina* may be said to have its official beginning in *Systema Mycologicum*, Vol. 1, by Elias Fries, published in 1821, since this is at present the accepted starting date for mycological nomenclature, at least as applied to the gill fungi. In this work Fries, p. 264, described the tribe "Galera" of the genus *Agaricus* as including *Mycena*-like ocher-brown spored fungi. This tribe was later described as a genus by Kummer but its circumscription was not materially changed. Like the other tribes in Fries's work, *Galera* became widely known over the world as one of the genera of the Friesian System.

Karsten (1879) divided *Galera* into two genera, retaining the name *Galera* for one and giving the new name *Galerula* to the other. In *Galera* he retained the following species: *G. sphaerobasis*, *G. lateritia*, *G. tenera*, *G. flexipes*, *G. antipus*, *G. conferta*, *G. spicula*, *G. spartea*, *G. pygmaeoaffinis*, *G. vittaeformis*, *G. rubiginosa*, *G. hypnorum*, *G. mniophila*, *G. aquatilis* and *G. tenuissima*. In *Galerula* he placed *G. pityria*, *G. ovalis*, *G. ravidata*, *G. mycenopsis* and its variety *upsaliensis*. This latter genus was never accepted, possibly because it was as artificial as the original genus, and possibly because most of the species included by Karsten were actually poorly known. It came to the attention of mycologists rather early, however, that the name *Galera* had been used previously by Blume (1825) for a genus of flowering plants, and thus it was not valid according to the International Code of Nomenclature.

Galerula came into use in North America (Murrill, 1917, and Atkinson, 1918) as a substitute for *Galera*. As has already been pointed out (Singer & Smith, 1946) this is its only logical and valid use. *G. ovalis* is surely a *Conocybe* and *G. mycenopsis* is probably a *Galerina*, so it must be admitted that *Galerula*, as circumscribed by Karsten, is a mixture of both types of fungi (*Conocybe* and *Galerina*), just as was true for the original *Galera*. Since it is based on a type species which is a nomen dubium, *Galerula* should be excluded as a doubtful genus in favor of *Galerina* and *Conocybe*.

Earle (1909), in establishing *Galerina*, named *G. vittaeformis* the type. Since Karsten considered this species a *Galera* at the time he described *Galerula*, it cannot be argued that the name *Galerina* is a later synonym of *Galerula*, no matter which species of the latter is selected as the lectotype. Kühner & Romagnesi (1953) have continued to use the name *Galera*—thus reversing Kühner's earlier position (1935), in the hope, perhaps, that it would be conserved. We are still of the opinion that conservation of *Galera*

(Fries) Kummer would serve no useful purpose, hence we shall continue to use *Galerina* (Singer & Smith 1946; Singer 1951; Moser, 1953).

The first monograph on *Galerina* was that of Kühner (1935). He recognized 18 species, and, as far as the material available to him allowed, did much to establish the genus on a scientific basis. The shortcomings of his work are due largely to his not having an adequate number of species to give a complete picture of the genus. However, his work remains an historical milestone in the advancement of our knowledge of these fungi. The treatment of *Galera* by Kühner & Romagnesi (1953) does not add much to Kühner's 1935 account, and the nomenclature is not fully in accordance with the International Rules. Moser (1953) has also given us a valuable descriptive key under the generic name *Galerina*, but, again, it is based on the relatively small European flora and is thus, like Kühner's, chiefly of local value. A paper by Singer (1950) revised the species of the genus occurring in the U.S.S.R. This paper was written in 1940, and Kühner's monograph served as a basis for editing it. It obviously suffers from the same shortcomings as do its predecessors.

DISCUSSION OF CHARACTERS USED IN DELIMITING TAXA

SPORE CHARACTERS

In order to standardize the observations on spores and thus bring out differences between species more sharply, the following procedures have been followed. All studies of spore ornamentation were made with a 1.30 N.A. oil immersion lens and a 15× eyepiece. Spores were mounted in Melzer's reagent or 3% KOH, but for final observations on fine ornamentation, Melzer's reagent was used. Artificial light (a frosted "day light" bulb) was used for illumination. Color of the spores was observed on fresh or dried spores mounted in both the above media, and fresh spores were also checked for color in water mounts. In KOH the color of the spore walls usually deepens or may change from yellow in water to rusty brown in KOH.

The spores in this genus typically have a warty to wrinkled exosporium—or the remains of this exosporium are scattered over the surface of the spore, except for a smooth area or "plage", as it was termed by Kühner (1935), over the suprahilar region. The various situations surrounding this typical condition furnish characters of diagnostic value for taxa at and above the species level. For instance, our observations have shown that the prominence of the exosporial particles is constant within rather close limits, and that the pattern which the exosporial layer follows in the course of the development of the spore is also constant; consequently certain differences in the ultimate pattern which this layer, or its remains, displays in the mature spore are of major importance to the taxonomic picture. These, in our estimation, have not been properly evaluated by previous authors.

The span of variation in these characters in the genus as a whole extends from a smooth non-wrinkled layer, or the absence of such a layer, to one which breaks up leaving prominent warts and wrinkles (ridges) over most of the spore. The degree of roughness is often correlated with other characters. In some species the entire exosporium tends to loosen and fit over the episporium as a sack, and is very wrinkled to warty. This condition appears to be rather frequent in tropical and subtropical species, but is not limited to them. In other species the exosporium adheres tightly over most of the surface which then appears smooth, but loosens in certain places around the plage area so that in face view blister-like inflations are seen as "ears" on either side of the plage. Or the loosening may extend completely around the hilar end of the spore, making it evident that the outer layer fits tightly over the spore except at the basal portion. Although Kühner observed and illustrated this character in his *G. calyptospora*, he missed its significance, very likely because the European flora is very poor in species of the group showing this character. As a result, he included (1935) some quite distinct *Galerinae* under the name *G. hypnorum*. The results of our study of the North American *Galerinae* have clearly demonstrated that a large and natural group has this type of spore.

In other species the spore appears almost smooth, but a faint ragged line delimits the plage. Finally a completely smooth spore is encountered. Species with such spores are clearly peripheral for the genus and assignment to *Galerina* is made on other characters.

At the opposite extreme we find a rough spore without a smooth plage. Such species usually lack clamp connections, and, as in smooth-spored species, assignment to *Galerina* is based on other characters, particularly the *Mycena*-like aspect. Some species with clamp connections show only rudimentary plage formation, and in some species one can find spores in which the exosporium covers the plage area but is free except at the boundaries of the area—thus forming a blister which, if it breaks, leaves the plage smooth but marked by a ragged boundary line. Presumably this blister formation is typical for all species with a well delimited plage.

One of the interesting discoveries made in the course of this investigation was that there are two species in the genus in which a bandlike thickening of the wall occurs a short distance back from the apex of the spore, so that in optical section there appear to be two thickenings in this region, one opposite the other. The presence of this band often gives the face view of the spore a slight angularity. The significance of this character is not clear at present.

The episporium may be thick and dark colored or thin and very pale, and these differences appear to have definite taxonomic significance. They are reflected in the color of the spore deposit as well as in the color of individual spores seen under the microscope. The pigment is in the wall and as a rule becomes much darker in KOH.

A small apical pore is present in a few species and it is not difficult to envisage a progression from this group (Section *Porospora*) to the *Conocybe* type of spore (truncate apex), or, which is more important, a transition to

the genus *Kuehneromyces*. It is significant that in *Galerina* most of the species show no or only slight differentiation in the spore apex, and that all stages of differentiation up to and including that of a distinct pore are present. For practical taxonomic purposes we have established three categories: 1) no differentiation, 2) the existence of a callus (thin spot) at apex, (apex subacute or, at least, strongly convex, or slightly protracted), 3) a distinct pore. Those species classified in *Porospora* have a readily observable pore in the spore apex, or, as in the *G. stagnina* group, are obvious variants of a form which shows a germ pore.

Spore size and shape retain the same taxonomic value in *Galerina* as is found in related genera such as *Cortinarius*. When collections are made with care to avoid getting a mixture of species, spore size and shape in four-spored forms are very constant. We have demonstrated this time and time again on common species such as *G. tibüicystis*. Variability in spore size is most frequently encountered where one finds pilei with 1-, 2-, 3-, and 4-spored basidia. In other words, the relation emphasized by Smith (1934) in *Mycena* also holds in *Galerina*. It is interesting to note that spore characters other than size and shape do not vary much between the two- and four-spored conditions; that is, these behave as species characters should behave.

The spore deposit varies in color from ochraceous-yellow to rusty brown, and this character is doubtless of more value than we have given it here. However, because of the small size of the carpophores, and the varying degrees of sterility which are encountered in variant-spored forms with less than four sterigmata, it is often difficult to get comparable spore deposits. Consequently we have placed emphasis on the color of individual spores as seen under the microscope.

Abnormal spores are present in occasional specimens and these are found both in "diads" and "tetrads", indicating that they may arise from either 2-, or 4-spored basidia. An infrequent type of abnormality is the bifid type in which, as a result of forking, the spore has two apices. This type of abnormality is quite frequent in some groups of agarics, *Inocybe* (Heim, 1943), *Coprinus* and *Agrocybe* especially. We have demonstrated to our satisfaction that fusion of spores is not involved. In *Coprinus*, on 4-spored basidia, we have observed a second apex just beginning to develop on one of the spores of a tetrad while all were still attached to the basidium; one cannot help but wonder if an additional nucleus did not migrate accidentally into the spore in question.

The most common type of abnormality, however, is a snoutlike prolongation of the distal fourth or third of the spore, producing an exceptionally long and usually narrow spore of a rather characteristic shape. We do not know the cause of this phenomenon, but can say that it is not at all uncommon in the *Coprinaceae* (especially *Psathyrella*). In this type of abnormality the spore surface may be smooth or nearly so instead of showing the usual pattern for the species. Such spores have not been included by us in the description of the typical size range and ornamentation pattern for the species.

On the basis of the over-all picture of spore characters in *Galerina* we can affirm its relationship to *Cortinarius*, as emphasized by Singer (1951). This relationship is strengthened considerably by the discovery made by Jorge E. Wright that the spores of *Cortinarius violaceus* tend to develop a poorly defined smooth plage. Consequently, if any change were to be made in the arrangement proposed by Singer (1951), it would be to move *Galerina* closer to *Cortinarius*. Additional support for this is found in the *Cortinarius*-like species of the *Calyptrospora* group which, in other characters, certainly connect *Cortinari* of the *C. acutus* type with *Galerina*. When closer observations are made in the light of our present contribution it may be found that there are a number of small *Cortinari* which should be transferred to *Galerina*.

CYSTIDIAL CHARACTERS

Although there is great diversity in cystidial characters in the genus as a whole, they are remarkably constant within each species; when variation is found it is according to a definite pattern. In other words the situation is much like that found in *Mycena* (Smith, 1947) and in other genera.

Distribution: The distribution of cystidia through the hymenium, over the gill edges, over the stipe, and on the cuticle of the pileus, furnishes distinctions of major importance in the delimitation of species. The terminology of Buller (1924), placing emphasis on position as a basis for classification, is very appropriate here. We have deemed it desirable to treat the cystidia of the lamellae under one heading and the dermatocystidia, those cystidia found on the cuticular layers of pileus and stipe, under a second.

A. *Cystidia of the Lamellae:*

1) Pleurocystidia. All sterile bodies in the hymenium covering the faces of the gills, excluding basidioles, are termed pleurocystidia. Since in taxonomic work it is always necessary to describe the characters of the pleurocystidia, we have not tried to carry their nomenclature further, i.e., we do not use the terms leptocystidia, cystidioles, lamprocystidia and metuloids, because to do so does not obviate describing them, and once described, any cystidium can readily be placed in its special category.

The common type of pleurocystidium is the fusoid-ventricose type with an obtuse to acute apex, as illustrated for *G. vittaeformis*. These are thin-walled, smooth, and arise mostly in the subhymenium or from about the level of the basidia. Their walls are hyaline but in some groups show a tendency to be slightly pigmented (ochraceous) and to become thick-walled (see stirps *vittaeformis*). In view of this tendency we are inclined to predict that some *Galerinae* with pleurocystidia in the form of brown, thick-walled setae will eventually be discovered.

A less common type of pleurocystidium is that with broadly rounded apex, as shown for *G. pruinatipes*. This type is very common in *Psathyrella*, but in *Galerina* has so far been found mostly in western North American and

South American species. It will be interesting to see if this correlation between distribution and cystidial types holds when more is known about the genus.

A very rare type is the thick-walled, encrusted (metuloid) type, as illustrated by *G. nana*. The pattern of distribution for this species, however, appears to be indefinite—the fungus is rare but seems to be collectable in many regions, if one knows the species and its type of habitat.

Certain curiosities should also be mentioned here, such as the corkscrew type, found in *G. atkinsoniana* var. *sphagnorum*, and those dichotomously branched apices such as in *G. thujina*. The real taxonomic value of such odd characters remains to be verified, but on the basis of what is known of cystidia and their constancy we feel obligated to place emphasis upon our observations. In other genera such oddities in cystidial morphology have been found to be constant for species or groups of species, as in certain rough-spored species of *Mycena*.

A difficulty in using presence or absence of pleurocystidia as a distinguishing character results from the fact that pleurocystidia are often seen on damaged portions of the hymenium of species where such organs are typically absent. Such cystidia always resemble the cheilocystidia in all their characters. Insect damage is the commonest type of damage observed; it is not clear whether the stimulation to produce such pleurocystidia is chemicals liberated by the insect or originates from the damaged hyphal cells themselves. This tendency to produce pleurocystidia over damaged areas is not limited to *Galerina* but has been observed frequently in *Psilocybe* as well, by Smith; its explanation is not a matter limited to *Galerina*.

Sometimes two or more types of pleurocystidia are present on the gill of a single carpophore. In *Galerina* the most usual pattern in this regard is the occurrence of small cystidia (cystidioles of some authors) in addition to the larger prominently projecting type ("true cystidia" of some terminologies). In a few instances we have given taxonomic emphasis to such a pattern, but in general, because of the considerable range in size of pleurocystidia, both types should be present in large numbers and their size-ranges should not overlap, if the difference is to be regarded as having meaning as a taxonomic character. Here, again, the problem is not limited to *Galerina* or even to agarics in general. A more significant difference is that involving the occurrence of two types of pleurocystidia distinguished on the basis of characters other than size, but this is very rarely encountered in *Galerina*.

2) Cheilocystidia. As can be seen by a glance over the pages of illustrations, most of the known types of cheilocystidia found in agarics are found in *Galerina* and, in addition, the genus has developed others of its own. Thus the cheilocystidia are of great importance, but they are extremely variable as to shape and size in many species, and therefore they must be studied carefully and the pattern of variation thoughtfully ascertained in an evaluation of their taxonomic importance.

The following are the major types of cheilocystidia within the genus:

a) The ventricose-capitate type: Cystidia of this type resemble in a

way those found in *Conocybe* but are often more variable. See *G. heterocystis*. The term lecythiform has been applied to them. In general the apical capitellum is smaller than the basal ventricose portion but this is not always true as both may be small, as in the stirps *Sideroides*, or, as in *G. subcerina*, the capitellum may be the same width as the base (9–12 μ in diam.).

b) The narrowly ventricose-capitate type: Atkinson applied the term tibiiform to these cheilocystidia. This type is characteristic of certain groups of species in *Galerina*, and in general is constant within expected limits of cystidial variation in a given species. In fact it is one of the most constant types in the genus. (See *G. tibiicystis* and members of the stirps *Sideroides*.)

c) Intermediate type: Under this type we place the pattern of variation observed in *G. cerina*. Here occasional cystidia of type *a* occur but most are ventricose-subcapitate or with oval apices, varying to the normal fusoid-ventricose obtuse type described as type *d*. This intermediate type *c* appears to have given rise, in different populations, to quite a number of variations in size and shape, and these account for taxa below the species level grouped around typical *G. cerina*.

d) The fusoid-ventricose type: This type occurs more frequently than any other and consists of a cystidium with a ventricose portion near the base narrowed to a neck above, and with an obtuse to acute apex. There may or may not be a distinct pedicel below the ventricose part. This type is often present when similar structures occur as pleurocystidia.

e) Vesiculose cells with or without prolongations. This is a rare type in *Galerina*, and when it does occur usually is found with some other type and is most easily seen in the part of the gill edge nearest the cap margin. Variation is toward a clavate type of cell somewhat like that found in many species of *Mycena*, but in that genus there has been greater specialization in the types of protrusions to which the cells give rise.

f) The broadly-rounded ventricose type. This occurs in species with similar structures present as pleurocystidia, but can also be found in some species lacking pleurocystidia. It varies to a somewhat filamentous-capitate type in which the filamentous part may or may not have wavy walls.

g) Miscellaneous types. Special modifications such as the cork-screw type and those with dichotomously forked apices are grouped here. So far these have been found to have no significance as groups, but rather indicate bizarre types, which, when more is known of the genus, may be found to be more wide-spread than we now know; they cannot be regarded as indicating relationship between species.

General comments on cheilocystidia: One general tendency noted in the genus is the development of slightly thickened ochraceous walls in the pedicels of the cheilocystidia. This is not constant enough or pronounced enough, insofar as we have observed it, to be of much value taxonomically. Such a tendency is also present in *Psathyrella*, a larger genus but of the same order as regards the cheilocystidia. The existence of this situation as a pattern in the genus causes one to wonder whether somewhere species with truly distinctive cheilocystidia with well-colored thickened walls do not exist.

In a few species, incrustations of material occur over the surface, often rather characteristically localized, and we have given emphasis to these at the species level, e.g. *G. lacustris*. In the genus as a whole, however, such incrustations appear to be in the nature of oddities, at least we have discerned no pattern which can be correlated with other characters. In regard to the matter of refractive inclusions, there does seem to be a correlation of the tibiiform type and the presence of small hyaline refractive granules and wall thickenings in or near the apex of the cell. These are minute and are best observed with an oil immersion lens. We have reported their presence but are not certain of their value as taxonomic characters.

It is not uncommon to find more than one type of cheilocystidium present in a species. For instance, if the gill edge is sterile with clavate to fusoid-ventricose elements, and pleurocystidia of some other type are present, one can expect to find the pleurocystidial type also present on the gill edge. In this respect *Galerina* is not different from *Pluteus*, *Inocybe*, *Psathyrella*, or *Agrocybe*. The only way we have found of evaluating this situation is to study each species carefully to determine its own pattern.

B. *Dermatocystidia*.

a) *Pilocystidia*. These structures occur in a sufficiently large number of the subsections and stirpes so that they should be recognized as an important character. A clue to their presence can be obtained by examining fresh young pilei under a good hand lens. If many are present the fresh cap appears minutely pubescent. However, sections always must be made for final verification, to ascertain such details as size, shape, wall-color, thickness, etc. Most often the pilocystidia more or less resemble the cheilocystidia. We do not find them so numerous as to form a turf or palisade layer, however. In the *G. vittaeformis* group pilocystidia with brown, somewhat thickened walls are known to occur along with the more abundant, hyaline, thin-walled type. In none of the species examined have these been a practical taxonomic character.

b) *Caulocystidia*. These account for the pubescence or pruinosity on the upper part of the stipe in most species. In general they resemble the cheilocystidia but vary more in size and shape. In the stirpes *Vittaeformis* they often extend to the lower part of the stipe, are very brittle (indicating hardened walls, somewhat thickened) and may be slightly colored, at least in the lower portion. Irregular to straight cylindrical filaments may be occasionally mixed in with the more characteristic elements. Here again, one must establish the pattern of variation for the species by many observations, and the age of the fruiting body is very important as these structures may be collapsed on old specimens.

HYPHAL CHARACTERS

Hyphae of the Gill Trama. In *Galerina* the gill trama is usually composed of parallel to somewhat interwoven hyphae and the hymenopodium is not

well developed. The hyphae usually have incrusting pigments which darken in KOH to ochraceous-brown or darker fulvous. The darkening effect of KOH is evident with sections of fresh as well as of dried material. In a few species there appears to be some differentiation in the subhymenium, in that the latter may be somewhat gelatinous as revived in KOH. This condition reminds one of the characteristically gelatinous subhymenium of some species of *Pholiota* (*sensu stricto*). So far, however, we have encountered difficulty in using it as a taxonomic character. The effect of the age of the carpophore on degree of gelatinization needs to be studied further, on fresh material. When the observations are properly standardized and more detailed studies of fresh material have been made, this differentiation may prove to deserve more emphasis than we have given it.

Cuticle of Pileus. The pileus trama in *Galerina* is said to be "homogeneous" in contrast to that of *Conocybe* in which there is an hymeniform layer as an epicutis, but the term "homogeneous" is improperly applied. In many species of *Galerina* a differentiated pellicle is evident which is composed of hyphae narrower than those of the tramal body and with walls of different chemical composition, i.e., gelatinous. Also, some species have pilocystidia, and to this extent the surface layer is specialized. Typically one finds in the tramal body interwoven nongelatinous hyphae of moderate to large diameter, more or less incrusting with pigment, which may, in some species, become very dark brown in KOH. In some the wall also contains pigment.

In many species the pileus trama, exclusive of the epicutis, lacks any distinctive organization—if an hypodermium is present it is poorly developed. In *G. insignis*, however, a unique type of structure is described (p. 215), and in *G. fibrillosa* the structure of the cuticular region is like that found in the subgenus *Inoloma* of *Cortinarius*. About the only *Galerina* characters of either species, however, are the small size, the cheilocystidia, and the demarcation of the plage on the spores. Since these are the characters which must be used as a final distinction between *Cortinarius* and *Galerina*, they should not be minimized. More exploration in mountains and the northern areas generally should be carried out in order to try to discover species linking such taxa as *G. insignis* more closely with the remainder of *Galerina*.

COLOR OF CARPOPHORE

The color of the pileus is actually not very distinctive for most species; it is some shade of pale to dark fulvous. After one has spent considerable time observing species closely, however, it is found that many of the slight differences in intensity are constant, although they are difficult to describe even with the aid of a color chart. This has influenced us to place some taxonomic emphasis on such differences as "cinnamon brown" (dark rusty brown) contrasted with "ochraceous tawny" (pale fulvous), or those colors going into the ferruginous series contrasted with "ochraceous tawny"—in other words the more pronounced color differences. These colors are, for the most part, an expression of the material incrusting the hyphae as well as the pigment in the hyphal walls themselves. This type of pigmentation

is the most constant found in the agarics, but it does frequently show decided changes when treated with strong bases such as KOH. We regard such changes as important, but they are not peculiar to *Galerina*. Chemical characters other than the KOH reaction have not yet been studied for most of the species and are not emphasized here. In view of the work on *Gomphidius* (Smith & Drisinger, 1954), we made a detailed study of dried material, of *Galerina*, to ascertain the iodine reactions of the flesh (Melzer's reagent). In the material studied to date no pronounced reactions of taxonomic importance have been found.

The color of the young gills is distinctive only when it is completely out of line with that of the majority of the species—pallid honey color to darker ochraceous. At maturity the color of the spores masks the earlier gill color. Although *Galerina* is to be regarded as closely related to *Cortinarius*, it does not show the diversity of gill colors (in young stages) of the latter genus, so that for *Galerina* gill color can be relegated to a position of little importance, except, perhaps, when dealing with species of doubtful position between the two genera.

We have found the color of the stipe to be relatively constant and reliable. In general it is merely a paler shade of that of the pileus; however, in some species a very pronounced darkening progresses upward from the base as the carpophores age. We have found this to be a valuable character, just as it is in related genera. The darkening may progress to the degree of "mummy brown" (nearly black) or it may darken in the bay-brown series to chestnut-brown or bay. In the stirps *Vittaeformis*, for some reason, the two-spored forms generally have stipes which darken more than those of the correlated, four-spored forms, but conditions during a single season can obscure this somewhat. During dry seasons the change is less pronounced than during seasons in which the precipitation is above normal.

In some species the stipe may be almost colorless when young, and gradually become dingy yellowish over all by maturity. This type of change is not to be confused with that described above; it is likely to occur in any species during aging, regardless of the original shade. In one species the stipe is dark umber over all at first but fades out as the carpophores age; this is an anomalous situation.

In only one species is the color of the veil markedly different from the general pattern (white to brown); viz., in *G. microcephala*, where it is green.

HABITAT SPECIALIZATION

For many species of *Galerina* the habitat appears to be a very important character; this indicates a certain degree of specialization. In the genera of Basidiomycetes, generally, there are almost always forms which differ from others by a lack of this type of specialization. This has been shown to be true in highly specialized groups such as *Crinipellis*, and even in mycorrhizal genera such as *Suillus*, where the section *Piperati* differs from the others in that its species form mycorrhiza not only with conifers but with hardwoods as well. According to our experience, in *Galerina* such unspecialized forms

are represented by *G. semilanceata* and *G. unicolor*. In contrast to these we have observed some habitat groups which we believe to be worth enumerating.

Typically sphagnicolous: *G. turfosa*, *G. evelata* (also on *Polytrichum*), *G. boliviara*, *nubigena*, *farinacea*, *G. cerina* var. *cerina* (also on *Polytrichum*), *G. cerina* var. *ampullicystis* (also on other mosses), *G. sphagnicola*, *G. tibiicystis*, *G. subtibiicystis*, *G. paludosa*, *G. gibbosa*, *G. sphagnorum*, *G. semiglobata*, *G. taimbesinhoensis*, *G. ferruginea*, *G. emmetensis* (also on other mosses), *G. stagnina*, *G. macrospora*, *G. riparia* and *G. atkinsoniana* var. *sphagnorum*.

Typically on *Polytrichum* and related groups: The *G. cerina* complex, *G. evelata* (see above also), *G. aberrans*, *G. inconspicua*, *G. saltensis* (also on other mosses).

Predominantly on *Dicranum*: *G. mycenopsis*, *G. cerina* (some forms).

Typically on burned ground: *G. carbonicola*, *G. aberrans*, (also on *Polytrichum*), *G. funariae* (on *Funaria*), *G. ferruginea*, (also on burned peat), *G. sphagnorum*, *G. subtibiicystis*, *G. semiglobata*, *G. taimbesinhoensis*.

On detritus left by avalanches, a habitat especially characteristic of the Pacific Northwest: *G. cascadiensis*, *G. insignis*, *G. rudericola*, *G. glacialis*.

On open lawns: *G. venenata*, *G. semilanceata*, *G. brunneimarginata* (the last two occur in other places as well).

On herbaceous stems of angiosperms or on, or associated with, non-arboreous angiosperms: *G. vaccinii* (*Vaccinium*), *G. subannulata* (*Empetrum*), *G. mollis* (*Capnoides*).

On conifer needles: *G. acicola*, *G. larigna*, *G. agloea*, *G. pinetorum* (also, from other habitats, *G. heterocystis*, *G. cedretorum*, *G. pseudocamerina*).

In greenhouses, cellars, etc.: *G. helvoliceps*, *G. nana*.¹

Among the lignicolous species there is a large group growing almost exclusively on moss-covered logs. For some of these, the presence and quality of the woody substratum seems to be of less importance than the genus of moss involved, e.g., variants of *G. cerina*, *G. dimorphocystis*, and *G. decipiens*. Some species grow on both conifer and hardwood logs, e.g., *G. triscopa*, *G. patagonica*, *G. autumnalis*.

Those observed only on conifer wood: *G. sahleri*, *G. laticeps* (*Pseudotsuga*), *G. fallax*, *G. subbadia*, *G. mammillata*, *G. sideroides* var. *sideroides*, *G. vinaceobrunnea*, *G. subfiliformis*, *G. tsugae* (*Tsuga*), *G. pruinatipes*, and *G. megalocystis*.

Observed only on hardwood logs: *G. pallidisporea* (*Alnus*), *G. uncialis* (*Quercus*), *G. tahquamenonsis*, *G. stylifera* var. *caespitosa*, *G. bullulifera*, *G. olympiana* (*Populus*), *G. papillata*, *G. minor*, *G. microcephala*, *G. subbullulifera*, *G. mesites*, *G. helvoliceps*, *G. viscida* (*Alnus*), *G. victoriae* (myrtaceous and fagaceous substrata), and *G. nana*.

Characteristically on rich loam, sand and humus: *G. odora*, *G. cortinarioides*, *G. occidentalis*, *G. fuscobrunnea*, *G. jaapii* (sometimes), *G. rugisperma*, *G. humicola*, *G. tundrae*, *G. subdecurrens*, *G. fibrillosa*, *G. farinosipes*, *G. arenaria*, *G. vialis*, *G. reflexa*, *G. clavus*, and *G. fuegiana*.

From the above listing and an examination of the appropriate para-

¹ Here we are dealing with species introduced from the American subtropics; both occur frequently in natural associations of Central and South America.

graph under each species, it is evident that in *Galerina* there appears to be no specialization toward mycorrhiza formation, such as is a feature of the related genus *Cortinarius*. This problem invites further study, but from existing evidence it appears that this difference between the two genera is quite sharp.

PHYLOGENETIC CONSIDERATIONS

A discussion of the relationship of *Galerina* to other agaric genera involves a review of the characteristics of these genera as well as a consideration, within *Galerina*, of the lines of speciation involving the characters upon which the supposed relationships are based. Let us first consider the lines of relationship within the genus against the categories of our classification, and in the order in which the latter are presented in our taxonomic section. This order, we hasten to add, is not to be regarded in itself as a phylogenetic progression.

I SUBGENUS TUBARIOPSIS

This is a small group of seven species classified as a subgenus, but very likely artificial at the infrageneric level. In it there are three species with spores having relatively thin, weakly ornamented walls: *G. nigripes*, *G. brunneimarginata* and *G. laevis*. On the basis of their spore characters we regard these three as closely related to each other. In some respects they show a closer affinity to certain species in section *Mycenopsis* of subgenus *Galerina* than to the other members of the subgenus *Tubariopsis*, for in *Mycenopsis* one finds a tendency toward reduction in number of clamp connections (*G. subtibiicystis*) and, among veilless species, an ornamented plage area (*G. tibiicystis*). *G. dimorphocystis* could very easily have been derived from near *G. pallidisporea*, (Section *Mycenopsis*), for in both the ornamentation of the spore is so slight that the question of ornamentation of the plage area is mostly academic, the important character in this instance being the presence or absence of clamps. The absence of a veil and the type of cheilocystidia indicate a connection between these two. *G. heterocystis*, *G. semilanceata* and *G. subceracea* comprise an inter-related group which we think may have originated from the vicinity of *G. hypnorum* (Section *Mycenopsis*) by the loss of clamps and by the plage remaining ornamented. These two characters, which delimit *Tubariopsis*, are of such a nature that they may represent single unit characters. The fact that they are correlated here, and that the combination of clampless hyphae with spores having a smooth plage has not been found, leads us to recognize the group as a subgenus even though the species do not represent an evolutionary sequence progressing from one species to another. It is our opinion that for practical taxonomic purposes it is a mistake to insist that truly natural groupings, as represented by existing species, have evolved in such single-line progressions.

In summary, we believe that the species of *Tubariopsis* can be derived

from at least two sources in the section *Mycenopsis*, or from an unknown common ancestor of the two, but that as a group they now depart far enough from the members of the core of the genus to be given the rank assigned to them in our classification.

II SUBGENUS GALERINA

Species with clamp connections on the hyphae and spores having a smooth plage (or spores entirely smooth) are grouped here.

SECTION CALYPTROSPORA

This section consists of an interesting assemblage of species better represented in the American than in the European flora. As a section it has the weakness of being based on a single character, the calyptrate spores, but as a practical aid in the recognition of species it is a most helpful grouping. There are two species, *G. subarctica* and *G. cortinarioides*, in which the fruit bodies, on the basis of their aspect in the field, very closely resemble small *Cortinarii*, and in both the spore wall, except for the smooth plage and the "ears", is roughened, as in many members of *Cortinarius*. Morphologically all that keeps them from being *Cortinarii* is the smooth plage and, around it, the wall separations which produce the characteristic "ears".

Cheilocystidia are well known for many species of *Cortinarius*, section *Hydrocybe*, and size ranges of its fruiting bodies overlap completely with those of *Galerina*, as Smith has demonstrated repeatedly in his field work in North America. Since the calyptrate condition is often found in only 15 per cent or less of the spores of a given species, one can hardly argue that this feature represents a serious objection to the idea that in this section we have a pathway connecting *Galerina* to *Cortinarius*. As for the smooth plage itself, *Galerina* contains species which lack it, and *Cortinarius* contains some which have it, so the presence or absence of the plage, a central character in distinguishing between the two genera, can hardly be used to refute the idea of the pathway postulated above.

G. odora has smoother spores than *G. subarctica* and *G. cortinarioides* and hence may be regarded as more distant from *Cortinarius*. *G. turfosa*, a fourth species in this complex, has the pigmentation of a *Cortinarius* but is a more typical *Galerina* in all other respects. All four species have the fibrillose inner veil which denotes a connection with *Cortinarius*. An odd character in both *G. subarctica* and *G. turfosa* is the tendency for the spores to appear angular in face view. The significance of this will be discussed later in connection with *G. allospora*.

Two species, *G. anelligera* and *G. psathyrelloides*, appear closely related to each other but not obviously associated with a line of development to any other group. These two may possibly connect up to the *G. cortinarioides* group through *G. acicola* on the basis of pigmentation. It is noteworthy that

obscurely angular spores are found in *G. psathyrelloides*. This is a prominent feature of species of *Inocybe*.

Though *G. macquariensis* has calyptrate spores it is foreign to this section. Since it is different in appearance from the other members of this section, and is characterized by an annulus and viscid pileus, it seems preferable to place it near *G. autumnalis* (Section *Naucoriopsis*) as far as natural relationships are concerned. No matter in what section it is classified, it will have to be keyed out in at least one other section. It does not fit into any of the lines of relationship in section *Calyptrospora*.

G. boliviana, *G. nubigena*, *G. farinacea* and *G. sphagnicola* form a calyptrate-spored group growing on *Sphagnum*, comparable in a way to the group around *G. sphagnorum* (Section *Mycenopsis*), since the fruit bodies show the usual modifications associated with that habitat. Veil development varies from copious to none at all in this group, as it does also in those species related to *G. sphagnorum*. The two groups are similar in that the spore surface is smooth to nearly smooth. In our estimation it is an open question as to what the actual relationships between species groups are here. A connection to section *Mycenopsis* is obvious, but is it to the species around *G. sphagnorum* or to other species, found on other genera of mosses? When one considers this group, he can understand why Kühner failed to interpret the calyptrate condition as an important character.

G. payettensis and *G. sahleri* have fruiting bodies somewhat resembling those of *G. triscopa* (Section *Mycenopsis*), but the microscopic features indicate a relationship closer to the species around *G. cerina* of this Section. The subacute cheilocystidia of *G. payettensis* are an unusual character in the *G. cerina* group, but the latter species show such tremendous variation in cystidial characters that the inclusion of *G. payettensis* in it is actually quite logical. Ultimate derivation of the *G. cerina* complex from the stirps *Triscopa* of Section *Mycenopsis* is a likely possibility. *G. cerina*, of course, is a tremendously variable species, and it will not be surprising if eventually it is divided up into a number of species. A most interesting feature in *G. cerina* is that among its variants (var. *longicystis* in particular) it connects very well with the members of the *G. pumila* group (Section *Mycenopsis*), so well that one usually seeks there for an identification if the specimen involved has fewer than the usual number of calyptrate spores.

G. filiformis is rather anomalous in having calyptrate spores and scattered to clavate to vesiculose pleurocystidia. On this basis it might be placed in Section *Physocystis*, but we suspect that its relationships are closer to the group around *G. minima* of Section *Galerina*.

G. austrocalyptrata, *G. fallax*, *G. evelata* and *G. subcerina* form a distinct group of veilless species otherwise very similar to those around *G. cerina*, and very likely derived from that group. The features separating the species are routine; i.e., spore size, color of carpophore, etc.

In regard to the section *Calyptrospora* as a whole, it is evident to us that it represents a number of branches originating in the subsection *Mycenopsidae* of Section *Mycenopsis*. This conclusion is based on the smooth to weakly

ornamented spore wall and the "*Galerina hypnorum* aspect" of so many of its members.

SECTION MYCENOPSIS

Subsection Tibiicystidiae

Here we recognize three groups, stirpes *Tibiicystis*, *Triscopa* and *Sideroides*. The subsection is based on the shape of the cheilocystidia, the index character being the width of the neck in its narrowest part. The stirpes are rather routinely characterized, i.e., habitat on *Sphagnum*, and rough as contrasted with smooth spores. As already pointed out, the members of the stirpes *Tibiicystis* show relationships with species in the subgenus *Tubariopsis*. As to relationships with other divisions of the genus, they connect to stirpes *Triscopa* through *G. pseudocerina* and *G. pistillicystis*. *G. tibiicystis* itself reminds one of a number of species in section *Mycenopsis*.

As for the stirpes *Triscopa*, a number of trends can be seen in the groupings listed below. The most discordant element is *G. uncialis* which may easily have been derived from stirpes *Cedretorum* of section *Naucoriopsis*, by the loss of pleurocystidia. That a change of this type can occur in agarics was pointed out by Smith (1947, p. 135) for *Mycena cayugaensis*. The spore ornamentation of *G. uncialis* supports this suggested relationship. Three large-spored species form a natural group around *G. cascadenis*. In this group, *G. camerinoides* lacks a veil and *G. pseudocerina* has rather roughened spores, but the other characters are quite routine. It is a simple matter, using spore size and the shape of the cheilocystidia as indices of relationship, to connect this stirpes to members of stirpes *Hypnorum*.

The group centering on *G. triscopa* is a distinctive, rough-spored group showing considerable range in veil development from no veil present to a truly copious veil as in *G. tahquamenonensis*. *G. tahquamenonensis*, *G. pellucida*, *G. puichra*, *G. triscopa*, *G. laticeps*, *G. mutabilis*, and *G. subbadia* are typically lignicolous species. The connections of this group to other *Galerinae* are a bit obscure, but some indications may be postulated on the basis of spore ornamentation which is typically conspicuous and reminds one of that found in many species of section *Naucoriopsis*, such as *G. autumnalis*, *G. unicolor* and *G. marginata*. Furthermore, a connection between stirpes *Triscopa* and Section *Naucoriopsis* may not be as remote as appears at first sight. The discovery of *G. wellsiae* has furnished evidence that the character of the presence of pleurocystidia is not an infallible indication of relationship among these fungi. Singer's discovery of *G. yungicola*, with essentially tibiiform pleurocystidia, is further evidence of a connection between the two groups. In the variants around *G. triscopa* it is a common thing for pleurocystidia to develop on areas of the hymenium where the basidia have been damaged, thus the genetic difference between pleurocystidiate and non-pleurocystidiate species may actually be slight. The most important difference to be accounted for is the shape of the cheilocystidia, but when this is considered in the light of the known variation in this character in the *G. cerina* complex

one hesitates to emphasize it here as far as phylogenetic considerations are concerned.

Galerina pistillicystis is interesting because it is characterized by tibiiform pilo-, caulo-, and cheilocystidia. It is comparable, in a general way, to species of stirps *Vittaeformis* but pleurocystidia are absent. A relationship to *G. pseudocerina* has already been pointed out, but the latter has a slight veil and may therefore be regarded as connecting up well with *G. pteridicola*, *G. aimara* and *G. yungicola*. These have thin veils leaving scattered fibrils over the lower part of the stipe. *G. yungicola* is aberrant in having pleurocystidia, but this is not out of line with our observations on the stirps *Triscopa* generally.

The stirps *Sideroides* is a progression of stirps *Triscopa* to species having smooth or essentially smooth spores. The general lines and groups of closely related taxa follow pretty much the pattern already discussed for stirps *Triscopa*.

The group around *G. pseudocamerina*, consisting of *G. occidentalis*, *G. cinctula*, *G. pseudocamerina*, *G. ampullaceocystis*, and *G. larigna*, are large-spored, rather heavily-veiled species. These show a connection with the stirps *Triscopa* in that the spores are not truly smooth. Also, in some species the cheilocystidia vary somewhat from the tibiiform type. A second group, differing from the *pseudocamerina* group only in the more poorly developed veil and smoother spores, is composed of *G. pallidispora*, *G. luteofulva*, *G. perangusta*, *G. dominici* and *G. borealis*. Both groups taken together show that speciation is active and lines of similarity (relationship?) are difficult to interpret because of connections between them in their fundamental characters.

In the small-spored species of stirps *Sideroides* (spores 10 μ long or less on 4-spored basidia) there are some significant features indicating a progression away from the core of the genus. The spores are smooth or practically so, and the shape, as seen in profile view, is less and less inequilateral to almost subelliptic. This is a distinct step away from the typical *Galerina* spore. In *G. pseudostylifera* the spore is slightly compressed. This is a feature of great importance in such genera as *Psilocybe* but it has not become prominent in *Galerina*. The central species in this small-spored group, *G. stylifera*, along with its variants, including *G. cuspidata*, *G. mammillata*, *G. sideroides* and *G. vinaceobrunnea*, has an interesting character which appears here for the first time in the genus, namely a gelatinous to subgelatinous hymenopodium, but it is not constant enough to be used as a practical taxonomic feature. In *Pholiota*, however, this feature is well developed. The smooth, or essentially smooth, spores, more or less ellipsoid in shape, a cartilaginous rather than fleshy-fragile consistency, and a viscid pileus, along with a fairly well-developed veil in some variants, also suggest *Pholiota*. The group is a vigorous one judging from both the number and the abundance of the species.

A somewhat less typical group in stirps *Sideroides* is that centered around *G. pseudo-badipes* and containing *G. fuscobrunnea*, *G. castanescens* and *G. agloea*. In *G. agloea*, for instance, most of the cheilocystidia have subacute rather than capitate apices. The cheilocystidia of *G. fuscobrunnea* are also slightly aberrant for the group.

Subsection Bulluliferinae

The subsection Bulluliferinae (one species, *G. bullulifera*) with vesiculose cheilocystidia may be related to *G. filiformis*, if the similarity in the shape of the pleurocystidia of the latter to the cheilocystidia of the former is used as a criterion, but we feel that the best that can be said of this subsection is that the relationships of the one species are so obscure that we are not able to select any one stirps in the *Mycenopsidae* as a point of origin for it; the verrucose spores would favor the *G. hypnorum* series.

Subsection Mycenopsidae

In this subsection the first grouping of species, stirps *Sphagnum*, is based on habitat, i.e., growth on *Sphagnum*, and as such does not represent a single phylogenetic line. The stirps is characterized, in addition, by the presence of a veil, smooth to practically smooth spores, and the characters defining the subsection. *G. norvegica* is aberrant because of its filamentous cheilocystidia, but on the basis of the annular zone left by the heavy veil, it could easily be a direct offshoot of *G. sphagnum*, *G. paludosa* or *G. andina*. We regard stirps *Sphagnum* as possibly more an ecological than a phylogenetic grouping. It is interesting that *G. taimbesinhoensis* lacks a clearly defined spore plage. If one were to disregard habitat, the species included in the stirps *Sphagnum* could easily be distributed in stirpes *Hypnorum* and *Mycenopsis*, and their relationships, as far as we can ascertain them, are with these two groups. *G. septentrionalis*, however, may actually be more closely related to *G. stagnina* (Section *Porospora*) than to stirps *Sphagnum*, since it has a slightly better developed apical opening of the spore, though this is scarcely large enough to be termed a "pore" in our classification. If one is searching for a connection to *G. stagnina* from section *Mycenopsis*, this species cannot be disregarded.

The core of the genus *Galerina* is composed of stirpes *Hypnorum* and *Mycenopsis* of the section *Mycenopsis*, and all of the section *Galerina*. This characterization not only emphasizes the smooth plage of the spore as a central feature but emphasizes the point that species with the mycenoid aspect but with smooth spores are also to be considered typical. This somewhat anomalous situation is inherent in any natural arrangement of *Galerina* simply because this is probably the way the species have evolved.

The first group we recognize in stirps *Hypnorum* is the group around *G. japii*, characterized by large spores and a fibrillose annular zone on the stipe. We place *G. ferruginea* in a separate group because of the color (dark ferruginous) and the fact that the plage area of the spore remains mostly ornamented. This species is of importance in considering the relationship of *Galerina* to *Cortinarius* where ferruginous colors are common and most spores have an ornamented plage area. *G. carbonicola* is a species with a smooth spore plage but it is connected to *G. ferruginea* by its pigmentation, and we place it close to the latter. We list *G. rugisperma* as a more isolated species on the basis of the spore ornamentation. There may be a connec-

tion with *G. helvoliceps* (stirps *Marginata*), but it is equally possible that this character of the over-all loosening of the outer spore layer which the two species share has arisen independently a number of times in the genus. In *G. decipiens* var. *separans*, a closely related taxon, there is a tendency for the outer layers of the spore to separate around the plage.

The remaining species of stirps *Hypnorum* center around the type of the stirps. They show a gradual diminution of over-all spore ornamentation to the extent that it is often difficult to decide whether a species is in this stirps or in stirps *Mycenopsis*. In our estimation there is a clear broad connecting band between the two groups, and one could well ask if there is actually any significant difference between them; however, we consider spore characters basic and prefer to use them if at all practicable. In this instance the feature used does serve to separate two groups of species, but as groups they intergrade and we recognize them at the lowest possible level.

In the stirps *Mycenopsis* we have species lacking pleurocystidia and with smooth to almost smooth spores. There are a few rather distinctive taxa or groups of taxa. The first, *G. tatooshiensis*, has a smooth spore without a pore, the aspect of *G. unicolor*, and a fibrillose annulus; but it appears that there is no very close relationship to section *Naucoriopsis* as might be suggested by the aspect of the fruit bodies, since two major features, spore ornamentation and presence of pleurocystidia, are not in agreement.

G. allospora is an odd species because of the peculiar subapical bandlike zone of wall thickening, but this is found in section *Inoderma* also. We see no true connection with that section because of this; it is more likely an instance of the simultaneous appearance of the same character in different lines within a genus. *G. dicranorum* may be regarded as somewhat atypical in the stirps because of the subfilamentous cheilocystidia. *G. embolus* could be considered a distinct stirps connecting up with the section *Physocystis*, but lacking pleurocystidia; we have not examined material, but base our statement on Orton's illustration of the cheilocystidia.

A group of dark colored species centers around *G. naucorioides*, the colors varying from ferruginous to dull cinnamon-brown, as contrasted with cinnamon to fulvous colors. The species placed here are *G. naucorioides*, *G. tundrae*, *G. emmetensis* and *G. aberrans*. Here again a *Cortinarius* aspect can be noted in some species. *G. pumila* and its variants, along with such closely related species as *G. leucobryicola*, *G. lacustris*, *G. lubrica*, *G. vexans*, *G. restrata*, *G. laeta*, *G. fennica*, *G. pumila*, *G. luteolosperma*, *G. subfiliformis*, *G. polytrichorum*, *G. cainii* and *G. proxima* form the central group in the genus. Among its members one finds a tendency toward the rich colors of *G. tundrae* (in *G. cainii*), variable spore size and variable spore ornamentation, a tendency for the pileus epicutis to gelatinize, and a great deal of variation in the shape of the cheilocystidia around types which have a ventricose base, a thick neck and, some sort of apical enlargement. The stirps *Hypnorum* connects with this group by all characters including spore ornamentation, as has been pointed out previously. Stirps *Sideroids* is to be regarded as merely a refinement of it with a few new characters appearing. Section *Galerina*

connects to it by all characters except the presence of pleurocystidia and well ornamented spores. Section *Porospora* connects up to the *Mycenopsidae* as a whole because in this group, especially in stirps *Mycenopsis*, there is some apical differentiation in the spore wall. It is for these reasons that we consider the stirps *Mycenopsis* a central one and the *Mycenopsidae* as a major part of the "core" of the genus.

SECTION POROSPORA

This Section is characterized by spores having an apical pore. A number of groups can be recognized on rather routine characters, such as spore size. In *G. lateritia*, and *G. subtruncata*, the spores are typically under 10 μ long. This group connects up to the stirps *Triscopa*. The variants around *G. stagnina* are characterized by very large spores, measuring 7–10 μ wide. *G. stagnina*, *G. stagninoides* and *G. macrospora* belong here. These appear to connect up to stirps *Mycenopsis*, possibly through *G. septentrionalis*. *G. nybergii* and *G. subdecurrens* are narrow-spored species with a *Galerina* aspect. *G. pseudomycenopsis* is also included in the section, but some doubts remain as to its true connections.

The interesting feature of this section is that we can trace transitions from a spore with very little apical differentiation to one with a practically truncate apex, and the connections to the typical *Galerina*-type spore are unmistakable. In view of the fact that the truncate spore is a central feature of the *Bolbitiaceae* and *Strophariaceae*, its presence here is noteworthy.

SECTION INODERMA

This is a small rather homogeneous group, peripheral to the core of *Galerina*. The distinguishing feature of the group is the innately fibrillose pileus which in two species shows a transition to the moist, hygrophorous type. To divide the section into stirps would require one for each of the four species. *G. insignis* has spores with a wall thickened as in *G. allospora*. *G. fibrillosa* is the most coarsely fibrillose species in the genus, being almost like a *Phaeomarasmius*. When fresh, *G. tsugae* has the cinnamon-brown color of a *Cortinarius* and is lignicolous. *G. vaccinii* is fulvous and grows under *Vaccinium* in high mountain meadows. Their connections to the main body of species in *Galerina* is not very clear beyond their relation to stirps *Triscopa*, *Hypnorum* and *Mycenopsis*.

SECTION PHYSOCYSTIS

The species of this section, with their broadly rounded pleurocystidia, fall into minor groups of various size. *G. cingulata* seems to be an isolated species because of the annular zone of veil remnants and the gelatinous pellicle of the pileus. *G. pruinatipes* is characterized by a bitter taste, coarsely ornamented spores and naucorioid aspect. A veil is present. *G. farinosipes* lacks a veil, the stipe is pubescent from caulocystidia, pilocystidia are pres-

ent, and the spores are faintly ornamented. *G. olympiana* and *G. salicicola* are more *Galerina*-like. Their spores are faintly ornamented. *G. microcephala*, *G. arenaria* and *G. subpapillata* are alike in having a copious veil and coarsely ornamented spores. *G. subbullulifera* is distinguished by inflated cheilocystidia. It is not surprising to find this type of cheilocystidium of diagnostic importance in at least a few species of *Galerina*. The remainder of the species, *G. victoriae*, *G. papillata*, *G. minor* and *G. viatica*, may be regarded as intermediate between this section and stirps *Cedretorum* of section *Naucoriopsis*. A veil is present at first, but it is thin.

In section *Physocystis* as a whole, the pleurocystidia depart markedly from the type found in the sections *Naucoriopsis* and *Galerina*. The important distinguishing features are the thick neck and broadly rounded apex of the pleurocystidium. The spores are typically galerinoid. The members of this section may have originated from the *Hypnorum* group, from near those with cheilocystidia having thick necks, or from stirps *Mycenopsis*, particularly those species having faint spore ornamentation and cheilocystidia with thick necks. However, we have no real evidence of this in the form of parallel species, one showing pleurocystidia and the other lacking them. It is quite possible that further collecting will lead to the discovery of species like *G. wellsiae* (Section *Naucoriopsis*), a species which connects taxa lacking pleurocystidia to those which have them.

SECTION NAUCORIOPSIS

This section shows more distinct developmental trends than does section *Physocystis*. In the stirps *Autumnalis*, based on the single character of the gelatinous pellicle of the pileus, two groups can be recognized, one around *G. subochracea*, with very fine spore ornamentation, and the other around *G. autumnalis*, which has well developed spore ornamentation. In neither of these groups is the fruiting body mycenoid in aspect. It appears to us that *G. autumnalis* and its satellite species represent an end line of development, since it cannot be claimed that the group connects to *Pholiota* even though some of the species were once placed there (see *G. autumnalis*) under the old Friesian classification. *G. reflexa* (see Section *Galerina*) may actually belong here in stirps *Autumnalis*. *G. macquariensis* is also placed here, but is quite isolated because of its calyptrate spores.

The stirps *Marginata* is subdivided as follows; *G. wellsiae* lacks pleurocystidia and is thus atypical for the stirps. It appears to be a simple segregate of *G. marginata* in which pleurocystidia are absent. *G. marginata* is the central species with the others of the stirps grouped around it, including *G. unicolor* which intergrades with stirps *Autumnalis*. *G. helvoliceps* has a loosely adhering outer spore wall, but other species in the stirps easily connect to it, as do some in stirps *Autumnalis*. *G. rudericola* has finer spore ornamentation than *G. marginata*, and *G. patagonica* is intermediate between them in this character. *G. vialis* shows a progression toward the type of spore ornamentation found in *G. helvoliceps*. Basically, the stirps *Autumnalis* and *Marginata* are

made up of lignicolous species; those which appear to be terrestrial may actually be using lignicolous material for the most part.

The stirps *Cedretorum* presents more diversified lines than the previous two stirpes, i.e., the marasmioid type exemplified by *G. sulciceps* which is a tropical poisonous species, and *G. pinetorum* characterized by thin-walled spores very faintly ornamented; its spore ornamentation reminds one of that of *G. laevis*, but a smooth plage is present and the hyphae have clamp connections. *G. pinetorum* is not clearly connected phylogenetically to other members of the group. *G. mesites*, *G. arenicola* and *G. subglabripes* are representative of a group in which spore ornamentation is very inconspicuous but the spore does not collapse readily. These species connect up to those centering around *G. cedretorum*, in which the spore ornamentation is heavier. In fact, that of *G. subpectinata* is almost as pronounced as that of *G. helvoliceps*. We have considered the possibility that this type of spore ornamentation (in *G. helvoliceps*) is itself an index to relationships, since it appears in all major subgroups of Section *Naucoriopsis*, but in each group a series of species is found leading up to it, and it does occur in other sections of the genus as well.

In our estimation the stirps *Cedretorum* connects to the stirpes *Marginata* and *Autumnalis* on the one hand, and to section *Galerina* on the other. The deciding feature is the classical one of an incurved pileus margin contrasted with one that is appressed. In the galerinoid species of *Naucoriopsis* it is often difficult to make a clear cut decision as to which condition prevails. No one appreciates this difficulty more than we do, yet when one studies the groups as intensively as we have, one gets a feeling for the species and can recognize them easily.

SECTION GALERINA

We have divided this section into two groups, stirpes *Minima* and *Vittaeformis*. Stirps *Minima* is characterized by a veil sufficient to leave a fibrillose zone on the stipe when it breaks, or, depending on the species, veil development which grades off to conditions where a veil is rudimentary to absent. If the latter condition prevails, the stipe lacks caulocystidia below the apical region. This stirps connects clearly to stirps *Cedretorum* and to stirps *Vittaeformis*. It contains some odd species, such as *G. thujina* with slightly compressed spores and branched pleurocystidia. There is a tendency for the plage to remain ornamented in *G. nancyae* and in *G. diabolissima*. *G. reflexa* may belong in stirps *Autumnalis*, as previously pointed out. *G. saltensis* is a possible connection to section *Physocystis* and is interesting in this respect. Thus it is readily apparent that in this group we find a progression from copious veil development to none at all, a progression from heavily ornamented spores to those that are nearly smooth; a progression in pleurocystidial types connecting to section *Physocystis*, and finally, species simply showing odd combinations of characters not involved in presently known phylogenetic lines.

The stirps *Vittaeformis*, although containing the nomenclatural type of the genus, is a somewhat specialized group because of the copious development of large caulocystidia. We have attempted to distinguish two groups within the stirps based on the presence or absence of pilocystidia. When pilocystidia are abundant, the pileus appears pubescent under a hand lens. It may well be argued that all we have here is a simple progression in the abundance of pilocystidia. Genetical studies involving this character would be very helpful. It appears to us that the species of stirps *Vittaeformis* have been derived from stirps *Minima* by the loss of the veil and the development of caulocystidia over the length of the stipe. On this basis *G. atkinsoniana* and *G. perplexa* are the most highly specialized because of the presence of specialized types of dermatocystidia.

SECTION PSEUDOTUBARIA

The position of this group in relation to the rest of the genus is somewhat uncertain. The group includes *G. clavus* and *G. fuegiana*, which are certainly galerinoid in the ensemble of their characters. It seems quite apparent that in the evolution of the spore in *Galerina* there is a tendency toward the loss of the exosporium and thus of the plage. It is possible that section *Pseudotubaria* arose from stirps *Marginata* in this manner.

SECTION INOCYBOIDES

The section *Inocyboides* is distinguished by the metuloids being present as pleurocystidia, but it is doubtful that any close connection to *Inocybe* exists here. The name merely calls attention to this type of pleurocystidia. The two species in question apparently have their connections to section *Physocystis*. In section *Galerina* it is interesting to note that there is a definite tendency for the cystidia to develop wall thickenings in the pedicel and lower portion generally.

RELATIONSHIPS TO OTHER GENERA

The foregoing discussion of individual groups of species is not intended to be exhaustive in the sense of accounting for the position of every species of the genus in a hypothetical map of the phylogeny of the group, but is given to highlight the most prominent pathways of supposed evolution. From this review of trends within the genus let us now consider connections with other genera. Singer (1951) included eight genera in the tribe *Cortinariaceae* of the family *Cortinariaceae*. Since *Galerina* was one of these it is logical to start with a consideration of the relationships of these genera to it. The largest genus, *Cortinarius*, with an estimated six hundred or more species in North America alone, may be regarded as the core of the tribe *Cortinariaceae*, and the position of the other genera arranged in relation to it.

The *Cortinarius* fruiting body varies in size from a pileus 5–15 mm broad to up to 400 mm broad. The shape of the pileus varies from acutely conic to

convex, with depressed pilei rare to infrequent. Depending on the subgenus considered, the stipe varies from equal to narrowed downward into the soil, but typically lacking a pseudorhiza; or the stipe may be clavate, clavate-bulbous, or with a depressed-marginate bulb. The epicutis of the pileus may be a gelatinous trichodermium, a layer of appressed gelatinous hyphae, or an ungelatinized layer, or no truly differentiated epicutis may be present. Among species with an hygrophanous pileus there is a tendency toward the presence of a colored hypodermium underneath the epicutis. The hyphae commonly have pigments encrusted on the walls, or the walls may be colored, or both conditions may exist together. Clamp connections are present in most species. The spores typically have the warty-rugulose type of ornamentation, and in a few species one finds a nearly smooth or smooth spore, in others a nearly smooth to smooth plage is present but seldom delimited by the torn edges of a membranous outer wall. Pleurocystidia are rare; cheilocystidia are infrequent but present in a fair number of the species having small pilei. If the related groups within *Cortinarius* are arranged on the basis of the complexity of the fruit body, we find the hygrophanous species have the most unspecialized features. The dry species (*Inoloma* and *Dermocybe*) generally show more complex pigmentation. The viscid species show the most highly specialized dermal layers, and in *Bulbopodium* we have the combination of viscid pellicle of the pileus and a marginate bulb on the stipe. The most highly differentiated subgenus of all, by virtue of its gelatinous veil, viscid pileus cutis and tendency for clamp connections to be absent on the hyphae of the fruit body, is *Myxacium*. Because of the number of species and the fact that most of them appear to be mycorrhiza-formers, *Cortinarius* is to be regarded as a rather specialized group. Supporting this conclusion we find that there are a number of satellite genera, obviously closely related to *Cortinarius*, but not connecting up clearly to other genera in the group or anywhere else in the Agaricales. Such genera as *Gymnopilus*, *Hebelema*, *Phaeocollybia*, *Rozites*, and possibly *Leucocortinarius*, are examples, with *Thaxterogaster* (a gastroid "Cortinarius") connecting the genus to the Hymenogastraceae. Where does *Galerina* fit into this picture? The *Cortinariii* which are practically indistinguishable from *Galerina* in the field, all belong in *Telamonia* or *Hydrocybe*, i.e., the hygrophanous species. They differ from *Galerina* chiefly in that the spore surface is completely ornamented and a majority of the species lack cheilocystidia. Moss is a typical habitat for both *Galerina* and *Cortinarius*, but few *Cortinariii* grow on rotting wood. There are pigment-incrusted hyphae in many species of both genera. The points of difference are that the *Cortinariii* have, on the average, much larger fruiting bodies and more fleshy stipes, whereas in *Galerina* the carpophore is generally mycenoid in aspect and the stipe is brittle. The smooth plage on an ornamented spore is a central feature in *Galerina*, whereas in *Cortinarius* it is an anomaly. The cheilocystidia found in the smaller *Cortinariii* resemble those found in at least some species of *Galerina*. In the latter genus, however, we find nearly all types, so that some sort of a connection through this character is almost unavoidable.

The problem is whether or not *Galerina* is truly connected to *Cor-*

tinarius, phylogenetically. From our study we believe that it is. All the characters that serve to distinguish the smaller *Cortinarii* can be found in *Galerina* at a primitive level of development. These are the completely ornamented spore surface, the ferruginous to deep rusty brown incrusting pigments on the hyphae of the carpophore, and the development of both the inner (cortina) and outer ("universal") veils. Conversely, many characters which are at a peak of development in *Galerina* are found sparingly among the hygrophanous *Cortinarii*. The presence and type of cheilocystidia, the smooth plage area of the spore, and a definitely non-mycorrhizal substrate relationship are outstanding in this respect. This seems to indicate a very clear relationship of the species of *Galerina* to those *Cortinarii* in *Telamonia* and *Hydrocybe*, but the anomaly in the situation is that those *Galerinae* actually difficult to distinguish from *Cortinarius* in the field have spores (calyptrate) which remove them slightly from a true intermediate position.

The question of which genus is the more primitive may now be considered. *Cortinarius* is one of the largest and most homogeneous of all the genera of gill fungi. This is especially true as regards the anatomy of the fruit body, the detailed structure of the spores, and the types of hymenial cystidia. The opposite situation prevails in *Galerina*. Here we have a diversity of spore types correlated with the mycenoid aspect of the fruiting body, we have many types of cheilocystidia and very diverse habitats, indicating a general lack of physiological specialization. Actually considering only the basic features, *Galerina* shows much greater diversity than *Cortinarius*, and on this basis might well be considered the older genus. Before discussing this point further let us consider the question of connections to other genera not in the immediate orbit of *Cortinarius*.

The genus *Kuehneromyces* is characterized by an epicutis of repent filamentous hyphae over the pileus, rusty-brown or duller color of the spore deposit, smooth truncate spores, and cheilocystidia of various types. One of the results of our study of *Galerina* was the discovery of a number of species, obviously *Galerina*-like, which have an apical germ pore definite enough so that when compared with spores of such species as *Kuehneromyces vernalis*, one is forced to admit that a generic difference on that basis is very weak. Before postulating a true connection between the two genera on this basis it would be well to know more of the details surrounding the development of the pore in such species as *G. stagnina*, in those *Galerinae* showing a "callus" at the spore apex, as well as the details of the pore in typical members of the Strophariaceae. Perhaps the electron microscope can be used to advantage in this connection. The relationship of *Psilocybe sensu lato* to *Kuehneromyces* also needs to be clarified, for the supposed difference in color of the spore deposit is more apparent than real, at least for a number of North American species. We have, then, three distinct genera, *Galerina*, *Kuehneromyces* and *Psilocybe*, which seem to be connected by basic characters. Since in these three the apical differentiations in the spore wall have not been studied with possible phylogenetic connections in mind, it would be premature to try to decide now whether we are dealing with a true evolutionary sequence or an

interesting convergence of characters. Either interpretation is defensible on the basis of our present information.

The possibility that *Galerina* is connected to *Pholiota* must also be considered. In *Pholiota* we find a rather well developed gelatinous hymenopodium, smooth spores and, typically, a viscid pileus. There is the distinct possibility that the annulate, nonpleurocystidiate species, *Pholiota discolor* Peck, connects up to *G. stylifera* var. *velosa*. The cheilocystidia are not identical but neither are they out of the orbit of expected variation. One important character which breaks a clear connection to *Pholiota* is the presence of large leptocystidia in the hymenium of the species of the latter most similar to the *Galerinae* concerned. The emphasis to be placed on this difference is somewhat of a problem, particularly in the light of *G. wellsiae*. In any event, the two genera approach each other so closely that the problem of their relationship should be given serious study in the future.

We see no close connection for *Galerina* with *Phaeomarasmius* (including "*Floccularia*") or with *Naucoria* (*Simocybe*) in the restricted sense of Singer (1951). In these genera the epicutis of the pileus is more of a trichodermium, or pilocystidia are much in evidence. We reserve final judgment as to the validity of a connection here until both genera can be properly monographed.

Inocybe, however, presents a different picture. There is a surprising similarity between the basic features of the fibrillose smooth-spored species of *Inocybe*, which may be regarded as primitive for the genus, and the *Galerinae* of section *Inoderma*. Since in addition to this there is a tendency toward angularity in many of the smooth-spored species of *Galerina*, it appears that there is a valid connection between *Galerina fibrillosa* and *Inocybe* on the one hand, and the more typical species of *Galerina* on the other. Since the discovery of *Thaxterogaster brevisporum* in Patagonia has shown what appears to be a connection not only between *Thaxterogaster* and *Cortinarius* but also between *Thaxterogaster* and *Inocybe*, we may well include *Inocybe*, as well as *Cortinarius* and *Galerina*, in the group of cortinariaceous genera that might have been derived from a common ancestor or from very closely related ancestors. This possibility should be kept in mind in future studies.

The genus *Alnicola* is closely related to *Galerina* in many respects, but in our estimation is better regarded as a satellite genus of the *Cortinarius* orbit between *Hebeloma* and *Naucoria*, as indicated by Singer (1951).

The present study of *Galerina* has served to revise many of our ideas of the genus and its relationships to other genera. Since it connects by basic characters through known species to *Cortinarius*, *Inocybe*, and possibly *Kuehneromyces* and *Pholiota*, it should be placed as relatively primitive in any proposed evolutionary sequence, and it is logical to derive the above mentioned genera from it. This poses the problem as to where *Galerina* came from. Since spores with rather thin walls are known in *Galerina* it is tempting to look toward *Tubaria*. Certainly the latter is a more primitive genus, but, as we have pointed out, as of this writing we have not uncovered an indisputable connection to it. This is a problem for future study; it may

very well be that actual connections exist but that the species have been described in other genera and hence the connections obscured.

Another possibility for the origin of *Galerina* should not be omitted. During recent years we have collaborated on many articles showing how the secotioid gastromycetes are connected to families of the Agaricales, as these families are outlined by Singer (1951). This work is by no means to be regarded as complete and it may very well be that a galerinoid gastromycete, possibly closely related to *Thaxterogaster*, will be found just as we have found gastroid *Gomphidii*, gastroid boleti, etc. This would throw the problem open for further consideration, especially since we already have, in addition to *Thaxterogaster* (a gastroid *Cortinarius*), a gastroid *Pholiota* (*Nivatogastrum*), and gastroid strophariaceous fungi (*Werraroa*). For the present we believe it best to let the problem of the origin of *Galerina* rest until such time as monographs of more than a regional scope for *Naucoria*, *Alnicola*, and *Tubaria* are available, and the complexities introduced into the picture by gastroid genera can be evaluated in terms of gastromycete species at and below the level of the secotiaceous genera.

SUMMARY AND ACKNOWLEDGMENTS

We have recognized 199 species of *Galerina* and this number is based on an examination of over 1000 collections, as indicated in the lists of material cited. The listing of collections is actually very conservative. These collections, except for certain types and a few additional collections, were seen and studied in the fresh condition by one or the other of us. We have not made an attempt to get dried material from all possible herbaria, and to attempt to classify it; we felt that such a time-consuming process could be pursued better with the aid of the present monograph. From material we have examined, however, we know that many collections in herbaria are mixtures of species, and hence notes taken on them when they were fresh, must be interpreted cautiously. It became apparent to us during the course of the present study that few people have collected *Galerinae* critically.

Our species concepts, built up as the result of handling this quantity of fresh material, and then restudying it all again after drying, are not narrow in the usual meaning of that term, but, as pointed out elsewhere, we have tried to report, and to circumscribe as accurately as possible, all populations which seemed to have any distinguishing characters. In the most puzzling groups, such as stirpes *Cerina* and *Vittaeformis*, we have made a special effort to study large numbers of specimens and have relegated to the position of varieties and forms most of the minor variants. We do not claim to have found all such variants, but we believe that we have recorded a sufficient number to give an indication of how the various characters which make up the complex are behaving.

We do not feel justified in emphasizing distribution at present. A critical analysis of the distribution pattern must await much more intensive collection in many important areas. The arctic and subarctic floras of North

America, for instance, very likely contain many of the species now known only from Mt. Rainier National Park.

In the descriptions themselves we have usually given complete data insofar as they were available on taxa at all levels, in order to facilitate comparisons in the future. In order to standardize the handling of color terms, those taken from Ridgway (1912) are placed between quotation marks, and those taken from Maerz & Paul (1930) are italicized. Where names were taken from the second edition of Maerz & Paul, this has been indicated following the color term, since there are so few examples. We have also indicated color in the usual mycological terminology (*fulvous*, *bister*, etc.) in order to make the descriptions usable to those without either of the two color charts. One point to be kept in mind is that many terms, as for example "old gold" used in both color charts, are not equivalent. We have used such terms as *ochraceous-tawny* in a general way, and such usage is indicated by the lack of quotation marks. These names are used for the approximate color of the Ridgway plate designated by that name but indicate that a critical comparison with the plate was not made.

The herbaria indicated in the paragraphs of material studied are abbreviated according to the second edition of Lanjouw and Stafleu (1954). Unless indicated to the contrary, all of Smith's collections are deposited in the Herbarium of the University of Michigan.

No work of this magnitude could have been brought to completion without the cooperation of many institutions and people, and it is a real pleasure to acknowledge the aid we have received.

Dr. E. B. Mains, Professor Emeritus and formerly Director of the University of Michigan Herbarium, has aided the project in many ways, including financial support for the field work from the Herbarium budget, reading the manuscript, discussing taxonomic problems, and checking critical details under the microscope. We are greatly indebted to the Faculty Research Fund of the University of Michigan, which supported Smith's field work in large measure from 1935 to 1954. We also wish to express our appreciation to Dr. A. H. Stockard, Director of the University of Michigan Biological Station for his excellent cooperation in meeting all of our special problems during the period of our residence at the Station during the summer of 1953, and during previous seasons when Smith used the Station as a base for operations in northern Michigan. The material we obtained while at the Station, and the problems we were able to solve, represent a very important contribution to the monograph.

We are also deeply indebted to the National Park Service, in particular to Mr. John C. Preston, formerly superintendent of Mt. Rainier National Park, and Mr. Preston P. Macy, formerly superintendent of the Olympic National Park and now superintendent of Mt. Rainier National Park, for the facilities placed at our disposal, in terms of aid from their staffs of naturalists and laboratory and housing accommodations. The valuable role our national parks serve in scientific work such as this is not sufficiently appreciated. It is a most important consideration, for instance,

when describing new species, to select a type from a location which is likely to remain undisturbed. Hence, whenever possible, we have designated a location within one of the Parks as a type locality. If one travels through the logged-off areas of Washington and Oregon and sees how plant habitats have been and are being ruined, he will appreciate this aspect of our parks. Unless some large areas, such as the Olympic National Park and Mt. Rainier National Park, are preserved in their natural state, many of the species characteristic of the virgin forests will be lost. Actually, since in recent years fungi have been proven to be an important natural resource, there is an economic aspect involved in preserving our fungus flora, to say nothing of learning enough about it so that as a country we can use it intelligently. Our national parks, at present, are the only areas in which there is reasonable hope of maintaining this flora intact, and as such they are and will become, increasingly important. The men who administer these areas, from the superintendents on down, deserve a special citation for serving the public well in spite of the failure of our government to give the parks the basic support needed to function properly, to say nothing of increasing their services.

The same may be said to be true as far as the Argentine National Park Service is concerned, especially the large area of Parque Nacional de Nahuel Huapí in Patagonia, which efficiently preserves from destruction through lumbering activities and tourist developments the flora and fauna of the northwest of Patagonia.

We also take pleasure in acknowledging the aid of the John Simon Guggenheim Memorial Foundation, which made it possible for us to spend the summer of 1953 working together on this project, and to work up South American material from previous collections. Last, but by no means least, we each wish to acknowledge the financial assistance received from the National Science Foundation in the comparatively recent years during which our final studies on this genus were in progress. This aid has proved to be a major factor in the success of our project, both in North and South America.

Many individuals and institutions have aided the project directly, in one way or another. The interest of Mr. Wm. B. Gruber of Portland, Oregon, in fungi was directly responsible for much of the work carried out in the Mt. Hood area of Oregon. Sir Edward Salisbury, former Director, and Dr. Taylor, present Director of the Royal Botanic Garden, Kew, Surrey, England, kindly authorized the loan of certain essential collections. Dr. G. Haglund of the Riksmuseet, Stockholm, Sweden, generously loaned us specimens as did M. Metrod, the well known French mycologist, now deceased. Dr. Richard P. Korf, of Cornell University, kindly loaned us Atkinson's types, and those of Peck and Murrill were made available to us by the curators at the New York State Museum and New York Botanical Gardens, respectively. To Dr. H. D. House, deceased, and to Stanley J. Smith, the present curator, we are indebted for the loan of materials and the privilege of studying in the herbarium of the New York State Museum at Albany. Dr. Fred J. Seaver, now retired, and Dr. Donald P. Rogers,

former curator, kindly permitted us to examine the types of W. A. Murrill deposited at the Garden, and favored us with the loan of various collections. Through the kindness of Dr. Erdman West of the Florida Agricultural Experiment Station and W. A. Murrill, of Gainesville, Fla., now deceased, we were allowed to examine certain pertinent material on deposit at that institution. Ing. J. C. Lindquist was helpful in making available type material of Spegazzini's species, preserved at the Instituto Spegazzini, Universidad de La Plata, Argentina. We also gratefully acknowledge the help given to the project by The Consejo Nacional de Investigaciones Cientificas y Tecnicas, Buenos Aires, and particularly the authorities of the University of Tucumán, Argentina, and the former director of the Institute Miguel Lillo, Dr. Descole, who made possible the field work in southern South America. Certain private citizens of South America, interested in the flora of that continent, have likewise been instrumental in the collecting phase on that continent. It is a pleasure also to acknowledge the help of Dr. B. Rambo, S.J. (now deceased), Señor Diem, Quetrihué, and Mr. Sutherland, Rio Grande.

CLASSIFICATION OF SPECIES

GALERINA Earle

Bull. N.Y. Bot. Gard. 5: 423. 1909.

Agaricus tribus *Galera* Fries, Syst. Myc. 1: 264. 1821.

Galera (Fr.) Kummer, Führer in Pilzk. p. 74. 1871.

(non *Galera* Blume, 1825)

Pholidotopsis Earle, Bull. N.Y. Bot. Gard. 5: 443. 1909.

DEFINITION: Carpophores typically mycenoid in aspect but in some groups collybioid to omphalioid; veil absent to well developed and often leaving a membranous annulus; pileus typically hygrophane, rarely dry and fibrillose; cuticle variable from scarcely differentiated to a well formed gelatinous pellicle of narrow appressed hyphae, not cellular, loosely fibrillose or with an obscure trichodermium in a few rare species; pilocystidia abundant and characteristic in some species, absent in most; color of pileus pallid to dark russet, usually some shade of tawny; lamellae attached to the stipe but type of attachment variable, typically ascending-adnate with a tooth, spacing, width and color when young of minor significance, margins often whitish from cheilocystidia; stipe typically mycenoid in aspect but rather tough in the larger lignicolous forms, typically honey color or more ochraceous, often darkening to blackish or bay brown from base upward, usually with caulocystidia at least over apical region but in some groups down to below the midportion, pseudorrhiza lacking as far as known.

Spores rusty brown in deposit and usually darkening in alkali, usually ornamented with the warty to wrinkled remains of an exosporium which covers all except the suprahilar depression thus leaving a smooth "plage" as it is called, sometimes the spore entirely smooth, sometimes roughened over all including the plage, but then the hyphae of the carpophore lack clamp connections, wall distinctly complex and usually appreciably thickened; basidia normal but variable (1-4 spored) from species to species or within a species in the number of spores produced: pleurocystidia present or absent and of diverse types depending on the species; cheilocystidia almost invariably present and often very characteristic; gill trama of nearly parallel to somewhat interwoven hyphae, with or without incrusting pigments on the walls, subhymenium gelatinous in a few species but mostly not distinctive; cuticle of pileus as given above; pilocystidia and caulocystidia may be present and vary as to type depending on the species.

HABIT, HABITAT AND DISTRIBUTION: Typically non-mycorrhiza forming but possibly mildly parasitic on mosses at times, usually associated with

moss (the most important bryophilous genus of the Agaricales yet known), but also common on rotting logs and lignicolous detritus, more rarely on herbaceous material or apparently terrestrial. The manner of occurrence is typically scattered to gregarious but also either solitary or caespitose. Distribution is world wide but they are most abundant in regions or areas with luxuriant moss populations.

TYPE SPECIES: *Agaricus vittaeformis* Fries Epicr. Myc. p. 207. 1838. Type species designated by Earle, 1909.

Key to Subgenera

1. Clamp connections absent on all hyphae of the carpophore and spores roughened over the plage area ----- Subgenus *Tubariopsis*
1. Clamp connections present on at least some of the hyphae of the carpophore and spores with smooth plage or spore entirely smooth -- Subgenus *Galerina*

Subgenus I. *Tubariopsis* (Kühner) Smith & Singer

Sydowia 11: 446. 1957.

Section *Tubariopsis* Kühner, Ency. Myc. 7: 168. 1935.

In the species of this subgenus clamp connections are absent from the hyphae of the fruiting body. The spores typically are without any trace of a plage, their surface may be warty or marbled all over including the plage area. A number of species in subgenus *Galerina*, such as *G. diabolissima*, have ornamented spores most of which lack a smooth plage or have an indistinct plage. In these clamp connections are abundant on the hyphae of the fruiting body. As yet no species with truly smooth spores and with clamps lacking on the hyphae of the fruit body has come to our attention.

The species typically lack pleurocystidia. Kühner reported them in *G. graminea* but it is possible that those he saw were over parts of the hymenium damaged by insects. In *G. heterocystis* some may be found close to the gill edge.

TYPE SPECIES: *Galerina laevis* (Pers.) Singer. *G. graminea* (Velen.) Kühner, Ency. Myc. 7: 168. 1935.

The pattern of speciation observed in this small but distinct group is repeated again and again throughout the various sections of subgenus *Galerina*. In one group of species a veil is present, and the amount of veil material different for different species. *G. nigripes*, *G. dimorphocystis*, *G. laevis*, and *G. brunnei-marginata* all lack veils. *G. subceracea*, *G. heterocystis*, and *G. semilanceata* each has a veil, although it may be rudimentary in *G. heterocystis*. Differences in spore size, and, secondarily, in characters shown by single species, complete the pattern of character combinations in this subgenus. These are rather standard characters as species are distinguished in the Agaricales at present, and the species concepts resulting from using them as the basis of the classification are of approximately the same magnitude as current concepts in comparable genera, such as *Mycena*, *Psilocybe*,

Psathyrella, *Conocybe*, etc. Even the same type of spore abnormality which occurs throughout the genus is found here in two species. This consists of an abnormally narrow and elongate spore present in amounts of 1-5% of those viewed in a mount.

Key to Species

1. Base of stipe blackening by maturity or soon after 7. *G. nigripes*
1. Base of stipe not as above 2
 2. Unexpanded buttons showing a distinct veil 3
 2. Veil absent (but long caulocystidia may simulate veil remnants) .. 7
3. Lamellae distant, thick and broad; pileus canescent 3. *G. subceracea*
3. Lamellae thin; pileus typically naked and moist 4
 4. Veil rudimentary and all traces often gone by maturity; spores 11-17 × 6-8 μ 1. *G. heterocystis*
 4. Veil copious, usually leaving an annulus 5
5. Spores 8-10 × 5-6 μ (4-spored) (see *G. heterocystis* var. *B.* also) - 2. *G. semilanceata*
5. Spores 7-8.5 μ broad 6
 6. Annulus persistent; cheilocystidia 24-50 × 4-9 × 1.3-3 × 3-3.8 μ (see appendix—*G. praetervisa*)
 6. Annulus soon evanescent; cheilocystidia ventricose-rostrate, rarely capitate (see appendix—*G. radiceicola*)
7. Pilocystidia absent 8
7. Pilocystidia readily demonstrated; pileus ochraceous to fulvous 9
 8. Spores 11-17 × 6-8 μ not readily collapsing 1. *G. heterocystis*
 8. Spores 7-9.5 × 4-5 μ many remaining collapsed in mounts (see *G. heterocystis* var. *A.* also) - 4. *G. brunneimarginata*
9. Stipe yellowish when young; many spores remaining collapsed in mounts in KOH 5. *G. laevis*
9. Stipe hyaline when young (at least the upper half); spores not remaining collapsed when mounted in KOH 6. *G. dimorphocystis*

1. *Galerina heterocystis* (Atk.) Smith & Singer, *Sydowia* 11: 447. 1957.

Galerula heterocystis Atkinson, *Proc. Am. Philos. Soc.* 57: 362. 1918.

Galera fragilis var. *clavata* Velenovský, *České Houby*, p. 548. 1921.

Galerula hypnorum var. *macrospora* Maire, *Bull. Soc. Myc. Fr.* 44: 49. 1928. (see Kühner, 1935).

Galerina clavata (Velen.) Kühner, *Ency. Myc.* 7: 171. 1935.

Galera clavata (Velen.) Kühner in Kühner & Romagnesi, *Flore Anal. Champ. Supér.* p. 318. 1953.

Illustrations: Figs. 239 & 242 (spores); 1, 2 cheilocystidia.

Pileus 2-15(25) mm broad, (1.5)3-10(12) mm high, obtuse-y conic

with a straight margin, expanding to campanulate or convex, at times remaining broadly conic sometimes with a small umbo or papilla, glabrous, moist, pale yellow to pale fulvous ("warm buff" to "ochraceous tawny", or *pl. 9 H 4* to *11 G 6*, spruce *y.* to *pl. 13 K 9*, rarely buckthorn brown or tinsel), translucent-striate, hygrophanous and fading to pale buff; flesh thin and fragile, taste mild, odor none.

Lamellae close to distant, mostly subdistant, ascending adnate or if cap broadly expanded somewhat adnexed, narrow to broad (3 mm), pale yellow become pale fulvous from spores (but not exactly concolorous with pileus [*Inca gold, pl. 11 G 5*, then *Yucatan*]), edges even.

Stipe 12–80 mm long, 0.5–3 mm thick, equal, tubular, fragile pallid to pale yellow at first (about concolorous with the young gills), gradually slightly more fulvous over all (*bure*) but not characteristically darkening from the base up, lower portion with faint white or pale cream fibrils from a rudimentary veil or veil lacking and stipe merely pruinose over upper half.

Spores 11–17 × 6.5–8.5 μ, somewhat inequilateral in profile (4-spored), often more oblong in 2-spored forms, nearly smooth to distinctly verruculose over all including the suprahilar area, pale cinnamon in KOH. Basidia 4-spored (in type) or various mixtures of 1–4-spored (2–3-spored forms common), (18)24–35(43) × (7)8–10(12) μ. Pleurocystidia none or present only near the gill edge and similar to cheilocystidia. Cheilocystidia variable in size (30–44 × 6–9 μ in type), 18–26 × 6–9 μ in some, 30–60 × 7–12 μ in others, more or less *Conocybe*-like, capitellum 5–7 μ diam., rarely subfusoid or forked and bicapitate. Gill trama regular, somewhat interwoven when mature, subhymenium not distinctive. Pileus trama pale ochraceous from incrusting pigment, homogeneous; epicutis of narrow appressed non-gelatinous hyphae, the layer only a few hyphae thick and not always demonstrable, pilocystidia none or rare and then only near the margin. Caulocystidia 30–70 × 7–25 μ, cylindrical, ampullaceous or ventricose-capitate, numerous over upper half. Clamp connections absent.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on moss but so far found only rarely on *Sphagnum*, also occurring on *Podocarpus* needles in South America. It is known from Europe, Asia (Altai Mts.), Japan, North America (Alaska, Washington to California, Wyoming, Michigan, Alabama and Tennessee), Jamaica in the West Indies, and South America from Salta to Patagonia. It fruits during the summer and fall, but the abundant fruitings encountered in the United States have been in the late fall during warm, relatively dry seasons.

OBSERVATIONS: The type of *G. heterocystis* has spores 12–15 × 6–7 μ obscurely inequilateral in profile view, narrowly oval in face view, and the walls mostly weakly ornamented to smooth. The basidia are 4-spored. The pleurocystidia are present mostly near the gill edge and 30–40 × 7–9 μ, their apices are subacute to subcapitate and their content as revived in KOH is usually yellowish.

Kühner's *G. clavata*, forme tétrasporique, as he defines it, is identical with *G. heterocystis*. He describes a slight veil which soon disappears without

leaving any significant traces. He noted some dermatocystidia on the pileus. Burton (1952) from England, and Singer C3036, both obviously typical, have conspicuously verrucose-roughened spores $13-15 \times 6-8 \mu$ which are tawny in KOH. A nearly smooth plage was noted in some. We regard this as the type form.

Around the type form we have observed a large number of forms differing in one or more characters. For the present we regard these as variants in a collective species, *G. heterocystis* sensu lato. Some of the variants studied, however, deserve comment.

(1) Two-spored forms. Forms with exclusively 2-3 sterigmata on a basidium were treated by Kühner. These had spores $(11.5)13-16 \times 6.7-8 \mu$ with very finely punctate ornamentation (almost smooth). No mention was made of a veil but Singer (C3044 from Tirol) observed an evanescent veil on specimens apparently exactly like Kühner's but lacking pilocystidia. In contrast to this, the spores of the 2-spored fruiting bodies of North American collections are generally more distinctly warty and darker in color than those of the 4-spored carpophores. Hesler 18046 has such heavily ornamented spores that it may represent a distinct species. Smith 48080, 2-spored, has reddish tawny incrusting pigment, fairly numerous pilocystidia, and spores $11-13(15) \times 5-6 \mu$. Material from the Altai had fairly strongly punctate spores, as in *Hebeloma*, which were moderately well pigmented (melleous-brownish), and as large as in Kühner's 2-spored form. On these a cortina was readily visible in young specimens just as in the typical 4-spored form. The specimens were found among mosses in an alpine meadow at 2600-2700 m. altitude. Specimens collected in the same region at lower altitudes were 4-spored and macroscopically identical as well as having spores with the same type of ornamentation and measuring $11.5-13.2 \times 6.5-7.5 \mu$.

In addition to the above 2(3)-spored forms, we frequently encounter carpophores with mixed (1)2-(3)4-spored basidia in which the range of the spore sizes is very wide. Such mixed forms are particularly common in North America and Central to Southern Argentina; in subtropical and tropical America these mixed forms usually belong to a small-spored variant.

(2) Evelate forms. In Smith 42013 there was no veil; the carpophores were yellow over all, and the spores (on 4-spored basidia) were nearly smooth. This variant needs further study. The Argentine veil-less forms come from semi-arid regions of the Northwest and West and are typically smaller spored (see below); compare also *G. dimorphocystis*.

(3) Size of the carpophores. During late September and October this species was abundant on moss under conifers along the Straits of Mackinaw (Michigan). Here it reached the same large dimensions (pileus 15-25 mm in diameter) reported by Singer from material on *Podocarpus* needles in Northwestern Argentina. Such large fruiting bodies, incidentally, are very readily mistaken for those of *G. vexans*, but the pileus does not glisten in the same way and the stipe is not so fibrillose.

(4) Variability of the cheilocystidia. The variation in size and shape of

the cheilocystidia reminds one of that observed for *Mycena citrinomarginata* (Smith 1947). In one section of a portion of the type, scattered to rare subfusoid cheilocystidia which had a yellow content when revived in KOH were present. Such coloration has been seen on a few cheilocystidia from the collections made in Michigan in 1953, but does not appear to be constant nor frequent enough to be demonstrated at will. In specimens from Japan, viz. Hongo Herb. 1121, on *Sphagnum*, the cheilocystidia appear to be covered with a gelatinous matrix causing debris to adhere. The spores are smaller than normal, and very pale.

(5) Spore-size. Here we are dealing with at least two phenomena. The less important of these is the occurrence of elongated narrow spores $11-13$ (15) \times $5-6$ μ , on 4-spored basidia. This is the same type of abnormality often observed in *Psathyrella*. We do not consider it taxonomically significant. On the other hand, there are forms in Europe, North America, and South America, with either 4-spored basidia or with mixed (1)2-(3)4-spored basidia where the spores are considerably smaller; these forms may be interpreted as transitional between *G. heterocystis* and *G. semilanceata*. They differ from the latter species in a veil not quite so well developed, more slender and smaller carpophores, absence of pilocystidia, etc. We would separate these forms as an autonomous species were it not obvious that the collections with smaller spores are not a fully homogeneous entity. We have at least two distinguishable and constant forms in subtropical South America, and it is not at all clear what the relation between the forms reported from North America, Japan, and Europe on one hand, and the two Argentine species or forms, might be. We shall describe the Argentine collections:

G. heterocystis var. A.

Pileus melleous to ochraceous brown in center and on striae (e.g. *buckthorn brown*, *tinsel*), rarely pale brown, much paler between striae, hygrophanous, fading to whitish or stramineous, once a detersile pubescence noted on very young fresh caps (but here no dermatocystidia demonstrable), conic to convex, eventually almost flat but with a small papilla or a small obtuse umbo, rarely even slightly depressed in the center, 2-11 mm broad.

Lamellae alutaceous-pallid to concolorous with the pileus, subdistant to distant, broadly adnexed, adnate, or adnate-subdecurrent, rather broad, sometimes ventricose.

Stipe paler than pileus, usually pallid below, glabrous or very slightly silky, when quite young often pubescent over all, equal, 15-27 \times 0.8-1.8 mm; veil none.

Spores 6.8-9.2 \times 4.8-5.5 μ (4-spored basidia), up to 10.5 \times 6 μ from 2-spored basidia, some elongated giant spores up to 14.5 \times 5.5-6 μ present in some collections, varying from smooth to finely but distinctly punctate, rather well pigmented and walls not thin but some collapsing, at least under cover glass pressure in KOH (not in all collections), without plage. Basidia (1)2-(3)4-spored, 25-26.5 \times 6.5-7.5 μ . Cheilocystidia numerous but often intermixed with basidia, hyaline, rarely the capitellum slightly thick-walled, either all capitate (capitellum 2.5-6 μ diam.), 20-40 \times 4.5-12 μ ,

or intermixed with all transitions from filamentous to ventricose below and from capitate to merely mucronate. Pleurocystidia, none. Epicutis hyaline or somewhat incrustated by tawny pigment, of filamentous hyphae; hypodermium not much differentiated from epicutis, but its elements broader; no gelatinized hyphae in cuticular layers. Hyphae without clamp connections. Pilocystidia absent even on margin of young well preserved material. Among small mosses in semi-arid zone, 600 m. alt., on sandy soil, 23-V-1955, Quebrada de la Sébila, La Rioja, Argentina, Singer T 3347, 3350, 3364 (LIL).

G. heterocystis var. B.

Pileus ochraceous, or *spruce* *y.* or 13-K-9 in center and on striae and paler between them, finely transparently striate over $\frac{3}{4}$ to $\frac{4}{5}$ of radius when wet, or never striate, hygrophonous, fading to much paler and then smooth to slightly sulcate, convex to convex-campanulate, papillate, 5-10 mm broad; veil in young caps either slightly appendiculate or covering the surface of marginal region with silky fibrils, soon disappearing.

Lamellae yellow (11-G-5), moderately broad to broad, often ventricose, moderately close to subdistant, thin, rounded-adnexed, adnexed, or adnate.

Stipe entirely appressedly white fibrillose to almost pubescent from veil with shining silky apex over a brownish (*bure*) ground color, tapering upwards, more rarely equal, 12-33 \times 0.7-1.8 mm; veil evanescent, not leaving a ring zone.

Spores 7.5-12.3 \times 4.8-7.3 μ , mostly about 9.5-10.5 μ long when coming from 4-spored basidia, ellipsoid-amygdaliform, melleous, finely and regularly punctulate, with moderately thick walls, and some spores easily collapsing; basidia 2-spored and 4-spored, the latter mostly in the majority, more rarely all basidia 4-spored, 23-31.5 \times 6.8-9.5 μ ; cheilocystidia capitate or subcapitate above (capitellum 4.8-7 μ diam., constriction below it 2-4 μ in diam.) hyaline, ventricose below, 31-45 \times 8-10.5 μ ; pleurocystidia, none; gill trama regular, its hyphae brownish to subhyaline; epicutis not gelatinized, without pilocystidia, hyaline; hypodermium often with incrusting pigment; caulocystidia numerous on apex, scattered to very sparse below, much like the cheilocystidia but often longer and capitellum often obsolete; clamp connections none. Among mosses in moss beds over rocks and over humus in Alnetum, montane zone, gregarious Dec. 12, 1958 and Jan. 15, 1950, at 2100 to 2200 m. alt. Tafi del Valle, Tucumán, Argentina, Singer T 884 and T 3161 (LIL).

Stordal 5216 from Norway likewise appears to be a 4-spored form with spores only 8-11 μ long; it likewise lacks pilocystidia and the spores have thicker walls than those of *G. laevis* and *G. brunneimarginata*. Smita 56633 consists of two fruiting bodies with (4-spored basidia) spores 8-11 \times 5-6.5 μ which are ochraceous tawny in KOH and well ornamented. Some of the cheilocystidia have yellow content. The specimens from Japan have spores 9-11 \times 5-6.5 μ and 9.2-13.5 \times 5.3-7 μ (mostly 10-11.5 μ long) and likewise 4-spored basidia, very little ornamented in Hongo 1391.

A collection on needles of *Abies religiosa* near Nexapa, Mexico, Singer M 1566, has even smaller spores (7.6-8.1 \times 4.5-5 μ), acute pileus, pallid

silky fibrillose stipe with pruinose apex and both pileus and stipe very pale, in part pallid; pilocystidia rare; basidia 4-spored. This should be searched for further since it differs considerably, inasmuch as the cheilocystidia are only subcapitate, more rarely with filamentous apex, and the cuticular layer of the pileus is not pigment incrustated, but yellow. We describe it here as a variety of *G. dimorphocystis*.

(6) Pilocystidia. The importance of the presence or absence of these structures in this complex is difficult to evaluate. It is possible that the character is not constant. It is also possible that on dried material of mature pilei these delicate cells are not always revived properly by the methods used and thus are missed in herbarium studies. We have collections which differ from each other only in the presence or apparent absence of pilocystidia. Pubescence noted on young pilei, even under a hand lens, does not necessarily mean that pilocystidia are present. In our T 3350 a pubescent pileus did not yield dermatocystidia of any kind. At present it must be assumed that in such cases the pubescence is caused by collapsing velar hyphae and that we have here a remainder of an extremely reduced veil covering part of the marginal zone of the young pileus and very soon evanescent. It remains to be seen from future careful observations on pilocystidia whether they are correlated with other important characters such as spore size, veil development or color.

In view of the variation found in our study of this collective species further studies are desirable, but should be made from fresh material in order to properly correlate all characters. This cannot be done satisfactorily from dried material. It is evident, however, that we have here a complex of the order of the *G. vittaeformis* group.

MATERIAL EXAMINED: Bigelow 4720 (MICH). Burke, R. P., Alabama (MICH). Burton, P. A., England (MICH). Hesler 18046 (TENN). Hongo Herb. 1121, 1391 (MICH). Morton Lange 1502 (MICH). McCabe 1523 (UC). Murrill, Fungi of Jamaica 453-type (CUP). Singer C3014, C3036, C3038, C3044, C3049 (Tirol); A-215 (Altai); S-142; 143; 144 (Buenos Aires); T 884; 1399; 1417; 1487; 3161; 3347; 3350 (Northern Argentina); M 783 (Patagonia); M 1567 (Mexico) (LIL). Smith 35807; 39826; 40101; 40209; 40245; 40303; 40315; 40317; 40318; 40319; 40320; 40321; 40322; 40323; 40357; 40556; 40592; 40818; 40821; 40822; 40825; 40831; 40970; 41000; 42013 (4-spored); 42787; 42967 (4-spored); 43468; 43473; 43640; 43695; 43723; 43843; 43914; 43961; 43964; 46336 (4-spored); 46468 (4-spored); 46604; 46606; 46719; 48080; 49228; 50074; 51019; 51874; 51988; 52065; 52096; 52230; 53198; 53595; 53769; 54325; 54712; 54837; 54846; 54847; 54991; 55128; 55702; 56633 (4-spored). Stordal 5216 (Norway, 4-spored form with spores 8–11 μ long) (0). C. Wright (Arakamchechene Isld. Behring Straits, (2-spored, with spores 9.7–12.5(14.5) μ long) F. H.

2. *Galerina semilanceata* (Pk.) Smith and Singer, comb. nov.
Galerina semilanceata Peck, Bull. Torrey Club 23: 415. 1896.

Galerula bryophila (Pk.) Atkinson, Proc. Am. Philos. Soc. 57: 364. 1918.
Galerula semilanceata (Pk.) Atkinson, Proc. Am. Philos. Soc. 57: 365. 1918.
Galera bryophila Peck, Ann. Rept. N.Y. State Mus. 54: 149. 1900 (1901)
 Illustrations: Pl. 1. Figs. 257–258 (spores); 3, cheilocystidia.

Pileus 8.5–25(30) mm broad, conic, with a flaring margin in age, glabrous or at first thinly fibrillose near margin from veil remnants, hygrophanous, when moist “yellow-ocher” to “cinnamon buff” fading to “antimony yellow” on disc and “warm buff” or paler near margin, sometimes a watery sordid tawny between disc and margin before fading; flesh thin but not unduly fragile, concolorous with surface; odor and taste mild.

Lamellae “antimony yellow” at maturity or with only a tinge of tawny (dominantly yellow), when young near “pinkish buff”, ascending, adnate and soon seceding, subdistant to close (about 18 reach the stipe), narrow (about 2 mm broad), edges even.

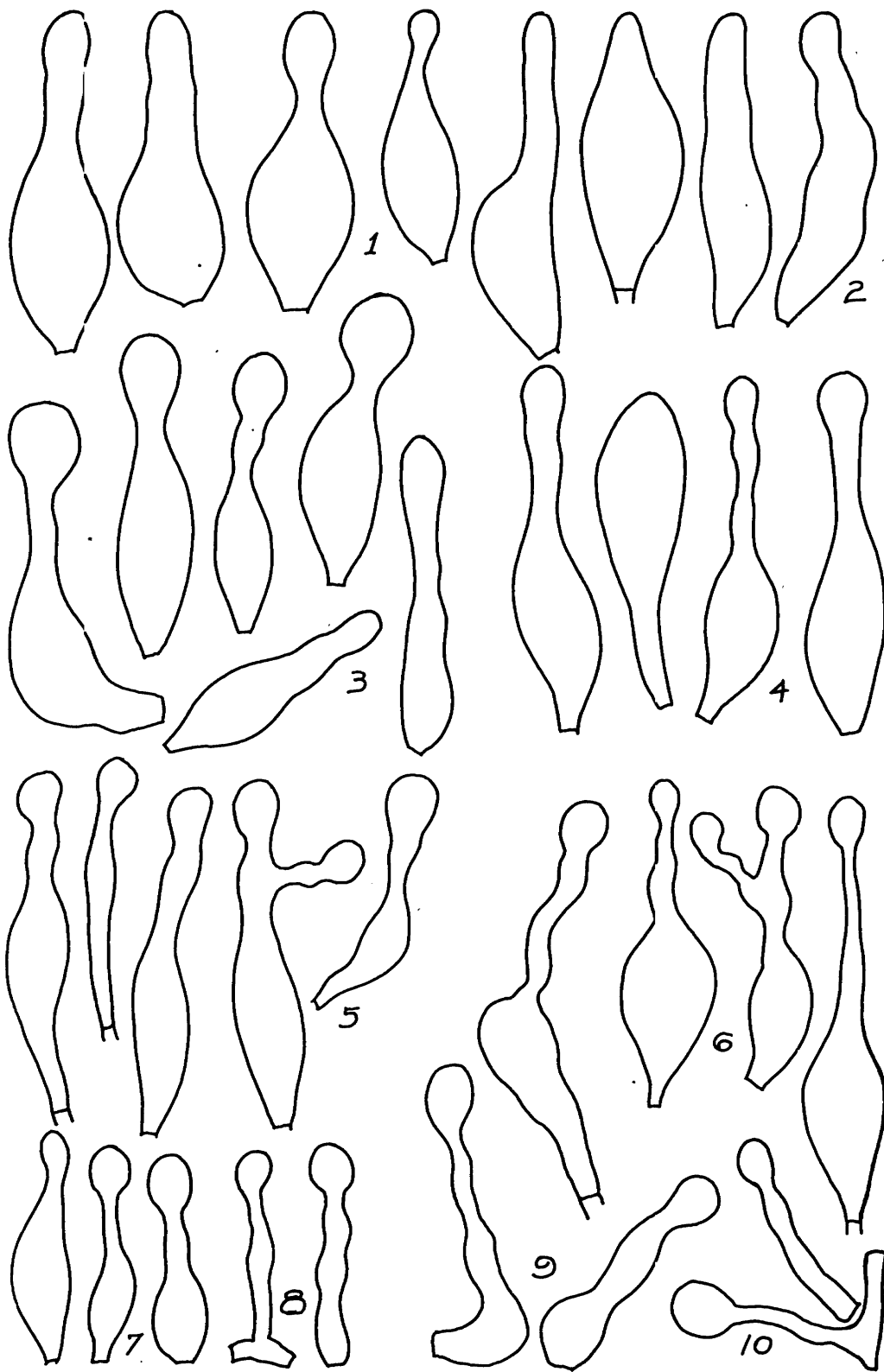
Stipe 50–90 mm long, (1)2–2.5 mm thick, slightly enlarged toward the base, hollow, “pinkish buff” over all but appearing whitish at least when young due to a dense fibrillose coating over lower two-thirds, apex pruinose and pallid yellowish beneath the pruina, becoming more or less glabrous in age, at times the lower portion ochraceous tawny or slightly darker.

Spores 8–10 × 5–6 μ , obscurely inequilateral in profile, ovate in face view, pale yellow under microscope when fresh, pale tawny to dull pale cinnamon in KOH, distinctly warty to warty rugulose under an oil immersion lens. Basidia 4-spored. Pleurocystidia none; cheilocystidia abundant, 26–38 × 6–10 μ , ventricose-capitate, the neck 3–3.5 μ and capitellum 4–5 μ , rarely forking at apex. Caulocystidia capitate to fusoid, variable in size. Gill trama pale yellow in KOH, subparallel. Pileus trama with a slightly gelatinous pellicle of appressed hyphae but the latter rather loosely arranged, a few pilocystidia seen, these about like the cheilocystidia or more filamentous, hyphae in the region of the hypodermium bright ochraceous in KOH. Clamp connections absent.

HABIT, HABITAT AND DISTRIBUTION: Gregarious to scattered on moss or in shaded, moist grassy areas with moss intermixed, also on mossy logs, etc.; often found in camp grounds or clearings around buildings; spring and fall, in the Pacific Northwest.

OBSERVATIONS: This species is distinct from *G. brunneimarginata* in its much more robust stature, well-ornamented, rather dark thicker-walled spores and in the presence of a distinct veil, which at times is very well developed. In Smith 41207 from Green Lake, Mt. Rainier, the stipe in the oldest fruiting body was bister at the base, but this appeared to be an effect of extreme aging, and was noticed only in this one collection.

In the types of both of Peck's species the spores remain yellowish in KOH and there is a tendency toward a more loose arrangement of the hyphae in the epicutis. These are the only differences between the collections cited above and the types. Veil remnants are present on the stipe in the type of *G. semilanceata*. Also in that type there is a tendency for the warts on the spores to slough off, but this is not limited to the suprahilar area. Our



Cystidia: Figs. 1-2, cheilocystidia of *G. heterocystis* (type); 3, cheilocystidia of *G. semilanceata* (type); 4, cheilocystidia of *G. subceracea* (type); 5, cheilocystidia of *G. brunneimarginata*; 6, 9 and 10, cheilocystidia, pilocystidia and caulocystidia, respectively, of *G. dimorphocystis*; 7 and 8, cheilocystidia and caulocystidia of *G. nigripes*.

description is taken from Smith 18024. Veil remnants still show in the dried specimens but do not show well in the photograph. The fruit bodies are unusually large. In Smith 49018 and 56818 the cap was viscid and no pilocystidia were found. These may represent a distinct taxon, but complete data are lacking so we only mention the collections here. In the type one might well question whether the pellicle was viscid; we may actually be confronted here with one of these intermediate conditions which vary depending on environmental circumstances. The species is actually most closely related to *G. heterocystis*. Hesler 16381 has an exceptionally large number of abnormal spores.

MATERIAL EXAMINED: Cooke, W. B., 18967 (MICH). Hesler 10162; 16381 (TENN.); Peck type *Galera semilanceata* (Washington, coll. Yeomans); type *Galera bryophila* (New York) (NYS). Sipe 940 (MICH). Smith 13383; 18024; 40446; 40632; 41064; 41163; 41164; 41207; 41209; 48169; 49018; 55381; 55638; 56818.

3. *Galerina subceracea* Smith & Singer, *Mycologia* 47: 559. 1955.

Illustrations: Fig. 4 (cheilocystidia).

Pileus 8–10 mm broad, broadly conic with a bent-in margin, surface canescent but moist and hygrophanous beneath the canescence, pale “cinnamon” to nearly “ochraceous tawny”, fading evenly to “pinkish buff”, opaque when moist, glistening when faded; flesh thin but firm and waxy pale yellow, odor and taste none.

Lamellae distant, thick, broad, adnate to adnexed, pallid becoming pale ochraceous-cinnamon, edges uneven.

Stipe 20–40 mm long, 1.5–2 mm thick, equal, hollow, fragile, near pinkish buff over all or tinged cinnamon above, thinly coated with white fibrils from a slight veil which scarcely leaves a zone.

Spores 8–10 × 5–5.5 μ , obscurely inequilateral in side view, ovate in face view, smooth or very faintly rough, very pale in Melzer's reagent, pale yellow in water when fresh, ochraceous in KOH. Basidia 4-spored. Pleurocystidia none, but some basidioles with ochraceous content in KOH. Cheilocystidia 26–34 × 6–9 μ , ventricose, with a narrow neck and subcapitate apex, neck about 3 μ in diam. below the capitellum, a few merely with subacute apices. Gill trama fulvous in KOH. Pileus trama homogeneous, rusty fulvous in KOH, epicutis only slightly differentiated; pilocystidia present but more irregular in shape than the cheilocystidia. Clamp connections absent.

HABIT, HABITAT AND DISTRIBUTION: Scattered on moss in a swampy area, Wilderness Park, Michigan, Oct. 7, 1953. (Smith 43847-*type*). Known only from type locality.

OBSERVATIONS: The canescent, cinnamon colored pileus, and thick, waxy, pallid gills, together with the presence of a veil, appear to distinguish this species. Observations on the spores must be made with excep-

tional care. The granular content often becomes aggregated against the wall, producing the illusion of roughness. In some cases these contents become separated by a hyaline homogeneous area (a diffuse layer of some liquid?); if under microscopic examination this area happens to coincide with the plage area, there will be the illusion of a smooth plage bounded by minute granules of roughness. By careful focusing on material mounted in Melzer's reagent, this artifact can be properly interpreted. This species is distinct within the veiled group of *Tubariopsis* but appears to be closely related to *G. semilanceata*. The spores do not remain collapsed in mounts revived in KOH; this character makes it possible for herbarium specimens of this species to be readily distinguished from *G. laevis* and *G. brunneimarginata*.

4. *Galerina brunneimarginata* (Murrill) Smith & Singer, comb. nov.
Naucoria brunneimarginata Murrill, N. Am. Fl. 10: 180. 1917.

Illustrations: Figs. 253–254 (spores); 5 (cheilocystidia).

Pileus 15–25 mm broad, campanulate to subexpanded, gibbous, surface smooth, glabrous, pale yellowish gray or dark cream color, margin entire, not striate, incurved when young, marked with a brownish zone; context cream color, odor and taste mild.

Lamellae sinuate, narrow, rather distant, yellowish, soon colored by the spores, entire and concolorous on the edges.

Stipe 30–50 mm long, 1–2 mm thick, cylindrical, equal, smooth, glabrous, cartilaginous, hollow, cream-colored.

Spores $7-9.5 \times 4-5 \mu$, ovate in face view, obscurely inequilateral in profile, inner wall rather thin and many collapsed spores present in revived mounts, outer wall or its remains present as lines and areas of thicker material (causing a slight unevenness), appearing smooth under all except highest power oil-immersion lens, as revived in KOH near cinnamon buff in color. Basidia 4-spored, $26-28 \times 7-8 \mu$. Pleurocystidia none. Cheilocystidia abundant but somewhat agglutinated, $28-40 \times 4-9 \mu$, cylindrical to slightly ventricose near base, obtuse to capitate at apex, hyaline, thin-walled. Gill trama nearly parallel. Epicutis of pileus a thin hyaline layer of loosely arranged nongelatinous appressed hyphae. Clamp connections absent.

HABIT, HABITAT AND DISTRIBUTION: Among leaves and grass in rich soil near or under trees, Pacific Coast states of Washington and California and possibly in Europe; fall and early winter.

OBSERVATIONS: The description given here is based entirely on the type. At first we were inclined to consider this as a more robust form of *G. laevis*, but no pilocystidia were seen, the cheilocystidia are somewhat agglutinated, the cap margin is described as incurved, and there is very likely a difference in the color of the pileus. It is similar to *G. laevis* in lacking clamps, in having thin-walled readily collapsing spores, and possibly in the

habitat. We have examined specimens of *G. laevis* (*graminea*) from Josserand, and from Favre, in which the pilocystidia are lacking as far as we can determine. We cite these collections here, indicating either that *G. brunneimarginata* also occurs in Europe, or that the character of pilocystidia being present or absent is not reliable. We cannot vouch for the color of the pilei in these specimens, though from the descriptions one would expect the species to be readily distinguished on this basis.

MATERIAL EXAMINED: Cooke 21748 (MICH.). J. Favre, Switzerland, 11-15-47 (MICH). M. Josserand, Lyon, France, 5-11-38 (MICH). McMurphy 52-type (NY). Rea 1099.

5. *Galerina laevis* (Pers.) Singer, Persoonia 2: 31: 1961.
Agaricus laevis Persoon, Myc. Europ. 3: 164. 1828.
Galera graminea Velenovský, České Houby, p. 548. 1921.
Galerina graminea (Velen.) Kühner, Ency. Myc. 7: 168. 1935.
 Illustrations: Kühner, op. cit. p. 169. 4 figs.

Pileus 7–15 mm overall, campanulate, then more or less expanded, convex-campanulate, obtusely conic to convex or plane, sometimes obtusely umbonate, when moist often with long striae, pale ochraceous to ochraceous, brownish ocher, ochraceous tawny, hygrophanous, fading from the disc outward to straw color or light ochraceous, glabrous but finely cobwebby and almost silky when seen in dry condition under a handlens; flesh thin, hyaline-melleous, odorless, taste mild.

Lamellae more or less distant, thin, beautifully yellow, then darker ochraceous, finally ochraceous tawny, rather broad and often more or less ventricose but sometimes with straight edges, adnate often sinuate, quite frequently slightly intervenose.

Stipe 15–35 mm long, 1–1.7 mm broad, equal, base rarely slightly enlarged, sometimes crooked, whitish-straw-colored to pale honey or pale yellow, base not appreciably fulvescent but sometimes white; silky, especially at first but in reality covered by minute erect hairs (caulocystidia); solid, then fistulose; flesh concolorous with surfaces, tender.

Spores 7.2–9.3(10) \times 4.2–5.7 μ , ellipsoid to ovoid, but somewhat inequilateral in some individual spores and occasionally somewhat versiform, light ochraceous to pale cinnamon in KOH, with the wall readily collapsing and thin (reaching 0.5 μ at maturity), with moderately dense, very low and small punctations which do not strongly contrast with the episporium but are distinct in KOH mounts under oil immersion, without plage, rarely some spores with very faint one. Basidia typically 4-spored, but frequently 1-, 2-, 3-spored basidia intermixed in a single preparation, 23–32 \times 5–8 μ , hyaline. Pleurocystidia, none. Cheilocystidia 23–37 \times (1.5)4–8.8 \times 2.5–6.5 μ , constriction underneath capitellum 1.5–3.2 μ in diameter, hyaline or with yellowish content, most frequently with ventricose base and distinct capitellum, rarely a few slightly off the edge line. Hymenophoral trama regular, hyaline or in parts yellowish, not gelatinized. Pileus trama with slight but

distinct ochraceous brownish pigment incrustations, epicutis of elongate filamentous hyphae, hyaline, intermixed with some broader hyphae, the extreme terminal hyphae often continued into pilocystidia. Pilocystidia hyaline, more rarely honey yellow, numerous or at times rare, much like the cheilocystidia, but often longer, more rarely shorter; surface of stipe covered with numerous caulocystidia, these much like the pilocystidia. Hyphae without clamp connections.

HABIT, HABITAT AND DISTRIBUTION: In grassy places, often among mosses, fruiting in June (Massachusetts) and Oct. until Dec. (Europe).

OBSERVATIONS: The macroscopical description is adopted from Kühner (l.c.). The microscopical description is based on our observations from three European collections. Judging from present records this is rare in North America, having been found only in Massachusetts. Both in this species and in *G. dimorphocystis* the caulocystidia elongate considerably and, especially in dried specimens, may be mistaken for veil remnants when the stipe is viewed under 5× or 10× magnification. Singer (1961) has established that *A. laevis* Pers. has the characters of this species. Since *A. laevis* is the older name and, in addition, attached to a type, we believe that Persoon's name should be used.

MATERIAL STUDIED: Bigelow 7979 (Massachusetts) (MICH); Nyberg, Finland, 1934 (H); Höhnelt, Niederösterreich, 28-X-1906 (FH, as *Galera hypnorum*); France, type of *Agaricus laevis* Pers. (L).

6. *Galerina dimorphocystis* Smith & Singer, Mycologia 47: 558.
1955. var. *dimorphocystis*

Illustrations: Figs. 255–256 (spores); 6 (cheilocystidia), 9 (pilocystidia), 10 (caulocystidia).

Pileus 4–12(15) mm broad, obtusely conic or campanulate with a straight margin, expanding to broadly conic or convex, often somewhat umbonate, surface moist and hygrophanous, when young often ochraceous tawny (*Yucatan*), later pale ochraceous tawny, fading to pale pinkish buff, outer half translucent striate, moist, densely pubescent when young, glabrescent; flesh very delicate, membranous, taste faintly raphanoid, odor raphanoid or none.

Lamellae close to distant, broad (about 1.5 mm) to relatively narrow, ascending, pale delicate ochraceous tawny, adnate, edges even.

Stipe 15–30 mm long, .5–2 mm thick, hyaline to slightly dingy yellowish (*sombrero*), pruinose or appearing fibrillose below because of elongated caulocystidia (no veil present), midportion glabrescent, very delicate and brittle.

Spores 7.5–10(11) × (3.7)4.5–6(6.7) μ, somewhat dingy ochraceous to pale tawny in KOH, inequilateral in profile, more or less narrowly ovate in face view, minutely punctate to practically smooth, with normally thickened wall for the genus (not collapsing), plage area not differentiated. Basidia 22.5–24 × 6–6.2 μ, 4-spored or rarely 2-spored. Pleurocystidia none. Cheilo-

cystidia hyaline to yellowish, (22)25–42 \times 4.5–10.5 μ , rarely some 30–40 \times 10–16 μ , capitate to subcapitate, the capitellum 3.7–6 μ , back of this the narrowest part of the neck 1.5–2.3(3) μ thick, some of those on the part of the gill edge nearest the cap margin typically vesiculose and (7.7)15–20 μ in diam., and some of these with an apical projection. Hyphae of pileus trama (and hypodermium) often of short broad cells up to 38 μ wide, with incrusted pigment dissolving somewhat in KOH to color the mount yellow. Pilocystidia in young caps numerous, capitate to subcapitate, up to 75 \times 7.5 μ .

HABIT, HABITAT AND DISTRIBUTION: Gregarious on moss, especially over mossy logs, in cold bogs or cold wet springy hillsides, or on wet mossy rocks, early June to Aug. It was found abundantly in the vicinity of the lower falls of the Tahquamenon River in Tahquamenon Falls State Park, Michigan, during 1953; Mt. Rainier National Park in Washington, and in the Laurentide Park, Quebec, Canada, in the fall of 1959, probably widely distributed and to be expected in abundance in Canada.

OBSERVATIONS: This is typically a small species likely to be mistaken for *G. hypnorum* in the field. The nearly hyaline stipe and lack of a veil distinguish it from *G. semilanceata*, which is typically more robust. The large vesiculose cheilocystidia are most numerous near the cap margin, but cannot always be found readily enough under the microscope to make their presence a quick means of spot identification. However, they are significant in the delimitation of this species from *G. laevis* which also has numerous pilocystidia. *G. dimorphocystis* differs from *G. brunneimarginata* in consistently smaller size, thicker-walled more conspicuously roughened spores, and different habitat. In some collections, such as Smith 41400 and Singer N-266, there is a tendency toward the production of abnormally long, narrow (to 13 \times 4.5 μ) spores which are drawn out at the apex, and which sometimes appear subangular in face view. These have been observed as both "diads" and "tetrads" in mounts, indicating that they may be produced on either 2-, or 4-spored basidia. The ornamentation is somewhat variable and may vary from distinct to faint in spores of a single print.

MATERIAL EXAMINED: Bigelow 3018; 3029; 3041; 3184; 3358; 5004; 6617; 6618 (MICH). Singer N-117; N-266; N-267; N-532 (F). Smith 38812; 41270; 41272; 41277; 41279; 41280; 41398; 41400 (abnormal spored); 41401-*type*; 41435; 41436; 41438; 41442; 41445; 41609; 41610; 41611; 41612; 41613; 41614; 41615; 41616; 41617; 41619; 41643; 48164; 49622; 49627; 49719; 56921; 57075; 61665. Thiers 2660; 2706; 2716; 2996 (MICH).

6a. *Galerina dimorphocystis* var. *nexapensis* Singer, var. nov.

Pileo 6–15 mm lato, 6.5–13 mm alto, acute conico vel conice acuteque papillato, sordide hyalino et dilute ochraceo, dein dilute brunneolo, longique pellucide striato; lamellis ochraceo-alutaceis, ascendentibus, angustis

vel latis, adnexis, sat confertis vel subdistantibus; stipite 45–58 mm longo, 1–4 mm crasso, ochraceo-albido, dein pallide stramineo, demum dilutissime brunneo ad basin, apice farinaceo-pruinato, fibrillis pallidis sericeis ubique obsito sed glabrescente, minime attenuato apicem versus vel subaequali, interdum flexuoso; sporis 7.6–8.1 \times 4.5–5 μ ; verruculosis, ochraceis, depressione suprahilari praeditis; disco levi suprahilari carentibus; basidiis tetrasporis; cheilocystidiis 30–44 \times 4.5–6.3 μ , numerosis, hyalinis, ventricosis, apice interdum subincrassatis vel aequalifiliformi; epicute subhyalina vel hyaline, hyalino-granulosa; hypodermio pigmento haud incrustato, flavo; pilocystidiis paucis vel nullis; hyphis omnibus defibulatis. Ad acus supra truncum *Abietis religiosae* putridum in silva acerosa montana gregatim, Mexico.

Pileus 6–15 mm broad, 6.5–13 mm high, acutely conic or conic with acute papilla, about as high as broad, sordid hyaline mixed with light ochraceous, becoming light brown with dark sordid-colored long translucent striations which nearly reach the disc, not sulcate, smooth, glabrous, not viscid; odor none.

Lamellae ochraceous buff, ascending rather narrow to fairly broad, adnexed, moderately close to subdistant.

Stipe 45–58 mm long, 1–4 mm thick, attenuate upwards or subequal, sometimes flexuous, ochraceous whitish, pale stramineous to almost pallid with pallid sericeous fibrils all over but glabrescent, eventually becoming slightly brownish at base, paler brown at the base than at apex, apex pruinose; no veil seen.

Spores 7.6–8.1 \times 4.5–5 μ , verruculose, ochraceous, with a suprahilar depression, without suprahilar plage; basidia 21.5–28 \times 5.2–6 μ , 4-spored; cheilocystidia 30–44 \times 4.5–6.3 μ , numerous and making the edge heteromorphic, hyaline, ampullaceous, ventricose in the middle and pedicellate below, above a rather long neck which is cylindrical and ends in a slightly enlarged to subcapitate (3.5–4.5 μ) apex or rarely merely obtuse at apex (neck 2–3.3 μ thick or if equal only 1.8–2.2 μ); pleurocystidia none; pilocystidia present but rare and often difficult to demonstrate; epicutis little differentiated, more hyaline than hypodermium, hyphae often with hyaline incrusting material, not gelatinized; hypodermium consisting of hyphae which are not pigment-incrusted, bright yellow in KOH; clamp connections lacking.

HABIT, HABITAT AND DISTRIBUTION: Gregarious among mosses on needles of *Abies*, mostly, fallen onto a rotting trunk of *Abies religiosa* in a conifer forest, Singer M1566-type near San Pedro de Nexapa, 3000 m. alt. Mexico, D.F. July 21, 1957 (MICH).

OBSERVATIONS: This variety is near var. *dimorphocystis* but differs in having somewhat smaller spores, fewer pilocystidia, broader pileus which never expands, and habitat on *Abies* needles.

7. *Galerina nigripes* Smith & Singer, Mycologia 50: 480. 1958.
Illustrations: Figs. 275–276 (spores); 7 (cheilocystidia), 8 (caulocystidia).

Pileus 8–11 mm broad, obtusely conic to campanulate, glabrous, moist, hygrophanous, tawny on disc and striae, ochraceous tawny between striae; odor and taste not recorded.

Lamellae broad, subdistant, ascending adnate, pale, ochraceous-tawny.

Stipe 25–30 mm long, ± 1 mm thick, equal, blackish at base, pallid honey color above, sometimes retaining the dark base when dried, naked (no sign of a veil).

Spores 8–11 \times 5–5.5 μ , almost elliptic in face view, very thin-walled and many collapsing in KOH, pale yellow-cinnamon in KOH singly, pale cinnamon in groups, very minutely ornamented, not darkening in Melzer's sol. Basidia 4-spored; pleurocystidia none. Cheilocystidia abundant, 22–34 \times 5–8 \times 2–3 \times 4–5 μ , tibiiform, hyaline, smooth, thin-walled. Gill trama regular, yellowish in KOH. Pileus trama yellowish in KOH, hyphae slightly incrustated; pellicle of pileus thin, of narrow appressed hyphae with non-gelatinous walls; no pilocystidia seen on type, very rare on Smith 55555. Clamp connections absent.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on mossy frondose trunks (type on oak); southwestern Oregon, Nov.; also in Northern Argentina (?).

OBSERVATIONS: The blackening stipe base distinguishes this species from *G. laevis* and *G. brunneimarginata*, which grow in habitats quite different from that of *G. nigripes*. Smith 55555 and 55382, also from mossy oaks in southern Oregon, had the dark stipe base, but the color disappeared when the specimens were dried. In the type traces of the dark color still remain. There is a tendency for the capitella of the cheilocystidia to adhere to each other and rarely one can make out a thin refractive layer over the surface, indicating the existence of a viscous material. This was also noted on a Japanese specimen of *G. heterocystis*. The material observed in Northern Argentina (prov. Tucumán, San Agustín, Jan. 7, 1959) differs only slightly, in occasionally acute pileus, slightly longer (43 mm) stipe which is finely longitudinally silky on melleous hyaline ground (but without a veil) and in the spores which are distinctly punctate, 9.8–12.8 \times 5.5–6.2 μ , rather well-pigmented (melleous ochraceous in KOH). The basidia are mixed, 2- and 4-spored (which might account for the slightly larger spores). The base of the stipe becomes bister, especially where handled. This grew in montane forest among mosses over completely humified *Alnus* wood.

MATERIAL EXAMINED: Smith 55382; 55473; 55555; 55608; 55691-type; 55695; 55704.

Subgenus II. *Galerina*

Clamp connections present at least on the fundamental tissue of the fruiting body and usually on all hyphae. Spores typically with a smooth suprahilar depression (the "plage"), this area either with well-marked boundaries or, in a few species, indistinctly delimited, rarely absent. In the truly smooth-spored species because of the absence of exosporial orna-

mentation there is no plage, or only a very faint boundary line can be ascertained under oil immersion.

Diversity in spore ornamentation and shape of the cheilocystidia and pleurocystidia when present form the key to the classification of this, the type, subgenus. The appressed or incurved margin of the pileus forms only a secondary character, in contrast to the emphasis given to it in the Friesian classification where it was used to distinguish genera. The section *Inoderma* is perhaps the most interesting since it could very well serve as a connecting link to *Inocybe*. The recognition of section *Porospora* is the most difficult, but practical decisions can be made rather accurately if one follows the rule that if the presence of a pore is doubtful, when the spore is seen under oil immersion, the species does not key out in *Porospora*.

Key to Sections

1. Spores calyptrate; pleurocystidia typically absent (rare in *G. filiformis*)
----- Section *Calyptospora* 49
1. Spores not calyptrate or if so pleurocystidia present ----- 2
 2. Surface of pileus innately fibrillose when faded, or with fibrils from a distinctly colored veil (veil not merely grayish-pallid to yellowish) ----- Section *Inoderma* 212
 2. Surface of pileus typically viscid to moist and hygrophanous and not appearing innately fibrillose when faded; if with veil fibrils, then these elements merely white to grayish or yellowish ----- 3
3. Pleurocystidia typically absent ----- 4
3. Pleurocystidia typically present (use caps that are not over-mature in which the hymenium is undamaged) ----- 5
 4. Spores with a narrow apical pore but apex not truncate; exosporial ornamentation practically absent or extremely faint hence plage not demonstrable or only very faintly so ----- Section *Porospora* 202
 4. Spores lacking a distinct apical pore (often merely with a callus); plage demonstrable if spores are ornamented -- Section *Mycenopsis*
5. Spores smooth and with no plage because of the lack of any exosporial ornamentation ----- Section *Pseudotubaria*
5. Spores usually with well-developed exosporial ornamentation and typically with a distinct plage ----- 6
 6. Pleurocystidia thick-walled in the neck and ventricose part, most of them muricate ----- Section *Inocyboides*
 6. Pleurocystidia typically thin-walled, not muricate ----- 7
7. Pleurocystidia with broadly rounded apices ----- Section *Physocystis* 217
7. Pleurocystidia with obtuse to acute apices ----- 8
 8. Margin of pileus incurved ----- Section *Naucoriopsis* 23
 8. Margin of pileus straight ----- Section *Galerina*

Section *Calyptospora* Smith & Singer, *Sydowia* 11: 448. 1957.

In this section the exosporium fits rather tightly over the episporium, but there is regularly a tendency for it to loosen adjacent to the plage. This loosening is evident in the formation of blisters near or over the basal area. In face view of a spore it is not uncommon for such blisters to appear as "ears", one on each side of the plage. Pleurocystidia are typically absent (but see *G. macquariensis* and *G. filiformis*), and the surface of the pileus is not fibrillose except from loose remains of a white to yellowish veil. The apex of the spore lacks a germ pore.

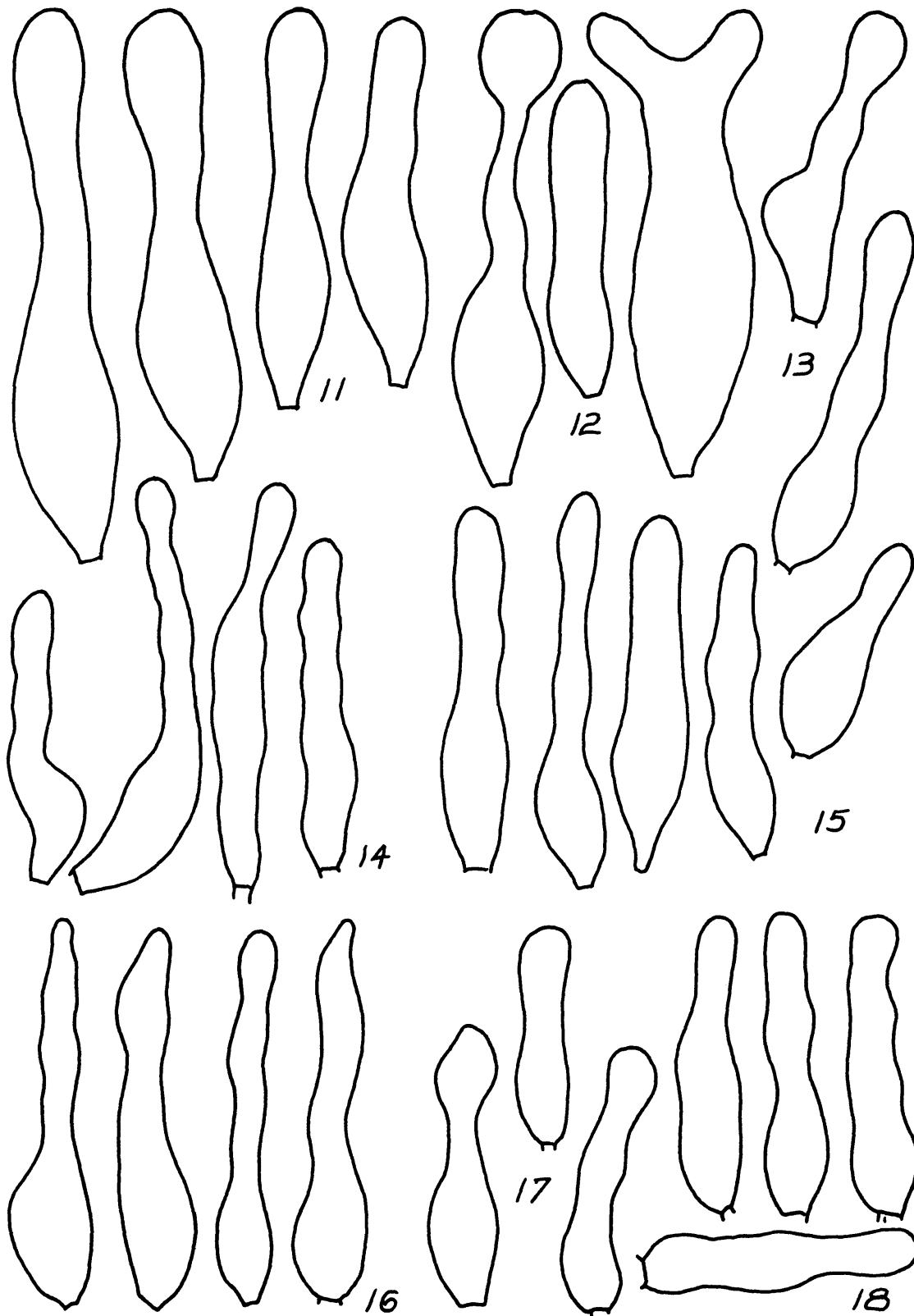
Certain of the species of this section are so similar in appearance to some of the smaller *Cortinari* that study of the spores is necessary before positive identification can be made. It appears to us that the members of this section are without question derived from *Cortinarius*. The tendency for the spores of a few *Cortinari*, including *C. violaceus*, to develop a smooth, though indistinctly bounded plage, shows clearly that either the beginnings or vestigial remains of this character are present in that genus.

TYPE SPECIES: *Galerina sahleri* (Quél.) Favre.

A section based on a single character is like any other taxon similarly based; it is weak. Here, however, for all practical purposes we have the combination of lack of pleurocystidia with the calyptrate spores (but see *G. macquariensis* in stirps *Autumnalis*). Regardless of whether this adds validity to the section, we believe this section is one of the most significant and distinctive in the genus, because of the diversity of the species in it and the fact that they clearly show a connecting link to *Cortinarius*.

Key to Species

1. Odor distinctly of freshly husked green corn (as in *Lyophyllum infumatum*); veil copious and remnants clearly evident 8. *G. odora*
1. Not as above though odor and taste may be distinctive in other ways 2
 2. Many spores in a mount obscurely to distinctly angular-ovate in face view 3
 2. Spores not as above 6
3. Cheilocystidia 5–8 μ in widest part; veil copious and leaving an annular zone with zones or patches of fibrils beneath 10. *G. subarctica*
3. Cheilocystidia typically 7–12 μ in widest part; veil thin to practically absent 4
 4. Pileus dingy yellow-brown; stipe dingy yellow-brown throughout 13. *G. psathyrelloides*
 4. Pileus bright tawny orange; stipe ochraceous to orange-brown... 5
5. Stipe pale ochraceous over all 9. *G. turfosa*
5. Stipe pale clay color above, orange-brown over lower part see *G. laeta* (99)
6. Stipe bister at base in age, copiously fibrillose; taste slightly rancid 11. *G. cortinarioides*
6. Not with above combination of characters 7
7. Habitat on naked needle beds, duff, or muck on the forest floor 8



Cystidia: Fig. 11, cheilocystidia of *G. odora* (type); Figs. 12–13, cheilocystidia of *G. turfosa*; 14, cheilocystidia of *G. subarctica*; 15, cheilocystidia of *G. camarinoides*; 16, cheilocystidia of *G. anelligera*; 17–18, cheilocystidia of *G. psathyrelloides* (type).

7. Typically associated with mosses or clearly lignicolous 10
8. Stipe with a well defined annular zone of buff fibrils and a densely pruinose apex 12. *G. anelligera*
8. Veil thin and scarcely ever leaving an annular zone 9
9. Veil buff colored; stipe not appreciably darker below; growing on black muck under *Thuja* 13. *G. psathyrelloides*
9. Veil white; stipe darker below; on needle carpets under *Picea* and *Abies* 14. *G. acicola*
10. Typically on *Sphagnum*; stipe usually more than 50 mm long .. 11
10. Typically on other mosses; stipe shorter than in above choice .. 15
11. Veil well developed, leaving a fibrillose annulus and at times patches and zones beneath the annulus 12
11. Veil rudimentary to absent 13
12. Pleurocystidia present; spores $8-10 \times 5.5-7 \mu$; lacking zones and patches of veil remnants below annulus -- see *G. macquariensis* (141)
12. Pleurocystidia absent; spores $9-12 \times 6-7.5 \mu$; stipe with zones and patches of veil remnants as in *G. paludosa* (Pl.) .. 15. *G. boliviana*
13. Taste farinaceous; veil none 17. *G. farinacea*
13. Not with above combination of characters 14
14. Pileus bright orange brown; stipe 20-50 mm long; occurring in cloud forest in Brazil 16. *G. nubigena*
14. Pileus tawny; stipe 50-120 mm; occurring in cold northern *Sphagnum* bogs 18. *G. sphagnicola*
15. Veil present on young carpophores 16
15. Veil lacking at all stages 19
16. Cheilocystidia subacute; fibrillose annular zone present on stipe; carpophore with aspect of *Galerina unicolor* 19. *G. payettensis*
16. Cheilocystidia obtuse to capitate 17
17. Stipe dark reddish brown below and over all in age; cob-webby veil covering button stages 20. *G. sahleri*
17. Not as above 18
18. Stipe bulbillose at base; taste farinaceous 21. *G. calyptrata*
18. Stipe typically equal or nearly so; taste mild 22. *G. cerina*
19. Pleurocystidia scattered, clavate to vesiculose or resembling the cheilocystidia 23. *G. filiformis*
19. Pleurocystidia absent 20
20. Spores $8-10(11) \times 5-6.5 \mu$ 21
20. Spores $9-12 \times 5.5-7 \mu$ or larger 22
21. Lamellae typically olive-tinged when young; many cheilocystidia pale fulvous (at least near base) in KOH 24. *G. austrocalyptrata*
21. Lamellae never olivaceous and cheilocystidia hyaline in KOH 25. *G. fallax*
22. Stipe dark yellow-brown below, nearly pallid above; spores $11-14 \times 6.5-8 \mu$ 26a. *G. evelata* var. *fulvipes*
22. Stipe more or less honey color over all though base may be slightly darker 23

23. Spores 11–13.5 × 6.8–8.2 μ; cheilocystidia rarely capitate -----
 ----- 26. *G. evelata*
 23. Spores 9–11.5 × 5.5–7 μ; cheilocystidia obtuse to capitate -----
 ----- 27. *G. subcerina*

8. *Galerina odora* Smith, Mycologia 45: 909. 1953.

Illustrations: Pl. 2, fig. A. Fig. 11 (cheilocystidia)

Pileus 10–30 mm broad, obtusely conic, expanding to broadly conic or somewhat umbonate, surface glabrous, moist and hygrophanous, faintly striate, dark ochraceous tawny, moist, fading to cinnamon buff; flesh buff color, thick in the disc, thin over margin, odor resembling that of fresh green corn, taste mild.

Lamellae broad, close adnate, cinnamon buff becoming ochraceous tawny or darker, edges white fimbriate.

Stipe 30–60 mm long, 2–3.5 mm at apex, evenly enlarged downward, lower part coated with appressed pallid fibrils or these in zones or patches, apex pruinose, pallid ochraceous above, brownish downward but when dried evenly reddish-brown overall.

Spores 10–14 × 6.5–8 μ, ovate in face view, in side view inequilateral, with blisters of the loosened exosporium especially around the smooth supra-hilar depression. Basidia 4-spored, 24–30 × 9–10 μ, with globular content. Pleurocystidia none. Cheilocystidia abundant, 36–50 × 7–11 μ, narrowly ventricose with obtuse to slightly enlarged apices or in some the apex tapered abruptly. Gill trama regular, cells greatly enlarged, pale ochraceous in KOH; subhymenium appearing cellular in sections; cuticle of pileus consisting of ochraceous, non-gelatinous hyphae. Pileus trama of broad, interwoven ochraceous hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on soil on banks in Washington, September.

OBSERVATIONS: *G. odora* is distinct from *G. cortinarioides* in its odor of fresh green corn when the flesh is crushed and in its larger spores. It was collected for a *Cortinarius* of the *C. acutus* group, but the spores showed that it was a *Galerina*. A thin growth of Bryophytes covered the bank where it grew, so that it was not clear whether the habitat should be listed as naked soil or not. In Smith 48165 very few spores were calyptrate, many misshapen spores were present and the range in size was great, indicating an abnormal condition.

MATERIAL EXAMINED: Smith 40210-*type*; 40213, 48021; 48165.

9. *Galerina turfosa* Smith & Singer, Mycologia 47: 560. 1955.

Illustrations: Pl. 2, fig. D. Figs. 263, 264–266 (spores); 12, 13 (cheilocystidia).

Pileus 8–15 mm broad, convex with a straight margin when young, broadly convex in age, margin at first fringed with scattered fibrils from the rudimentary veil, otherwise glabrous, when fresh lubricous and “Sanford’s brown” to “chestnut” (ferruginous to bay), slowly changing to “ochraceous tawny” in age before fading, fading to ochraceous buff; flesh thin, fragile and watery, odor none or slight, taste slightly farinaceous.

Lamellae broad, adnate to subdecurrent, broadest at stipe, (3–4 mm), tapering to edge of cap, subdistant, dull brown when young, cinnamon-brown in age, margin white floccose.

Stipe 20–60 mm long, 2–3 mm thick at apex, equal, fragile, hollow, base slightly bulbous, pale ochraceous, at first covered over lower half by scattered fibrils representing remnants of the veil, glabrescent.

Spores 10–12(13) \times 6.5–7.5(8) μ , inequilateral in profile, broadly ovate in face view (many almost angular-ovate), outer wall separating around suprahilar depression to produce loosened wrinkled blisters, apical callus present. Basidia 4-spored, 28–34 \times 8–9(10) μ , hyaline in KOH. Pleurocystidia none or rare and then near the gill edge. Cheilocystidia (36)40–50 \times 9–12 μ , fusoid-ventricose to subcylindric, apices obtuse, walls thin and hyaline in KOH. Pileus trama homogeneous beneath a poorly formed cuticle of subgelatinous narrow hyphae (no well differentiated pellicle). Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious among *Sphagnum* and other mosses, Whitmore Lake, Michigan; known only from the type locality.

OBSERVATIONS: The ferruginous color of the pileus in young specimens, and the cinnamon-brown gills at maturity distinguish this species in the field from members of the *cerina* complex. Under the microscope the large, almost angular-ovate spores are somewhat distinctive. The habitat was a burn with, at its edges, an overgrowth of mosses, including *Sphagnum*, and it was in this zone that both collections were made.

MATERIAL EXAMINED: Smith 33-1022-type; 33-1101.

10. *Galerina subarctica* Smith & Singer, sp. nov.

Illustrations: Fig. 14 (cheilocystidia).

Pileus 20–30 mm latus, convexus vel late conicus, demum plano-umbonatus, udus, subhygrophanous, rufo-brunneus, ad marginem leviter striatus; lamellae confertae, latae, subochraceae; stipes 40–70 mm longus, 3–4 mm crassus, deorsum 5–6 mm crassus, rufo-brunneus fibrilloso-annulatus; sporae saepe subangulares, 10–12 \times 6.5–8 μ , subcinnamoneae, saepe calyptratae; cheilocystidia 42–65 \times 5–8 \times 3–4 \times 4–6 μ . Specimen typicum legit prope Anchorage, Alaska, 9 Oct. 1959. Wells 1959 # 3 (MICH).

Pileus 20–30 mm broad, convex to obtusely conic with the margin appressed when young, in age broadly convex or expanded umbonate and at times the margin undulating, subhygrophanous, dark red-brown moist and faintly striate on the margin, not viscid, buff when faded (pale dingy

cinnamon buff as dried), glabrous. Context concolorous with the pileus, fairly firm, thick at disc and attenuated sharply to margin, odor and taste farinaceous.

Lamellae pale yellow-brown becoming slightly darker with age, adnate or uncinatae by a very short tooth, close to subdistant, moderately broad, pallid-marginate and crisped under a lens, edges entire.

Stipe 40–70 mm long, 3–4 mm at apex, enlarged downward to 5–6 mm at base, hollow, cartilaginous, concolorous with or paler than pileus, darkening to sooty gray at base, punctate to fibrillose-pruinose from pallid fibrils above the annular zone, with appressed patches of whitish fibrils below or in these zones.

Spore deposit rusty yellow-brown; spores $9\text{--}12 \times 6\text{--}7.5 \mu$, in profile inequilateral to subangular-inequilateral, in face view ovate to angular-ovate, surface minutely ornamented (sub oil immersion) and a faint to distinct line bounding the smooth plage, a fair number ($\pm 15\%$) calyptrate, dark rusty brown in KOH, very dark red-brown in Melzer's reagent.

Basidia $20\text{--}35 \times 9\text{--}11 \mu$, clavate, 4-spored, hyaline to yellowish in KOH, and pale cinnamon basidioles numerous in dried material revived in KOH. Pleurocystidia none; cheilocystidia $42\text{--}65 \times 5\text{--}8 \times 3\text{--}4 \times 4\text{--}6 \mu$, subcylindric to slightly enlarged at base, neck straight to flexuous and apex acute to subcapitate, arising from a tangled layer of hyphae yellow revived in KOH, but cell itself thin-walled and hyaline. Hymenophoral trama regular and yellowish in KOH, the cells somewhat enlarged; epicutis of pileus of appressed yellowish nongelatinous hyphae $2\text{--}5 \mu$ diam. hypodermial region dull cinnamon colored and hyphae with some incrusting pigment. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious to subcespitate on fallen spruce needles, duff and soil with high lignin component, late fall, near Anchorage, Alaska. (Wells 59 # 3).

OBSERVATIONS: This species is close to *G. cortinarioides* and *G. turfosa*, and like the latter has spores showing a tendency to angularity. It differs from the latter in its much more copious veil, paler colors as dried, and a stipe which darkens appreciably at the base though this color change does not show on the dried specimens.

11. *Galerina cortinarioides* Smith, Mycologia 45: 897. 1953.

Illustrations: Pl. 2, fig. C. Figs. 267, 269–270 (spores).

Pileus 10–20 mm broad, obtuse with a straight margin, expanding to broadly conic or margin spreading and disc a flattened umbo, surface glabrous except for a few marginal fibrils, hygrophanous, "ochraceous tawny" or darker when moist and then translucent striate, about cinnamon buff when faded; flesh thickish but soft and fragile, watery ochraceous, taste slightly rancid (not farinaceous), odor none.

Lamellae broad, close, adnate, ventricose, pale to dark ochraceous tawny, edges crenulate.

Stipe (10)30–40 mm long, (1.5)2–3.5 mm thick, very fragile, pallid brownish above, darker below and base bister in age, surface copiously decorated with remnants of a white veil but apical zone soon evanescent.

Spores 8–11 × 6–7 μ, ovate in face view, inequilateral in profile, ochraceous tawny, outer wall wrinkled, fitting like a sack over the spore and with loose ragged boundaries at hilar end, plage smooth and marked by a ragged line or with blisters of loosened exosporium (calyptrate). Basidia 4-spored, 23–30 × 8–9 μ. Pleurocystidia none. Cheilocystidia abundant, (32)46–56(66) × 6–12(15) × 3.5–5 × 5–8 μ, fusoid-ventricose with long necks and obtuse to capitate apices, hyaline or some with yellow content as revived in KOH, thin-walled. Gill trama regular to subinterwoven, ochraceous in KOH from incrusting pigment. Epicutis of pileus of narrow (3–5 μ) non-gelatinous hyphae with pale ochraceous-tawny incrusting pigment; pileus trama of broader hyphae and also with incrusting pigment. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on soil in a trail to Green Lake, Mt. Rainier National Park, Washington, Sept.

OBSERVATIONS: Here as in *G. odora* the aspect is that of a *Cortinarius* of the *acutus* group. For additional comments see *G. odora*.

MATERIAL EXAMINED: Smith 40019-*type*; 40097; 40860; 40889; 40891.

12. *Galerina anelligera* Smith & Singer, Mycologia 50: 475. 1958.
Illustrations: Fig. 16 (cheilocystidia).

Pileus 6–9 mm broad, obtusely conic becoming conic-campanulate, surface glabrous, moist, hygrophanous, dull ochraceous tawny fading to a dingy cinnamon buff; odor and taste not distinctive.

Lamellae broad, close, adnate, concolorous with the pileus.

Stipe 10 mm long, 2 mm thick, equal, heavily pruinose above and sheathed below up to the fibrillose annulus with pale buff (yellowish) fibrils, dark brown over all beneath the pruina and fibrils.

Spores 9–12.5 × 5–6.5 μ, ovate in face view, somewhat inequilateral in profile, nearly “cinnamon-brown” in KOH, calyptrate, plage smooth, remainder of surface faintly roughened (under oil). Basidia 4-spored. Pleurocystidia none. Cheilocystidia abundant, 40–55 × 7–11 μ, fusoid-ventricose, necks 4–5 μ thick and apices obtuse to slightly enlarged, hyaline to yellowish in KOH. Gill and pileus trama well colored (rusty) from incrusting pigment. Epicutis of pileus a layer of radial narrow non-gelatinous hyphae, the walls incrusting. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On wet duff under conifers, South Fork of Lake Fork, Payette Lakes, Idaho, Sept. 17, 1956, R. Shaffer (Smith 53493) -*type*.

OBSERVATIONS: The buff colored veil and dull brown calyptrate spores relate this collection to *G. psathyrelloides*. It differs in having slightly smaller spores, well-developed veil, and heavy pruinosity over the apical region of the stipe. It has the appearance of a *Psathyrella* but the spores clearly indicate its position in *Galerina*.

13. *Galerina psathyrelloides* Smith, Sydowia, Beiheft 1: 51. 1957.
Illustrations: Pl. 3, fig. C. Fig. 17, 18 (cheilocystidia).

Pileus 10–15(20) mm broad, obtuse when young, expanding to obtusely campanulate, surface moist, glabrous, hygrophanous, near “snuff brown” when moist, soon fading to dingy cinnamon-buff, striate when moist and glabrous, except for marginal veil fibrils; flesh very soft and fragile, odor and taste not distinctive.

Lamellae close, broad, adnate, readily seceding, pale buff becoming dingy ochraceous tawny, edges often crenulate.

Stipe 20–30 mm long, 2–2.5 mm thick, terete hollow, concolorous with the pileus or a little paler, evenly colored throughout, undulating, with a few pale buff fibrils from the rudimentary veil lower down.

Spores “buckthorn brown” in deposit, $11-13 \times 6-7(7.5) \mu$, ovate to obscurely angular-ovate in face view, inequilateral in profile, many calyptrate in face view, plage clearly delimited, outer layer smooth to slightly wrinkled under high-dry magnification, occasionally the outer layer extending over the plage as a blister, inner wall thick and dull brown (near “snuff brown”) in KOH. Basidia 4-spored, $26-28 \times 8-9 \mu$, clavate, hyaline in KOH. Pleurocystidia none. Cheilocystidia abundant, fusoid ventricose becoming subcylindric, $40-55 \times 7-12 \times 5-7 \mu$, apices obtuse to subcapitate, hyaline in KOH individually but pale ochraceous in mass, somewhat agglutinated in KOH, thin-walled, smooth. Gill trama somewhat interwoven. Pileus trama without a distinctive pellicle, the hyphae near the surface encrusted with pigment, $5-12 \mu$ in diam. Clamps present but not abundant.

HABIT, HABITAT AND DISTRIBUTION: Gregarious to subcespitose on muck in cedar swamps, late fall, Michigan.

OBSERVATIONS: In the field this species reminds one of a *Psathyrella* in the *P. obtusata* group, because of the dull colors and very fragile *Psathyrella*-like consistency. It is close to *G. acicola* but the stipe is not as dark as in that species, the veil is buff colored, and there is a tendency for the spores to appear somewhat angular in face view. It may also be close to *G. cerina* var. *luteovelata* but that variety has cheilocystidia $9-12 \mu$ broad at the apices in some, and the apices are broadly rounded. Also, the aspect of the *G. cerina* variants is typically that of *Galerina* whereas that of the present species is decidedly that of *Psathyrella*. *G. psathyrelloides* is not a moss-inhabiting fungus as is *G. cerina* and its variants.

MATERIAL EXAMINED: Smith 50755; 50800; 50935-type. (MICH).

14. *Galerina acicola* Smith & Singer, Mycologia 47: 562. 1955.
Illustrations: Fig. 19 (cheilocystidia).

Pileus 10–20 mm broad, obtusely conic, expanding to conic-campanulate, surface glabrous except for a few evanescent fibrils along the margin from the thin partial veil, moist and hygrophanous, “cinnamon-brown” on

disc, dull "ochraceous-tawny" over striate marginal area, fading to pale tan or darker; flesh concolorous with the pileus surface, thin, fragile, odor and taste not distinctive.

Lamellae bluntly adnate to slightly adnexed, broad, close to subdistant, dull ochraceous-tawny (concolorous with cap margin), edges even to minutely crenulate.

Stipe 40–50 mm long, 2–2.5 mm thick, equal, sordid, watery cinnamon-brown below, pallid brownish above, not darkening much more in aging, lower portion at first with scattered white fibrillose patches representing veil remnants, apex slightly pruinose.

Spores 11–13 \times 6–7 μ , slightly inequilateral in profile, in face view narrowly ovate, surface appearing smooth in many but in others the exosporium separating from episporium forming distinct blisters or separating in small sheets, suprahilar depression smooth, apical callus present. Basidia 4-spored, 26–30 \times 9–10 μ , hyaline in KOH. Pleurocystidia, none seen. Cheilocystidia abundant, 46–60 \times 7–10(12) μ , narrowly ventricose with greatly elongated necks and obtuse apices or the latter almost subcapitate, hyaline and thin-walled in KOH. Gill trama somewhat interwoven, the walls yellow to tawny with incrusting pigment. Pileus trama homogeneous tawny revived in KOH, because of incrusting pigment. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on conifer needles, Little Crater Lake, Mt. Hood National Forest, Oregon, Oct. 5, 1946, Smith 24101-*type*, and Michigan, Smith 61657.

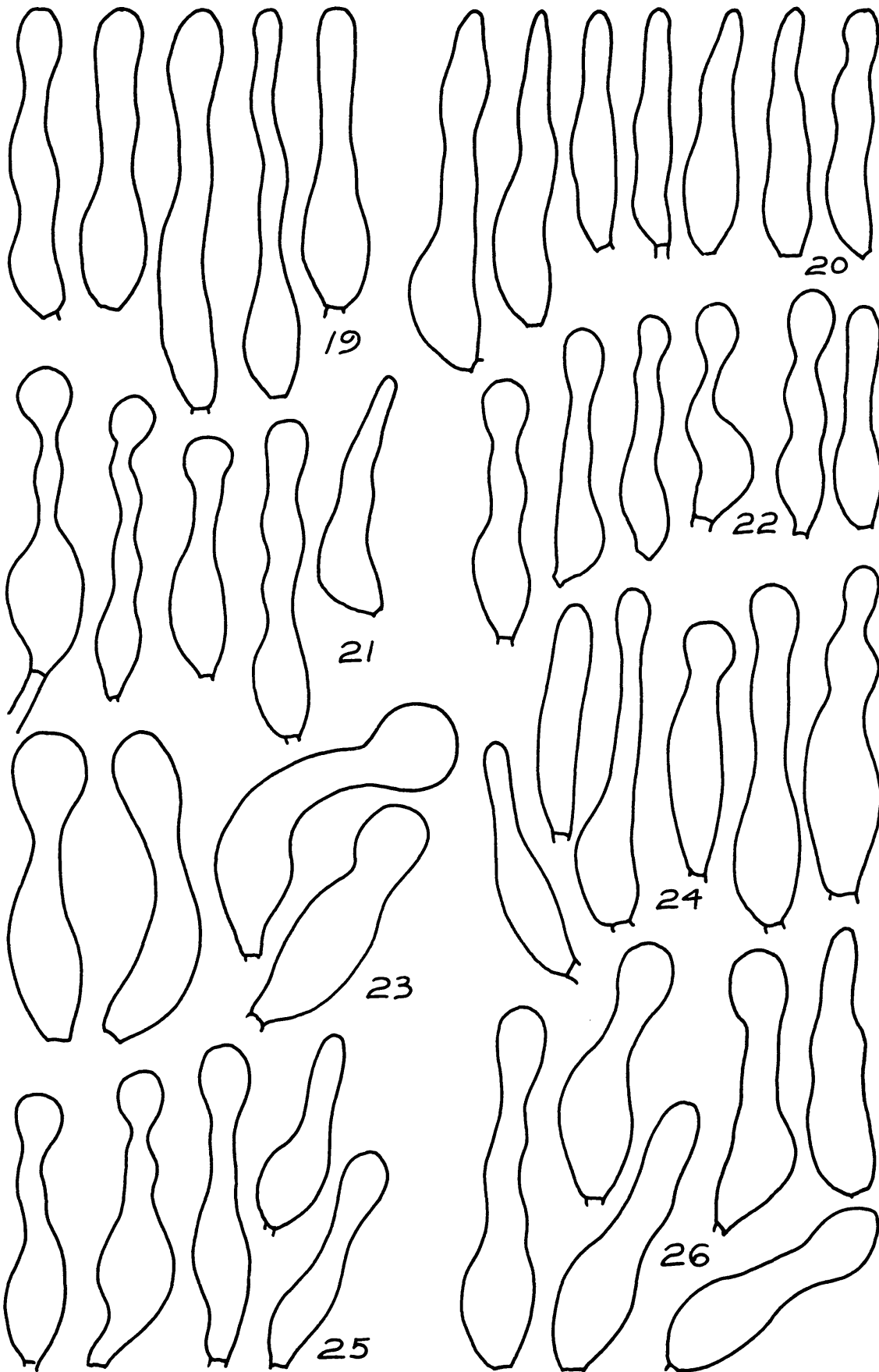
OBSERVATIONS: This species grows on naked needle beds in the manner of *Mycena psammicola*, i.e., scattered in abundance over a considerable area. In addition to this distinctly different habit and habitat, it differs from *G. cerina* in having a larger darker ("cinnamon brown") pileus, and the stipe darkened more at the base. It differs from *G. psathyrelloides* in having the aspect of a small *Cortinarius* rather than a *Psathyrella*, in having a white veil, and in the different habitat.

15. *Galerina boliviana* Singer, sp. nov.

Illustrations: Fig. 20 (cheilocystidia).

Pileo 6.5–17 mm lato, campanulato dein campanulato-umbonato, siennicolori vel ochraceo-brunneo; lamellis ochraceo-brunneolis, subconfertis vel subdistantibus, adnatis, latiusculis; stipite 47–87 longo, 2.2–4 mm crasso, brunneolo-ochraceo vel ochraceobrunneo, annulo semper bene evoluto sed in adultis interdum fugaci instructo; sapore subfarinaceo; sporis calyptratis, 9–11.5 \times 5.8–7.7 μ , melleis; cheilocystidiis ventricosis, infra apicem extremum constrictis usque ad 1.5–5.5 μ , interdum subcapitatis; epicute haud gelatinascente; fibulis permultis.

Pileus 6.5–17 mm broad, campanulate, later campanulate or prominently gibbous, glabrous, moist and hygrophanous, sienna-brown to dark dull yellow-brown over the disc and striations (*oak, raw sienna, Sudan brown*),



Cystidia: Fig. 19, cheilocystidia of *G. acicola*; 20, cheilocystidia of *G. boliviana*; 21, cheilocystidia of *G. nubigena*; 22, cheilocystidia of *G. farinea*; 23, cheilocystidia of *G. sphagnicola* (type); 24, cheilocystidia of *G. payettensis*; 25, cheilocystidia of *G. sahleri* var. *sequoiae* (type); 26, cheilocystidia of *G. calyptrata*.

between the striae paler (*Saratoga* or *buff*), pale buff when faded; context with odor none or weak, taste slightly farinaceous.

Lamellae moderately close, adnate, ascending at first, becoming horizontal, rather broad, dingy ochraceous tawny (between *Yucatan* and *Chipmunk*).

Stipe 47–87 mm long, 2.2–4 mm thick, subequal or tapering upward, hollow, pale dingy ochraceous tawny (between *spruce y* and *pl. 12 J 8*, then *samovar*), finally darker over basal portion (concolorous with lamellae); veil strongly developed, annuliform and leaving zones and patches on the stipe lower down as in *G. paludosa*, apical annulus white, at times fugacious.

Spores $9\text{--}11.5 \times 5.8\text{--}7.7 \mu$, pale ochraceous tawny in Melzer's solution; melleous in KOH or ammonia (not deeply colored), surface appearing smooth to slightly wrinkled and soon (in KOH) showing blisters or ears around the smooth plage (hence calyptrate), somewhat inequilateral in profile, ovate in face view. Basidia $24.5\text{--}34 \times 7.7\text{--}11.3 \mu$, 2-, 3-, 4-spored or all 4-spored. Pleurocystidia none. Cheilocystidia $(20)26\text{--}34(40) \times 8\text{--}12 \mu$, fusoid-ventricose with necks more or less elongated and apices obtuse to subcapitate, neck typically $3\text{--}6 \mu$ in thickness, hyaline or with brownish pedicels; clavate cells near cap margin brownish, numerous at times. Gill trama subregular, of hyphae lacking heavy pigment incrustations. Epicutis of pileus of relatively narrow pigment incrustated melleous hyphae which are not gelatinized; hypodermium consisting of broader hyphae with walls very heavily pigment-incrustated (deep brown) and with intracellular dissolved (cinnamon) pigment. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On *Sphagnum* in open Cejas vegetation and along the ditch of a road, 3000 m alt. Cotapata, prov. Nor-Yungas, Depto. La Paz, Bolivia. Singer B 628a, *type*.

OBSERVATIONS: The copious veil with its remnants distributed in belts over the lower half or two thirds of the stipe as in *G. paludosa* separates this species from *G. turfosa*. In addition the spores show no tendency toward angularity when seen in face view. The belts of veil material left over the lower part of the stipe also distinguish *G. boliviana* from both *G. farinacea* and *G. sphagnicola*. Macroscopically *G. boliviana* resembles *G. paludosa*.

MATERIAL EXAMINED: Singer B627; B628a-*type*; B628b (MICH).

16. *Galerina nubigena* Smith & Singer, sp. nov.

Illustrations: Fig. 21 (cheilocystidia).

Pileo 5×5 mm vivide aureo-ochraceobrunneo, acuto, striato, papillato; lamellis ochraceo-brunneis, subdistantibus, ascendentibus, ad notis. Stipite aureo-ochraceo brunneo, apice pruinato, 44×1.8 mm; velo sericeo exiguoque. Sporis $11\text{--}12.5 \times 7\text{--}7.2 \mu$, calyptratis; basidiis 2–4-sporis. Cheilocystidiis plerumque ventricosus basin versus, constrictis infra partem apicolem inflatam, saepe capitulatis, $29\text{--}56 \times 55.5\text{--}13.8 \mu$; pilocystidiis nullis; hyphis fibulatis. Ad *Sphagna* in silva montana nebularem Boliviae; Singer B1469 typus (MICH).

Pileus about 5 mm broad and high, conic with an acute central papilla, bright orange-brown (*gold pheasant* with *Hazel* papilla), spruce yellow between the transparent striae, margin crenulate; context odorless.

Lamellae yellowish brown *Yucatan*, subdistant, ascendant, adnate.

Stipe about 20–44 mm long, and 1 mm at apex, slightly thicker below, evenly ochraceous orange *Saratoga*, apex pruinose; veil pallid, insignificant, consisting merely of appressed silky fugacious fibrils.

Spores 10.5–12.5(14) \times 6.7–7.7 μ , calyptrate, smooth, with perisporial ear-like blisters, inequilateral in profile view, ovate in face view, tawny. Basidia 22–34 \times 7–8.5 μ , (1)2–(3)4-spored, variable in shape (ventricose to cylindric). Pleurocystidia none. Cheilocystidia 29–56 \times 5.5–13.8 μ \times 1.7–4.5 \times 4.2–11.3 μ , hyaline or yellowish in lower part, ventricose at base, capitate to subcapitate at tip, at times with pigment incrustations over lower part. Hymenophoral trama with hyphae varying from long-filamentous to short-inflated (up to 22 μ diam.), walls incrustated with yellowish to ochraceous pigment, filaments regular in arrangement. Pileus with epicutis little differentiated but usually present as a few narrow hyaline appressed non-gelatinous filaments; hypodermium of unequal diameter and heavily incrustated with rusty-melleous pigment (intracellular pigment lacking). Caulocystidia present over stipe apex. Clamps present.

HABIT, HABITAT AND DISTRIBUTION: On *Sphagnum* in cloud forest vegetation at 2200 m alt. Cerro Uchumachi, prov. Nor-Yungas, Depto. La Paz, Bolivia, Feb. 25, 1956, Singer B1469-*type* (MICH).

OBSERVATIONS: This species appears to be closest to *G. sphagnicola* but differs in brighter color of the pileus, smaller size, and lack of an appreciable number of acute cheilocystidia, in addition to the difference in its distribution.

17. *Galerina farinacea Smith, Sydowia, Beiheft 1: 50. 1957.**
Illustrations: Fig. 22 (cheilocystidia).

Pileus 8–15 mm broad, obtusely conic with an appressed margin when young, becoming obtusely campanulate to broadly conic, surface glabrous, moist, hygrophanous, conspicuously striate when moist, “tawny” or a richer fulvous varying to “ochraceous tawny”, dingy ochraceous when faded; flesh thin and membranous, odor none, taste distinctly farinaceous.

Lamellae distant to subdistant, adnate, broad, pale buff becoming ochraceous tawny, edges even.

Stipe 30–80 mm long, 1–1.5 mm thick, equal, flexuous, pale ochraceous or almost as dark as the pileus but evenly colored, perfectly naked and moist (no sign of a veil).

Spores 8–10(12) \times 5–6 μ , ovate in face view, inequilateral in profile, dark ochraceous tawny in KOH, calyptrate and occasionally with blisters.

* originally published in error as *farinaceae*.

Basidia 2- and 4-spored, hyaline to yellowish in KOH. Pleurocystidia none. Cheilocystidia $26\text{--}35 \times 8\text{--}11 \mu$, broadly fusoid-ventricose with obtuse to slightly enlarged apices, hyaline in KOH. Gill trama subparallel, hyaline to yellowish in KOH. Pileus trama of pigment-incrusted hyphae. Clamps present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on *Sphagnum*, Michigan, fall, common during some seasons.

OBSERVATIONS: This species has smaller spores than *Galerina evelata* and, in addition, has a farinaceous taste. There is also a difference in the size of the cheilocystidia ($26\text{--}35 \times 8\text{--}11$ as compared with $40\text{--}50 \times 11\text{--}14 \mu$) but this is not necessarily distinctive. *Galerina acicola* is not found on *Sphagnum* and lacks a farinaceous taste. *Galerina sphagnicola* Atkinson is closest, but this species has a rudimentary veil and lacks a farinaceous taste. Smith 50361 from Trout Lake, Michigan, in a *Polytrichum* bog, may be an intermediate form. In it, however, numerous capitate cheilocystidia were present and it had a slight farinaceous taste. This variant needs further study. Bigelow 6621 is placed here provisionally since the spores were scarcely calyptrate and the taste was not recorded.

MATERIAL EXAMINED: Bigelow 6621 (MICH). Smith 50251; 50256; 50259; 50260; 50261; 50296-*type*; 50355; 50361.

18. *Galerina sphagnicola* (Atk.) Smith & Singer, comb. nov.

Galerula sphagnicola Atkinson, Proc. Am. Philos. Soc. 57: 362. 1918.

Illustrations: Fig. 23 (cheilocystidia).

Pileus 10–25(30) mm broad, obtusely conic expanding to obtusely campanulate, rarely convex, umbonate in type, surface glabrous except for a few white marginal fibrils from veil when young, varying from opaque to conspicuously translucent-striate, color “tawny” when young, becoming ochraceous tawny or umbo remaining darker, fading to “warm buff” or finally “pinkish buff”; flesh thin, very soft, odor and taste none.

Lamellae close, narrow to moderately broad, broadly adnate, occasionally with decurrent lines, cinnamon buff becoming ochraceous-tawny, edges even but often whitish.

Stipe (40)50–100(120) mm long, 1–3(4) mm thick, equal or nearly so, very soft and weak, supported almost entirely by the moss, hollow, undulating, watery ochraceous-tawny with a pallid base or lower part merely pale honey color, pruinose at apex and with a few whitish evanescent fibrils lower down from the remains of the thin veil, soon glabrous.

Spores $9\text{--}11.2(12) \times 6\text{--}7.3(8) \mu$, somewhat inequilateral in profile, broadly ovate in face view and often with acute apex, obscurely calyptrate to calyptrate (most spores with loosened exosporium around the smooth plage or at times with blister covering the entire plage), well-colored (fulvous-rusty) in NH_4OH , with apical callus. Basidia 4-spored, $26\text{--}30 \times 7\text{--}8 \mu$, hyaline in KOH; pleurocystidia none. Cheilocystidia variable, $30\text{--}50 \times 7\text{--}11(13) \mu$, base mostly ventricose, neck flexuous, apex subacute to sub-

capitate or rarely capitate, hyaline, smooth. Pileus trama homogeneous or the cuticular hyphae narrow but non-gelatinous, mostly encrusted with a rusty to ochraceous (in KOH) pigment. Gill trama tawny to ochraceous in KOH, subparallel. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered to gregarious on *Sphagnum* in bogs, Quebec, Massachusetts, Michigan and New York, Sept.

OBSERVATIONS: This species is analogous to *G. sphagnorum* but differs distinctly in spore markings; it is the latter which indicate a relationship to the *G. cerina* group. The field aspect of *G. sphagnorum* distinguishes it at once from the *cerina* variants, but will cause confusion with *G. sphagnicola* and mixed collections of these two are likely to occur if one collects carelessly. Bigelow 6219 has cheilocystidia which are "moniliform" near the apex and in some the capitellum is drawn to a short beak.

MATERIAL EXAMINED: Bigelow 6219; 6220; 6221; (MICH). Cornell Univ. Herb. 18587 (part)-*type*, collected by Whetzel and Jackson (CUP). Smith 41267; 41278; 41313; 41392; 41767; 42575; 42577; 42908; 42957; 43913; 50562; 50563; 50565; 50566; 50568; 50570; 50571; 50572; 50573; 50574; 50575; 50576; 50577; 50577a; 50579; 50580; 50581 (some capitate cheilocystidia present); 50582; 61637.

19. *Galerina payettensis* Smith & Singer, Mycologia 50: 481. 1958.
Illustrations: Fig. 24 (cheilocystidia).

Pileus 10–15 mm broad, conic-campanulate, the umbo conic as in *G. triscopa*, glabrous, moist, hygrophorous, "saya brown" (dull cinnamon) fading to cinnamon buff.

Lamellae broad, close, adnate, dull ochraceous tawny.

Stipe 10–20 mm long, 2 mm thick, equal, dull brown below, paler above, apex dingy cinnamon buff and heavily pruinose, veil leaving a thin annular zone but no sheath below the zone.

Spores 9–11 × 5–6.5 μ, inequilateral in profile, ovate in face view, about 25% calyptrate, pale tawny in KOH, outer layer smooth to minutely wrinkled. Basidia 4-spored. Pleurocystidia none. Cheilocystidia 30–46 × 5–10 × 3.5–4.5 × 3.5–6.5 μ, fusoid-ventricose and walls often flexuous, apex subacute. Hyphae of pileus trama yellowish in KOH mostly from incrusting pigment, cuticle a layer of radial hyphae not sharply differentiated from those of flesh. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On wet moss under conifers, South Fork, Lake Fork Creek, Payette Lakes, Idaho, Sept. 17, 1956, Smith 53491-*type*.

OBSERVATIONS: The aspect of the fruiting bodies is that of *G. unicolor*, but the fibrillose annular zone and microscopic characters rule out that species. In microscopic characters it is closest to *G. cerina* var. *ampullicystis*, but differs in the rostrate cheilocystidia and in the aspect of the carpophores. In aspect it is very similar to *G. psathyrelloides* but that species has cheilocystidia with thicker necks and obtuse to subcapitate apices. *G. triscopa* differs in having smaller non-calyptrate spores.

20. *Galerina sahleri* (Quélet) Kühner in Favre, Flor. Crypt. Suisse 10: 136. 1948.

var. *sahleri*

Galera sahleri Quélet, Champ. Jura et Vosges, p. 254. 1872.

Galera calyptrospora Kühner, Le Bot. 17: 172. 1926.

Illustrations: Favre op. cit. fig. 57.

Pileus 5–10 mm broad, obtusely conic becoming campanulate to plano-umbonate, the umbo not as conic as in *G. triscopa*, surface glabrous or at first with scattered fibrils over marginal area, moist and hygrophanous, dull ochraceous tawny moist, when faded cinnamon buff to pinkish buff; flesh thin and fragile, odor and taste not recorded.

Lamellae distant, adnate, moderately broad, ochraceous-tawny at maturity, thin.

Stipe 5–15 mm long, ± 1 mm thick, equal, pruinose above and somewhat fibrillose over lower half from the remains of the thin pallid veil, honey color above, reddish brown from the base upon aging.

Spores 10–13.5 \times 5.5–7 μ , elongate-ovate in face view, somewhat inequilateral in profile, smooth except for the ragged boundary of the plage and small blisters on each side (appearing as small ears in face view), also frequently with a dorsal blister near apex, ochraceous-tawny in KOH. Basidia 4-spored. Pleurocystidia none. Cheilocystidia ventricose-subcapitate to merely ventricose-obtuse, 28–40 \times 7–11 μ , smooth, hyaline to yellow in KOH. Clamp connections present. Pilocystidia none. Caulocystidia similar to cheilocystidia but larger.

HABIT, HABITAT AND DISTRIBUTION: Scattered on conifer logs, especially those with a heavy cover of moss; Michigan and Quebec, also in Europe (France and Switzerland).

OBSERVATIONS: Favre's (1948) account covers our collections so well that there can scarcely be any doubt that it applies to the same species. The slightly more obtuse pileus, slightly thinner veil (possibly), and the thin gills taken all together do not seem to be indicative of any real difference.

In Smith 43962 from a rotten log in Reese's Bog, Cheboygan County, Michigan, Oct. 11, 1954, the veil was lacking though the collection was in perfect condition. With only one small collection available showing this character we do not feel justified in formally recognizing it as a taxon, though in the light of our observations on the genus as a whole, it is not without significance.

Orton (1960) regards this as the true *G. hypnorum* but we cannot subscribe to this view. Fries, in *Systema* Vol. 1, in his account of *G. hypnorum*, does not mention the cobwebby fibrils which cover the young pileus and, since this is one of the distinguishing characters of Quélet's species and emphasized in Kühner's account, it would seem significant. In the American collections two tendencies are evident which separate them from the European material as described. In ours the stipe becomes darker brown and there is a tendency for the veil to be thinner and to disappear earlier.

There may be a third tendency, one towards a lignicolous habitat independent of *Bryophyta*. This at least is indicated by Smith 43962.

MATERIAL EXAMINED: Scotland, Isle of Eigg. 7-28-51, communicated by R. W. Dennis (MICH). Smith 43962 (veil lacking); 44039; 44041 (aspect of *G. triscopa*); 44076 (our description was taken from this specimen); 44077; 44079; 44080; 44081; 58307; 61516.

20a. *Galerina sahléri* var. *sequoiae* Smith & Singer, var. nov.

Illustrations: Fig. 25 (cheilocystidia).

Var. *typicae* similis sed sporae subrugulosae; cheilocystidia deorsum crasso-tunicata; pileus sordide fulvus. Specimen typicum in Herb. Univ. Mich. conservatum; Smith 3745.

Pileus 4–8(10) mm broad, broadly conic-campanulate, in age plane with a low obtuse umbo, or umbo obsolete, surface covered with scattered fibrils, disc in some slightly hoary, color nearly “buckthorn brown” (dingy fulvus), disc darker, translucent striate when moist and with subdistant striations, margin somewhat dentate in some caps; flesh, thin, fragile, watery ochraceous, taste mild, odor none.

Lamellae subdistant, broad, adnate or depressed-adnate, rather thick, pale ochraceous, edges even.

Stipe 10–15 mm long, about 1 mm thick, fragile, pale ochraceous above, dark reddish brown below, covered by sparse fibrillose patches especially near the base from an evanescent veil.

Spores 10.5–13 × 5.5–6.8 μ, narrowly almond-shaped in profile, ovate in face view, tawny in KOH, exospore wrinkled and with blisters around the smooth or nearly smooth plage, apical callus present. Basidia 4-spored, hyaline in KOH, 24–27 × 8 μ. Pleurocystidia none. Cheilocystidia abundant, 36–52 × 8–13 μ, fusoid-ventricose to ventricose-subcapitate, thin-walled, hyaline in KOH or the lower portion pale to dark ochraceous and walls thickened in the pedicel. Gill trama subparallel to interwoven, tawny in KOH from incrusting pigments. Pileus trama homogeneous, upper portion dark tawny brown in KOH from incrusting pigment on the hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On mossy redwood logs, Orick, California, Dec. 3, 1935 (Smith 3745-*type*). Known only from the type locality.

OBSERVATIONS: This collection has the thickened gills of Favre’s material, but the colors of the pileus apparently are darker, the spores more roughened, and the basal part of the cheilocystidia tends to be thick-walled and ochraceous as revived in KOH. Also, the pileus is less umbonate than in either the Michigan or Swiss collections.

21. *Galerina calyptrata* Orton, Trans. Brit. Myc. Soc. 43: 237. 1960.

Illustrations: Fig. 26 (cheilocystidia).

Pileus 3–15 mm broad, obtusely conic becoming broadly conic to campanulate, margin straight to slightly bent in at first, dull to bright ochraceous orange to orange-tawny when fresh, slowly becoming tawny and fading to pale dingy ochraceous, striate when moist, margin at times crenate and sometimes with the faint fibrillose remains of a thin white veil. Context watery ochraceous tawny, fading to buff, taste slightly farinaceous, odor none or if context is crushed slightly farinaceous.

Lamellae adnate, sometimes with a tooth, broad, distant to subdistant, pale buff to pale honey color or ochraceous, finally ochraceous tawny, edges typically faintly crenulate.

Stipe 15–40 mm long, 0.5–2 mm thick, stuffed but soon hollow, equal or with a small basal bulb, often flexuous, pale honey color becoming pale tawny from the base up, apex sparsely pruinose, at first thinly coated over lower half with white fibrils from the thin veil but all traces of veil finally vanishing.

Spores 9–12(14) × 5–7(7.5) μ , inequilateral in profile view, ovate in face view, calyptrate and most of surface smooth to slightly roughened, rusty brown in KOH, in Melzer's reagent rusty brown to more reddish brown, with an apical callus. Basidia 4-spored, 28–35 × 9–10 μ . Pleurocystidia none. Cheilocystidia 30–60 × 5–10 × 2.5–4 × 5–9(10) μ , ventricose toward base, neck more or less elongated and somewhat flexuous at times, and with an oval to rounded head at apex. Epicutis of pileus of non-gelatinous appressed hyphae.

HABIT, HABITAT AND DISTRIBUTION: Gregarious to scattered on mosses, England, late summer and fall.

OBSERVATIONS: This is a typical member of the *G. cerina* complex distinguished from *G. cerina* and variants by the *farinaceous* taste. In addition there are numerous other small differences which should not be slighted, among them the often very distinct small bulb at the base of the stipe, and the more ochraceous orange colors of the pileus. One cannot but wonder if this and *G. farinacea* are merely growth forms of one species, but after considering the problem the answer appears to be in the negative. *G. farinacea* lacks a veil. This fact has been clearly established, and *G. calyptrata* has a distinct white veil. Around this major difference we can group the same aggregation of minor characters which separate *G. calyptrata* from *G. cerina*.

MATERIAL EXAMINED: Smith 63396; 63397.

Galerina cerina complex

Key to Variants

- | | |
|--|---|
| 1. Veil pale yellow | 2 |
| 1. Veil pallid to white | 3 |
| 2. Cheilocystidia 30–45 μ long | |
| 22a. <i>G. cerina</i> var. <i>luteovelata</i> f. <i>luteovelata</i> | |
| 2. Cheilocystidia (45)50–70 μ long | |
| 22a. <i>G. cerina</i> var. <i>luteovelata</i> f. <i>occidentalis</i> | |

3. Neck of cheilocystidia 6 μ or more thick and apex obtuse to broadly rounded ----- 22e. *G. cerina* var. *brachycystis*
3. Neck of cheilocystidia 2–5(6) μ in thinnest part ----- 4
4. Spores only slightly calyptrate, 9–12 \times 5.5–7.2 μ (4-spored) -----
----- 22d. *G. cerina* var. *longicystis*
4. Spores distinctly calyptrate ----- 5
5. Lamellae often decurrent as in *Xeromphalina picta* -----
----- 22g. *G. cerina* var. *decurrans*
5. Lamellae adnate to hooked ----- 6
6. Typically on *Polytrichum*, rarely on *Sphagnum* or in burned areas; stipe tawny below ----- North American—22. *G. cerina* var. *cerina*
----- South American—22h. *G. cerina* var. *nebulareum*
----- 22i. *G. cerina* var. *yungensis*
- Typically on other mosses; stipe typically not appreciably darker in basal half ----- 7
7. Spores 8.5–10.5 \times 5–6 μ ----- 22f. *G. cerina* var. *ampullicystis*
7. Spores larger ----- 8
8. Cheilocystidia 24–36 \times 6–10 μ and 3–4.5 μ in neck, ventricose below, obtuse to subcapitate at apex ----- 22b. *G. cerina* var. *bresadolae*
8. Cheilocystidia versiform, more or less ventricose near base, neck often with repeated enlargements, apex capitate or capitellum mucronate ----- 22c. *G. cerina* var. *contorticystis*

22. *Galerina cerina* Smith & Singer Mycologia 47: 563. 1955.
var. *cerina* f. *cerina*

Illustrations: Fig. 27 (cheilocystidia).

Pileus 5–15 mm broad, convex to subconic, glabrous, lubricous, margin striatulate, color when moist evenly rich “tawny” or the margin slightly paler, fading to buffy tan, margin at very first with a slight fringe of fibrils; flesh relatively thick and watery for such a small carpophore, concolorous with surface, odor and taste not distinctive.

Lamellae broad, adnate, subdistant, pale ochraceous buff becoming ochraceous tawny, edges even.

Stipe 20–30(50) mm long, 2–3 mm thick, equal, fragile, undulating, tubular, apex concolorous with young gills, usually “tawny” over lower portion or becoming so and there at first covered by the remains of the slight pallid veil, naked below in age, apex pruinose.

Spores 8.7–12 \times 5.5–7 μ , inequilateral in profile (5.5–6 μ broad), in face view ovate and very slightly broader (slightly lentiform), “tawny” in KOH under the microscope, smooth but exosporium separating from around the plage area to give it a ragged boundary and in a fair percentage in each deposit showing further separation in the form of blisters or complete separation around the apiculus to give a sack-like effect. Basidia 27–35 \times 8–10 μ , 4-spored. Pleurocystidia none. Cheilocystidia 30–40(50) \times 7–12 \times 3–5 \times 5–7(12) μ , some fusoid-ventricose and many ventricose-subcapi-

tate. Gill trama regular, tawny from incrusting pigment. Pileus trama homogeneous, tawny in KOH. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious typically on *Polytrichum* or more rarely on *Sphagnum*, *Dicranum* and other mosses, sometimes on humus in sphagnum bogs or in burned areas; Eastern North America to the Pacific Coast. More common in the spring and early summer than in the fall.

OBSERVATIONS: There is a strong tendency for pleurocystidia to be produced whenever the hymenium has been injured. In Smith 61629 and 61837 the thickness of the neck of the cheilocystidium at the thinnest part is $\pm 3 \mu$ with a capitellum of about 6μ and a ventricose portion $6-8 \mu$; in other words a distinct tendency toward the tibiiform type is evident.

MATERIAL EXAMINED: Bigelow 3319; 3688; 4477; 7271 (4-spored) (MICH). Cornell U. Herb. 25019-*type*, *Galerula cerina* (CUP). Kanouse 500; 522 (MICH). Singer N-1325; N-1249 (CF). Mains 33-625 (MICH). Smith 33-606; 1185 (with elongate cheilocystidia); 1188-*type*; 1198; 1199; 28745; 33989; 36743; 36744 (spores narrow); 36747; 36774; 36776; 36776a; 36784; 36800; 36967a; 37050; 37322; 37756; 41246 (with some abnormal spores); 41247; 41248; 41249; 41250; 41251; 41252; 41263; 41264; 41271; 41275; 41282; 41305 (2-types of spores); 41306; 41307; 41309 (abnormal spores); 41315; 41338; 41391; 41394; 41395; 41433; 41443; 41521; 41618; 41621; 41664 (no veil); 41674; 41692; 42001; 42008; 42010; 42011; 42012; 42019; 42020; 42041; 42154; 42159; 42160; 42162; 42164; 42183 (near var. *brachycystis*); 42201; 42202; 42204; 42205; 42269; 42909; 42920; 43010; 43026; 43916; 43920; 44036; 47409; 47448; 48789; 49350; 49735; 54515; 58265; 60898 (4-spored); 61494 (4-spored); 61629 (4-spored); 61643 (4-spored); 61657 (2- and 4-spored, mostly 2-spored); 61699 (4-spored); 61837 (2- and 4-spored); 66629.

Galerina cerina var. *cerina* f. *bispora* Smith & Singer, *Mycologia* 47: 565. 1955.

As in the type variety, but spores $11-14 \times 6.5-8 \mu$; on 2-spored basidia; pileus acute.

HABIT, HABITAT AND DISTRIBUTION: On *Polytrichum*, near Whitmore Lake, Michigan, June, 1951, Smith 44136-*type*.

OBSERVATIONS: In the dried condition the pilei do not appear to be very different from those of the 4-spored form, but there seem to be fewer capitate cheilocystidia. Additional collections are needed to show whether this, as we now assume, is merely a bisporous form of the type variety, or a variety in its own right.

22a. *Galerina cerina* var. *luteovelata* f. *luteovelata* Smith & Singer, *Mycologia* 47: 566. 1955.

Illustrations: Fig. 28 (cheilocystidia).

Pileus 8-10(15) mm broad, obtusely conic, remaining unexpanded, striate to disc when moist, hygrophanous, "ochraceous tawny" with "tawny" striations on disc when moist, "cinnamon buff" faded, glabrous; flesh concolorous with surface, thin and fragile, odor and taste not distinctive.

Lamellae subdistant (9-11 reach the stipe), broad (2 mm), 1 row of lamellulae, adnate but soon seceding, near "clay color" young, soon "ochraceous tawny", edges even.

Stipe 10-20 mm long, 1 mm thick, equal or base flaring a little, very fragile, "ochraceous buff" and fibrillose with yellow fibrils toward the base, paler and pruinose above, glabrescent in age.

Spores 10-12.5 \times 6.5-8 μ , somewhat inequilateral in profile view, ovate in face view, tawny or darker in KOH, smooth or exospore slightly rugulose and around the apiculus separating from epispore in blisters and thin sheets, plage smooth with ragged boundary. Basidia 4-spored, 26-30 \times 9-10 μ , hyaline in KOH. Pleurocystidia none. Cheilocystidia abundant, 30-42 \times 7-12 μ , apices up to 9-12 μ broad in some and obtuse to broadly rounded, bases ventricose, hyaline, thin-walled, in many the broadly rounded apex wider than the basal ventricose portion. Gill trama interwoven, pale rusty brown in KOH from incrusting pigment. Pileus trama homogeneous, hyphae dark rusty brown from heavily incrusting pigment as revived in KOH. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered on mossy logs or standing trunks; Washington, fall.

OBSERVATIONS: As limited here only collections with a distinctly yellow veil are admitted. Smith 42154 we now place in *G. cerina* var. *bresadolae*.

MATERIAL EXAMINED: Smith 13191-*type*; 40859.

22a. *Galerina cerina* var. *luteovelata* f. *occidentalis* Smith & Singer, f. nov.

Illustrations: Fig. 29 (cheilocystidia).

Pileus 8-15 mm latus, conicus, pallide fulvus; stipes 20-30 mm longus, 1.5-2 mm crassus, sursum pallide melleus; deorsum fulvo-melleus; velum subochraceum, fibrillosum; sporae 9-12 \times 5.5-6.5(7) μ . Specimen typicum in Herb. Univ. Mich. conservatum est; legit Smith 47903 prope Snoqualmie Pass, Washington, 26 Sept. 1954.

Pileus 8-15 mm broad, conic, broadly so in age, glabrous, moist, striate, hygrophanous, dingy ochraceous tawny; stipe 20-30 mm long, 1.5-2 mm thick, equal, paler above than below but not dark brown below, with pinkish buff veil fibrils, glabrescent, apex pruinose.

Spores 9-12 \times 5.5-6.5(7) μ , inequilateral in profile, ovate in face view, nearly russet in KOH, calyptrate or with a hyaline "bubble" over plage, if not calyptrate then there is considerable loosening of the membrane around plage area. Basidia 2- and 4-spored. Cheilocystidia variable, type 1: ventricose capitate 30-35 \times 9-11 \times 5-7 μ , (but not nine-pin shaped as in *Conocybe*); type 2: fusoid-ventricose with long straight necks 30-45 \times 9-12 μ , apices obtuse to subacute; type 3: ventricose-elongate

50–70 × 8–11 × 9–10 μ with an oval apical swelling. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on a mossy log, Snoqualmie Pass, Washington, Sept. 26, 1954, Smith-47903-*type*.

OBSERVATIONS: Many abnormal, smooth, elongate narrow spores were present in mounts but were not included in the measurements, since this type of abnormality is frequent in other species and other genera, such as *Psathyrella*. To us it indicates that the mycelium producing the carpophores is of hybrid origin. This hypothesis is substantiated by the variability of the cheilocystidia. Because of the colored veil, the collection is attached to var. *luteovelata* as a form. It is worthy of putting on record in view of the variation pattern of this complex species.

22b. *Galerina cerina* var. *bresadolae* Smith & Singer, Mycologia 47: 568. 1955.

Illustrations: Fig. 30 (cheilocystidia).

Pileus (2.5)6–12 mm broad at base, sharply conic to cuspidate and remaining unexpanded or campanulate, surface glabrous, smooth, moist, hygrophanous, bright ochraceous tawny when fresh, fading to yellowish (near warm buff), paler between than on the striae when moist, odor and taste none.

Lamellae distant, ascending adnate, narrow to moderately broad or finally ventricose, ochraceous tawny or nearly so, edges even.

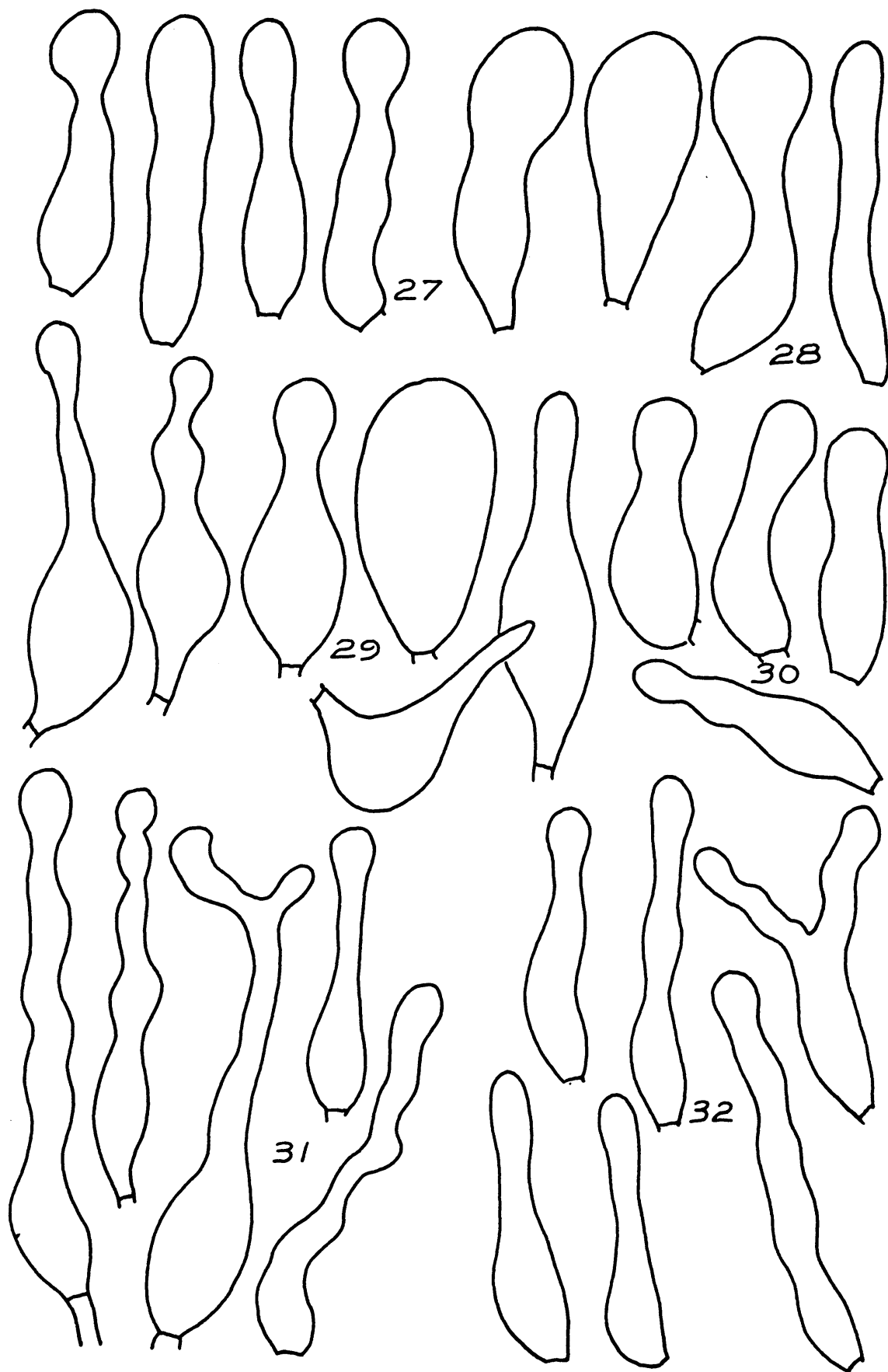
Stipe (10)25–40 mm long, about 1 mm thick, equal, ± pale honey color and not appreciably darker at the base, slightly fibrillose over lower half from remains of rudimentary veil, pruinose at apex.

Spores 9–12 × 6.5–8 μ, inequilateral in profile view, in face view broadly ovate, tawny in KOH, smooth except for blisters or a loose sheath of outer layer bordering the suprahilar depression. Basidia 4-spored or 2- and 4-spored mixed. Pleurocystidia, none seen. Cheilocystidia abundant 24–36(39) × 4.5–12 μ, fusoid-ventricose with short necks 3–4.5 μ thick and obtuse to subcapitate apices 3.5–8 μ in diam. Gill trama somewhat interwoven; pileus trama homogeneous. Clamp connections present. Caulocystidia present near apex.

HABIT, HABITAT AND DISTRIBUTION: Scattered on mossy logs or other rotten wood with a cover of mosses; summer and fall, Michigan, North Carolina, Tennessee and Washington.

OBSERVATIONS: This is probably the variant determined as *Galera cerina* by Bresadola (CUP n. 3956). It was collected by Atkinson, in 1899, between 4000 and 5000 ft., in the Blue Ridge Mts. of North Carolina, and has spores exactly as above. This variety differs from var. *cerina* chiefly in its more conic to cuspidate pileus and non-darkening stipe.

MATERIAL EXAMINED: Bigelow 4155; 5680; 6550; 6616; 7272 (MICH). S. C. Hoare, Kingsmere, Que., 10-21-53; Bells Corners, Ontario, 5-25-53 (MICH). Hesler 11793 (in part). Oswald 11 (MICH). Smith 36797; 40862;



Cystidia: Fig. 27, cheilocystidia of *G. cerina* var. *cerina* f. *cerina*; 28, cheilocystidia of *G. cerina* var. *luteovelata* f. *luteovelata*; 29, cheilocystidia of *G. cerina* var. *luteovelata* f. *occidentalis*; 30, cheilocystidia of *G. cerina* var. *bresadolae*; 31, cheilocystidia of *G. cerina* var. *contorticystis*; 32, cheilocystidia of *G. cerina* var. *longicystis*.

40994-*type*; 40999; 42003; 42154; 49722; 57188; 57208; 57246; 58293; 61664; 61667. Singer N-143; N-1174a; N1233a; N-1323.

22c. *Galerina cerina* var. *contorticystis* Smith & Singer, Mycologia 47: 570. 1955.

Illustrations: Fig. 31, 48 (cheilocystidia).

Pileus 5–8 mm broad, obtusely conic then campanulate and rounded on apex, rather intensely colored (*gypsy* to *copper*), in age more ochraceous tawny, young cap *persimmon*, not viscid, glabrous, with straight margin, transparently striate and also sulcate when mature, flesh inodorous.

Lamellae ochraceous brown, subdistant, very broad somewhat ascending even when mature.

Stipe about 30 mm long, 1–1.7 mm thick at apex, evenly *topaz*, eventually yellow (*golden corn*), with strong fibrils from the hyaline veil which still shows in mature specimens but has no tendency to become yellow as the stipe does.

Spores 9.8–12 × 6.8–7.5 μ, calyptrate. Basidia 4-spored. Pleurocystidia none. Cheilocystidia 27–44(51) × 7–8 μ, extremely irregular and varying from subulate to ventricose below and subcapitate above, the capitellum often mucronate, often entirely flexuous with repeated constrictions, the subcapitate ones predominant, often budding, thinnest part of neck 2–4.5 μ. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious to scattered on moss over rotten conifer wood, Michigan and Massachusetts.

OBSERVATIONS: The intense color of the pileus and its sulcate striations at maturity, the stipe with its tendency to become yellow, and the curiously shaped cheilocystidia are distinctive. In quite a few of the collections of *G. cerina* we have noticed varying numbers of this curious type of cheilocystidium, and hence, in view of the spore characters and well developed veil, place this collection within the *G. cerina* complex. The color of the pileus approaches that of *G. turfosa*.

MATERIAL EXAMINED: Bigelow 3640-*type*; 7275 (MICH). Singer N-1326 (F).

22d. *Galerina cerina* var. *longicystis* Smith & Singer, Mycologia 47: 567. 1955.

Illustrations: Fig. 32 (cheilocystidia).

Pileus 4–8 mm broad and high, sharply conic or conic-campanulate and subpapillate, not expanding, glabrous, longstriate with translucent striations, hygrophanous, pale fulvous to fulvous but never as bright as "tawny" (between *raw sienna* and *Peruvian brown*) moist, paler between the striae, when faded pinkish buff to pale ochraceous; odor none taste not distinctive.

Lamellae distant, broad, ventricose, ochraceous tawny, ascending adnate, edges even.

Stipe 20–30 mm long, 0.6–1 mm thick, equal, dull honey yellow above and over all at first, becoming pale ochraceous tawny but not darkening appreciably from the base upward, with a thin coating of pallid velar fibrils over lower portion.

Spores 9–12.5 \times 5.5–7.2 μ , ovate in face view, obscurely inequilateral in profile view, rich tawny in KOH, wall appearing smooth but under oil slightly calyptrate at times and minutely areolate and with a ragged line delimiting the plage. Basidia 4-spored, rarely 2-spored. Pleurocystidia none. Cheilocystidia fusoid-ventricose with a ventricose lower portion and apices varying from subacute to oval-enlarged, 26–45(80) \times 5.2–12(15) \times 2.3–4.5 \times 5–9 μ . Gill trama somewhat interwoven; pileus trama homogeneous, dingy ochraceous in KOH. Caulocystidia ventricose with gradually attenuate non-capitate apices, about 31–45 μ long. Epicutis of pileus of narrow appressed non-gelatinous incrustated hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered on mossy logs, Washington, Michigan, Quebec and Massachusetts, late summer and fall. Smith found it once in England.

OBSERVATIONS: The spores from 4-spored basidia are slightly larger than in var. *ampullicystis*, but the cheilocystidia are not very dissimilar. However, the pileus of var. *longicystis* is sharply conic. One of the important characteristics here is that the spores are less calyptrate than in most other variants of *G. cerina*. This has influenced us to propose it as a variety. In Bigelow 6448 the spores were 8.5–10 \times 5–6 μ and the cheilocystidia were merely obtuse. The rather small blisters around the plage area on the spore, however, appear to indicate identity with this variant. A distinct veil is lacking in specimens of collections Smith 56608, 61591 and 56296, but in citing the collections here we are assuming a veil once had been present. Bigelow 5399 appears to be an intermediate with *G. hypnorum*, as the spores are slightly roughened and a few also have blisters around the plage. Both capitate and subacute cheilocystidia are numerous.

MATERIAL EXAMINED: Bigelow 4368; 5289; 5291; 5294; 5295; 5339; 5399; 6440; 6442; 6443; 6448; 6450; 6451; 6968; 8053 (MICH). Singer N-1279 (F). Smith, Tahquamenon Falls State Park, Mich., 7-23-53; 40451; 40453-*type*; 41660; 56296; 56608; 57275; 61541; 61591; 61601; 61656; 61658; 61669; 61671; 61673; 61676; 61678; 61687; 61691; 61694; 61697; 61698; 61751; 61755; 63253.

22e. *Galerina cerina* var. *brachycystis* Smith & Singer, Mycologia 47: 569. 1955.

Illustrations: Fig. 33 (cheilocystidia).

Pileus 3–5 mm broad, conic, remaining unexpanded, margin straight, glabrous, hygrophanous, cinnamon brown when moist, becoming pale

ochraceous tawny before fading, ochraceous to "ochraceous buff" faded, translucent striate to apex when moist; flesh very thin and delicate, odor and taste not distinctive.

Lamellae adnate, distant, moderately broad, pale ochraceous like the faded pileus, edges even.

Stipe 25–30 mm long, filiform, equal, with a small bulb at base, lower part with scattered appressed fibrils from the thin veil, upper part faintly pruinose, glabrous in age, pale watery brown over all.

Spores 8–10(11) \times 5–6.5 μ , inequilateral in profile, ovate to obscurely angular-ovate in face view, dull tawny as revived in KOH, the exospore loosening around the hilar region and partially separating from the epispore, with an indistinct apical callus. Basidia 24–26 \times 9–10 μ , 1-, 2-, 3-, 4-spored, spore size taken from a 2–4-spored cap, hyaline in KOH. Pleurocystidia none. Cheilocystidia abundant (32)34–40(44) \times 10–15 μ , broadly fusoid-ventricose with short necks and obtuse apices, thin-walled, hyaline in KOH. Gill trama interwoven, hyaline or nearly so in KOH. Pileus trama homogeneous, pale yellow from incrusting pigment. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on mosses in moist shady places on sandy soil (often on *Polytrichum piliferum*), Michigan and Washington, summer and fall.

OBSERVATIONS: The short fat cheilocystidia and relatively small spores led us at first to regard this as a distinct species but in view of the variability of the cheilocystidia in *G. cerina* and the variable number of spores born on a basidium in the material cited above, it is very unlikely that in the material available we have a true picture of this variant and hence, while it is important to put it on record in accordance with the principles we are following in this paper, we are reluctant to dignify it with the rank of a species. We hesitate to refer it to *G. fallax* as a variety because that species lacks a veil.

MATERIAL EXAMINED: Smith 33-606-*type*; 33-610; 47403; 50799.

22f. *Galerina cerina* var. *ampullicystis* Smith & Singer, Mycologia 47: 565. 1955.

Illustrations: Fig. 35 (cheilocystidia).

Pileus 2–6 mm broad, up to 5 mm high, obtusely conic to campanulate-umbonate, not acute, at times becoming convex, glabrous, moist, hygrophanous, translucent striate and tawny when moist, paler between the striae and sometimes also on the umbo, fading from umbo outward, buff when faded, margin straight at first; flesh very thin, fragile, inodorous.

Lamellae moderately broad, flat or almost ventricose, ascending, finally nearly horizontal, distant to subdistant, adnate, light ochraceous brown.

Stipe 10–30 mm long, 0.3–1 mm thick, base up to 1.5 mm diam. equal or with a slight bulb, pruinose at the apex, otherwise with some appressed

silky fibrils from the veil, sordid stramineous, often whitish at base, finally the base watery cinnamon brown; veil pallid to white.

Spores $8.3\text{--}10.3 \times 5.3\text{--}6 \mu$ ($11\text{--}13 \times 6\text{--}7 \mu$), calyptrate, somewhat inequilateral in profile view, ellipsoid-subamygdaliform in face view, rarely a few with dorsal spur. Basidia $20\text{--}27.5(34.5) \times 6\text{--}8(10) \mu$, 4-spored, with very few to many 2-spored intermixed. Pleurocystidia none. Cheilocystidia ventricose-fusoid below, ampullaceous with a thin elongated neck, more rarely subcapitate and then thin portion beneath capitellum $2.2\text{--}3.8 \mu$ diam., $31\text{--}58 \times 5.3\text{--}10 \mu$ (if not capitate neck sometimes up to 5μ broad), numerous bodies $27 \times 9 \mu$ also present toward the pileus margin. Pileus trama and epicutis not pigmented, not gelatinized, without pilocystidia. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Among mosses (not *Polytrichum*) including *Sphagnum*, very frequently on mossy conifer logs, in small groups or solitary; Michigan, Massachusetts, and Tennessee in the United States, and Quebec in Canada.

OBSERVATIONS: This variety also seems to approach *G. fallax* in its macroscopic characters but has a distinct veil and slightly larger spores, both of which are characters of *G. cerina*, to which we attach it as a variety. The tendency for the neck of the cheilocystidium to be very thin is seen here to be an inconstant character, but on the average the cheilocystidium has a thinner neck than in var. *cerina*. Thiers collected a single fruiting body at Tahquamenon Falls State Park, Mich., with the cheilocystidia as above (necks on capitate cells $2.5\text{--}3.5 \mu$ thick) but with spores $10\text{--}13 \times 6\text{--}7.5 \mu$. The basidia were 4-spored. The specimen was destroyed in the study.

MATERIAL EXAMINED: Bigelow 3068; 4654; 4724; 5737; 6444; 6446; 6447; 8298; 8308; (MICH). Hesler 9548. Singer N-142-type; N-530; N-1166; N-1322; N-1233b; N-1228 (F). Smith 42176; 61507; 61635; 61689; 61700.

22g. *Galerina cerina* var. *decurrens* Smith, var. nov.

Illustrations: Fig. 34 (cheilocystidia).

Pileus $3\text{--}7$ mm latus, ovatus demum obtuse campanulatus, glaber, udus, fulvus demum dilute ochraceus; sapor mitis. Lamellae latae, distantes, late adnatae demum decurrentes; stipes $15\text{--}25$ mm longus, $1\text{--}1.5$ mm crassus, sursum ochroleucus, deorsum subfulvus; velum album, sparsum, evanescens. Sporae $9.5\text{--}10 \times 6\text{--}6.5 \mu$, calyptratae; pleurocystidia nulla; cheilocystidia $26\text{--}40 \times 6\text{--}8 \times 3\text{--}4.5 \times (3)4\text{--}6 \mu$. Specimen typicum legit Smith 63398 prope Burnham Beeches Angliae, ad muscos, Oct. 2, 1960.

Pileus $3\text{--}7$ mm broad, oval when young, expanding to campanulate, the apex obtuse and the margin flaring, surface glabrous, moist, hygrophanous, tawny when fresh, dingy ochraceous faded; context lacking an odor or taste.

Lamellae broad, distant, broadly adnate to short-decurrent (often

adnate along gill edge and only the decurrent tooth presenting a free margin—as in *Xeromphalina picta*), whitish when young, pale ochraceous tawny when mature.

Stipe 15–25 mm long, 1–1.5 mm thick, equal, in age dark honey to fulvous below and pale honey above, at first with a few fibrils from the rudimentary veil, naked in age.

Spores 9–10 × 6–6.5 μ, ovate in face view, somewhat inequilateral in profile, pale fulvous in KOH, dark red-brown in Melzer's sol., an appreciable number calyptrate, some with small blisters near apex but surface otherwise practically smooth. Basidia 4-spored. Pleurocystidia none. Cheilocystidia 26–40 × 6–8 × (3)4–6 μ, at apex obtuse to subcapitate, rarely subacute, neck rarely with irregular swellings. Epicutis of pileus of non-gelatinous more or less incrustated hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On mossy ground, Burnham Beeches, near London, England, Oct. 2, 1960, Sm-63398-*type*.

OBSERVATIONS: This variety is known so far only from the type locality but is very striking in the field because of its resemblance to *Xeromphalina picta* in the shape of the cap and in the gill attachment.

22h. *Galerina cerina* var. *nebulorum* Smith & Singer, var. nov.

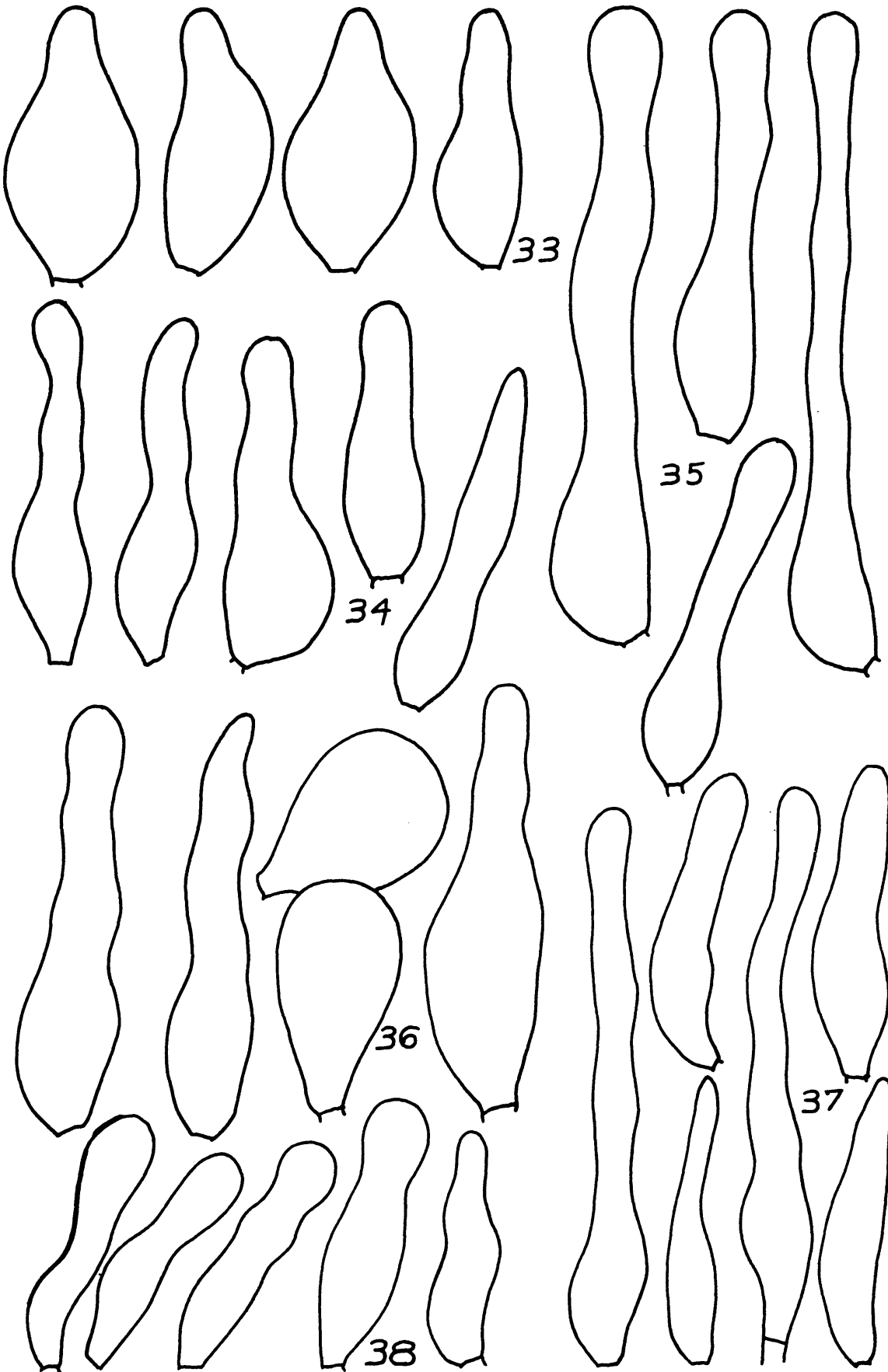
Pileo 3–6.5 mm lato, acute conico; lamellis subdistantibus vel distantibus, angustis, ascendentibus; stipite 20–33 × 0.5 mm, pallido vel alutaceo ad apicem, ceterum ochraceo-flavo vel aureo-ochraceo, apice pruinato, ceterum sparse serico e velo, mox glabrescente; sporis 10–12 × 5.7–7.7 μ, calyptratis, bene pigmentatis vel moderatate coloratis-basidiis plerumque 4-sporis; cheilocystidiis 33–50 × 5.5–11 μ forma variabilibus, hyalinis, nonnullis subochraceis vel ad basin luteis vel ferugineis, plerumque basin versus ventricosis, apice cylindraco vel constricto praeditis; epicute haud gelatinosa; fibulis visis. Ad quisquillas monocotyledoneas nec non ad Hepaticas inter muscos minores in silva humidissima zonae “Cejas” in monte Uchumachi Boliviae, typus Singer B1471 (MICH).

Pileus 3–6.5 mm broad, 4–6.5 mm high, higher than broad or nearly so, acutely conic, rarely with a papilla, glabrous, hygrophorous, when moist striate and *Peruvian brown* to nearly *Yucatan* over disc and striae, between the striae *Inca gold* to *buff*, paler when faded.

Lamellae moderately close to distant, ascending, adnate, narrow, *samovar* to antique gold or *buff*.

Stipe 20–33 mm long, 0.5–1 mm thick, filiform, equal or base very slightly thickened, apex pruinose, color *antique gold* then *Inca gold* or *snow shoe* or between *spruce y* and *gold leaf* below, almost pallid to *buff* above, basal portion often *mast color*; veil present but not strongly developed, consisting merely of a few appressed silky pallid fibrils which at times form an annular zone but never an annulus in youth.

Spores 10–12 × 5.7–7.7 μ, calyptrate, well pigmented to moderately so (ferruginous-melleus), smooth but with a more or less well-developed



Cystidia: Fig. 33, cheilocystidia of *G. cerina* var. *brachycystis*; 34, cheilocystidia of *G. cerina* var. *decurrens*; 35, cheilocystidia of *G. cerina* var. *ampullicystis*; 36, pleurocystidia and cheilocystidia of *G. filiformis*; 37, cheilocystidia of *G. austrocalyprata* var. *austrocalyprata*; 38, cheilocystidia of *G. fallax* f. *fallax*.

perisporial sac, often with the characteristic "ears" or blisters at the hilar end, elliptic to ovate in face view, slightly inequilateral in profile. Basidia $18-30 \times 5.5-9.5 \mu$, 4-spored, rarely some 2- or 3-spored. Pleurocystidia none. Cheilocystidia $33-50 \times 5.5-11 \mu$, hyaline or a few somewhat ochraceous (in KOH and NH_4OH), sometimes the bases ferruginous or yellow, often somewhat incrustated at the base, variously shaped, usually ventricose below the middle and often at the base, the upper thinner portion once to repeatedly constricted, varying to equal in diam. throughout, apex often enlarged to $3.8-7 \mu$, rarely some cheilocystidia merely cylindrical to clavate or ventricose in mid-portion; pseudoparaphysoid cells at or near margin of pileus brownish, subvesiculose. Epicutis of pileus consisting merely of a thin layer of radial, appressed, hyaline non-gelatinous hyphae; hypodermium of broad more or less radial hyphae with hyaline to yellow walls heavily incrustated by ferruginous tawny to ochraceous brown pigment. All hyphae with clamp connections.

HABIT, HABITAT AND DISTRIBUTION: On small particles (twigs of *Chusquea* etc.) of monocotyledonous plants and on *Hepaticae*, always under thin moss cover (never on deep beds of moss such as *Polytrichaceae* or *Sphagnum*), solitary in extremely wet fog forest, fruiting in Feb., Mt. Uchumachi, prov. Nor-Yungas, Depto. La Paz, Bolivia, Singer-B 1457; B 1458; B 1471-type; B 1472 (all MICH).

OBSERVATIONS: This is a characteristic, small, constant form connected with the fog forest. For additional comments see *G. cerina* var. *yungensis*.

22i. *Galerina cerina* var. *yungensis* Smith & Singer, var. nov.

Pileo 5–15 mm lato, obtuso, subfulvo, striato, stipite 29–46 mm longo, 2–3 mm crasso, deorsum obscure fulvo, fibrilloso. Sporae $9-10 \times 9-6.3 \mu$; cheilocystidia $30-36 \times 7-10.5 \times 1.8-4 \times 3-5 \mu$. Specimen typicum legit prope Catarata, San Juan, prov. Nor-Yungas, Depto. La Paz, Bolivia, Singer B624 (MICH).

Pileus 5–15 mm broad, 4.5–9 mm high, obtusely conic, becoming campanulate to nearly convex, moist and hygrophamous, dingy fulvous, (*Alamo*), becoming paler on disc and striae and dingy ochraceous (*Inca gold*) between striae.

Lamellae as in the type variety.

Stipe 29–46 mm long, 2–3 mm wide, tapering upwards, or more rarely subequal, dingy ochraceous above, dingy fulvous below, strongly appressed white-fibrillose silky, eventually glabrescent, not annulate or with an annular zone only when young.

Spores $9-10 \times 6-6.3 \mu$, calyptrate, ochraceous tawny in KOH, smooth, almond shaped in profile, with an apical callus. Basidia 4-spored, small, hyaline, $19-25 \times 7 \mu$. Cheilocystidia $30-36 \times 7-11 \times 2-4 \times 3-5(7) \mu$, neck ampullaceous and long ($\pm 20 \mu$), hyaline. Gill trama regular, ochraceous to ochraceous-hyaline, not or only slightly incrustated, some cells very

broad. Pileus epicutis non-gelatinous; hypodermium of ochraceous brown incrustated hyphae. Clamps present.

HABIT, HABITAT AND DISTRIBUTION: In rather deep moss on soil and rocks (no *Sphagnum* present), in the upper Yungas forest zone, Bolivia.

OBSERVATIONS: This differs from var. *nebulorum* in heavier veil, slightly smaller spores, and habitat.

General Observations on *G. cerina*

This species has presented us with difficulties from many aspects. In the first place the nomenclature in regard to the original *Galera cerina* Bresadola, published in Saccardo, Fl. Ital. Crypt., p. 779, 1916, became confused by Atkinson, who in 1918 published "*Galerula cerina* (Bres.) Atk. sp. nov." and cited "*Galera cerina* Bresadola in Herb. non publicaris" as a synonym. The fungus Bresadola described in 1916 was characterized by an evanescent veil. In general his description covers our fungus fairly well. However, the only material in his herbarium turned out to be evelate and to have all the characters of *G. vittaeformis*. This material was made available for our study through the kindness of the late Dr. G. Haglund of the Naturhistoriska Riksmuseet at Stockholm. The caulocystidia were very evident and no indication of a veil was present. Atkinson, in contrast to Bresadola, designated as type a numbered collection (CU-3956) which belongs, according to our analysis, to the assemblage of varieties here described as *Galerina cerina* Smith & Singer.

It seems evident to us that Atkinson thought he was taking an unpublished herbarium name of Bresadola's and publishing it for the first time, but under a generic name different from that Bresadola had used. This is entirely logical because, in Atkinson's mind, *Galerula* was a substitute name for *Galera*. In view of this, and of the fact that Bresadola had actually already published the name *Galera cerina* two years earlier, we must assume that, had Atkinson been aware of this, he would merely have proposed as a new combination the name "*Galerula cerina*". As it stands now all we can credit Atkinson with is the new name based on Bresadola's type. Certainly no one can deny that Atkinson *thought* he was publishing Bresadola's species. Thus Atkinson's designation of a new type is invalid because it is based on the mistaken idea that the species had not been validly published previous to that time. The type for *Galera cerina* is the collection from "Trentino". Bresadola did not mention American specimens in his original account. Atkinson had obviously arrived at the use of Bresadola's name (*G. cerina*) because he had sent material of a "Galera" to Bresadola who determined it as *G. cerina*. Such a specimen is actually preserved at Cornell. This, again, is added proof that everything Atkinson did in regard to this species was centered around the idea that he had Bresadola's *G. cerina*.

However, we do not know that *G. cerina* in the sense of Bresadola's Trentino collection actually has calyptrate spores. We do know that Atkinson's type does. We also know that Bresadola had a confused concept, as is shown by the only specimens of his that we have examined. Taking all this

into consideration the only sensible procedure is to declare *G. cerina* Bresadola a nomen confusum and reject it on these grounds. Then Atkinson's publication of *Galerula cerina*, based on Bresadola's type of *Galera cerina*, is also rejected, as it was simply a transfer. It thus becomes necessary, in *Galerina*, to describe the fungus Atkinson had as a new species and to designate a type (Smith & Singer 1955). The epithet *cerina* is preserved to designate a valid species concept, in the only sense that it had ever been used to any extent. No usage in regard to this name ever developed in Europe.

Even after the nomenclatorial problem has been disposed of, there are still aspects of the species in need of explanation or, at least, discussion. We have accepted the concept, typified by var. *cerina*, (the form characteristic of the *Polytrichum* succession of an old *Sphagnum* bog), with numerous varieties grouped around it. The word variety has been used in such different meanings in botanical literature that it appears necessary to comment on the sense of the term as it is used here. The varieties as described here are neither well-delimited geographic races nor myco-ecotypes as defined by Singer, nor can they be discarded as forms, inasmuch as their character combinations are sufficiently hereditary as to characterize homogeneous populations. The type variety, in particular, has been found to be one of the most constant populations in the genus.

Taking the group as a whole, we find in it indications of all the major types of cheilocystidia found in the genus. We are inclined to regard this situation simply as an unstable one, which possibly developed as the type variety invaded less favorable habitats which, in turn, have effected some degree of selection on the fungus. The minor morphological characters "selected" may very well be associated with physiological characters important to survival in the new location.

One of the problems we faced was whether to draw up a composite description on the basis of all collections or to distinguish taxa of the rank of species or lower. It soon became clear that a composite description would have no meaning when collections were compared with it. For example, var. *cerina* became buried under a mass of conflicting detail, and our experience has made it clear that in this variety we have a taxon of both ecological and morphological importance.

By using the other approach we found ourselves with a rather large number of varieties which *did* seem to represent populations. Our present arrangement is based on them and is to be interpreted as a guide for further study of the problem of variation in the species. This implies a study of the constancy of such variants and their interfertility. In regard to the development of variants in this species, we found var. *cerina* to be very abundant in a local *Polytrichum* bog (a *Sphagnum* bog which had been burned over years ago and since overgrown with large cushions of *Polytrichum*) and have formulated certain ideas as to what may have occurred here.

Starting with var. *cerina* in its typical habitat, what is the picture of development? First, a rapid spread of *Polytrichum* after the fire. After the moss cushions have developed to a certain point the conditions for the in-

vasion of the fungus are favorable. Once a mycelium becomes established it spreads with almost incredible rapidity, possibly by means of binucleate oidia, until the whole area is occupied, probably by a single strain of the agaric. The cushions of *Polytrichum* are fairly long-lived and the fungus mycelium in them is equally long-lived. Thus a single strain of the agaric will not only occupy the whole burn, but the original mycelium will continue to produce fruiting bodies over a period of many years. Under these circumstances, as one would expect, the carpophores are fairly constant in their characters. New mycelia of a species are not likely to invade areas already occupied by established mycelia of that species, hence mutation in the established mycelium is about the only source of variation.

We are inclined to believe that this is the picture in the bog south of Pellston, where var. *cerina* was found so abundantly and was so constant in its characters. If these postulations are correct, there would be little opportunity for evolution in a species within such an area, because the situation is actually static barring basic changes in the condition of the habitat or the climate.

The evolution of new variants should occur in surrounding areas, within range of the spore rain from the established population. Within this range a variety of conditions will provide substrata differing from that occupied by the original population, but still within the tolerance limits of at least some of the variants. The populations encountered here, then, should be smaller than that of the parent and likely to show, in the aggregate, various differences not observed in the parent population. Given a reasonable lapse of time, another extensive fire not too remote from the first, and after it the usual invasion of a *Polytrichum* carpet or series of cushions which often follows fire over boggy ground, and we have a second "macro-habitat" waiting for invasion by the fungi. After a chance invasion from some nearby source there is again the possibility of rapid spread of a single strain through the area. But this strain need not be identical with the one which took over the first habitat. Thus a second "very constant" variant would exist and could be collected in great quantity over a period of years. If these hypotheses are valid a study of a number of isolated old burns over a wide area should show a number of established variants. We hope to follow this up with future studies, however, comparative experimental work on the physiology and sexuality of these populations would also be most valuable. Var. *cerina* is typically vernal and is seldom found after the middle of July. Many of the other varieties fruit later. This in itself is an indication of physiological differentiation to say nothing of those adjustments required for survival in a different habitat.

23. *Galerina filiformis* Smith & Singer, Mycologia 50: 474. 1958.

Illustrations: Fig. 36 (pleurocystidia and cheilocystidia).

Pileus 2.5–4 mm broad and 4.5 mm high, narrowly conic, surface moist, hygrophanous, margin connivent when young, soon straight and

sterile, color cinnamon-buff to "ochraceous tawny" and striate; flesh soft and delicate, odor none.

Lamellae narrow (linear), not extending to the cap margin, *distant*, ascending and only touching the apex of the stipe, pinkish buff, edges even.

Stipe 20–25 mm long, 0.5 mm thick, pallid above and faintly pruinose, cinnamon-buff downward, naked over lower part.

Spores 8–11 × 5–6 μ (4-spored) or 11–14 × 7–8.5 μ (1- or 2-spored), ovate in face view, somewhat inequilateral in profile, a fair percentage distinctly calyptrate, plage smooth and distinctly bordered, remainder of wall smooth to slightly wrinkled, ochraceous tawny in KOH or a little darker. Basidia 4-spored (2- and 1-spored also). Pleurocystidia scattered, clavate to vesiculose, 26–34 × 12–20 μ, thin-walled, some present which are similar to cheilocystidia (1-spored basidia may simulate pleurocystidia). Cheilocystidia variable, 30–50 × 4–12 μ, neck 2–5 μ, apices enlarged in some and 4–5 μ diam., some cylindric-capitate, some ventricose at the base and with flexuous neck and enlarged apex, also some clavate cells up to 18 μ in diam. present. Gill trama ochraceous. Pileus trama with a thin non-gelatinous pellicle. Clamps present.

HABIT, HABITAT AND DISTRIBUTION: On a mossy redwood log, Trinidad, California, Dec. 10, 1956, Smith 56556-*type*.

OBSERVATIONS: This and *G. macquariensis* are the only species, to our knowledge, which show both pleurocystidia and a fair percentage of calyptrate spores. The stature of *G. filiformis* is that of *G. subfiliformis*. Because of this combination of characters it is important to place the species on record even though known only from the type locality. Since it seems to be related to species of section *Calyptrospora*, and since the pleurocystidia are rare, it is treated here; however, arguments could be advanced for placing it in section *Physocystis*.

24. *Galerina austrocalyptrata* Smith & Singer, sp. nov. var.
austrocalyptrata.

Illustrations: Fig. 37 (cheilocystidia).

Pileo ochraceobrunneo, opaco, hygrophano, conico vel conico-papillato dein campanulato-convexo vel conico-umbonato, 2–3 × 2–2.5 mm; margin substriato. Lamellis ochraceo-brunneis, adnatis, ascendentibus, angustis, subconfertis. Stipite stramineo-ochraceo, subobscuriore basin versus, sed haud manifeste atrato senectute vel tactu neque umquam obscuriore quam dilute brunneo, ad apicem pruinato, ceterum glabro, usque ad 10–80 × 0.5–1.5 mm.; velo nullo vel vix evoluto sericeo-levi. Carne tenerrima. Sporis 8–9.7 × 5.5–6.2 μ, calyptratis. Basidiis tetrasporis; cheilocystidiis 23–66 × 6–9.5 μ, sursum ventricosis, ampullaceis, apicem versus 1.5–3 μ diam., apice claviculatis, subcapitatis vel capitatis; pleurocystidiis nullis. Hyphis fibulatis. Epicute ex hyphis repentibus, stramineis, haud gelatinosis efformata; hypodermio ex hyphis repentibus, latioribus, fortius pigmentatis numerosis, cheilocystidiis similibus. Ad ligna muscosa, gregatim. Lago Nahuel Huapi,

Puerto Blest Patagoniae Argentinensis. Typus in Herbario Lilloano conservatus est.

Pileus 1.5–5 mm broad, 2–3 mm high, higher than broad to broader than high, glabrous and smooth but with slightly striate margin (by transparency), conic or conic-campanulate and papillate, later campanulate-convex to conic-convex and umbonate or obtuse, opaque, ochraceous tawny (*Buckthorn brown*, *Chipmunk*, *Antique gold*), hygrophamous, not viscid. Context very thin, subconcolorous, taste mild, odor none.

Lamellae ochraceous brown (saya brown), adnate to adnexed, ascendant, mostly horizontal when mature, narrow to moderately broad, subdistant to distant.

Stipe 10–80 × 0.5–1.5 mm, subequal, pruinose at apex, otherwise glabrous or only finely appressedly longitudinally silky-striatulate, without any veil remnants in the young or adult specimens, silkiness hyaline, otherwise stramineous-ocher (*roe*) in upper part, deeper colored toward the base, darkening further to *chipmunk* or *wigwam* in age or on handling.

Spores 8–10.7 × 5–6.2 μ, calyptrate, ellipsoid to pip-shaped, well-pigmented in KOH. Basidia 16.5–25 × 7–10.5 μ, clavate, all 4-spored or very few 2-spored present. Pleurocystidia none. Cheilocystidia 22–66 × 6–9.5 μ, ventricose, with upper portion long-filamentous but the tip claviform-broadened or subcapitate to capitate in most cells, hyaline to ochraceous or fulvous brown in dried material, diameter of effilate apex 1.3–4.8 μ, of tip 2–7 μ.

Epicutis of pileus stramineous, not gelatinized, consisting of thin hyphae forming a cutis. Hypodermium also a cutis, hyphae here somewhat broader than in epicutis and strongly pigmented, incrustated by a ferruginous-brown or ochraceous-brown conspicuous pigment. Dermatocystidia on pileus, none seen. Apex of stipe beset with dermatocystidia which are similar to the cheilocystidia but more versiform. Hyphae with clamp connections.

HABIT, HABITAT AND DISTRIBUTION: On mossy logs of trees (*Nothofagus?*, *Saxegothaea?*), gregarious but not cespitose, fruiting in fall. Southern Argentina and South Chile.

OBSERVATIONS: This is close to *G. filiformis* but differs in the absence of pleurocystidia. It differs from *G. fallax* in cystidial characters. Smith 41440 apparently belongs here in spite of the gap in distribution, though the spores are less calyptrate, but so they are in M1823. The cystidial characters compare very well, except that subacute cystidia also occur.

MATERIAL EXAMINED: Pujals & Gamundi 50 (Argentina: Neuquén, Puerto Blest, path to the "Cántaros", 23-IV-1958). (LIL)-*type* (isotype MICH). Singer M1823 (Argentina); B1901 (Chile: Llanquihué, Peulla) (LIL).

24a. *Galerina austrocalyptrata* var. *olivaceolamellata* Singer, var. nov.

A varietate typica lamellis olivaceo-brunniis differt. Typus in herbario Lilloano conservatus est.

This has a somewhat broader pileus (to nearly 10 mm) and olive brown lamellae (*maple sugar to fox*).

Among mosses on hardwood. Chile: Llanquihué, Peulla, March 21, 1959, leg. Singer M1945 (LIL).

25. *Galerina fallax* Smith & Singer, Mycologia 47: 561. 1955.

f. *fallax*

Illustrations: Pl. 2, fig. B.; pl. 3, fig. B. Fig. 38 (cheilocystidia).

Pileus 5–10(15) mm broad, obtusely conic becoming broadly conic to nearly convex, or remaining conic with a flaring margin, surface glabrous, moist and hygrophanous, "tawny" to "ochraceous tawny" and conspicuously translucent striate moist, fading to near cinnamon buff but darkening in drying, at first the disc with a pale watery circumscribing line.

Lamellae ascending, nearly free, close to nearly subdistant, broad, edges even.

Stipe 10–30 mm long, filiform or nearly so, equal, tubular, fragile, glabrous, pale ochraceous above, ochraceous tawny or darker below.

Spores 7–9 × 5–6 μ, inequilateral in profile view, ovate in face view, tawny or darker in KOH, smooth and with exosporium loosening and separable from episporium at least over basal portion, apical callus present. Basidia 4-spored, 17–20 × 6–7 μ, hyaline in KOH. Pleurocystidia none. Cheilocystidia subventricose with obtuse apices or subcylindric, 24–35 × 6–9 × 3–4 × 5–7 μ, hyaline, thin-walled, smooth. Gill trama interwoven to subparallel, yellow from incrusting pigment. Pileus trama homogeneous, ochraceous tawny or darker from incrusting pigment. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on mossy conifer logs, Washington, Michigan, Quebec, Massachusetts and New York. It is also recorded from Norway. Fruits during the late summer and fall.

OBSERVATIONS: This is a common fungus on mossy logs and is one of the segregates of the old "*Galera hypnorum*". *Galerina hypnorum*, in this work, is characterized by consistently larger, non-calyptrate spores. In *G. fallax* the separation of the exosporium to form blisters or loose areas can be demonstrated in both fresh and dried material. Stordal No. 4139 was from *Sphagnum* but is very close otherwise. About one-fourth the spores are calyptrate and the cheilocystidia are more variable in shape than in the type collection. *Galerina subcerina* has larger spores and much broader cheilocystidia.

MATERIAL EXAMINED: Bigelow 4653; 5338 (MICH). Boynton 9-10-49, G. S. Burlingham (Kelly 881) (MICH). C. H. Kauffman, Ithaca, N. Y., 10-8-02 (MICH). Smith, Rock River, Mich., 9-22-29; 33-207; 33-626; 33-952; 16239-*type*; 25513; 29193; 29251; 36331; 36380; 36400; 36402; 36545; 36742; 36785; 36879; 36887; 36900; 37039; 39042; 39266; 40998; 41090; 41138; 41141; 41157; 41253; 41266; 41393; 41434; 41440; 41896; 42588; 42904; 50569; 54508; 61592b; 61728; 61747. Stordal 4139 (O).

25a. *Galerina fallax* f. *subfiliformis* Smith & Singer, f. nov.

Sporae subcalyptratae $9-9.5 \times 5 \mu$. Cheilocystidia $32-40 \times 6-7 \times 3-4 \times 4-5 \mu$. Specimen typicum legit Smith 61758 prope Mare du Sault, Laurentide Park, Que., 2 Sep. 1956.

The very slightly calyptrate spores place this as an intermediate taxon between sections Calyptrospora and Mycenopsis.

We have it from naked needle beds of *Larix*, on moss under conifers (mostly spruce) and from mossy conifer logs in Quebec, and Bigelow has it from moss and mossy logs in Massachusetts. It fruits during the summer and fall.

MATERIAL EXAMINED: Bigelow 6546; 6619 (MICH). Smith 61647; 61726; 61758-type.

26. *Galerina evelata* (Singer) Smith & Singer, stat. nov.

var. *evelata*

Galerina hypnorum var. *evelata* Singer; Pap. Mich. Acad. 32: 146. 1948.
Illustrations: Fig. 39 (cheilocystidia).

Pileus about 5 mm broad, at first almost campanulate or obtuse, later convex, ochraceous fulvous, moist, hygrophanous, fading from the disc outward, outer half translucent striate, smooth, pale ochraceous to alutaceous-pallid faded, glabrous; flesh thin, odor none.

Lamellae ochraceous, rather distant, adnate becoming adnexed, sub-ascendant, finally nearly horizontal.

Stipe variable in length, about 1 mm thick, filiform, smooth, glabrous, concolorous with pileus or nearly so, veil lacking (observe buttons).

Spores $10-13.5 \times 6.5-8.2 \mu$, distinctly calyptrate, inequilateral in profile, ovate with a blunt protruding apex in face view, tawny in KOH, nearly smooth or with a few wrinkles or separations showing over remainder of surface. Basidia 4-spored. Pleurocystidia none. Cheilocystidia abundant, $30-42 \times 8-12(14) \times 3-5 \times 4-8 \mu$, base ventricose, neck often long and straight, apex obtuse to subcapitate or capitate. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On *Sphagnum* and *Polytrichum* moss beds, sometimes among these mosses over dead wood near conifer stands, solitary or in small groups never cespitose, in regions with low temperature and high precipitation average; July to Sept., Northern hemisphere; White Mountains, Mt. Washington, Massachusetts, Quebec and Tennessee; Artybash, Altai Mts. Asia.

OBSERVATIONS: In *G. evelata* var. *fulvipes* the stipe is dark at the base in age. In var. *evelata* the stipe is more evenly colored and the pileus is not umbonate as in *G. triscopa*. Consequently, we are inclined to regard *evelata* as a distinct species. We considered the possibility of considering *G. evelata* a variety of *G. cerina* without a veil, but this is about as unsatisfactory as trying to connect it with *G. sahleri*. In our abundant collections of *G. cerina* the presence of a veil has been a conspicuous and constant feature. The distinctly

inequilateral spores, as seen in profile view, are a feature of this species, and there is a tendency for the spore apex to be drawn out into a short protuberance, as is evident in Bigelow 7672. Bigelow 6622 appears to be near *G. evelata* but the cystidia are narrow, being only 5–8 μ at the base, and most have merely obtuse apices. Also the spores are less calyptrate. If a veil were present this collection could be referred to *G. cerina* var. *longicystis*.

MATERIAL EXAMINED: Bigelow 6622 (variant); 7672 (MICH). Hesler 9477. Singer WM-3-type; M-21 (FH); A-765(LE). Smith 61499; 61830.

26a. *Galerina evelata* var. *fulvipes* Smith & Singer, var. nov.

Illustrations: Fig. 40 (cheilocystidia).

Pileus 5–8 mm latus, obtuse conicus, luteobrunneus; lamellae confertae vel subdistantes, angustae; stipes 20–40 mm longus, 1–3 mm crassus, glaber, deorsum luteo-brunneus; sporae 11–14 \times 6.5–8 μ , calyptratae; cheilocystidia 36–50 \times 9–11 μ , ventricosa ad apicem subcapitata. Specimen typicum in Herb. Mich. conservatum est, legit Smith 48836 prope Longmire Wash. 11 Oct. 1954.

Pileus 5–8 mm broad, obtusely conic and remaining unexpanded, margin even and somewhat flaring, in age the ends of the gills protrude beyond the margin to give cap a crenate effect, striate halfway to disc, glabrous and moist, "snuff brown" on disc, pale "snuff brown" to margin, hygrophanous, fading to pale pinkish buff; flesh very thin, concolorous with pileus, soft, odor and taste none.

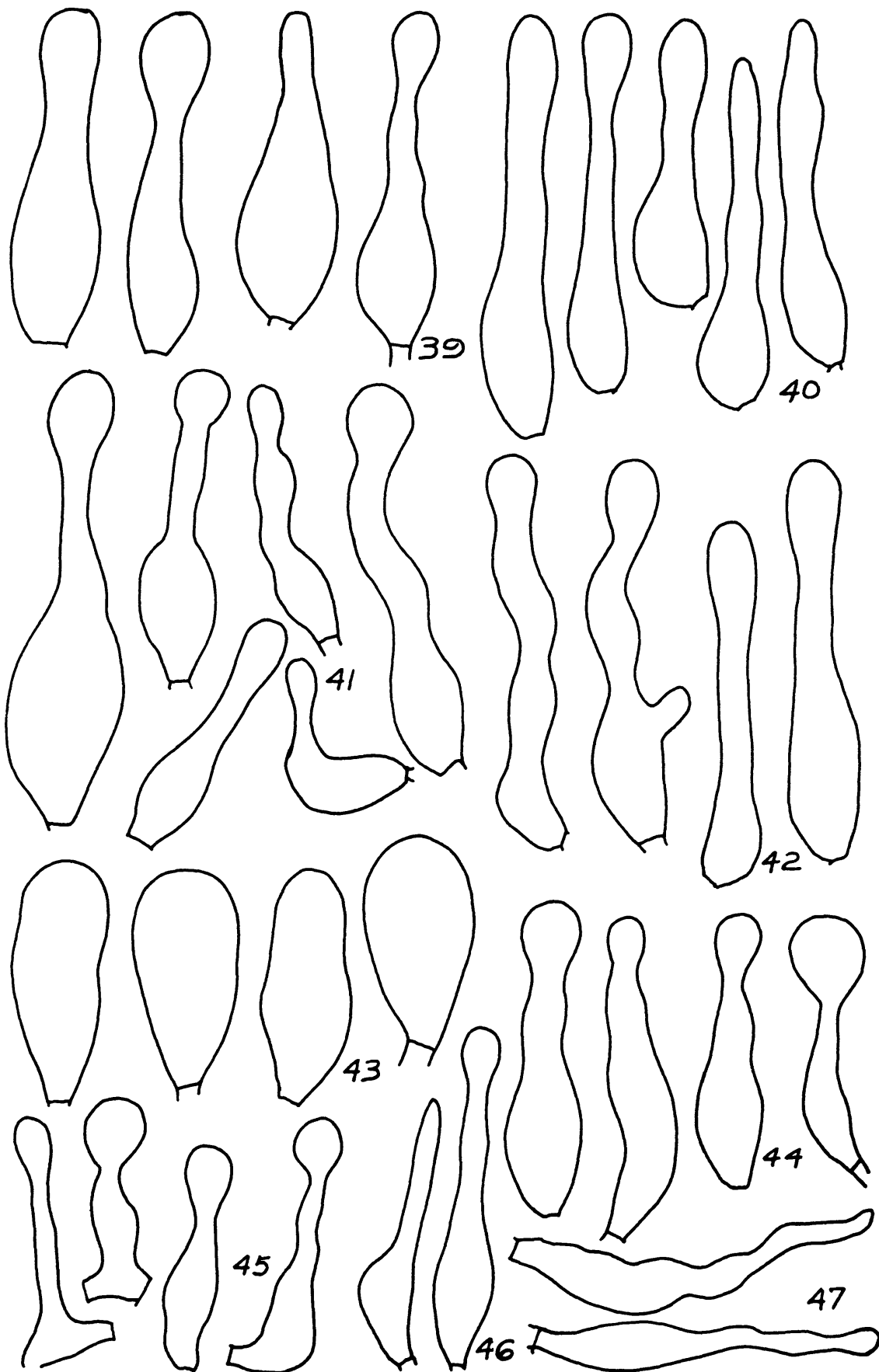
Lamellae adnate, close to subdistant, narrow, thin, edge minutely fimbriate, not forked and not intervenose, readily separable from pileus trama, dingy ochraceous tawny at maturity, paler when young.

Stipe 20–40 mm long, 1–3 mm thick, terete, central, hollow, glabrous (no fibrils of any kind present), pallid near apex, merely "snuff brown" at the base.

Spores 11–14 \times 6.5–8 μ , inequilateral in profile view, ovate in face view, usually a fair number calyptrate, plage area showing on nearly all, smooth except for loosened wall material and plage boundary, pallid ochraceous in KOH, dark red brown in Melzer's sol. Basidia 2- and 4-spored, 24–27 \times 8–9 μ , hyaline in KOH. Pleurocystidia none. Cheilocystidia 36–50 \times 9–11 μ , fusoid-ventricose with long necks and obtuse to subcapitate apices, ventricose basal part 9–11 μ broad, apex 5–7 μ broad, neck 4–5 μ thick, hyaline; gill trama interwoven. Pileus trama with a poorly defined pellicle of hyaline nongelatinous hyphae, with a hypoderm of enlarged hyphal cells beneath. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on mossy logs, Washington and Quebec, fall.

OBSERVATIONS: This variety is close to the *cerina* complex but lacks a veil, has duller colors than *G. evelata* var. *evelata*, more capitate cheilocystidia,



Cystidia: Fig. 39, cheilocystidia of *G. evelata* var. *evelata*; 40, cheilocystidia of *G. evelata* var. *fulvipes*; 41, cheilocystidia of *G. subcerina* var. *subcerina*; 42, cheilocystidia of *G. subcerina* var. *anglica*; 43, cheilocystidia of *G. bullulifera*; 44, cheilocystidia of *G. tibiicystis*; 45, pilocystidia; 46–47, cheilocystidia of *G. subtibiicystis*.

and more strongly pseudoamyloid spores. The pallid spores in KOH when fresh are distinctive. It seems to favor patches of *Dicranum*.

MATERIAL EXAMINED: Smith 48836-*type*; 61495; 61583; 61762; 61770.

27. *Galerina subcerina* Smith & Singer, *Mycologia* 50: 485. 1958.
var. *subcerina*

Illustrations: Pl. 3, fig. A. Fig. 41 (cheilocystidia).

Pileus 3–10 mm broad, obtusely conic to campanulate rarely convex, margin straight, surface glabrous moist and hygrophanous, ochraceous tawny and striate moist, fading to pale buff; odor and taste not recorded.

Lamellae broad, distant, adnate, nearly concolorous with moist pileus when mature.

Stipe 10–30 mm long, filiform to 1.5 mm thick, equal, pale honey color overall, pruinose at apex, naked over the remainder, no veil present.

Spores 9–12 × 5.5–7 μ, ovate in face view, somewhat inequilateral in profile view, calyptrate, tawny in KOH, darker red-brown in Melzer's, callus very inconspicuous. Basidia 4-spored or more rarely 2-spored. Pleurocystidia absent or present only near the gill edge, similar to cheilocystidia. Cheilocystidia abundant, 26–38(50) × 7–12 × 2–5 × 4–13 μ, base equal to slightly ventricose, neck 4–6 μ diam., apex obtuse to capitate, smooth, hyaline to pale yellowish in KOH. Gill trama fulvous in sections revived in KOH. Pileus trama fulvous in KOH (individual hyphae with ochraceous incrusting pigment), pellicle of appressed hyphae 5–8 μ in diam. and slightly gelatinous in KOH as well as ochraceous in color. Clamps present.

HABIT, HABITAT AND DISTRIBUTION: Usually only a few fruiting bodies in a small area; on mossy conifer logs or on mossy ground cover, Michigan, Quebec, Massachusetts, and Tennessee in North America, England in Europe. Summer and fall. Common in the Laurentide Park north of Quebec in Canada.

OBSERVATIONS: This was the most abundant *Galerina* in the Laurentide Park in Quebec during the late summer of 1959. The spore size is remarkably constant though occasional collections are found in which the size ranges down to 8–10 × 5–5.5 μ. The cheilocystidia are more variable. In some collections, such as Smith 42014 (Michigan), the cheilocystidia are consistently small (19–26 × 7–9 × 3–4 × 3–5 μ) and scarcely capitate. In others, such as Bigelow 6967, they measure up to 40 μ long and are mostly subcapitate. In the great majority, however, the range is from 25–35 μ in length. The most significant variation is in the size and shape of the apical swelling. In a group of collections we at one time designated "variant 5" the cheilocystidia are mostly capitate and the capitellum measures (5)7–13 μ in diam. Bigelow 5603 from Lake Munroe, Quebec is one of this group. In this same group, in fact on the same gill edge, Smith 61831, it is possible to find some cheilocystidia which are merely obtuse to subacute at the apex. In "variant 2" an almost tibiiform cheilocystidium was sometimes found (2 μ in the neck and 5 μ in the capitellum). In this same variant some

vesiculose cheilocystidia up to 14 μ also were found. In Smith 61771, also "variant 2", the spore shape was variable with almost all degrees of bifid or mitten-shaped spores present along with some which were elongate and subangular. In "variant 3" the spores were not conspicuously calyptrate and the cheilocystidia were up to 50 μ long with obtuse to subcapitate apices.

MATERIAL EXAMINED: Bigelow 2927; 3090; 3189; 3281; 3359; 3362; 3601; 3644; 3732; 3764; 3765; 3767; 3768; 3776; 4143; 4145; 4146; 4149; 4150; 4151; 4152; 4156; 4207; 4340; 4369; 4370; 4373; 4375; 4379-*type*; 4478; 4479; 4481; 4569; 4722; 4723; 4978; 5602; 5603; 6218; 6441; 6445; 6552; 6554; 6615; 6637; 6967; 7274; 7868; 8018 (MICH). Hesler 11793. Smith 42014; 48171; 54337; 54640; 56932; 57200; 60898; 61497; 61498; 61501; 61503; 61508; 61514; 61515; 61538; 61540; 61542; 61543; 61544; 61546; 61547; 61548; 61550; 61579; 61580; 61582; 61584; 61587; 61588; 61592a; 61597; 61600; 61602; 61604; 61649; 61653; 61668; 61675; 61680; 616846; 61688; 61690; 61761; 61764; 61765; 61766; 61769; 61771; 61831; 61835; 61836; 62089; 63152. Thiers 3005; 3016; 3256 (MICH).

27a. *Galerina subcerina* var. *anglica* Smith, var. nov.

Illustrations: Fig. 42 (cheilocystidia).

Pileus 3–8 mm latus, obtuse conicus, udus, hygrophanus obscure fulvus demum subochraceus; lamellae ascendentes, distantes, latae, pallide fulvae; stipes 10–20 mm longus, filiformis, sursum pallidus pruinosisque, deorsum obscure luteobrunneus, velum nullum. Sporae 9–11 \times 5.5–6.5 μ , calyptratae, fulvae; cheilocystidia 26–35(50) \times 4–8 \times 2.5–5 \times 4–5 μ ; pleurocystidia nulla. Specimen typicum ad muscos, Quantock Hills, Somerset Angliae, 20 Sept. 1960, Smith 63259 (MICH).

Pileus 3–8 mm broad, obtusely conic, surface moist and hygrophanous, dark tawny fading to pale ochraceous tawny; lamellae ascending, distant, broad, pale tawny. Stipe 10–20 mm long, filiform pallid and pruinose above, lower down dark yellowish brown, no veil present. Spores 9–11 \times 5.5–6.5 μ , calyptrate, fulvous in KOH. Cheilocystidia 26–35(50) \times 4–8 \times 2.5–5 \times 4–5 μ . Pleurocystidia none.

On moss, Quantock Hills, Somerset County, England, 20 Sept. 1960, Smith 63259 (MICH).

OBSERVATIONS: This variety differs from the type variety chiefly in having a stipe which darkens below and cheilocystidia generally narrower and often elongated to almost filamentous capitate in shape.

Section *Mycenopsis* Smith & Singer, *Sydowia* 11: 448. 1957.

Spores lacking a pore, verrucose or slightly asperulate or smooth, not calyptrate; pleurocystidia none; cheilocystidia present; clamp connections present.

This section is characterized within the subgenus *Galerina* by the viscid to moist hygrophanous pileus which is not conspicuously fibrillose when faded, the noncalyptrate spores, and the absence of pleurocystidia. The ornamentation of the spores is varied in this group, being almost absent in some even when the spores are observed under the highest magnification, or the spores may actually be smooth; in others the ornamentation occurs in the form of warts, wrinkles or minute irregularities. In some there is a tendency for the exosporium to separate from the episporium, but a calyptrate type of spore, as we have defined it, is not admitted.

This is the largest of the sections of subgenus *Galerina*, and as far as the number of species, and probably the number of carpophores produced, is concerned, it is the most important single group in the genus.

TYPE SPECIES: *Galerina mycenopsis* (Fr.) Kühner, sensu Kühner, Ency. Myc. 7: 190. 1935.

Key to Subsections

1. Cheilocystidia vesiculose.....Subsection *gulluliferinae*
1. Cheilocystidia not as above (but variously shaped—fusoid, ventricose, tibiiform, ventricose-capitate etc.)..... 2
2. Cheilocystidia essentially capitate to subcapitate with the neck typically 3 μ or less thick in the thinnest part, *or*, if not capitate then the apex acute to subacute and the neck 3 μ or less thick near the tip
..... Subsection *Tibiicystidiae*
2. Cheilocystidia not as above, *or*, if capitate the narrow part of the neck more than 3 μ thick Subsection *Mycenopsidae*

Subsection *Tibiicystidiae* Smith & Singer, Sydowia 11: 448. 1957.

TYPE SPECIES: *Galerina tibiicystis* (Atk.) Kühner, Ency. Myc. 7: 176. 1935.

This subsection is characterized by the cheilocystidia which are either tibiiform and 3 μ or less thick in the narrow part of the neck, or narrowly ampullaceous with necks up to 3 μ thick a short distance back from the apex. It is divided into stirpes as indicated in the following key:

Key to Stirpes

1. Typically on *Sphagnum* or deep moss beds; veil absent to rudimentary; spores usually distinctly roughened Stirps *Tibiicystis*
1. Typically not on *Sphagnum* 2
2. Spores distinctly roughened as seen under a high-power oil-immersion
..... Stirps *Triscopa*
2. Spores smooth to faintly marbled under oil-immersion
..... Stirps *Sideroides*

Stirps *Tibiicystis*

This stirps is characterized by capitate cheilocystidia with thin necks, the sphagnicolous habitat and greatly elongated stipes, the veil being absent or only poorly developed, and the slight to strongly developed exosporial ornamentation. There is a tendency for the plage of the spore to be poorly delimited because, at least in some spores, the ornamentation clings to the plage area to a certain degree.

Key to Species

1. Veil absent (check buttons) ----- 28. *G. tibiicystis*
1. Veil present (check buttons) ----- 2
 2. Clamp connections not present on hyphae of epicutis or on connective hyphae ----- 29. *G. subtibiicystis*
 2. Clamp connections present on epicuticular hyphae and connective hyphae ----- 3
3. Cheilocystidia mostly capitate but some (often quite a few) subacute, ventricose part (at base) 4–8 μ ----- see *G. pumila* (102)
3. Cheilocystidia obtuse to capitate, neck 3–4(5) μ and ventricose part 8–11 μ thick ----- see *G. luteolosperma* (103)

28. *Galerina tibiicystis* (Atk.) Kühner, Ency. Myc. 7: 176. 1935.

Galerula tibiicystis Atkinson, Proc. Am. Philos. Soc. 57: 365. 1918.

Galera tibiicystis (Atk.) Kühner & Romagnesi, Flore Anal. Champ. Supér. p. 319. 1953.

Galerula lasiosperma Atkinson, Proc. Am. Philos. Soc. 57: 364. 1918.

Illustrations: Pl. 4, fig. A. Fig. 44 (cheilocystidia), 45 (pilocystidia).

Pileus 10–30(35) mm broad, conic, with a slightly incurved margin when young, obtusely conic in age or umbonate with a spreading margin, glabrous, strongly hygrophanous, when moist “tawny” to “ochraceous tawny” and translucent striate (often nearly to disc), fading to various shades of ochraceous buff and then opaque; flesh thin, very watery and soft, pale ochraceous tawny moist, pallid faded, taste slightly unpleasant but not distinctive, odor none.

Lamellae moderately close to subdistant, narrow to moderately broad (up to 5 mm), bluntly adnate, somewhat ascending but becoming horizontal, more or less concolorous with the pileus, edges even.

Stipe 55–100(200) mm long, 2–3.5 mm thick, weak and very fragile, equal or nearly so, hollow, concolorous with young caps but paler in age, pallid to whitish in the part covered by moss, pruinose pubescent above at first but soon appearing naked, veil none.

Spores 8.5–11(14) \times 5–6(7) μ , with rugulose-warty exosporium, plage nearly smooth or with indefinite boundaries in some, somewhat inequilateral

in profile, ovate in face view, dark tawny to russet in KOH, with a minute apical callus. Basidia narrowly clavate, 4-spored (rarely 1-2-3-spored intermixed), $26-32 \times 9-10.5 \mu$, hyaline in KOH. Pleurocystidia none. Cheilocystidia abundant, ventricose at base, with a narrow neck and capitate apex, many subcylindric-capitate, hyaline to ochraceous revived in KOH, $36-60 \times 8-12 \times 3-4 \mu$, pedicel often with secondary septations. Gill trama parallel to subparallel, subhymenium not distinct; pileus trama homogeneous, the cuticle of hyphae $5-8 \mu$ in diam., hyaline, somewhat interwoven; tramal body of broader hyphae and transition to cuticle gradual, the broader hyphae pale yellow in KOH but no appreciable incrusting pigment seen; some scattered pilocystidia seen on some pilei, these similar to cheilocystidia or with more thickened walls, hyaline. Caulocystidia numerous near apex of stipe and mixed with free hyphal fibrils, similar to the cheilocystidia or longer. All hyphae with clamp connections.

HABIT, HABITAT AND DISTRIBUTION: Common in sphagnum bogs of northern and mountainous regions of the United States, Canada, Central, Eastern and Northern Europe, and Japan, fruiting from May until Nov. in considerable abundance.

OBSERVATIONS: This is one of the common species found in sphagnum bogs. We were unable to locate the type and so have accepted the species as described by Kühner (1935). This is now a well established concept and consistent with the original description. *Galerula lasiosperma* Atk. appears to be identical, but our independent studies of the type revealed that some carpophores in the type collection had slightly shorter spores ($7-9 \times 5-6.5 \mu$). In others the spores were $9-10 \times 6-7 \mu$. Since we have not discovered any correlated characters we do not wish to do more than point out the difference here. We have some evidence to indicate that a narrow-spored taxon also exists in this group, but it cannot be assigned to *G. lasiosperma*. Atkinson indicated broad (up to $7-7.5 \mu$) spores for both. In Smith 16720 from Mt. Baker, Wash., the spores were not quite so dark in color as in the type of *G. lasiosperma*. Smith 4611 also had pale spores, as did one Michigan collection.

MATERIAL EXAMINED: Bigelow 3808; 4540 (MICH). Chaillet 45, France (L*) S. Davis (Kelly 4-7 (MICH). J. Favre, Switzerland, 7-14-35 (narrow spores, long cysts) (MICH). J. W. Groves, Aldershot, Nova Scotia, 2-9-53 & 10-2-53 (MICH). L. R. Hesler 4335; 10681 (TENN). Hongo (Japan: Ōtsu) 1121 (MICH). C. H. Kauffman, 7th Lake, Adirondack Mts., New York, 9-11-21 (MICH). E. B. Mains 6044 (MICH). PRH 107 (MICH). D. A. Reid, Inverness, Scotland, August, 1955 (MICH). Singer, Mt. Lake, Virginia (typical) (FH); N-725 (F); 465 (Europe). Smith, Mud Lake Bog, Washtenaw Co., Mich., August, 1929; 33-589; 33-941; 33-942; 26; 75 (narrow spores); 4022 (wide cystidia); 4611; 6124 (typical); 7598; 16720; 18425 (narrow spores); 37018; 41641; 42579; 42583; 42584; 42585; 42586; 43714; 43724; 43963; 60882; 61492; 61496; 61646; 61678; 61843. Thesleff, Finland, 7-10-92 (H). Tuomikoski, Finland, 4 collections (H).

* May 1821. This is probably one of the oldest preserved specimens of *Galerina*.

29. *Galerina subtibiicystis* Singer, Lilloa 26: 146. 1953 (1954).
Illustrations: Fig. 46, 47 (cheilocystidia).

Pileus 8–35 mm broad, obtuse to convex, finally with uplifted margin, tawny to ochraceous tawny, glabrous, moist, hygrophanous, fading to yellow or cinnamon buff, striate when moist; flesh subconcolorous with surface, odor none.

Lamellae rusty ochraceous, never distinctly ascendent, adnate-subdecurrent, broad, medium close.

Stipe 30–100 mm long, 1–3 mm thick, equal, weak, pallid, eventually somewhat yellowish except for the base which remains pallid, with a pallid veil but neither annulate nor belted, soon glabrescent, not changing color to brown strongly in the midportion.

Spores (7)8.8–10.3(11) \times 5–5.5(7.2) μ , with a fine but distinct punctation visible, mostly fulvous in KOH, plage *not* well marked. Basidia 25–29 \times 7.5–8.3 μ , 2-, 3-, 4-spored (mostly 4-spored). Cheilocystidia characteristically filamentous with capitate apex and long thin body, slightly enlarged (5–7 μ) near the base, capitellum 3.5–5.5 μ broad, 1.2–2.9 μ thick necks, 30–45 μ long. Caulocystidia present, 33–70 \times 6.5–7 μ . Large fundamental hyphae of gill trama with little or no incrusting pigment but with numerous clamp connections; the thin hyphae of pileus cuticle, veil elements and all connective hyphae lack clamps.

HABIT, HABITAT AND DISTRIBUTION: Scattered in deep *Sphagnum* in montane bogs without trees, Taimbesinho (alt. 1000 m.), in South Brazil, Singer B-102-*type* (LIL) (isotype MICH).

OBSERVATIONS: This species is interesting as a link between the subgenus *Tubariopsis* and the stirps *Tibiicystis*. The plage of the spore is indistinct, and the narrow hyphae of the fruiting body have no clamp connections. Because of its evident affinity to *G. tibiicystis* and the presence of clamp connections on the broad hyphae, we prefer to place it here. It has somewhat of a counterpart in the northern hemisphere in *G. luteolosperma*, but the cheilocystidia and ornamented spores readily separate the two.

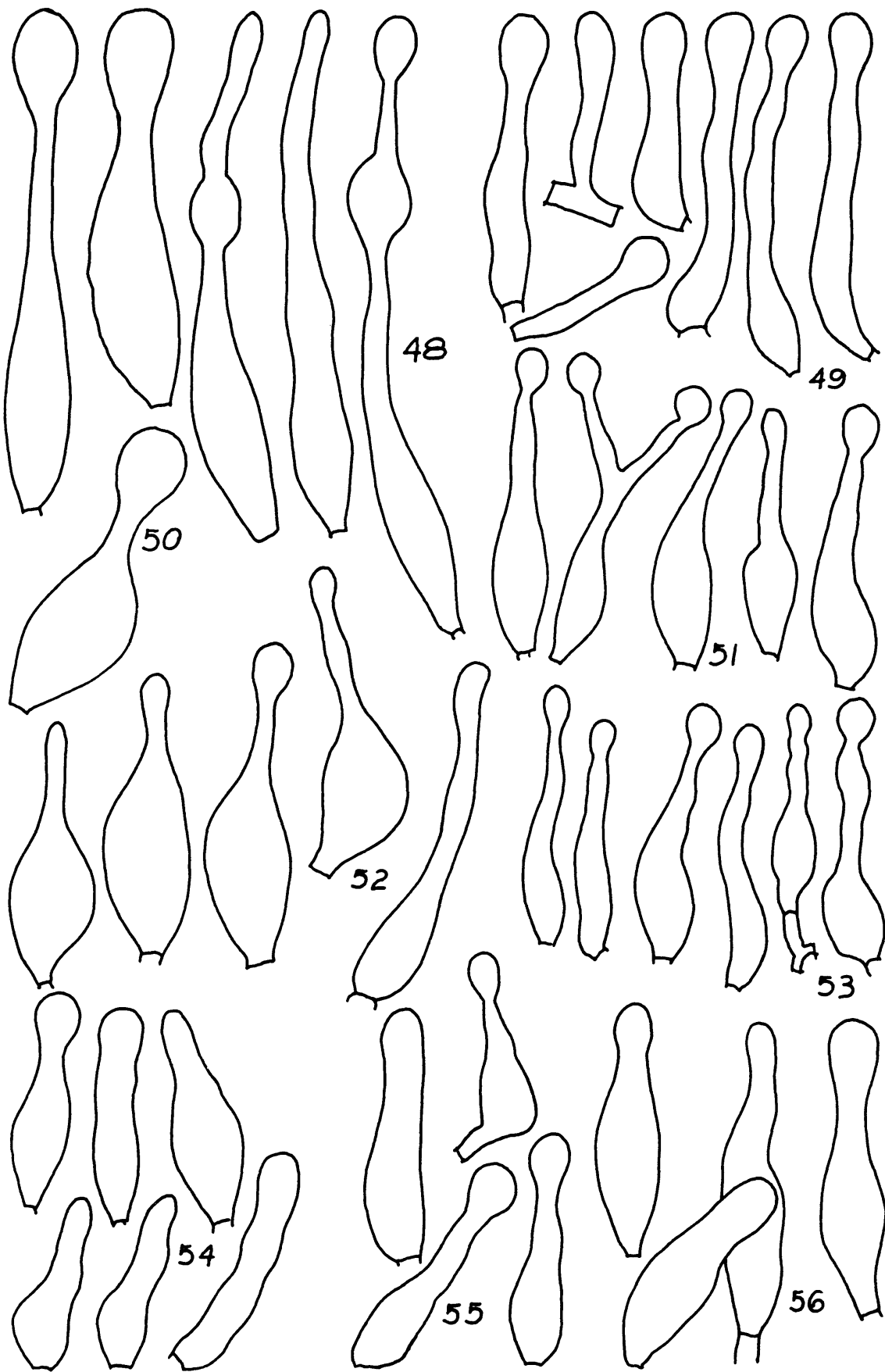
Stirps *Triscopa*

This stirps differs from stirps *Tibiicystis* in that the habitat is typically not deep moss and hence the stipes of the fruit bodies are usually much shorter. Some species having cheilocystidia with very narrow necks but acute to scarcely enlarged apices are included here (see *G. pellucida*). Pleurocystidia are typically absent, but may occur in places where the hymenium has been damaged. The spores are sufficiently well ornamented that it is not difficult to see the markings (in 3% KOH) with the aid of an oil immersion lens.

Key to Species

- | | |
|---|----|
| 1. Spores 9–15 μ long (on 2- or 4-spored basidia) | 2 |
| 1. Spores 5–8(10) μ long | 13 |

2. Pileus dark rusty brown to Vandyke brown on disc 3
 2. Pileus fulvous to honey color 4
3. Cheilocystidia 24–32 + 6–9 μ ; growing on alder logs
 ----- see *G. pallidispora* (51)
3. Cheilocystidia 40–70 \times 6–12 μ ; growing on naked peat
 ----- see *G. luteofulva* (52)
4. Cheilocystidia 40–70 μ long 5
 4. Cheilocystidia 18–36(40) μ long 10
5. Cheilocystidia 4–7 μ broad in basal ventricose part
 ----- see *G. perangusta* (53)
5. Cheilocystidia typically 7–12(14) μ broad in ventricose portion 6
 6. Cheilocystidia practically all subacute to obtuse 30. *G. uncialis*
 6. Many capitate to subcapitate cheilocystidia present 7
7. Stipe with a distinct annular zone see *G. cinctula* (47)
7. Veil rudimentary to absent 8
 8. Pileus broadly convex, margin spreading see *G. dominici* (54)
 8. Pileus conic umbonate to conic campanulate 9
9. Lamellae narrow, spores faintly warty-rugulose (under oil), cheilocystidia 6–12 μ broad in ventricose part 31. *G. cascadiensis*
9. Lamellae broad, spores distinctly warty-rugulose (under oil), cheilocystidia 5–8 μ broad in ventricose part 43. *G. pteridicola*
10. Veil absent to rudimentary 11
 10. Veil typically leaving a zone or annulus on stipe 12
11. Spores 9–11 \times 5–6 μ , nearly smooth (see *G. pistillicystis* (42) also)
 ----- 32. *G. camerinoides*
11. Spores 11–14(16) \times 6.5–8(10) μ , distinctly roughened
 ----- 32. *G. pseudocerina*
12. Spores smooth (or nearly so)
 ----- see *G. larigna* (50) and *G. ampullaceocystis* (49)
12. Spores distinctly ornamented see *G. pseudocamerina* (48)
13. Veil leaving an annulus on stipe and stipe fibrillose below it, growing on hardwood logs, pilocystidia absent 34. *G. tahquamenonensis*
13. Characters not combined as in above choice 14
 14. Pileus viscid, brick red on umbo 35. *G. pellucida*
 14. Not as above 15
15. Pileus typically sharply conic, or, if expanded, with a distinct conic umbo 16
15. Pileus obtusely conic to convex 18
 16. Spores 5–6.5 μ long, growing on humus 36. *G. humicola*
 16. Spores 6–8(10) μ long, growing on wood 17
17. Veil absent (check buttons), stipe naked and shining 37. *G. pulchra*
17. Veil thin to rudimentary (at times all traces gone by maturity)
 ----- see key to 38. *G. triscopa* complex
18. Exosporial ornamentation well developed, loosening readily in crushed mounts in KOH 39. *G. laticeps*
18. Spore ornamentation not as above 19
19. Pileus dark red-brown to dark cinnamon when fresh 20



Cystidia: Fig. 48, cheilocystidia of *G. cerina* var. *contorticystis*; 49, cheilocystidia of *G. camerinoides*; 50, cheilocystidium of *G. cascadensis*; 51, cheilocystidia of *G. pseudocerina*; 52, cheilocystidia of *G. tahquamenonensis*; 53, cheilocystidia of *G. pellucida*; 54, cheilocystidia of *G. humicola*; 55, cheilocystidia of *G. pulchra*; 56, cheilocystidia of *G. triscopa* var. *triscopa* f. *triscopa* (type of *G. coniferarum*).

19. Pileus tawny or paler moist ----- 21
 20. Veil present; stipe honey color over all in age ---- 40. *G. mutabilis*
 20. Veil absent; stipe russet to cinnamon brown over all
 ----- 41. *G. subbadia*
 21. Pileus not striate moist; pilocystidia absent ----- 45. *G. yungicola*
 21. Pileus conspicuously striate ----- 22
 22. Spores 4–5.5 μ broad ----- 42. *G. pistillcystis*
 22. Spores 6–7 μ broad ----- 44. *G. aimara*

30. *Galerina uncialis* (Britz.) Kühner, Ency. Myc. 7: 217. 1935.

Agaricus uncialis Britzelmayer in Ber. Naturw. Ver. f. Schwaben 30: 21. 1890.

Naucoria uncialis (Britz.) Sacc. Syll. Fung. 11: 59. 1895.

Galera uncialis (Britz.) Kühner in Kühner & Romagnesi, Flore Anal. Champ. Supér. p. 320. 1953.

Illustrations: Britz. Hymen. Tab. 248, fig. 231. Kühner, Ency. Myc. 7: 218, fig. 72, 1935.

Pileus 5–22(30) mm broad, hemispheric to plano-convex, rarely to plano-concave, sometimes conico-convex, margin slightly involute at first, sometimes revolute in old specimens, smooth and glabrous, rather fleshy, hygrophanous; when moist yellowish orange-brown to orange-brown when young, darker with age, to dull reddish brown, slightly paler near margin, somewhat shiny and greasy; when dry pale ochraceous buff to rusty buff with center slightly browner, dull. Context glassy yellow-brown when moist, dark reddish brown in base of stalks of old specimens, much paler when dry, odor and taste strongly farinaceous.

Lamellae, 15–28 reach stipe, (1)3–7(10) lamellulae between each pair, rather distant to rather crowded, adnate or adnexed, subdecurrent in small specimens, with edge slightly concave or straight at first, becoming ventricose, from brownish ochraceous to rather dark rusty brown (Séguy, 191), edge whitish.

Stipe 12–27 mm long, 0.8–3 mm thick, cylindrical or slightly attenuated or thickened towards base, pale yellow-brown to dull orange-brown, becoming dark reddish brown near base, slightly pruinose near apex, with white fibrillose annular zone; lower part with appressed white to isabella colored fibrils, glabrescent with age; base somewhat whitish to brownish tomentose.

Spore print rather dark reddish rusty brown (\pm Séguy 146). Spores 7.5–10(10.5) \times 5.0–6.5 μ , broadly subamygdaloid to ellipsoid, very rough, with a distinct plage, with tightly fitting exospore, yellow-brown in water, ferruginous in NH_4OH , rather dark reddish brown in KOH . Basidia 24–35 \times 6.5–9 μ , 4-spored, cylindrical to clavate, often slightly constricted in the middle, sometimes intermixed with similarly shaped or wrinkled yellowish bodies. Pleurocystidia none. Cheilocystidia numerous, 33–61 \times 6–12 μ , slender to very slender lageniform or fusiform with long, very slender necks 1–3(4) μ thick, rarely subcapitate, rarely with yellowish contents. Trama of gills regular to subregular. Cuticle of pileus 40–70 μ thick, of subradial to interwoven 2–4 μ wide hyphae, upper layer 20–50 μ thick, gelatinizing in

age. Context with broad incrusted hyphae, vascular hyphae scarce, opaquely yellowish. Clamps present.

HABIT, HABITAT AND DISTRIBUTION: In late autumn on mosses in coastal dunes, sometimes on mossy trunks (Bas 1180). In nine out of ten collections (as listed) associated with *Hypnum cupressiforme*. Europe.

OBSERVATIONS: We have included the description by Bas (1960). The stipe which darkens below, the fibrillose annulus and long slender cheilocystidia with acute to subacute apex are distinctive. Singer has restudied Bas's material as well as fresh material from the Netherlands and finds both in full agreement with the description given above, but in some (with scattered 2-spored basidia) spore length reaches 12 μ .

31. *Galerina cascadenis* Smith & Singer, Mycologia 47: 571. 1955.
Illustrations: Fig. 50 (cheilocystidium).

Pileus 12–18 mm broad, obtusely conic becoming conic-umbonate with a spreading margin, glabrous, moist, hygrophanous, dark ochraceous tawny and faintly striate moist, cinnamon buff faded; odor and taste not recorded.

Lamellae close, narrow, adnate, dark ochraceous tawny, edges whitish and fimbriate.

Stipe 40–45 mm long, 1.5–2.5 mm thick, somewhat enlarged downward, honey color above, dark ochraceous tawny below, lower half with scattered fibrils from the rudimentary veil, apex pruinose.

Spores 9–11(12.5) \times 5–6(7) μ , somewhat inequilateral in profile, ovate in face view, outer wall faintly rugulose-warty, suprahilar area smooth and marked off by a ragged line, ochraceous tawny in KOH. Basidia 2- and 4-spored. Pleurocystidia none. Cheilocystidia abundant, 40–70 \times 6–12 μ , ventricose-capitate to cylindrical-capitate or some with long narrow necks and subacute apices and a narrowly ventricose base, capitate individuals at times with a prolongation beyond the capitellum, this prolongation may or may not be capitate. Gill trama regular. Pileus trama homogeneous; clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Subcespitate on debris of an old avalanche, Green Lake, Mt. Rainier National Park, Washington. Oct. 19, 1952, Smith 41144-*type*, known only from type locality.

OBSERVATIONS: The stature of the carpophore reminds one of *Cortinarius acutus*; the combination of large, typically *Galerina* spores and long cheilocystidia of the tibiicystis type are distinctive microscopically. In *G. cortinarioides* the spores are calyptrate and the cheilocystidia are the usual fusoid-ventricose type. *G. cascadenis* differs from *G. uncialis* in stipe characters and habitat as well as in the size of the cheilocystidia, and thinness of the veil.

32. *Galerina camerinoides* Smith, Mycologia 45: 895. 1953.
Illustrations: Fig. 15, 49 (cheilocystidia).

Pileus 4–7 mm broad, obtusely conic, the margin appressed against the stipe when young, becoming broadly conic, near cinnamon buff on disc,

margin paler and near pinkish buff, translucent-striate, hygrophanous, becoming slightly paler and opaque when faded, glabrous at all times; flesh very thin, concolorous with surface, odor and taste not distinctive.

Lamellae distant, 8–10 reach the stipe, 1 tier of lamellulae or none at all, broadly adnate, broad, edges even, pale ochraceous tawny.

Stipe 10–15 mm long, ± 1 mm thick, equal, fragile, pale honey color, coarsely pruinose to apex.

Spores $9-11 \times 5-6 \mu$, subelliptic in profile, elliptic in face view, ochraceous tawny or somewhat darker in KOH, very minutely punctate-roughened, with a nearly smooth plage, small apical callus present. Basidia 2- and 4-spored, $26-30 \times 8-9 \mu$, hyaline in KOH. Pleurocystidia none. Cheilocystidia $18-36 \times (3)4-8(9) \mu$, cylindrical-capitate to ventricose at base and capitate at apex, neck often very narrow ($\pm 3 \mu$), hyaline and thin-walled in KOH; gill trama interwoven, pale yellow in KOH. Pileus trama near surface (hypodermium) tawny in KOH from heavy incrustations of pigment. Clamp connections frequent. Caulocystidia $30-62 \times (4)6-12 \mu$, variable in shape but the general pattern cylindrical to subventricose with capitate apices.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on moss over rocks; Oregon.

OBSERVATIONS: The cheilocystidia are definitely the *G. sideroides* type but the spores, under a good oil immersion lens, are seen to be typical of stirps *Triscopa*. No veil was noted in the type. This species cannot be *Agaricus camerinus* Fries because the stipe is not "umbrino" as Fries described it. For a comparison with *G. larigna*, see that species.

MATERIAL EXAMINED: Smith 19374-type.

33. *Galerina pseudocerina* Smith & Singer, Mycologia 50: 483. 1958.

Illustrations: Fig. 51 (cheilocystidia).

Pileus 5–8 mm broad, obtusely conic becoming broadly conic, glabrous, moist, hygrophanous, striate, ochraceous tawny; flesh thin, odor none, taste mild.

Lamellae *distant, broad*, adnate, pale ochraceous tawny, edges even.

Stipe 20–30 mm long, 1 mm thick at apex, pruinose above, naked lower down at maturity or at first with a few fibrils from the rudimentary veil, pale honey color over all.

Spores $11-14(16) \times 6.5-8(10) \mu$, broadly inequilateral in profile, oval in face view, distinctly tuberculate-roughened, rich tawny in KOH, plage often difficult to see, small and its boundary irregular. Basidia $20-25 \times 8-10 \mu$, clavate, readily collapsing, 2- and 4-spored. Pleurocystidia none. Cheilocystidia ventricose-capitate, $18-26 \times 6-9 \times 2-2.5 \times 3-5 \mu$, neck very narrow and capitellum small, smooth, hyaline to yellowish in KOH. Gill trama subregular, ochraceous in KOH; pileus trama fulvous from pigment incrusting the hyphae as well as color in wall. Cuticle of narrower

hyphae than those of the hypoderm but not gelatinous. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on *Dicranum*, Trout Lake, San Juan Mountains, Colorado.

OBSERVATIONS: The large, ornamented, richly colored, broad spores, capitate cheilocystidia and only the most rudimentary of veils are the distinguishing characters. The field aspect of the species is that of *G. cerina*, but of course the spores are very different.

Smith, 52745, Trout Lake, Colorado, Aug. 23, 1956, appears to be the same species. In it the basidia are 4-spored, the spores $9-12.5 \times 6-7.5 \mu$, but nearly all are ornamented over the plage area. The fact that a very few show some indication of a smooth plage is considered significant. Clamp connections are abundant. The cheilocystidia are $20-30 \times 6-8 \times 2.5-3.5 \times 4-6 \mu$ and ventricose-capitate, as in *G. pistillicystis*. The spores are well-ornamented, broadly ovate to elliptic in face view, in profile view subelliptic to obscurely inequilateral, and russet to "Mars brown" in KOH. This is probably the 4-spored form of the species.

MATERIAL EXAMINED: Smith 52182-*type*; 52717; 52745; 52923.

34. *Galerina tahquamenonensis* Smith, Mycologia 45: 919. 1953.
Illustrations: Fig. 52 (cheilocystidia).

Pileus 8-12(15) mm broad, obtusely conic with a \pm incurved margin, expanding to campanulate or remaining convex, glabrous except for margin which is at first appendiculate with patches of the thin veil (\pm dentate-appendiculate), veil remnants soon evanescent, color when young and moist "Mars brown", soon "cinnamon brown" the margin becoming dingy ochraceous tawny and striate, hygrophanous, fading to dingy cinnamon buff or paler; flesh concolorous with pileus, soft, taste and odor not distinctive.

Lamellae broadly adnate, broad, nearly subdistant at first, truly subdistant at maturity, ochraceous tawny (paler than pileus), edges even.

Stipe short, 10-20 mm long, 1-1.5 mm thick, equal or enlarged below, concolorous with pileus below, apex soon fading out to almost concolorous with the gills but in age again often darker, peronate fibrillose up to the superior thin often mostly fragmentary annulus, pruinose above, in age glabrescent.

Spores (7)9-10(12) \times 5-6.5(7) μ , ovoid to subelliptic, roughened at least around the suprahilar plate, ochraceous tawny when revived in KOH. Basidia 1-, 2-, 3-, and 4-spored. Pleurocystidia none seen. Cheilocystidia $24-36 \times 9-11 \mu$, ventricose with a narrow neck and sometimes with a small capitellum, wall of capitellum thickened in some and highly refractive. Gill trama parallel, the cells short-ellipsoid, tawny to rusty brown in KOH, subhymenium not distinctive. Pileus trama dark rusty brown in KOH and homogeneous, without pilocystidia, pigment incrustated on the hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on rotten hardwood,

Tahquamenon Falls State Park, Michigan, July 2, 1952. It has been collected between July 2 and Aug. 28. Known only from the type locality.

OBSERVATIONS: The stature of this species is that of *G. triscopa* but the well-developed veil readily distinguishes it. The species appears to be most closely related to *G. pseudocamerina* in the characters of spores and cheilocystidia, but differs in having a peronate veil and usually in being annulate, as well as in its habitat, on hardwood logs.

MATERIAL EXAMINED: Smith 37025; 38355; 39045-*type*.

35. *Galerina pellucida* (Murrill) Smith & Singer, *Sydowia* 11: 449. 1957.

Naucoria pellucida Murrill, *Mycologia* 4: 78. 1912.

Illustrations: Fig. 53 (cheilocystidia).

Pileus 7 mm broad, thin, conic to plane with an obtuse umbo, surface bay to latericious on the umbo, testaceous-striate between the umbo and margin, dotted over the surface with translucent gelatinous pearly white droplets or specks.

Lamellae adnexed, ventricose, distant, pale testaceous, marked with droplets like those on pileus surface.

Stipe 10 mm long, 0.5 mm thick, cylindrical, equal, smooth, pallid above, bay below.

Spores 7–9 × 5–6 μ, bright rusty cinnamon, roughened over all except the basal part of the suprahilar area, Basidia 16–20 × ± 6 μ, hyaline, 4-spored. Pleurocystidia none seen. Cheilocystidia abundant, 24–36(50) × 4–7 μ (at base) × 2 μ in the flexuous neck, hyaline, agglutinated on edge as if viscid. Epicutis of pileus giving rise to numerous pilocystidia similar to the cheilocystidia (gelatinous and decumbent so as to give the impression of thin gelatinous pellicle). Pileus trama orange in KOH. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On wood at New Haven Gap, Jamaica, Jan. 4, 1909. Murrill 763-*type* (N.Y.)

OBSERVATIONS: The aggregations of pilocystidia no doubt account for the droplets described by Murrill. This fungus, in its pigmentation both when fresh and when revived in KOH, reminds one of *Gymnopilus*, but the tendency for the suprahilar depression to become smooth, and the resemblance to *G. triscopa* cause us to place it here. It is outstanding in either genus because of the cystidia.

Smith examined Murrill's number 763 and obtained the data presented in our description of the microscopic characters. Since the part of the type studied by Smith offers a logical explanation for the gelatinous dots emphasized by Murrill in his original description, we are assuming that we have studied the specimen that Murrill described, and which must, therefore, be regarded as holotype. Dennis (1953), however, has given a different interpretation of the type, in which the cheilocystidia are described as *Conocybe*-like. In his description, he gives the character of the cap surface

of *N. pellucida* as “finement velouté”. This does not check with Murrill’s original description, and, furthermore, Murrill never would have applied the name *pellucida* to a species with this type of cap surface. Consequently we are forced to the conclusion that Dennis obtained his microscopic data from a specimen other than the holotype.

36. *Galerina humicola* Smith, Mycologia 45: 903. 1953.
Illustrations. Fig. 54 (cheilocystidia).

Pileus 10–15 mm broad, conic campanulate, the margin only slightly incurved at first and soon straight, expanding to plane with a sharp conic umbo, surface moist, at first with scattered fibrils from the remains of the veil, soon glabrous, translucent-striate, “cinnamon brown” to “ochraceous tawny” at first, hygrophanous and “warm buff” (yellow) faded, fading on disc first; flesh thin, concolorous with surface, very soft and brittle, odor and taste slightly pungent.

Lamellae close (15–18 reach the stipe), two tiers of lamellulae, adnate but seceding readily, broad (± 2 mm), dull ochraceous tawny over all, edges even.

Stipe 15–20 mm long, ± 1 mm thick, slightly enlarged at apex, concolorous with pileus at first but soon becoming dark sordid brown from the base upward, with a superior whitish fibrillose zone from the remains of the veil, zone evanescent, sparsely white fibrillose toward the base.

Spores $5.5\text{--}6.3 \times 4\text{--}4.5 \mu$, inequilateral in profile, in face view sub-elliptic to ovate, tawny to pale russet in KOH, exosporium wrinkled to rugulose-tuberculate, plage nearly smooth, with an apical callus. Basidia 4-spored, $16\text{--}19 \times 5\text{--}6.5 \mu$, hyaline in KOH; pleurocystidia none; cheilocystidia $32\text{--}48 \times 5\text{--}8 \mu$, abundant, fusoid-ventricose to almost tibiiform (narrowly ventricose with subcapitate apices), hyaline, thin-walled (a few with yellowish content as revived in KOH). Pileus trama homogeneous, dull yellow brown in KOH from incrusting pigment, no cuticular differentiation. Clamp connections present at base of basidia.

HABIT, HABITAT AND DISTRIBUTION: Subcespitate on black humus (muck) near a stump, Milford, Michigan, June 5, 1941, Smith 15552-*type*. Known only from the type locality.

OBSERVATIONS: This species differs from *G. laticeps* in having an annular zone of veil fibrils, spores which lack blisters of the loosened outer layer, and in its habitat on muck instead of oak wood. It differs from *G. triscopa* in its habitat, smaller spores, and in its slightly pungent odor. The more tibiiform cheilocystidia may be an additional character, but here a number of collections are needed on which to base an opinion, since the cystidia of *triscopa* are variable.

37. *Galerina pulchra* Smith & Singer, sp. nov.
Illustrations: Pl. 4, fig. B. Fig. 55 (cheilocystidia).

Pileo 10–20 mm lato, conico demum conico-campanulato, glabro, nitente, hygrophano, subbadio dein pallide fulvo; subamaro; lamellis confertis, latis, subfulvis; stipite 20–40 mm longo, 1–1.5 mm crasso, glabro, nitente, sursum fulvo, deorsum badio. Prope Green Lake, Mt. Rainier National Park, Oct. 19, 1952, Smith 41205. Specimen typicum in Herb. Univ. Mich. conservatum.

Pileus 10–20 mm broad, conic young, becoming conic-campanulate, umbo prominent and acute, surface moist and shining but not viscid, hygrophanous, "russet" to dark tawny fresh, fading to near ochraceous buff, fading around the disc first, translucent striate moist; flesh concolorous with surface, odor none, taste slightly disagreeable.

Lamellae close, broad, adnate and readily seceding, dark tawny to cinnamon, edges even.

Stipe 20–40 mm long, 1–1.5 mm thick at apex, equal or with a small basal bulb, glabrous and shining, naked, concolorous with pileus young, in age dark blackish brown from the base up.

Spores 7–8.5(9) × 4–4.5(5) μ , inequilateral in profile, ovate in face view, rusty brown in KOH, smooth plage distinct, remainder of surface rugulose, with a minute apical pore. Basidia 4-spored. Cheilocystidia 28–40 × 6–9 μ , ventricose-capitate to fusoid-ventricose with flexuous necks and subacute apices, hyaline in KOH. Pleurocystidia, none seen. Gill trama somewhat interwoven, dull rusty yellow in H₂O fresh, yellow in KOH, no appreciable subhymenium. Pileus trama homogeneous, no pilocystidia and no appreciable cuticular differentiation. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Densely gregarious on an old mossy conifer log, Green Lake, Mt. Rainier National Park, Oct. 19, 1952, Smith 41205-*type*. Known only from type locality.

OBSERVATIONS: Carpophores in all stages of development were found and there was no trace of a veil at any stage. The somewhat disagreeable taste, large size and shining appearance are distinctive. We were at first inclined to regard this as the typical variety of *G. triscopa*, but subsequent collections during 1953 indicated that the Green Lake collection was distinct in several respects, as indicated above. Considerable variation in the type of cheilocystidia has been mentioned for the varieties of *G. triscopa*; some carpophores of this collection show a high percentage of cystidia with flexuous necks and subacute apices. The carpophores were not actually counted, but there must have been hundreds along the length of the log.

Galerina triscopa complex

Key to Varieties

1. Cheilocystidia elongating to 50–60 μ ----- 38a. *G. triscopa* var. *triscopa* f. *longicystis*
1. Not as above ----- 2
2. Typically on hardwood; veil leaving a distinct zone on stipe, zone may disappear in age ----- 38b. *G. triscopa* var. *tetrascopa*

2. Typically on conifer wood; veil rudimentary, all veil traces often gone by maturity ----- 38. *G. triscopa* var. *triscopa*

38. *Galerina triscopa* (Fr.) Kühner, Encyc. Myc. 7: 206. 1935.
var. *triscopa* f. *triscopa*

Agaricus triscopus Fries, Monogr. Hymen. Sueciae 1: 375. 1857.

Galera triscopa (Fr.) Quélet, Enchir. Fung. p. 107. 1886.

Naucoria triscopa (ex errore: *triscopoda*) (Fr.) Sacc. Syll. Fung. 5: 841. 1887.

Galerula parvula Murrill, N. Am. Fl. 10: 162. 1917.

Galerula coniferarum Murrill, N. Am. Fl. 10: 162. 1917.

Naucoria truncicola Velenovský, České Houby, p. 526. 1921.

Illustrations: Pl. 4, upper fig. C. Fig. 56 (cheilocystidia).

Pileus 3–10(12) mm broad, sharply conic when young and often with the margin incurved, expanding to campanulate or plano-umbonate, the umbo characteristically sharp and abrupt, glabrous moist, hygrophanous, chestnut (*Mohawk*) to cinnamon brown or tawny at first, becoming ochraceous tawny at times before fading to tan, translucent-striate to disc when moist; flesh very thin, concolorous with the surface, odor not distinctive, taste mild.

Lamellae adnate, ascending, becoming ventricose, close, rarely subdistant to distant, dull ochraceous becoming ochraceous cinnamon to tawny (raw sienna), edges even and whitish.

Stipe 10–30(35) mm long, about 1 mm thick, equal or slightly attenuated upward, tubular, cartilaginous, often curved, with a pruinose apex, glabrous below or with a few silky fibrils from a thin rudimentary veil (check young specimens), concolorous with the lamellae above, becoming dark reddish brown (*Mohawk*) or at least *Mosul*, 14 F 8 below.

Spores 6.5–8.5(9.2) × 3.5–5.3(6) μ, slightly inequilateral in profile, narrowly ovate in face view, tawny when revived in KOH, roughened from the wrinkled-verrucose exosporial ornamentation and with a well-marked plage, with an apical callus. Basidia 21–25 × 6–7.5 μ, 4-spored, rarely a few 2-spored intermixed, hyaline in KOH. Pleurocystidia typically absent (most frequently present on damaged areas of the hymenium). Cheilocystidia abundant, 28–45 × 5–9 × 2–4 × 3–6 μ, subcylindric to subventricose with obtuse to subcapitate apex, hyaline, thin-walled, smooth. Caulocystidia in fascicles, either cylindrical or ventricose and clavate or ampullaceous, some subcapitate like the cheilocystidia, hyaline or, near the base, brownish, 30–36 × 4–7 μ. Gill trama consisting of interwoven dull ochraceous pigment-incrusted hyphae. Epicutis scarcely differentiated or of 1–2 hyphae thick, the filaments non-incrusted but not gelatinized and only occasionally giving rise to pilocystidia similar to the caulocystidia. All hyphae with clamp connections.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on wood of both hardwoods and conifers, summer and fall, North America (New York, Virginia, Michigan, Montana, and the Pacific North West); Europe (Sweden, Ger-

many, Austria, France, Eastern Europe) and in the Altai Mts. of Asia, hence probably circumpolar.

OBSERVATIONS: The veil in var. *triscopa* is so fugacious when it is present at all that it does not furnish a practical character for purposes of identification of mature specimens. The cheilocystidia at times contain refractive granules in the subcapitate apex (Smith 41025, for instance). In Smith 33-999, from Ive's Lake in the Huron Mts. of Michigan, pleurocystidia were abundant on areas of the hymenium which had been damaged by insects, and were scattered over apparently undamaged areas. They were fusoid-ventricose with flexuous necks and obtuse apices, i.e., essentially like the cheilocystidia which in this collection showed many individuals typical as well as many which were more elongated than usual. In Singer N-1284 the thin portion of the cheilocystidium is 2.5–3.5 μ thick and nearly all the cystidia are capitate. In this collection the lamellae are distant. There is also considerable variation in the color of the pileus. Most of the collections made during the late fall of 1953 had pilei that were ochraceous tawny when fresh, with the exception of the umbo which was slightly duller and darker.

Generally the cheilocystidia are of an intermediate type between the tibiiform and the fusoid-ventricose category with obtuse apices. This, coupled with a slight tendency toward the development of pleurocystidia, indicates to us that this species is relatively primitive in the genus. We have not been able to correlate slight differences in spore size with degree of veil development.

MATERIAL EXAMINED: Bigelow 4338; 4378; 7280b; 7603; 7634; 7636; 8045; 8115; 8612 (MICH). W. B. Cooke 22111 (MICH). J. Favre, Switzerland, Oct., 1948 (MICH). S. C. Hoare, Merivale, Ont., 10-1-53 (MICH). Höhnelt (Wiener Wald, Austria) as *Galera sahleri* (FH). C. H. Kauffman, Bay View, Mich., 9-4-05; New Richmond, Mich., 9-11-10; Adirondack Mts., N. Y., 9-8-14; Whitmore Lake, Mich., 6-27-20; Steinback Rd. Woods, Ann Arbor, 10-13-26; Echo Lake, Flathead National Forest, Montana, 7-14-28; (MICH). Murrill, types of *Galerula coniferarum* and *Galerula parvula* (NY). V. Potter 4801 (MICH). Singer, N-1284 (F) (MICH); V-370 (FH) C3080 (LIL) (Tirol); earlier material from Europe and Altai Mts. (Fe). A. W. Slipp, Univ. of Idaho, Forest Pathology Herb. 2680 (980-sta. 24) (MICH). Smith 33-784; 33-999; 7150; 10219; 17348; 34142; 36539; 38660; 41571; 41665; 41733; 41877; 41913; 42270; 42354; 42437; 42701; 42714; 42715; 42717; 43017; 43029; 43166; 43167; 43168; 43169; 43170; 43174; 43175; 43370; 43372; 43375; 43694; 43777; 44025; 44631; 47218; 47284; 47288; 49962; 50469; 50704; 51531; 52665; 53358; 53977; 53992; 55004; 61537; 61718; 61721; 61724; H. D. Thiers 3685 (MICH). Tuomikoski, Finland, 9-20-54 (H).

38a. *Galerina triscopa* var. *triscopa* f. *longicystis* Smith & Singer, Mycologia 50: 489. 1958.

Illustrations: Fig. 58 (cheilocystidia).

Pileus 6–12 mm broad, sharply conic with an incurved margin, becoming expanded but retaining a prominent conic umbo, evenly cinnamon brown to russet (very dark rusty brown), odor and taste not recorded.

Lamellae subdistant, broadly adnate, broad, dark rusty brown, edges denticulate.

Stipe 20 mm long, 1.5 mm thick, equal, badius below, paler above (dark wine-red as dried), surface of lower part with a few grayish fibrils from a thin veil, soon naked, apex slightly pruinose.

Spores 6–7.5 × 4–4.5 μ, inequilateral in profile, ovate in face view, warty roughened (under oil), with a smooth plage, dark dull ochraceous tawny in KOH. Basidia 4-spored. Pleurocystidia none or near edge and similar to cheilocystidia. Cheilocystidia 30–40 × 9–12 μ, and fusoid-ventricose, elongating to 50–60 μ and then subcylindric with flexuous walls, seldom enlarged at apex; basal part in age pale ochraceous tawny, the elongated cells finally agglutinated into fascicles. Pileus trama lacking a distinct pellicle, all hyphae heavily incrustated. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered on a very decayed mossy conifer log, Payette Lake, Idaho, Aug. 30, 1954, collector H. Bigelow (Smith 47110-type).

OBSERVATIONS: The elongated cheilocystidia at once distinguish this fungus from *G. triscopa* var. *triscopa* even if one disregards the color. The two are identical in stature.

38b. *Galerina triscopa* var. *tetrascopa* Smith & Singer, var. nov.

Illustrations: Figs. 249–250 (spores); 57 (cheilocystidia).

A var. *triscopa* differt praesentia veli in maturis; ad ligna frondosa acerosaque, aestate, subpraecox. Specimen typicum in Herb. Univ. Mich. conservatum; Smith 42157.

Pileus 4–10 mm broad and 3–5 mm high, sharply conic with a straight margin when young, becoming conic-campanulate with an acute umbo or sharply pointed papilla, in age sometimes with slightly crenulate margin, glabrous, moist, hygrophamous, dark rusty brown (“cinnamon brown” or *raw umber* or *cocoa* M & P), fading to “cinnamon buff” often merely rich tawny and translucent-striate when moist; flesh thin, soft, odor none, taste slight but not distinctive.

Lamellae close to distant, rather broad (1.5 mm), often ventricose, adnate to rounded adnexed, pale ochraceous tawny when young, tawny at maturity, edges even and initially white, subarcuate toward stipe.

Stipe 10–20 mm long, 0.5–1 mm thick, straight or flexuous, bay to chestnut-colored below and pale ochraceous above in age, when young ochraceous all over, at first with a thin annular zone of silky fibrils from the remains of a distinct veil of pallid to dingy fibrils, apex pruinose.

Spores 6.5–8 × 4–4.5(5) μ, somewhat inequilateral in profile, in face view ovate, roughened from a wrinkled exosporium over all except the smooth plage. Basidia 4-spored, 14–24 × 5.3–8 μ. Pleurocystidia none.

Cheilocystidia 34–42(63) \times 4.5–10 μ , slightly ventricose at the base with elongated apex (2.5–4.5 μ diam.) and equal to subcapitate (head 4.8–6 μ), hyaline or sometimes brownish in the lower third, thin-walled. Pilocystidia none. Pileus trama homogeneous, the cuticular hyphae rather thin (4.8–5.3 μ , pigment-incrusted and nongelatinized. Hyphae of gill trama regular, central strand ochraceous brownish from slight pigment incrustations, remainder hyaline or nearly so. All hyphae with clamp connections.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on wood of hardwood trees as well as conifers, northern Michigan, July and Aug.

OBSERVATIONS: The earlier time of fruiting, together with the presence of a distinct veil distinguishes it from var. *triscopa*. Singer collected a small form with an obtuse pileus (2–4 mm broad) at Douglas Lake, Aug. 7, 1953, N-1076. Also one collection by Singer, N-843, consisting of two carpophores, had pilocystidia. One carpophore showed a veil and the other did not. In a collection from the Pellston Hills the veil was intermediate; the primordia were distinctly veiled and at early maturity fine appressed silky fibrils were all that remained. A number of the collections from Wilderness Park fell into this category. Hence we regard var. *tetrascopa* as a variety in which intermediates connecting it with the type variety are to be expected.

MATERIAL EXAMINED: Singer N-395; N-1324; N-843. Smith 42157-type; 42169; 42170; 42187; 42188; 42189; 42190; 42191; 42267; 42338; 42421; 43172; 43824.

39. *Galerina laticeps* Smith, Mycologia 45: 906. 1953.

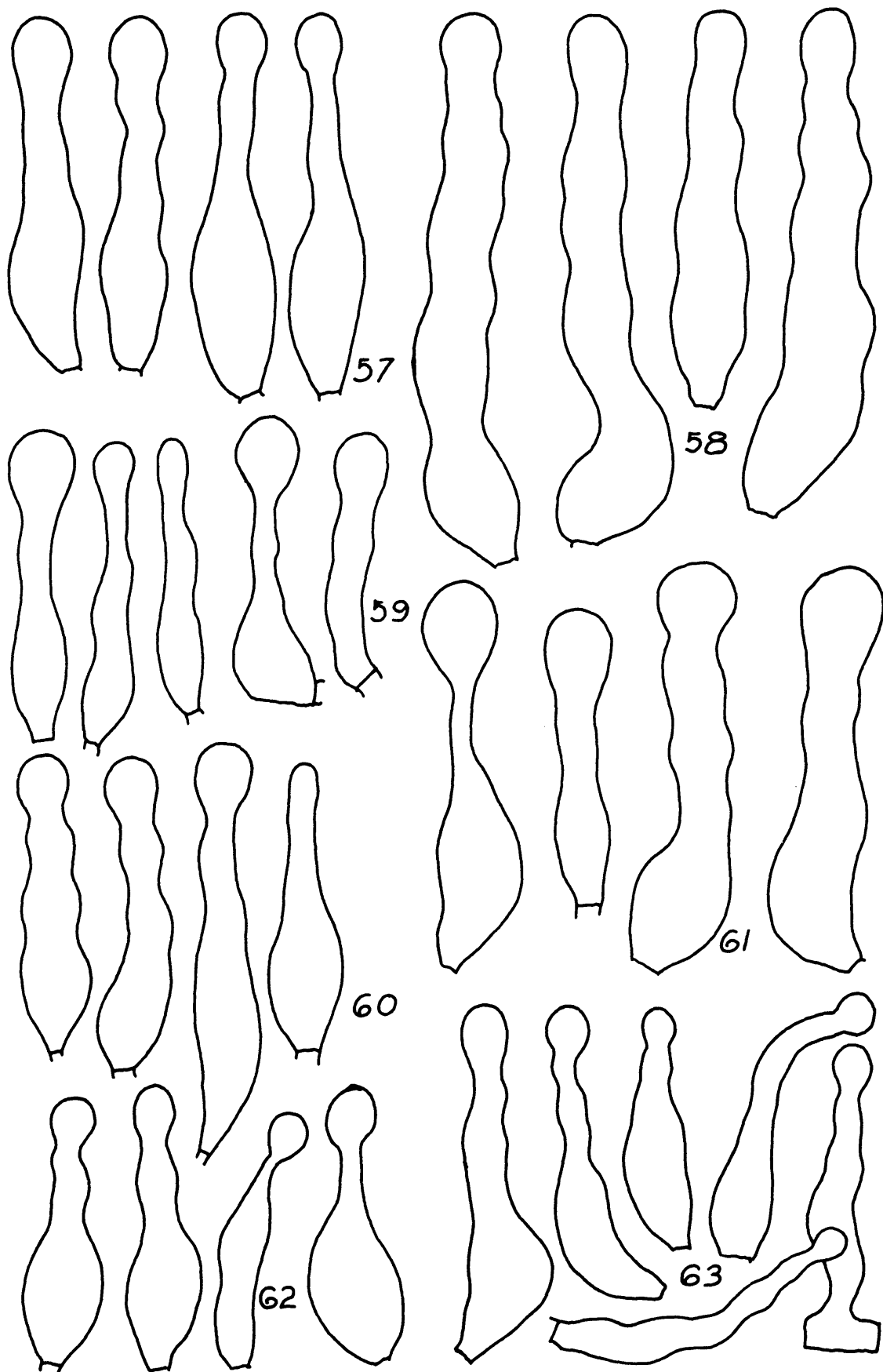
Illustrations: Fig. 59 (cheilocystidia).

Pileus 6–12 mm broad, convex to obtuse-conic at first, broadly convex in age, margin apparently straight at first, surface glabrous moist hygrophanous, with a very faint fringe of fibrils along the margin at first, evenly "Sayal brown" and only faintly striate in age before fading, fading to sordid cinnamon buff or paler; flesh thin, brittle, concolorous with surface, odor none, taste bitter.

Lamellae close to crowded, 1–2 tiers, depressed to rounded adnate, moderately broad, ventricose (1.5–2 mm), thickish, when faded concolorous with pileus, edges whitish.

Stipe 10–25 mm long, 1.5–2 mm thick, equal, hollow, concolorous with or slightly paler than the pileus, not darkening below, at first with a faint fringe of white fibrils from the remains of a thin veil, soon glabrescent, base not conspicuously mycelioid.

Spores 7–8 \times 5–6 μ , ovate to almost angular-ovate in face view, in profile inequilateral, with a smooth plage, endospore thick and tawny to near russet in KOH, outer layer loosely enveloping the endospore except for the plage and very wrinkled to rugulose as well as somewhat deciduous, with a slight apical callus. Basidia 4-spored, hyaline in KOH. Pleurocystidia lacking. Cheilocystidia scattered, 30–46 \times 7–9 μ , thin-walled,



Cystidia: Fig. 57, cheilocystidia of *G. triscopa* var. *tetrascopa*; 58, cheilocystidia of *G. triscopa* var. *triscopa* f. *longiscystis*; 59, cheilocystidia of *G. laticeps*; 60, cheilocystidia of *G. subbadia*; 61, cheilocystidia of *G. mutabilis*; 62, cheilocystidia of *G. pistillicystis*, 63, caulocystidia.

hyaline in KOH, slightly ventricose at base, with a narrow neck and an obtuse to subcapitate or filamentous-subcapitate apex. Gill trama homogeneous, rather dark ochraceous tawny from incrusting pigment. Clamp connections present but most appear to be false clamps with no fusion of the clamp with the main hypha. Pilocystidia similar to cheilocystidia, scattered to rare.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on rotten conifer and hardwood logs, etc., fall, Oregon, Michigan and Massachusetts.

OBSERVATIONS: A Michigan collection from an oak stump (Smith 33-1043) appears to belong here. It has "cinnamon-brown" gills and a very dark stipe. Some pleurocystidia were also seen on apparently undamaged areas of the hymenium. This variant should be collected in greater abundance; if the characters are constant it deserves recognition. Smith 33-1107 has spores as in *G. laticeps* but no veil, distant broadly adnate gills, and grows on burned peat. It probably represents a distinct taxon but lack of sufficient data prevents it from being clearly distinguished from *laticeps* at this time. *G. aimara* is close but is moss-inhabiting, has rather distant gills, is ochraceous in color, and the spore ornamentation is not readily removed.

MATERIAL EXAMINED: Bigelow 8019; 8569; (MICH). Smith 33-1043 (variant); 33-1107; 19865-*type*; 20143; 49434.

40. *Galerina mutabilis* Smith, sp. nov.

Illustrations: Fig. 61 (cheilocystidia).

Pileus 4–7 mm latus, convexus, sordide subvinaceo-cinnamoneus; lamellae latae, confertae, adnatae; stipes 20–30 mm longus, 1.5–2 mm crassus, sursum umbrinus, deorsum pallidus, demum ochroleucus; sporae $6.5\text{--}8 \times 4.5\text{--}6 \mu$; cheilocystidia $35\text{--}50 \times 6\text{--}9 \times 3\text{--}5 \times 4\text{--}9 \mu$. Specimen typicum legit Smith, 30 Nov. 1956 (N. 55153), prope Humboldt County State Park, California (MICH).

Pileus 4–7 mm broad, convex to broadly convex, the margin incurved, surface near "Verona brown" to dingy ochraceous tawny, faintly silky over all at first from thin pallid fibrils, soon glabrous, scarcely striate (none in collection truly mature).

Lamellae broad, close, adnate, pinkish buff becoming ochraceous tawny, edges white crenulate.

Stipe 20–30 mm long, 1.5–2 mm thick, equal, cartilaginous, pallid below, umber at apex, faintly white-silky fibrillose from the veil, in age dingy honey color over all.

Spores $6.5\text{--}8 \times 4.5\text{--}6 \mu$, broadly ovate in face view, somewhat inequilateral in profile, cinnamon to tawny-cinnamon in KOH, surface roughened except over the smooth plage, plage boundary faint but distinct. Basidia 4-spored. Pleurocystidia none. Cheilocystidia abundant, $35\text{--}50 \times 6\text{--}9 \times 3\text{--}5 \times 4\text{--}9 \mu$, hyaline in KOH, thin-walled. Gill trama ochraceous in KOH, regular. Pileus trama compactly interwoven, yellowish in KOH, with many

hyaline refractive particles present between the hyphae. Pellicle rudimentary and not gelatinous; clamps present.

HABIT, HABITAT AND DISTRIBUTION: Scattered on naked bark of living redwood, Humboldt County State Park, California, Nov. 30, 1956, Smith 55153-*type*.

OBSERVATIONS: The broadly ovate spores, the stipe which is darker above at first, the dingy cinnamon pileus, the habitat, and the typical *G. triscopa* cheilocystidia are distinctive.

41. *Galerina subbadia* Smith & Singer, Mycologia 47: 572. 1955.
Illustrations: Fig. 60 (cheilocystidia).

Pileus 5–10 mm broad, plane with a low obtuse umbo, margin incurved, surface glabrous, color “russet” to “cinnamon brown” and translucent striate moist, hygrophorous and fading to “ochraceous buff”; flesh thin, membranous, fragile, odor and taste not distinctive.

Lamellae moderately close and broad, bluntly adnate, ochraceous tawny, edges somewhat crenate.

Stipe about 10 mm long and 0.7 mm thick, curved, equal or base slightly enlarged, very fragile, color of cap or paler; no veil seen.

Spores 7–8(10) × 4–4.5(5) μ , inequilateral in profile, ovate in face view, tawny or darker in KOH, exospore wrinkled causing surface to appear obscurely roughened, suprahilar depression distinctly delimited and smooth, with an apical callus. Basidia 4-spored, hyaline in KOH. Pleurocystidia rare to absent, similar to cheilocystidia if present. Cheilocystidia 28–36(44) × 5–8 μ , some cylindrical-capitate, others fusoid-ventricose with very narrow neck (2–3 μ), all hyaline and thin-walled in KOH or only the basal part pale ochraceous in KOH. Gill trama subparallel, ochraceous tawny in KOH from heavy incrustations of pigment. Pilocystidia similar to cheilocystidia, scattered. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on wood of conifers, rarely on moss covered soil, Oregon, Michigan and Massachusetts, in summer and fall, rare.

OBSERVATIONS: This is one of the convex to obtuse species of the stirps *Triscopa*. The pilocystidia were present and similar in both of Smith's collections, but in 36419 there is a tendency for the spores to be narrower in relation to their length. The majority of the cheilocystidia are capitate to subcapitate. The pleurocystidia noted in the type were probably at injured places in the hymenium and are not of taxonomic importance.

This species differs from *G. laticeps* in its narrower, less ornamented spores and in the presence of pilocystidia, as well as in the darker colored pileus. *G. aimara* has broader spores and is moss-inhabiting. Potter 3167 was gregarious on moss but has the narrow spores and a fair number of very pale spores 11 × 4 μ .

There is a possibility that Smith 36419 and Potter 3167 represent a distinct taxon, but our data are insufficient to settle the question.

MATERIAL EXAMINED: Bigelow 4036; 4372 (MICH). Potter 3167. Smith 7845-*type*; 36419.

42. *Galerina pistillicystis* (Atk.) Smith & Singer, *Sydowia* 11: 449. 1957.

Galerula pistillicystis Atkinson, *Proc. Am. Philos. Soc.* 57: 364. 1918.

Illustrations: Fig. 62 (cheilocystidia), 63 (caulocystidia).

Pileus 4–12 mm broad, obtusely campanulate to convex, margin appressed when young, expanding to broadly convex at maturity, surface glabrous, moist, hygrophanous, bright ochraceous tawny to pale ochraceous tawny and striate moist, paler between the striations, fading to pale yellowish.

Lamellae narrow to broad, ascending adnate to adnate, later sometimes horizontal or nearly so, moderately close, pale yellowish becoming concolorous with the pileus, edges even.

Stipe 15–25 mm long, filiform or up to 1.2 mm, equal, fragile and delicate, pruinose over all from caulocystidia but glabrescent, pale honey yellow to whitish over all, veil none.

Spores $7\text{--}10.8 \times 4.3\text{--}5.5 \mu$ ($12.5 \times 5.3 \mu$), subinequilateral to subelliptic in profile, narrowly obovate to almost oblong in face view, tawny in KOH, surface very minutely tuberculate or exosporium merely faintly marbled, plage smooth, apical callus distinct. Basidia 4-spored or rarely 2- or 3-spored, hyaline in KOH. Pleurocystidia none. Cheilocystidia abundant, $20\text{--}30 \times 4\text{--}7 \mu$, subventricose-capitate, capitellum $4.7\text{--}5 \mu$ thick, thin-walled, hyaline in KOH. Pilocystidia rare to scattered, more or less like the cheilocystidia, $15\text{--}28 \times 3\text{--}3.5 \times 4\text{--}5 \mu$, hyaline or brown. Gill trama hyaline or nearly so revived in KOH, somewhat interwoven. Pileus trama homogeneous, with tawny incrusting pigment on hyphae near the surface. Clamp connections present. Caulocystidia similar and numerous.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on very rotten logs, mostly among moss, New Hampshire, New York, Michigan, Washington; fruiting mostly in June and July.

OBSERVATIONS: In Singer N-1229 pilocystidia were absent, otherwise it was like the others. It was found on wood, Tahquamenon Falls State Park, Mich., Aug. 12, 1953.

The distinguishing characters are the pale honey-colored pruinose stipe, narrow spores and capitate cheilocystidia. It is apparently somewhat similar to the group of species around *G. triscopa*, but in the characters of the cheilocystidia approaches the stirps *Sideroides*. The cheilocystidia are almost identical in shape with those shown for *G. heterocystis*, but that species lacks clamps and typically has much larger spores. Pilocystidia are rare on the type, but fairly numerous in some of the other collections.

Bigelow 4148 has spores $8\text{--}10 \times 4.5\text{--}5 \mu$ as in the type but the cheilocystidia are obtuse to subcapitate.

Bigelow 6555 showed remarkable variations in a number of characters. The following data were taken from it: Stipe (of only entire specimen in collection) 20 mm long (dried), and not drying darker below, pruinose overall from caulocystidia. Spores: "normal", type 1: $9\text{--}10 \times 4.5\text{--}5 \mu$,

inequilateral in profile, about oblong in face view, ochraceous in KOH, pale rusty brown in Melzer's, surface very slightly roughened, no plage nor apical pore visible under oil immersion, no apical callus present, a few broken spores noted in mount; "abnormal", type 2: $18-20.7 \times 4.6-6.9 \mu$, inequilateral in side view, surface appearing smooth, no plage visible; basidia 4-spored, $28 \times 7 \mu$, hyaline in KOH; pleurocystidia present (abundantly scattered on some gill faces at least), but perhaps due to insect damage; cheilocystidia abundant, $20-36 \times 5-9$ (base) $\times 2-3$ (neck) $5-6$ (capitellum) μ , subventricose to ventricose-capitate, thin-walled, hyaline in KOH, capitellum incrustated with a gelatinous or mucilaginous cap, often several cheilocystidia clumped together by these sticky caps; the hyphae near the pileus surface form a yellowish brown layer, the context underneath it is a pale yellow-hyaline mass of tangled hyphae; clamp connections present but very rare; pilocystidia scattered but numerous, more or less like the cheilocystidia but often branched or forked, $26 \times 6 \times 3 \times 6$; caulocystidia abundantly scattered, ventricose-capitate to subcylindric-capitate. On mossy soil, Amherst, Massachusetts, June 12, 1958. In microscopic characters this variant differs in its abnormal spores of large size and lack of an apical callus. The cheilocystidia are slightly longer and broader at the base than in typical specimens and have a capitellum with a mucilaginous cap. Clamp connections are very rare. All of these characters add up to a similarity with *G. heterocystis*, but whether a true relationship exists we are not prepared to say.

MATERIAL EXAMINED: Atkinson 24072-*type* (CUP). Bigelow 4148; 6555 (variant I) (MICH). Hesler 16381 (TENN). Imshaug 49 (MICH). Mains 4174. Singer N-265; N-1229 (F). Smith 16225; 16926; 25553; 28484; 28954; 29195; 29197; 29335; 29844; 36540; 41402.

43. *Galerina pteridicola* Smith, sp. nov.

Illustrations: Fig. 64 (cheilocystidia).

Pileus 6–15 mm latus, campanulatus, pruinosis, pallide fulvus; lamellae latae, confertae. Stipes 20–35 mm longus, circa 1 mm latus, subochraceus, deorsum sparsim fibrillosus; sporae $9-12 \times 4.5-5.5 \mu$, rugulosae; cheilocystidia $34-50 \times 5-8 \times 2-3 \times 4-6 \mu$, capitata. Specimen typicum legit Smith 16209 (MICH). Mt. Shuksan, Washington, 16 Aug. 1941.

Pileus 6–15 mm broad, obtuse, becoming campanulate, surface pruinose at first but soon merely moist and hygrophorous, ochraceous tawny, paler when faded; context soft and fragile, odor and taste not distinctive.

Lamellae moderately close and broad, ascending-adnate, about concolorous with the moist pileus.

Stipe 20–35 mm long, about 1 mm thick, equal or nearly so, more or less concolorous with pileus or slightly darker below, lower part at first thinly fibrillose from a pallid, thin veil, upper part pruinose.

Spores $9-12 \times 4.5-5.5 \mu$, ochraceous tawny in KOH, surface distinctly warty-rugulose, except for smooth plage, obscurely angular-inequi-

lateral to oblong or ovate in face view, no apical differentiation. Basidia 2- and 4-spored. Pleurocystidia none. Cheilocystidia $34-50 \times 5-8 \times 2-3 \times 4-6 \mu$, mostly distinctly capitate at apex, hyaline and thin-walled. Pilocystidia present and mostly similar to cheilocystidia. Clamp connections present on hyphae of epicutis of pileus.

HABIT, HABITAT AND DISTRIBUTION: Scattered on fern petioles of the past season, Mt. Shuksan, Washington (near timber line), 16 Aug. 1941, Smith 16209-*type*.

OBSERVATIONS: The habitat, on fern petioles, is very unusual for a *Galerina*, but this character may not be constant. Bigelow 3643 and Smith 36667 and 39131 possessed a veil and long narrow spores but did not occur on fern petioles. However, they are placed here more logically than in any other species. *G. pistillicystis* appears to be the most closely related species, but *G. pteridicola* differs in the thin veil and more conspicuously roughened angular-ovate spores.

MATERIAL EXAMINED: Bigelow 3643 (MICH). Smith 16209-*type*; 36667; 39131.

44. *Galerina aimara* Singer, sp. nov.

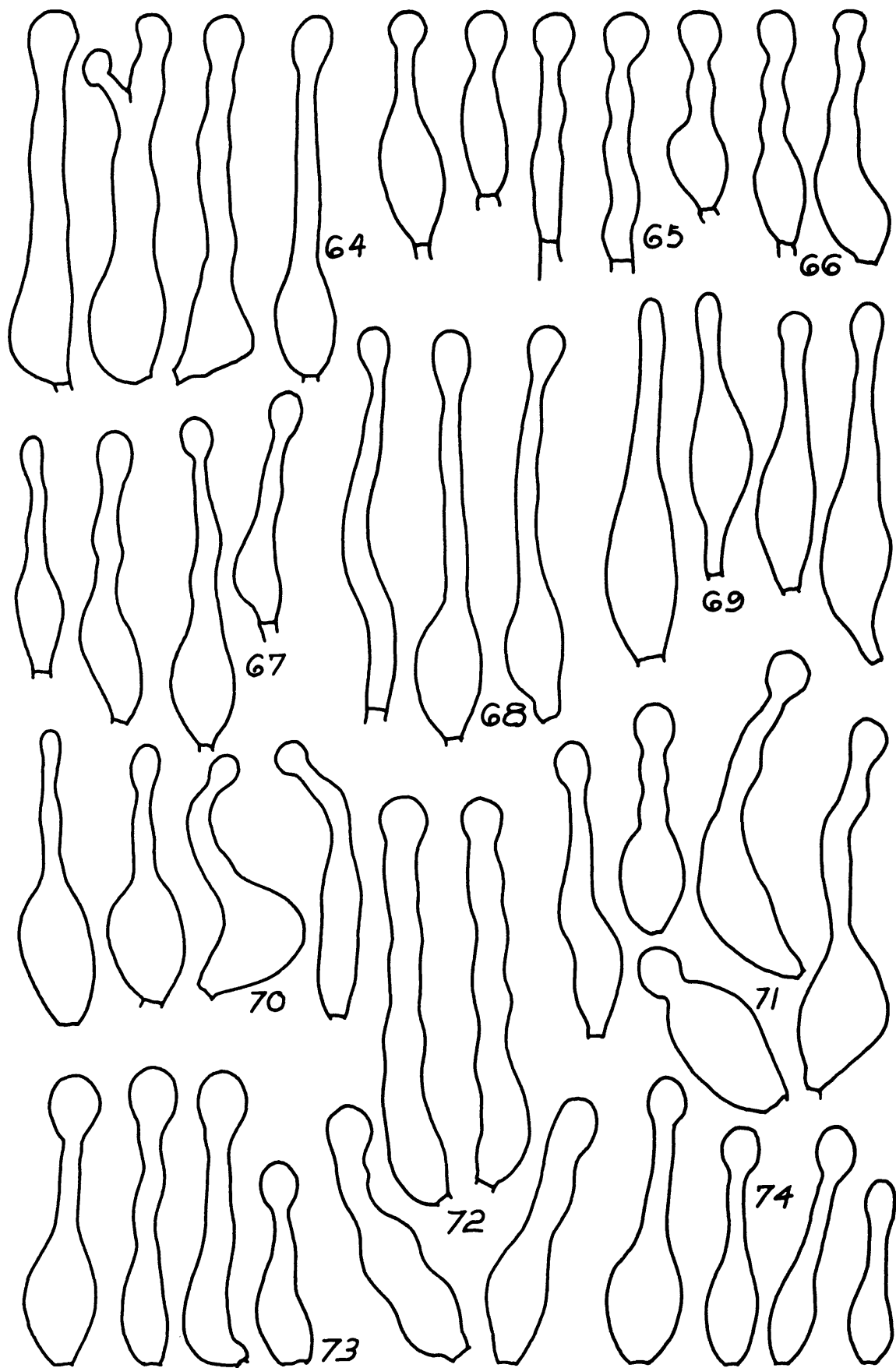
Illustrations: Fig. 65 (cheilocystidia).

Pileo 5–20 mm lato, ferrugineo-brunneo vel siennicolori, glabro, haud viscido, striato vel reticulato, hygrophano, campanulato dein obtuse gibboso. Lamellis siennicoloribus, demum frequenter anastomosantibus, subdistantibus dein distantibus, latis; stipite 25–58 \times 1–3 mm castaneo-ochraceo-brunneo vel pileo subconcolori, apice dilutiore pruinatoque, deorsum subtiliter sericeo e veli vestigiis sed semper appresse inconspicueque velato; odore nullo. Sporis (7)8.3–9.8 \times (5)6.2–6.7 μ , verrucis 0.5 μ altis episporio obscurioribus obsitis, bene affixis, disco levi bene delimitato; basidiis plerumque tetrasporis; cheilocystidiis 24–44 \times 3.5–8.8 μ capitatis vel subcapitatis, infra capitulum usque ad 1–3 μ constrictis; pleurocystidiis nullis; pellicula epicuticulari nulla; fibulis praesentibus.

Pileus 5–20 mm in diam., conic to obtusely conic or campanulate gibbous, with a membranous often slightly projecting margin, glabrous, at times subreticulate (if lamellae are anastomosing), hygrophanous, when moist dull tawny with long translucent striae, the striae and center between *rust sorolla* and *alamo*, between striae *raw sienna*, fading to dull ochraceous and estriate; context subconcolorous, odor none.

Lamellae ochraceous, subdistant to distant, broad, ventricose, ascendant, adnate and often with a decurrent tooth, thin, subascendant to ascendant and ventricose toward cap margin, subarcuate, in older specimens often tending to form distant and curved anastomosing veins.

Stipe 25–37 mm long, 1–3 mm thick, chestnut, ocher-brown or concolorous with the pileus, the ground color often red-brown between *Mohawk* and *Java*, paler at apex, with very fine appressed silky fibrils which cause the surface to appear paler; apex pruinose over the upper fourth; veil



Cystidia: Fig. 64, cheilocystidia of *G. pteridicola*; 65, cheilocystidia of *G. amira*; 66, cheilocystidia of *G. yungicola*; 67, cheilocystidia of *G. pseudocamerina* var. *pseudocamerina*; 68, cheilocystidia of *G. pseudocamerina* var. *fulvo-velosa*; 69, cheilocystidia of *G. occidentalis*; 70, cheilocystidia of *G. larigna*; 71, cheilocystidia of *G. pallidispora*; 72, cheilocystidia of *G. perangusta*; 73, cheilocystidia of *G. borealis*; 74, cheilocystidia of *G. pseudostylifera*.

even in the youngest stages always delicate, appressed and inconspicuous, fugacious, never heavy or annuliform or even producing belts.

Spore deposit between dull rusty ochraceous brown *13K 10* and *raw sienna*. Spores (7) $8.3\text{--}9.8 \times (5) 6.2\text{--}6.7 \mu$, verrucose from exosporial ornamentation, suprahilar plage smooth and distinctly delimited. Basidia (19) $24\text{--}26.7 \times 6.3\text{--}7 \mu$, (2-) 4-spored. Pleurocystidia none. Cheilocystidia $24\text{--}44 \times 3.5\text{--}8.8 \mu$, broadest near base, neck $1\text{--}3 \mu$ in diam., apex capitate to subcapitate rarely subacute, capitellum $2\text{--}5.3 \mu$ in diam. Occasional bunches of pilocystidia on younger caps especially near margin, ($28 \times 7.7 \mu$ and with a capitellum $\pm 5 \mu$ or capitellum lacking). Epicutis of pileus thin ($\pm 10 \mu$) of hyaline or slightly brownish incrustated, thin, filamentose hyphae; hypodermium of hyphae more or less heavily incrustated with brown pigment. Clamp connections regularly present.

HABIT, HABITAT AND DISTRIBUTION: In open moss-covered Cejas vegetation among *Polytrichaceae* which may be mixed with *Hypnum*-like mosses, Jan. (summer), 3000 m alt., Cotapata, Prov. Nor-Yungas, Depto. La Paz, Bolivia, Singer B-502-*type*.

OBSERVATIONS: This species keys out next to *G. triscopa* but is distinct by its habitat on moss, its broader spores and possibly in the almost cinnamon-brown color of the dried specimens. The broader more heavily ornamented spores and presence of a veil separate it from *G. pistillicystis*.

MATERIAL EXAMINED: Singer B-502-*type*; B652; B653 (MICH).

45. *Galerina yungicola* Singer, sp. nov.

Illustrations: Fig. 66 (cheilocystidia).

Pileo 6–9 mm lato, convexo, ochraceo-brunneo, estrio; lamellis ochraceo-brunneis, rotundato-adnexis, subangustis; stipite 10–15 mm longo, 1–1.5 mm crasso, sordide ochraceo aequali, apice pruinato, innate pallide sericeo ad basin; sporis $8.2\text{--}9.6 \times 4.8\text{--}6 \mu$, bene pigmentatis, disco levi bene evoluto praeditis amygdaliformibus, fortiter verrucosis; basidiis tetrasporis; cheilocystidiis $25\text{--}28 \times 8\text{--}9 \mu$, subtus ventricosis, apice angustis vel fortiter constrictis usque ad $2.5\text{--}2.8 \mu$, subcapitatis (capitulo $\pm 4 \mu$ in diam.) tramate lamellarum hyalino, haud gelatinoso, pilei haud gelatinoso, tramate pilei haud gelatinoso, hyalino; hyphis hypodermii admodum pigmento incrustatis, epicute paulum dicerente; hyphis fibulatis. Typus (Singer B932e, Bolivia) in Herb. Mich. conservatus est.

Pileus 6–9 mm broad, convex, smooth, not striate, glabrous, dingy ochraceous tawny (*gold pheasant*), appearing fatty-shiny moist but apparently not in the least gelatinized.

Lamellae almost concolorous with pileus (*Peruvian brown*), close, rounded-adnexed, rather narrow.

Stipe 10–15 mm long, 1–1.5 mm thick, equal, pruinose above, innately pallid silky lower down but no veil present, not viscid, concolorous with pileus or slightly paler (in dried condition), fresh between *desert* and *topaz*.

Spores $8-10 \times 5-6 \mu$, inequilateral in profile, ovate in face view, nearly russet in KOH, dull red-brown in Melzer's sol., coarsely verrucose, with a distinctly delimited smooth plage. Basidia $22-29 \times 6.8-8 \mu$, clavate or at times narrowed in midportion, hyaline or sometimes stramineous (revived in KOH), 4-spored. Basidioles clavate, about $14 \times 8 \mu$. Pleurocystidia rare to scattered, similar to cheilocystidia. Cheilocystidia $25-28 \times 8-9 \mu$, ventricose below and with or without a short pedicel, above the ventricose part narrowed to a short or long neck ending in a subcapitate to capitate apex, the neck $2.5-4 \mu$ thick, hyaline to yellowish in KOH. Pilocystidia none. Gill trama regular, hyaline, not gelatinized; pileus trama proper interwoven, hyaline or nearly so and not gelatinized; hypodermium of subparallel repent hyphae which are strongly incrustated with brown pigment. Epicutis little differentiated from the hypodermium except for slightly narrower hyphae with less incrustating pigment, not gelatinized and not hyaline. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on slightly burned woody humus around a very old stump at margin of a forest, summer, R. Singer B 932-*type*; Coroico, 1700 alt., Prov. Nor-Yungas, Depto. La Paz, Feb. 5, 1956 (MICH).

OBSERVATIONS: This species appears to be related to *G. pistillicystis* but apparently lacks pilocystidia and, curiously for a *Galerina*, has a cap non-striate when moist. The stipe is pruinose only at the apical region. The spores and colors of the carpophore are apparently quite similar to those of *G. carbonicola* but the cheilocystidia are different.

Stirps Sideroides

Spores smooth to faintly marbled or punctate as seen under an oil immersion lens; pleurocystidia absent (or present only on damaged areas of gill surface); cheilocystidia mostly tibiiform, i.e., with an inflated basal portion, a long narrow neck ($1-3 \mu$ thick), and a terminal head or enlargement ($2-5 \mu$ thick); pileus margin often incurved at first.

In a few species the cheilocystidia may have narrow necks ($2-3 \mu$) and taper to the apex or the apex may be obtuse to slightly enlarged; these, however, are not typical of the stirps but instead intergrade with the type found in subsection *Mycenopsidae*.

Key to Species

- | | |
|---|------------------------------|
| 1. Spores $9-12 \mu$ or more long | 2 |
| 1. Spores $5-8(10) \mu$ long | 14 |
| 2. Veil copious, leaving an annulus or fibrillose annular zone on stipe | 3 |
| 2. Veil thin and remaining as scattered patches of fibrils, or absent | 8 |
| 3. Cheilocystidia $58-70 \times 9-10 \times 3-4 \mu$ | see <i>G. unicolor</i> (149) |

3. Cheilocystidia smaller ----- 4
 4. Pileus dark rusty cinnamon young; taste very disagreeable
 ----- 46. *G. occidentalis*
 4. Not with above combination of characters ----- 5
 5. Heads of cheilocystidia 3–8 μ ; growing on heather twigs (see *G. tatoo-*
shiensis (111) also) ----- 47. *G. cinctula*
 5. Cheilocystidia if capitate, with heads mostly under 4 μ in diameter -- 6
 6. Spores 10–14 \times 6–8 μ ; taste mild (see key to varieties)
 ----- 48. *G. pseudocamerina*
 6. Spores 9–12 \times 5–6.5 μ ; taste typically
 at least slightly farinaceous ----- 7
 7. Ventricose part of cheilocystidium typically greatly inflated (8–14 μ),
 apex only occasionally capitate ----- 49. *G. ampullaceocystis*
 7. Ventricose part of cheilocystidium 3–10 μ in diameter, many subcapitate
 at apex ----- 50. *G. larigna*
 8. Pileus viscid ----- see *G. cuspidata* (57), 2-spored forms
 8. Pileus not viscid ----- 9
 9. Cheilocystidia small (22–35 μ long) ----- 10
 9. Cheilocystidia longer than above ----- 11
 10. Thin veil present when young; pileus pale ochraceous tawny
 ----- 55. *G. borealis*
 10. Veil absent; pileus russet when young ----- 51. *G. pallidispora*
 11. Pileus margin bright yellow, disc bay brown (fresh); growing on naked
 (often burned) peat ----- 52. *G. luteofulva*
 11. Not with above combination of characters ----- 12
 12. Lamellae staining ochraceous-tawny when bruised; odor and taste
 farinaceous; on trunks of redwood in California -- 53. *G. perangusta*
 12. Lamellae not staining ----- 13
 13. Spores finely punctate-verrucose; pileus ochraceous-brown (see *G.*
camarinooides also) ----- 54. *G. dominici*
 13. Spores smooth except for faint plage line in some; pileus cinnamon
 brown when young ----- see *G. allospora* (97)
 14. Spores 8–9 \times 4.5–5 μ ; pileus conic to cuspidate --- 57. *G. cuspidata*
 14. Spores 5–8 \times 3–4.5 μ or if slightly larger
 the pileus not cuspidate ----- 15
 15. Pileus with a distinct gelatinous pellicle ----- 16
 15. Pileus epicutis not gelatinous ----- 23
 16. Spores slightly compressed (5.5–7 \times 4–4.5 \times 4.5–5 μ); stipe hollow
 and fragile ----- 56. *G. pseudostylifera*
 16. Spores terete in section; stipe more cartilaginous-pliant ----- 17
 17. Pileus clay color, fading to whitish, usually with a papillate umbo
 ----- 58. *G. mammillata*
 17. Pileus when fresh darker than above and not whitish when faded -- 18
 18. Veil absent; stipe glistening ----- 59. *G. sideroides*
 18. Veil present as indicated by fibrils on stipe ----- 19
 19. Pileus dark vinaceous brown (“Rood’s brown”) moist; on wood of con-
 ifers ----- 60. *G. vinaceobrunnea*

19. Pileus color in bay to cinnamon to yellow-brown series 20
 20. Pileus bay-brown fresh, on conifer debris
 ----- 61c. *G. stylifera* var. *badia*
 20. Pileus cinnamon brown to tawny or paler when young 21
 21. Veil copious and stipe with a well-formed annular zone; pileus dingy
 yellow-brown 61b. *G. stylifera* var. *velosa*
 21. Veil thinner and pileus darker brown 22
 22. Cespitose on rotting hardwood logs and stumps
 ----- 61a. *G. stylifera* var. *caespitosa*
 22. Solitary to gregarious on conifer debris
 ----- 61. *G. stylifera* var. *stylifera*
 23. Spores 8–10 × 4.5–5 μ; pileus blackish brown at first; on earth under
 alder 62. *G. fuscobrunnea*
 23. Spores smaller; pileus paler; on wood or needles 24
 24. Cheilocystidia mostly subacute, rarely capitate 65. *G. agloea*
 24. Cheilocystidia mostly capitate 25
 25. Pileus rusty brown to tawny and remaining dark when faded; stipe red-
 brown over all in age 63. *G. castanescens*
 25. Pileus in ochraceous tawny series; stipe bister to only slightly reddish
 brown in age 64. *G. pseudo-badipes*

46. *Galerina occidentalis* Smith, Mycologia 45: 907. 1953.

Illustrations: Fig. 69 (cheilocystidia).

Pileus 10–18 mm broad, obtuse to convex, expanding to plane or with a slight umbo, surface glabrous, moist, hygrophanous, striate before fading, dark rusty cinnamon to near tawny moist and slowly changing to tan, finally fading to dingy cinnamon; flesh thin, concolorous with surface, taste disagreeable-rancid.

Lamellae horizontal, close, adnate, narrow to moderately broad, cinnamon, edges even to slightly fimbriate.

Stipe 20–30 mm long, up to 2.5 mm thick at apex, equal or enlarged downward, concolorous with or slightly paler than pileus, darkening below in drying, annulate above with a zone of fibrils, apex pruinose, lower portion sheathed with a thin white-fibrillose coating, annulus at times evanescent.

Spores (8.5)9–12 × 5.5–6.3 μ, ovate in face view, slightly inequilateral in profile, smooth or very indistinctly roughened, the depression smooth but the boundary faint, tawny in KOH. Basidia 2-spored. Pleurocystidia none. Cheilocystidia 26–34 × 6–10 μ, neck ± 2 μ, apex often capitate, capitellum 3–4 μ diam. and with an apical thickening. Gill trama parallel, cells enlarged and dark cinnamon in KOH. Pileus trama homogeneous and dark cinnamon in KOH; epicutis, a paler nongelatinous layer of hyphae 4–6 μ in diam. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On humus, Carbon River Entrance, Mt. Rainier National Park, Oct. 2, 1952, Smith 40441-*type*. An earlier collection, Smith 30035, was made in the Park, Aug. 9, 1948 on wood in the Lower Tahoma Creek area.

OBSERVATIONS: *G. occidentalis* is closely related to *G. tahquamenonensis* but can be distinguished in the field by its very disagreeable taste and close narrow lamellae. The variation in the habitat from lignicolous to terrestrial in *G. occidentalis* is not likely to mean much because of the great amount of lignicolous material in the soil in the Carbon River area. The dark color of the pileus and gill trama of *G. occidentalis*, as well as their structure, are typical of *Psilocybe*, but the spores preclude assignment to that genus. The primitive structure of the epicutis of the pileus prevents *G. occidentalis* from being placed in *Alnicola*—where the spore characters of color and markings would be likewise aberrant. The cheilocystidia, however, are reminiscent of that genus. Under the best oil immersion lens available it was clear that the pattern of markings on the spores was typical of *Galerina*, and since this correlated with the general aspect of the fruiting bodies, the species is placed in *Galerina* and in this stirps because of the very faintly ornamented spores. *G. ampullaceocystis* should differ in having cheilocystidia with the basal part more vesiculose (apparently measuring up to 20 μ in diam. in some), in having fewer with capitate apices, and in the merely farinaceous taste. We have not studied material of *G. ampullaceocystis*.

MATERIAL EXAMINED: Smith 30035; 40441-*type*.

47. *Galerina cinctula* Orton, Trans. Brit. Myc. Soc. 43: 239. 1960.

Pileus 5–15 mm, conico-convex, soon expanded, often obtusely or broadly umbonate, tawny-honey or honey-yellow, drying pale yellowish from center, sometimes remaining deeper yellow at center, striate to center when moist, sometimes with remnants of veil at margin; flesh concolorous, yellowish in center of stem; odor and taste farinaceous.

Gills adnate, often ventricose, pale yellow then yellow ochraceous or yellowish rusty, finally rusty-ocher, subdistant or subcrowded, [L 12–24 1 (0)1–3(7)], edge whitish flocculose.

Stem 8–25 \times 0.5–1.25 mm, equal or slightly thickened at base or bulbillose, pale yellowish above, darker honey, tawny-honey or pale date-brown below, apex pruinose, lower $\frac{1}{2}$ to $\frac{3}{4}$ entirely covered with copious white-silky veil often forming a broad band but without a distant ring, stuffed.

Spores amygdaliform, 10–13 \times 5–6 μ , minutely punctate (sub-immers). Basidia 2-spored, 24–30 \times 7–8 μ . Cheilocystidia capitate-lageniform or skittle-shaped, neck sometimes flexuose, venter often irregularly shaped, 30–50 \times 5–11(14) μ , capitellum 3–8 μ diam. Caulocystidia at stem apex similar. Pleurocystidia none. Hyphae of cap cuticle filamentous, hyaline, branched, sometimes clamped, 6–14 μ diam., hyphae of veil 4–8 μ diam.

HABIT, HABITAT AND DISTRIBUTION: On heather twig, Glen Einich, 29 Aug. 1955; on soil, Surlingham Wood, Surlingham, 20 Oct. 1956; on very rotten stump, Mousewood Farm Wood, Honingham, 10 July 1958. Great Britain.

OBSERVATIONS: Distinguished by copious white veil, 2-spored basidia,

capitate-lageniform cystidia and small size. Orton has also found what he believes to be this species in moss in the open. We have not examined specimens microscopically. The pale color of the pileus should separate it at once from *G. occidentalis*.

G. pseudocamerina

Key to Varieties

1. Veil buff to tawny, leaving a distinct superior zone of fibrils
----- 48b. *G. pseudocamerina* var. *fulvo-velosa*
1. Veil pallid to white ----- 2
2. Veil copious as in *G. paludosa* -- 48a. *G. pseudocamerina* var. *pargoloviana*
2. Veil merely leaving one or two zones low down on the stipe
----- 48. *G. pseudocamerina* var. *pseudocamerina*

48. *Galerina pseudocamerina* Singer, Lilloa 22: 572. 1949 (1951).
var. *pseudocamerina*

Galerina josserandii Kühner, Bull. Soc. Nat. Oyonnax 10-11 suppl. (Mém. hors série, 2) p. 4. 1957.

Illustrations: Fig. 67 (cheilocystidia).

Pileus 5-9 mm latus, udus, striatus, fulvus hygrophanus, deinde stramineus; sapor mitis; lamellae confertae, subfulvae, latae, adnatae; stipes 20-27 mm longus, 1-1.5 mm crassus, pallide stramineus, sursum albo-fibrillosus, subannulatus; sporae 11-14.8 × 5.7-7 μ; cheilocystidia 27-45 × 6-9 × 1-1.5 × 2.2-3 μ. Specimen typicum in Herb. Chicago Mus. Nat. Hist.; legit Singer N-250.

Pileus 5-9 mm broad, often nearly as high, translucent striate over one-half to two-thirds of the radius, hygrophanous, fading to stramineous, tawny when moist, campanulate, more rarely convex, papillate but obtuse; odor and taste not distinctive.

Lamellae moderately close, ocher brownish, rather broad, adnate.

Stipe 20-27 mm long, 1-1.5 mm thick, equal or with slightly thickened base, pale stramineous buff, not darkening or staining brown from the base upward, with appressed white fibrils from the veil all over the lower portion and up to a belt-like sericeous zone or two such zones, the very apex pruinose; flesh concolorous with the surface.

Spores 11-14.8 × 5.7-7 μ, very finely marbled, with plage. Basidia 2-spored. Pleourcystidia none. Cheilocystidia 27-45 × 6-9 μ, subcapitate to capitate apex, neck 1-1.5 μ thick, capitellum 2.2-2.7 μ diam. Pilocystidia lacking. Caulocystidia present over apex of stipe. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On rotten trunk (conifer) directly on the wood, or gregarious among small mosses, Tahquamenon Falls State Park, Luce Co., Michigan, June 10, 1953.

OBSERVATIONS: This variant is nearest to Kühner's (1935) concept of

G. camerina (non *A. camerinus* Fr.). The Pargolovo collection has the most copious veil, and the Hoh River collections the most highly colored veil. Since the characters involved here are those we have found to be most distinctive for variants in other species complexes, we are assigning varietal rank to the populations exhibiting them as outlined in our key.

MATERIAL EXAMINED: Singer N-250-*type* (CF). Smith 41388.

48a. *Galerina pseudocamerina* var. *pargoloviana* Singer, var. nov.

Pileo 10–20 mm lato, sordide fulvo; stipite fibrilloso-annulato; velo albido. Specimen typicum legit Singer prope Pargolovo, U.S.S.R., 1937 (LE).

Pileus 10–20 mm broad, conic and umbonate, then becoming flattened, yellowish brown ochraceous to reddish brown, rarely almost umber brown, at the margin very weakly striatulate when mature, strongly hygrophanous, pallescent and smooth when dry, sometimes opimous when dry, but usually not; flesh very thin, concolorous, inodorous.

Lamellae cream colored, yellowish, light yellowish brown, broad at the stipe (2–3 mm), narrowly attenuate toward the margin, adnate to emarginate and then in lines decurrent, moderately close.

Stipe 27–36 mm long, 1.5–3.5 mm thick, pale brownish, very often with rusty base, underneath the annulus with several indistinct fibrillose pallid belts (as in *G. paludosa*), above it extremely finely pruinose mealy-fibrillose, tubular, cylindrical, often with a small bulb; annulus almost always distinct and rather persistent, belt-like, sometimes distant, white or whitish yellow.

Spores 10–14 × 5.5–8 μ, pale yellow to melleous (NH₄OH), ellipsoid to slightly amygdaliform, with callus, weakly roughened (marbled) from exosporial ornamentation, with smooth plage. Basidia 2-spored, 25–28 × 8 μ. Pleurocystidia none. Cheilocystidia subampullaceous with a distinct capitellum at the tip, 28–36 × 5–6 μ diam. (at capitellum), neck 1.5–2.5 μ diam.; hyphae of the surface of pileus repent, pigment-incrusted. Pilocystidia none seen. All hyphae with clamp connections.

HABIT, HABITAT AND DISTRIBUTION: This form has not been noted previously in Europe (where all other descriptions refer to the typical form with non-annular veil). The present collection was made on conifer needles among hepatics and also on the ground, along a ditch in a *Picetum oxalidosum*, June 10–14, 1937, Pargolovo, Leningrad region, (LE).

MATERIAL EXAMINED: J. Favre, Tschuggen, Switzerland, 6-27-46 (MICH). Singer, Leningrad, Russia, 1937 (type LE) (syntype MICH).

48b. *Galerina pseudocamerina* var. *fulvo-velosa* Smith, var. nov.
Illustrations: Fig. 68 (cheilocystidia).

Pileus 10–20 mm latus, fulvus vel luteo-brunneus; stipes fibrilloso-annulatus; velum palide fulvum. Specimen typicum in Herb. Univ. Mich.

conservatum; legit prope "Jackson Guard Station", Hoh River, Olympic Mt. Nat'l. Park, May 7, 1939, Smith 13194.

Pileus 10–20 mm broad, obtuse becoming expanded umbonate, umbo usually conic, often remaining campanulate, glabrous, moist, hygrophorous, "ochraceous tawny" on disc and over striae, "buckthorn brown" over remainder, striate to disc, fading to "clay color", margin at first with scattered fibrils from the scanty veil; flesh thin, fragile, moist, concolorous with surface, odor and taste none.

Lamellae "clay color" becoming "ochraceous tawny", adnate, broad (± 2 mm), close (± 20 reach the stipe) to subdistant, edges even and whitish.

Stipe 20–30 mm long \times 1.5 mm thick, fragile, hollow, "ochraceous tawny" faintly fibrillose below and with a distinct superior zone of fibrils arising from the buff to tawny veil remnants, apex appressed fibrollose.

Spores 10–13(15) \times 6–7(8) μ , obscurely inequilateral in profile, ovate in face view, ochraceous tawny revived in KOH, appearing smooth but outer layer very slightly wrinkled, plage faintly delimited, apical callus present. Basidia 2- and 4-spored. Pleurocystidia rare or none. Cheilocystidia abundant (gill edge sterile), 32–46(60) \times 6–9 μ , ventricose at base, narrowed upward to a very narrow flexuous neck and minute subglobose head, thin-walled or wall of capitellum slightly thickened, hyaline in KOH. Gill trama ochraceous tawny in KOH but the cuticular layer consisting of hyaline non-gelatinous hyphae 4–6 μ diam. and bearing clamp connections.

HABIT, HABITAT AND DISTRIBUTION: Scattered on old logs in advanced decay, and on humus, Hoh River, Olympic National Park, Washington, May 7–9, 1939.

OBSERVATIONS: The tawny veil is a variation parallel to that found in *G. pruinatipes*.

MATERIAL EXAMINED: Smith 13194-*type*; 13249.

49. *Galerina ampullaceocystis* Orton, Trans. Brit. Myc. Soc. 43: 236. 1960.

Pileus 9–14 mm, convex or conico-convex then expanded, either papillate or obtusely umbonate, tawny honey with paler ochraceous or slightly yellowish margin and darker sometimes van dyke center, drying pale ochraceous or ochraceous honey from center, center sometimes remaining darker, striate when moist, matt or with slight silky sheen when dry, margin sometimes fringed with remnants of veil when young and fresh.

Lamellae adnate or adnato-decurrent, pale creamy ochre or ochraceous honey then pale to deeper rusty honey, subcrowded, L 16–20 1 3, edge minutely white flocculose under lens when fresh; flesh concolorous, smell and taste mealy.

Stipe 18–40 \times 1–2 mm, equal or slightly swollen at base, pale ochraceous or ochraceous-honey above, darker rusty honey or pale amber below, apex minutely white pruinose, white or whitish veil forming ring-zone or narrow membranaceous ring and scattered patches below this.

Spores ellipsoid amygdaliform, 9–11.5 \times 5–6 μ smooth (sub immers).

Basidia 2-spored, $24-30 \times 7-9 \mu$. Cheilocystidia vesiculose below with shorter or longer narrow neck (ampul-like), only occasionally capitate at apex, $(20)24-35 \times 8-14 \mu$, neck $8-16(20) \times 1-2 \mu$, apex $1-2(3) \mu$. Pleurocystidia none; hyphae of cap cuticle filamentous, some incrustated-pigmented, occasionally branched, cells often \pm cylindric often with small clamp, $4-14 \mu$ diam. Hyphae of veil, hyaline, clamped, $3-6 \mu$ diam.

HABIT, HABITAT AND DISTRIBUTION: On very rotten wood (probably coniferous); Tomich, Inverness-shire, 15 July 1958 (K).

OBSERVATIONS: Orton at first thought this might be *G. pseudocamerina* but because of the well-marked veil, smaller spores and rather differently shaped cystidia, preferred to describe it as a new species. It differs from other veiled species of *Galerina* in its bright colors, spore and cystidial characters, and possibly habitat. The shape of the cystidia is particularly striking. The type was not studied microscopically by us; our description is taken from Orton, op. cit.

50. *Galerina larigna* Singer, Akad. Nauk USSR. Bot. Inst. Not. Syst. e Sect. Crypt. 5(7-9): 93. 1941.

Illustrations: Fig. 70 (cheilocystidia).

Pileus 3-7 mm broad (in Asia some collections up to 18 mm), conic, expanding to campanulate or convex, glabrous, moist, hygrophorous, "tawny olive", fading to dingy tan, concolorous or light ochraceous in marginal portion, canescent when faded, striatulate on the margin when moist but smooth when dry; flesh thin, fragile, yellowish brown, odor and taste none or weakly farinaceous.

Lamellae adnexed to adnate or adnate-subdecurrent, moderately close to distant (16-25 reach the stipe), moderately broad to broad (1.5 mm), "cinnamon buff" when young, "tawny olive" when mature, with denticulate edges.

Stipe 10-20(30) mm long, $\pm 1(3)$ mm thick, equal or unequal, tubular, dry, paler than pileus, often whitish at the apex but becoming somewhat sordid ochraceous to fuscous below; veil forming an apical to rarely median band-like annulus which is rather persistent.

Spores $9-11(12) \times 5-6.5 \mu$, in profile obscurely inequilateral, narrowly ovate in face view, perfectly smooth to very slightly rugulose and with a faint ragged line marking the suprahilar depression, pale ochraceous in KOH, with an apical callus or minute pore. Basidia $32-33 \times 9-9.3 \mu$, 2-, 3-spored. Pleurocystidia none. Cheilocystidia $26-30 \times 3-10 \mu$, fusoid-ventricose and tapered to a pointed to subcapitate apex, but often some without a basal inflated portion, wall tending to be slightly thickened and refractive at the apex. Gill trama regular, with subparallel, later interwoven hyphae, ochraceous in KOH. Pileus with an epicutis of thin hyaline hyphae decumbent on cap but with elongate-fusoid to cylindric end-cells, ochraceous from incrusting pigment in the hypodermium. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On needles and humus under larch (*Larix sibirica*) and spruce (species of *Picea*). It fruits in midsummer (July),

and is known from Siberia (Altai Mts.) and Tennessee (Great Smoky Mts. National Park).

OBSERVATIONS: The rather persistent band-like annulus, faintly ornamented spores, and narrow cheilocystidia are distinctive. The widely separated collections indicate that this is probably a rare but circumpolar species. A form was collected in the Altai Mts., Singer A-341 (LE), which had 2- and 3-spored basidia but was mostly 4-spored. We have not examined material of *G. ampullaceocystis*, but from the description it appears to be exceedingly close to *G. larigna*. In this case it is doubtful if the difference in habitat is distinctive. We have keyed *G. ampullaceocystis* out on the width of the ventricose part of the cheilocystidium, which is the only distinguishing character we can find which might be significant. *G. camerinoides* is a very closely related species but in it the stipe does not darken and no veil is present. The cheilocystidia appear to be variable in *G. larigna* to the extent that they are mostly capitate in the Tennessee collection, and mostly subacute in the type as described. In view of the few collections known, however, we hesitate to erect an additional variety or species for the Tennessee collection.

MATERIAL EXAMINED: Hesler 17642 (TENN). Singer A-329-*type* (LE).

51. *Gallerina pallidispora* Smith, Mycologia 45: 911. 1953.

Illustrations: Fig. 71 (cheilocystidia).

Pileus 10–25 mm broad, obtusely conic expanding to campanulate, surface glabrous, moist, hygrophalous, “russet” at first but becoming “ochraceous tawny” before fading, “warm buff” (pale yellow) faded, when dried dingy buff.

Lamellae bluntly adnate, close, moderately broad, ochraceous tawny, edges even.

Stipe 30–40 mm long, 2–3 mm thick, equal or slightly enlarged downward, concolorous with pileus and fading like it, not darkening in age or on drying, pruinose above, glabrous below except for mycelium around the base.

Spores 9–13 × 5–6.5 μ, subinequilateral to nearly oblong in profile, narrowly ovate to suboblong in face view, pale ochraceous in KOH, surface smooth to minutely punctate (plage very faintly delimited), apical callus minute. Basidia 2-spored, rarely 1-spored basidia seen, 24–28 × 6–7.5 μ, hyaline. Pleurocystidia, none seen. Cheilocystidia often curved and with ventricose portion one-sided, 24–32 × 6–9 × 1.5–2 μ × 2.5–3 μ, thin-walled, hyaline. Gill trama parallel or nearly so, tawny to yellow in KOH; subhymenium not distinctive. Pileus trama homogeneous, clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered on alder logs, Graves Creek, Olympic National Park, Washington, May 23, 1939.

OBSERVATIONS: The pale spores, lack of pleurocystidia, small cheilocystidia many with capitate apex, russet pileus and unicolorous stipe distinguish the species. The aspect of the carpophore is that of *G. sideroides*, but

the very slightly roughened spores are aberrant in this stirps, yet we feel certain it will be sought for here. The habitat on hardwood logs distinguishes *G. pallidispora* from sphagnicolous species with similar cheilocystidia.

MATERIAL EXAMINED: Smith 13694-*type*; 14232.

52. *Galerina luteofulva* Orton, Trans. Brit. Myc. Soc. 43: 240. 1960.

Pileus 5–15(17) mm, conico-convex then expanded, papillate or with small obtuse umbo, rarely almost plane, tawny-honey with darker bay-brown or vandyke disk and yellower margin, margin bright yellow at first, drying pale ochraceous or yellowish, striate to umbo when moist, margin with remnants of white veil when young; context concolorous, odor none.

Lamellae adnate or adnato-decurrent, \pm ventricose, pale to deep yellow then pale or yellowish buff, finally tinged rusty, subdistant, L 10–16 1/3(7), edge paler flocculose, often conspicuously so.

Stipe 12–30 \times 1–1.5 mm, \pm equal, often flexuose or incurved, pale yellowish or pale honey or cap color, apex yellowish pruinose, white veil forming fugacious scattered patches on lower region at first, slightly hollow.

Spores ellipsoid-amygdaliform, 9–12.5 \times 5.5–6.5 μ , punctate to almost smooth. Basidia 4-spored; marginal cystidia \pm lageniform with long, sometimes flexuose neck and apex, sometimes capitate, 40–70 \times 6–10(12) μ , apex 3–7 μ . Caulocystidia similar or perhaps less commonly capitate. Pleurocystidia none. Hyphae of cap cuticle filamentous, incrustated-pigmented, 4–8 μ diam.

HABIT, HABITAT AND DISTRIBUTION: On bare peat, Newby Head, 16 Sept. 1953 (type in Herb. Kew); on burnt peaty soil, Mortimer, 26 Oct. 1954.

OBSERVATIONS: Distinguished by gills and cap margin being bright yellow at first, by shape of marginal cystidia, white veil when young and, probably habitat. Differs from *G. sahleri* s. Favre in absence of calyptrate spores, gills yellow at first and lageniform cystidia. We have not seen fresh specimens or studied the type microscopically. The species is included here on the strength of Orton's account.

53. *Galerina perangusta* Smith & Singer, Mycologia 50: 482. 1958.
Illustrations: Pl. 12, fig. G. Fig. 72 (cheilocystidia).

Pileus 5–15 mm broad, up to 10 mm high, narrowly conic and remaining so, surface glabrous, moist and hygrophanous, pale cinnamon-brown to dull tawny, disc soon fading to cinnamon buff or more yellowish, margin striate when moist; flesh thin, concolorous with surface, taste distinctly farinaceous, odor similar if flesh is crushed.

Lamellae narrow to moderately broad, ascending-adnate, close to subdistant, pallid buff young, becoming dark dingy ochraceous tawny when bruised, concolorous with pileus in age, edges pallid.

Stipe 25–35 mm long, 1–1.5 mm thick, equal down to a small basal enlargement, tubular, cartilaginous, dingy honey color gradually darkening over all to dingy tawny (not darkening appreciably from base upward), when very young faintly fibrillose from a rudimentary veil but all traces soon gone.

Spores $8.5\text{--}11 \times 5.5\text{--}6.5 \mu$, inequilateral in profile, ovate in face view, smooth but with a faint ragged line marking the plage, pale ochraceous tawny in KOH, dark red-brown in Melzer's sol., apical callus distinct. Basidia 4-spored. Pleurocystidia none. Cheilocystidia abundant, $(35)40\text{--}60 \times 4\text{--}7 \times 2.5\text{--}3.5 \times 4\text{--}6 \mu$, base equal to slightly ventricose, neck equal, apex slightly enlarged to merely blunt, hyaline to faintly yellowish in KOH, thin-walled, smooth. Gill trama regular, ochraceous tawny to merely yellowish. Pileus trama with a non-gelatinous, poorly differentiated pellicle and a tramal body of more or less ochraceous to cinnamon-colored incrustated hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on mossy trunk of redwood, Humboldt State Park, California, Nov. 30, 1956, Smith 56077-*type*.

OBSERVATIONS: The farinaceous taste, essentially smooth spores, elongate, narrow cheilocystidia mostly with enlarged apices, slight veil and changing gills are distinctive. It is readily distinguished from *G. allospora* var. *laurentiana* by its farinaceous taste.

MATERIAL EXAMINED: Smith 55148; 56077-*type*.

54. *Galerina dominici* Singer apud Dennis, ex Singer, sp. nov.

Illustration: Dennis, Kew Bull. 15: 141. 1961. Fig. 110.

Pileo 10–12 mm lato, longe transparenter striato, dilute brunneo, obtuso, glabro, haud viscido. Lamellis subangustis, adnato-subdecurrentibus, subdistantibus, ferrugineo-brunneolis. Stipite 25–35 \times 0.5–1.0 mm, aequali, manifeste sursum pruinoso. Sporis 9.5–11 \times 5.5–6.2 μ , minutissime punctulato-verruculosis, zona subhilari bene delimitata. Basidiis tetrasporis. Cheilocystidiis 31–60 \times 5.5–9 μ longe effilata. Pleurocystidiis nullis. Epicute pilei hypodermio que incrustato pigmento, non-gelatinosis Inter muscos in arboribus. Sierra de Santo Domingo, Venezuela. Typus in herbario Lilloano conservatus est.

Pileus 10–12 mm broad, convex and broader than high, margin spreading, light ochraceous brown or tawny when fresh, translucent-striate to near apex, glabrous, not viscid or umbonate; context thin, odor and taste not recorded.

Lamellae adnate-subdecurrent, subdistant, moderately broad, pale fulvous as dried.

Stipe 25–35 \times 0.5–1.0 mm, subequal and filamentous, strongly pruinose at apex, apex paler and base darker than pileus, veil not showing on mature specimens.

Spores 9.5–11 \times 5.5–6.2 μ , subellipsoid, very finely punctate-verrucose and this exosporial ornamentation about the same color intensity as the

episporium and very low, hence most spores appear almost smooth in KOH, plage distinctly delimited.

Hymenium: Basidia $27-32 \times 8-9.2 \mu$, 4-spored. Pleurocystidia none. Cheilocystidia $31-60 \times 5.5-9 \mu$, ampullaceous, ventricose below but with a long thin ($1.5-2.8 \mu$) neck which may be up to 50μ long, tip more often than not subcapitate (but head not globose), hyaline. Pilocystidia none. Caulocystidia numerous near apex but present down to the midportion. Hyphae of the hymenophoral trama with incrustated pigment. Pileus epicutis a very thin poorly differentiated layer, the hyphae with pigment incrustations and not gelatinized; hypodermium of hyphae broader than in epicutis but incrustated and not showing any gelatinization. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: In moss on trees in the fog zone (upper limit of forest), Venezuela, Mérida, Sierra de Santo Domingo, 3440 m. alt. leg. Dennis 2506 (LIL)-*type*.

OBSERVATIONS: We do not have data on the odor and taste of this species. Although this and *G. perangusta* seem rather alike from the descriptions, it is almost certain that, when more data on *G. dominici* become available, differences other than in the shape of the pileus and in habitat will be apparent.

55. *Galerina borealis* Smith & Singer, Mycologia 50: 470. 1958.
Illustrations: Fig. 73 (cheilocystidia).

Pileus 8–15 mm broad, obtuse becoming obtusely conic or with a flaring margin, surface glabrous, moist, hygrophanous, striate when moist, pale ochraceous tawny fading to pallid brownish and drying a grayish brown; odor none.

Lamellae broad, adnate, subdistant, pallid buff becoming pale dull cinnamon, edges even.

Stipe 30–50 mm long, ± 1 mm thick, equal, fragile, honey color over all or in age the base only slightly darker, at first with a few scattered fibrils from the rudimentary veil, in age naked but with pruinose apex.

Spores $9-11.5 \times 5-6 \mu$, inequilateral in profile, ovate in face view, *pale ochraceous* in KOH, smooth (hence none or only a faint plage), apical callus present. Basidia 4-spored. Pleurocystidia none. Cheilocystidia $26-32 \times 3-7 \times 2-3 \times 3-5 \mu$, filamentose-capitate to merely filamentose or some more or less ventricose at base, hyaline in KOH; gill trama yellowish in KOH, regular. Pileus trama with an epicutis of narrow ($4-8 \mu$) \pm incrustated non-gelatinous hyphae over a highly colored hypoderm. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on moss during late summer and fall, Idaho and Quebec, rare.

OBSERVATIONS: In the characters of the cheilocystidia the species is related to *G. pistillicystis* but is distinct because of the large pale smooth spores. It is rather similar to *G. luteolosperma* in spore characters, but in *G. luteolosperma* the cheilocystidia are broader at the base and apex and the necks are $3-4(5) \mu$ wide in the thinnest part. *G. borealis* differs from *G. pumila*

var. *subalpina* in having cheilocystidia with thinner necks and more capitate apices. *G. borealis* when dry is duller in color than most species of *Galerina*. It is distinguished from *G. dicranorum* by its paler spores and thinner necked cheilocystidia.

MATERIAL EXAMINED: Smith 54772-*type*; 61696.

56. *Galerina pseudostylifera* Smith, sp. nov.

Illustrations: Fig. 74 (cheilocystidia).

Pileus 15–25 mm latus, campanulatus, viscidus, hygrophanus, fulvus vel pallide fulvis demum subochraceus; sapor insipidus, odor nullus; lamellae pallidae demum subfulvae, confertae, adnatae, latae; stipes 3–4 cm longus, 2.5–3.5 mm latus, fragilis, cavus, sursum pruinosis pallidesque, deorsum albo-fibrillosus, subochraceus; sporae $6-7 \times 4-4.5 \times 4.5-5 \mu$; leaves; cheilocystidia $18-26(30) \times 5-9 \times 2-2.5 \times 3-4 \mu$. Specimen typicum legit Smith 60235 (MICH) prope Burgdorf, Idaho. 17 Aug. 1958.

Pileus 15–25 mm broad, obtusely conic becoming campanulate surface viscid and hygrophanous, ochraceous tawny to tawny moist, near cinnamon buff faded, margin scarcely striate; context thin, colored like surface of pileus when moist and when faded, neither odor nor taste distinctive.

Lamellae pallid young, then brownish and finally pale fulvous from spores, close adnate, moderately broad, edges even.

Stipe 30–40 mm long, 2.5–3.5 mm at apex, hollow and fragile, at apex pallid and silky-pruinose (ends of fibrils projecting), lower down white-fibrillose from remains of veil but glabrescent, cinnamon buff (subochraceous) from base up to near the apex.

Spores $5.5-6.5(7) \times 4-4.5 \times 4.5-5 \mu$, elliptic to obscurely inequilateral in profile view, elliptic to ovate in face view, terete to slightly compressed, smooth, pale fulvous in KOH, scarcely darker in Melzer's reagent, apical pore extremely minute. Basidia 4-spored. Pleurocystidia present near the gill edge, scattered to abundant, similar to cheilocystidia. Cheilocystidia $18-26(30) \times 5-9 \times 2-2.5 \times 3-4 \mu$, lecythiform, hyaline, smooth, capitellum appearing mucilaginous in KOH. Gill trama with a central strand of subparallel pale fulvous hyphae with the cells often somewhat enlarged; subhymenium of hyaline narrow subgelatinous hyphae. Epicutis of pileus a layer of tangled hyaline to yellowish hyphae 2–4 μ in diameter, gelatinous and bearing clamps at cross walls, body of context entirely of fulvous, enlarged hyphal cells, pigment both in hyphal wall and incrustated.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on rotting conifer logs in cold wet places in the mountains, Burgdorf, Idaho, Aug. 17, 1958, Smith 60235-*type*.

OBSERVATIONS: This species is obviously in the stirps *Sideroides* and very close to *G. mammillata* though it has little resemblance to that species in the field. It is an important species because in it we find a tendency for the spores to be compressed, for the cheilocystidia to be *Conocybe*-like, and the stipe to be hollow, fragile, and not darkening appreciably.

57. *Galerina cuspidata* Smith, Mycologia 45: 898. 1953.
Illustrations: Pl. 5, fig. A. Fig. 75 (cheilocystidia).

Pileus 10–15 mm broad at base, 10–12 mm high, sharply conic to cuspidate, becoming conic-campanulate, margin straight at first, surface viscid, glabrous or with flecks of fibrils from veil along the margin, “Sayal brown” (dull cinnamon), moist, hygrophamous, fading to yellowish or finally pallid, moist margin only faintly striatulate; flesh thin, pliant, concolorous with surface, odor and taste none.

Lamellae close to crowded, broad and ventricose, adnate to adnexed but ascending, “pinkish buff” young, gradually becoming “cinnamon”, edges even.

Stipe 20–30 mm long, 2–2.5 mm thick at apex, equal or nearly so, pallid above, honey color below, base darker in age, surface thinly fibrillose from remains of pallid veil, apex naked or minutely pruinose.

Spores 8–9 × 4.5–5 μ (11–12 × 5–5.5 μ), smooth, ellipsoid, in profile the ventral line straighter than the dorsal. Basidia 4-spored (some 2-spored). Pleurocystidia none seen. Cheilocystidia 18–32 × 4–6.5 μ, narrowly fusoid-ventricose to narrowly ventricose-subcapitate, often variously contorted. Gill trama parallel, the subhymenium gelatinous. Pileus trama cinnamon in KOH underneath a gelatinous pellicle of narrow hyaline hyphae, 3–5 μ diam. Clamp connections present,

HABIT, HABITAT AND DISTRIBUTION: Gregarious on moss in a springy area, North Fork, French Creek, Medicine Bow Mts., Wyoming, Aug. 14, 1950, Smith 35716.

OBSERVATIONS: This species is easily distinguished from *G. sideroides* by the cuspidate to acutely conic pileus and larger spores. The subgelatinous hymenium is a distinct feature of the type but in view of what we found in *G. stylifera* we do not care to emphasize it at present.

MATERIAL EXAMINED: Smith 35716-type.

58. *Galerina mammillata* (Murrill) Smith & Singer, Sydowia 11: 449. 1957.

Naucoria mammillata Murrill, N. Am. Fl. 10: 180. 1917.

Illustrations: Pl. 7, fig. A. Figs. 265, 268 (spores); 76 (cheilocystidia).

Pileus 10–25 mm broad, at first sharply conic with an inrolled margin, expanding to plano-umbonate, the umbo conic, in age sometimes with an elevated margin and a nearly obsolete umbo, surface glabrous, lubricous to subviscid, color evenly “cinnamon buff” or “clay color”, the margin faintly striatulate, hygrophamous and fading to whitish; flesh thin but pliant, tapered from disc to margin but thick in the disc, odor and taste not recorded.

Lamellae ventricose and rather broad, subdistant to close, adnate with a tooth, concolorous with pileus but becoming ochraceous tawny, edges white floccose.

Stipe 30–50 mm long, 2–4 mm thick, equal, tough-cartilaginous, concolorous with pileus above, bister to dark reddish brown below, longitudinally fibrillose to fibrillose-striate below from the partial veil, occasionally with an evanescent apical fibrillose zone.

Spores 7–8 × 3.5–4 μ , narrowly elliptic in either profile or face view, ochraceous tawny to paler in KOH, smooth, apical pore present but minute and apex not truncate. Basidia 4-spored, hyaline in KOH, 18–20 × 5–6 μ . Pleurocystidia none seen. Cheilocystidia abundant, 23–30 × 4–7(8) μ , narrowly fusoid-ventricose with subcapitate to obtuse apices, necks 2–3 μ thick, capitellum 3–5 μ , thin-walled or with refractive local thickenings variously located in the wall, hyaline in KOH. Gill trama parallel to subparallel, hyaline to faintly yellowish in KOH, subhymenium a broad gelatinous band of narrow interwoven hyphae. Pileus trama homogeneous and hyaline or nearly so, pellicle well differentiated, hyaline and gelatinous. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered on rotten conifer wood, Pacific Northwest and Michigan, not uncommon in the western area but rare in the Great Lakes Region.

OBSERVATIONS: The pellicle of the pileus is typically thick and sharply differentiated, but in rain-washed specimens may be practically obliterated. The gelatinous subhymenium is a conspicuous feature of this species, but some collections clearly belonging here do not show it well. This is the reverse of the situation found in *G. stylifera*. Murrill's type appears to have been a rather weather-beaten specimen so not much emphasis is placed by us on the lack of a veil. Smith 41001, which appears to belong here, has the pellicle almost obliterated and no evident veil remnants are present.

This species differs from *G. sideroides* and *G. stylifera* in a number of characters. It is paler in color, fades to white, is more cartilaginous and the spores are truly smooth. As restricted here, *G. sideroides* has no veil and a more shining stipe. *G. stylifera*, in our estimation, is closest to *G. mammillata* but in its typical form has an obtuse to convex pileus and darker colors. *G. cuspidata* grows on moss and has wider spores.

MATERIAL EXAMINED: Murrill 694-type (NY). A. W. Slipp 1297-sta. 1 (University of Idaho, Forest Path. Herb. 3297) (MICH). Smith 3928 (typical); 7844; 17675; 17949; 18141; 19305; 20124; 24240; 26703; 28560; 29603; 29661; 30300; 40449; 40893; 40900; 41001; 41145; 41146; 41167; 43960; 48593; 48711; 48996; 49126; 49240; 49243; 49287; 49424; 54231; 54357; 54493; 54771; 54840; 55000; 56470; 56765.

- 59. *Galerina sideroides* (Fr.) Kühner, Encyc. Myc. 7: 215. 1935.**
Agaricus sideroides [Bull.] Fries Epicr. Myc. p. 196. 1838.
Naucoria sideroides (Fr.) Quélet, Champ. Jura et Vosges p. 131. 1872.
Simocybe sideroides (Fr.) Karsten, Bidr. Finl. Nat. Folk 32: 424. 1879.
Hylophila sideroides (Fr.) Quélet, Enchir. Fung. p. 101. 1886.
Galera sideroides (Fr.) Kühner in Kühner & Romagnesi, Flore Anal. Champ.

Supér. p. 320. 1953.

Illustrations: Pl. 7, fig. D. Fig. 78 (cheilocystidia).

Pileus 10–25(30) mm broad, obtuse to conic, expanding to nearly plane or slightly umbonate, surface *viscid*, glabrous, hygrophorous, “argus brown” to “amber brown” and faintly striatulate when moist, near cinnamon buff to clay color faded, fading in streaks from the disc outward; flesh thin, soft, odor and taste not distinctive.

Lamellae broadly adnate, seceding, subdistant to close, broad, ochraceous tawny when mature, paler when young, edges even.

Stipe 20–40 mm long, 2–2.5 mm thick, equal, fragile, pale honey color above, soon dark bay brown (red brown) from the base upward, surface glabrous and shining or only at very first with a few faint fibrils near the base.

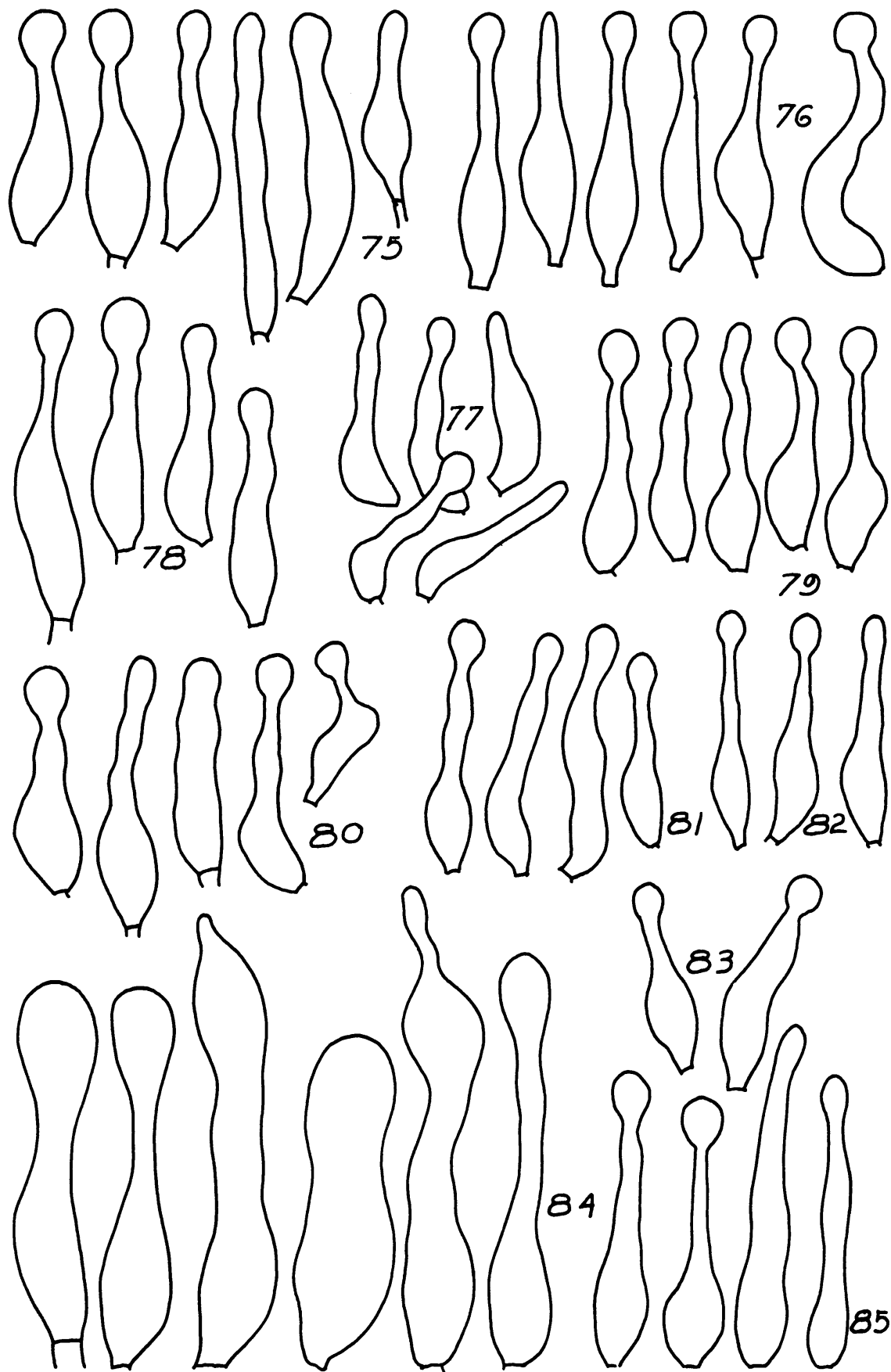
Spores 7–8.5(9) \times 4–4.5 μ , smooth, elliptic to obscurely ovoid, pale dull cinnamon in KOH. Basidia 4-spored, 20–40 \times 7–8 μ , hyaline in KOH. Pleurocystidia none. Cheilocystidia abundant, ventricose-subcapitate with a thickening of the wall most always in the capitellum, some nearly filamentose-capitate and then often irregular in outline, hyaline in KOH. Gill trama pale cinnamon in KOH, hyphal cells short and broad, subparallel, subhymenium not gelatinous. Pileus trama cinnamon in KOH beneath a thin pellicle of narrow hyaline gelatinous hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on rotten conifer logs, Washington, Michigan, and apparently also in Sweden. It usually fruits during the fall, and has been found most abundantly in Wilderness Park, Emmet County, Michigan.

OBSERVATIONS: The aspect of this species is that of *Psilocybe corneipes*, but the microscopic characters of course are very different. Fries (1838) cited Bulliard’s plate 588, a good illustration and stated “velum prorsus nullum”. Our specimens check both with the plate and this description of the lack of a veil. About the only possible discrepancy between our material and Fries’ description is that he described the gills as narrow and we find them moderately broad to broad. However, the width of the gills as shown in Bulliard’s plate is not out of line with what we found in our collections, and in addition Smith has observed considerable variation in the fresh material. Consequently we are not inclined to regard this apparent difference as significant. The dark ferruginous to bay color of the base of the stipe is quite different from the bister to “mummy brown” color found in *G. stylifera*.

As to nomenclature, it appears that we must accept Kühner’s transfer of *Agaricus sideroides* to *Galerina*, even though the fungus he described under that name is *G. stylifera*.

We believe that *G. stylifera* is the common species of the pair in Europe, as it is in North America, where *G. sideroides* is rare. If further studies should prove that *G. sideroides* sens. Smith & Singer does not occur in Sweden, the latter would have to be considered as new. If, on the other hand, *G. sideroides* should be connected to *G. stylifera* by transitional forms—we have no reason



Cystidia: Fig. 75, cheilocystidia of *G. cuspidata*; 76, cheilocystidia of *G. mammillata*; 77, cheilocystidia of *G. vinaceobrunnea*; 78, cheilocystidia of *G. sideroides*; 79, cheilocystidia of *G. stylifera* var. *stylifera*; 80, cheilocystidia of *G. stylifera* var. *caespitosa*; 81, cheilocystidia of *G. stylifera* var. *velosa*; 82, cheilocystidia of *G. stylifera* var. *badia*; 84, cheilocystidia of *G. fuscobrunnea*; 83 & 85, cheilocystidia of *G. castanescens*.

to believe this on the basis of our own experience—the Friesian name could be restored to the whole complex.

MATERIAL EXAMINED: J. Favre, Mont-Roux, Switzerland, 10-19-47; Switzerland, 10-10-48 (MICH). W. B. Gruber, Mt. Hood, Oregon, 10-25-42 (MICH). Karsten, 9-X-1872 (no obvious veil present) (H). A. W. Slipp, University of Idaho, Forest Pathology Herbarium 2645 (945-sta. 24) (MICH). Smith 17678; 38702; 40444; 40993; 41138; 41147; 41153; 43465; 43466; 43475; 43716; 43718; 47045; 47705; 48656; 49115; 50848; 54122; 54167; 54360; 54558.

60. *Galerina vinaceobrunnea* Smith & Singer, Mycologia 47: 573. 1955.

Illustrations: Pl. 8. Figs. 278, 279 (spores); 77 (cheilocystidia).

Pileus 10–30 mm broad, obtuse to convex with an incurved margin, expanding to nearly plane or with an inconspicuous umbo, surface glabrous, subviscid, “Roods brown” to tawny and retaining a dull cinnamon cast when faded; flesh thin, odor and taste not recorded.

Lamellae moderately broad, adnate, nearly horizontal, dull brownish becoming ochraceous tawny, edges even.

Stipe 30–50 mm long, 1.5–3 mm thick at apex, somewhat enlarged downward, surface thinly fibrillose over lower part from veil remnants, apex fibrillose punctate, rusty brown below, paler above and darkening slightly from the base up in age.

Spores 6–7 × 4 μ, ellipsoid to subovoid, smooth, ochraceous tawny in KOH. Basidia 18–22 × 6–7 μ, 4-spored, hyaline in KOH. Pleurocystidia none. Cheilocystidia ventricose-subcapitate, 18–26 × 3–8 μ, the head 3.5–4 μ, thin-walled, hyaline in KOH. Gill trama interwoven, pale tawny in KOH. Pileus with a distinct hyaline gelatinous pellicle, beneath this the tramal body is tawny or paler and of interwoven hyphae, pigment incrustated. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious to subcespitose on conifer wood, Miller’s Bog, Burt Lake, Michigan, Sept. 23, 1949, Smith 34149-type.

OBSERVATIONS: The important difference between this species and *G. stylifera* is one of color; in addition the stipe of *G. vinaceobrunnea* does not darken so much.

60. *Galerina stylifera* (Atk.) Smith & Singer, Sydowia 11: 449. 1957.
var. *stylifera*

Galerula stylifera Atkinson, Proc. Am. Philos. Soc. 57: 365. 1918.

Illustrations: Pl. 6, fig. A; pl. 7, fig. C; pl. 9, figs. A, B, E. Fig. 79 (cheilocystidia).

Pileus 15–50 mm broad, broadly convex with an inrolled margin soon plane or with a very obscure umbo, surface glabrous, viscid, polished, trans-

lucent striate moist, between “ochraceous tawny” and “cinnamon brown” (darker when young, paler at maturity) with the margin sometimes “cinnamon buff” (dull yellowish), hygrophorous and fading to pale dingy buff; flesh thin (± 1.5 mm), tapered to the margin, pliant, concolorous with pileus surface, odor none, taste mild.

Lamellae moderately close, 25–28 reach the stipe, 2–3 tiers of lamellulae, broad (up to 6–7 mm in 5 cm caps), depressed adnate and seceding, “buckthorn brown” young, becoming “ochraceous tawny” or darker, edges even.

Stipe 40–60 mm long, (2.5)3–6 mm thick, equal, hollow, brownish within, with a slight and soon evanescent apical annular zone of veil fibrils, thinly fibrillose below, pruinose near apex, glabrescent, becoming bister or darker from the base upward, apex usually about concolorous with gills.

Spores $6.3\text{--}8.7 \times 4\text{--}5 \mu$, smooth, ochraceous tawny in KOH or slightly darker, ellipsoid, plage scarcely demonstrable. Basidia 4-spored, projecting when sporulating, $19\text{--}22 \times 4.3\text{--}7.5 \mu$, hyaline in KOH. Pleurocystidia absent. Cheilocystidia abundant, ventricose-subcapitate to narrowly nine-pin shaped, $23\text{--}28 \times 3.5\text{--}8 \mu$, hyaline in KOH. Caulocystidia similar to cheilocystidia or filamentous. Gill trama regular, yellow to pale tawny in KOH from incrusting pigment, subhymenium narrow and not gelatinous. Pileus trama homogeneous beneath a thick gelatinous pellicle of narrow (3–6 μ) hyphae which have occasionally some yellowish incrusting pigment; flesh proper pale tawny in KOH at least near the pellicle and hyphae 8–16 μ in diam. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on buried sticks along roads, around debris and on decaying logs, mostly on conifer wood, throughout northern and western United States and Europe.

OBSERVATIONS: *G. stylifera* differs from *G. sideroides* in a number of characters. It has a veil, the stipe is more or less mummy brown instead of bay at the base, and there appears to be a slight difference in the color of the pileus. *G. stylifera* is a relatively common fungus and varies greatly in size. The veil may be quite heavy. In some collections (Smith 20203 & 24534) with thin veils the subhymenium is more highly refractive than usual and appears gelatinous. Attention was given to the use of this character in classifying the species of this stirps, but without satisfactory results. It is characteristic in some but not so in others, and in *G. sideroides* it does not seem to be constant. However, further observations should be made as it is possible that an additional taxon should be distinguished here, one in which the veil is thin and the subhymenium truly gelatinous.

MATERIAL EXAMINED: Atkinson 24399-*type* (CUP). Karsten, Salo, Finland, Aug., 1881 (H). Smith 33-87; 33-987; 3047; 3076; 4712; 17363; 20203; 20235; 20819; 24178; 24534; 27178; 34148; 38702 (gelatinous subhymenium present); 40131; 40372 (gelatinous subhymenium present); 41024; 41088; 41094; 41111; 41148; 41161; 41168; 41169; 43306; 43337; 43340; 43414; 43436; 43629; 43634; 43644; 43693; 43915; 43919; 43959; 44026; 44030; 44040; 44066; 44074; 46819; 47362; 47716; 47738; 48325; 49086; 51155 (typical); 51156; 53393; 53483; 53766; 53857; 54109; 54398;

54683; 54764; 55138; 55226; 55270; 55277; 56113; 56172; 56349; 56506 (slender form); 63265.

61a. *Galerina stylifera* var. *caespitosa* Smith & Singer, var. nov.

Illustrations: Figs. 286, 287 (spores); 80 (cheilocystidia).

A *G. styliferae* forma typica sporis obscurioribus, habitu caespitoso ad lignum frondosum differt. Specimen typicum in Herb. Mich. conservatum; Smith 41223.

Pileus 10–30 mm broad, convex to plane, glabrous, viscid, hygrophanous, dark ochraceous tawny and faintly striate, fading to dingy tan and then slowly darker, often dull rusty brown from deposited spores; flesh similar to that of *G. marginata* in consistency, odor and taste not recorded.

Lamellae close broad, broadly adnate, dull rusty brown from the spores, edges even.

Stipe 20–30 mm long, 1–2 mm thick, equal or nearly so, at first whitish fibrillose from the thin, pallid veil, glabrescent, dull cinnamon brown from base upward in age, when dried evenly dull cinnamon brown.

Spores $6.5\text{--}8 \times 4\text{--}4.6 \mu$, ellipsoid, smooth or appearing faintly marbled under oil, near "buckthorn brown" revived in KOH. Basidia 4-spored, $20\text{--}25 \times 5\text{--}6 \mu$. Pleurocystidia none. Cheilocystidia filamentose to subcapitate, or ventricose-subcapitate with narrow (2.5μ) wavy necks, hyaline, some with thickened wall in capitellum, $20\text{--}34 \times 3\text{--}8 \mu$, head $3\text{--}6 \mu$. Gill trama subparallel, pale tawny in KOH, with a ramose-filamentose paler subhymenium which becomes slightly gelatinized in KOH. Pileus trama homogeneous, rusty cinnamon in KOH, cuticular hyphae radial, narrower than those of trama, gelatinous. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Cespitose on rotten hardwood logs, Haven Hill, Oakland County, Michigan (Highlands Recreation Area), Oct. 1951, Smith 41223-*type*.

OBSERVATIONS: Remnants of a viscid pellicle were demonstrated on the pilei of sections revived in KOH, consequently we assume that the pileus is viscid when fresh as in the type variety. It is difficult to evaluate the position of this variety from the one collection available. Comparison of the spore prints of the two varieties may easily show a sufficient difference to justify ranking var. *caespitosa* as a distinct species, but this has as yet not been done. Here again, is a situation where a comparative study of cultures may yield valuable data, as may be expected in the entire complex *sideroides-stylifera-vinaceobrunnea*.

61b. *Galerina stylifera* var. *velosa* Smith & Singer, Mycologia 50: 487. 1958.

Illustrations: Fig. 81 (cheilocystidia).

Pileus 2.5–3.5(5) cm broad, convex with an inrolled margin, expanding to broadly convex or nearly plane, surface glabrous or margin at first decorated with veil remnants, viscid, pale “ochraceous-tawny” to “buckthorn-brown”, moist, fading to cinnamon-buff and slightly darker when dried; flesh moderately thick and pliant, odor and taste not distinctive.

Lamellae “buckthorn-brown” becoming nearly “ochraceous-tawny”, more or less concolorous with cap, moderately close, 2–3 tiers of lamellulae, broad (up to 6–7 mm), depressed-adnate, seceding, edges even.

Stipe 40–60 mm long, 3–6 mm thick at apex, evenly enlarged downward, rather firm, solid to tubular, pallid and silky above the rather pronounced fibrillose annular zone, coated with patches or zones of fibrils below, brownish toward the base but not discolored markedly in drying.

Spores 6–7 × 4 μ, essentially ellipsoid, smooth, apical pore not evident. Basidia 4-spored, 20–22 × 6 μ, hyaline in KOH. Pleurocystidia none. Cheilocystidia abundant, 20–26 × 4–7 × 2–3.5 × 3–4 μ, narrowly ventricose below, hyaline, thin-walled; gill trama with a broad subparallel ochraceous tawny floccose zone flanked by very narrow gelatinous subhymenial layers or these not showing at all. Pileus trama of floccose-interwoven hyphae pale tawny near the gills and hyaline near the cuticle but a narrow tawny hypodermium present between the hyaline area and the gelatinous hyphae; pellicle thick, of narrow gelatinous hyaline to yellowish hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered to cespitose on decayed conifer wood, Colorado and Idaho.

OBSERVATIONS: This is a large form consistently mistaken in the field for *G. autumnalis*, but distinguished from it by a fibrillose rather than membranous annulus.

MATERIAL EXAMINED: Smith 19554; 28134; 40924; 46816; 47201-*type*; 47223; 52702; 55054; 59716.

61c. *Galerina stylifera* var. *badia* Smith & Singer, Mycologia 50: 486. 1958.

Illustrations: Pl. 7, fig. B. Fig. 82 (cheilocystidia).

Pileus 10–20 mm broad, convex, the margin incurved, expanding to broadly convex or nearly plane, glabrous, viscid, shining, dark red-brown (*badius*) but gradually becoming paler (to ochraceous tawny) and finally fading to cinnamon buff, striate when moist.

Lamellae subdistant, broad, adnate, yellowish young, becoming ochraceous tawny.

Stipe 20–35 mm long, 2.5–3 mm thick, equal, *rusty brown* below, honey color above, apex pruinose, glabrous except for a thin fibrillose zone from the broken veil, naked and watery in appearance at maturity. When dried evenly tawny over all or base only slightly darker.

Spores 6–7 × 3.8–4.3 μ, ellipsoid, smooth, pale tawny in KOH and not

darkening in Melzer's solution. Basidia 4-spored. Pleurocystidia none. Cheilocystidia $18-26 \times 3-7 \times 2-3 \times 3-5 \mu$, capitate, hyaline, smooth. Gill trama with a floccose central cinnamon colored (in KOH) strand of tissue flanked by a gelatinous subhymenial zone on either side. Pileus trama with a distinct gelatinous pellicle of narrow hyaline hyphae; context floccose and pale cinnamon to ochraceous. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on conifer debris, Idaho and Quebec in the fall.

OBSERVATIONS: The bay-brown pilei and difference in the color change of the stipe distinguish the variety.

MATERIAL EXAMINED: J. G. Parlin 15152 (MICH). Smith 54092; 54112-*type*; 61767.

62. *Galerina fuscobrunnea* Smith, Mycologia 45: 902. 1953.

Illustrations: Fig. 84 (cheilocystidia).

Pileus 5–10 mm broad, conic with a straight margin, expanding to conic-campanulate, glabrous, moist, hygrophanous, disc near "mummy brown" (blackish brown) at first, "buckthorn brown" and striate over marginal area, fading to pale buff on disc first; flesh concolorous with surface, soft, odor and taste mild.

Lamellae broadly adnate, subdistant, broad, 1–2 tiers of lamellulae, pale yellowish brown (\pm honey color).

Stipe 20–30 mm long, 1 mm thick, tubular, equal, concolorous with cap or a shade paler and with a few inconspicuous fibrils indicating presence of a thin veil.

Spores $7.5-9.5(10.4) \times 4.5-5.5 \mu$, narrowly subelliptic to very slightly inequilateral in profile, narrowly ovate in face view, smooth to very minutely roughened (exospore not separating from endospore), tawny or darker in KOH, suprahilar plate smooth but very indistinct and faintly bounded as seen under oil, apical pore not visible. Basidia 4-spored, hyaline in KOH. Pleurocystidia none. Cheilocystidia abundant, $32-48 \times 5-8 \mu$, narrowly clavate to subcylindric, often with flexuous walls, apices of some with slight incrustation, hyaline in KOH, thin-walled. Gill trama interwoven, rusty brown in KOH. Pileus trama homogeneous, rusty brown in KOH. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on humus under alder, swampy area below Wapanitia Summit, Cascade Mts., Oregon, 3500 ft. Sept. 24, 1946, Smith 23701-*type*.

OBSERVATIONS: The narrow practically smooth spores are distinctive along with the cheilocystidia. The habitat in alpine swamps may also be significant together with the very dark brown color of the young carpophores. The pilei lack the gelatinous pellicle which characterizes most species of this group. It differs from *G. agloea* in that the base of the stipe does not

darken in age though it may be very dark at first, and it lacks the pronounced veil development of both *G. larigna* and *G. occidentalis*.

63. *Galerina castanescens* Smith & Singer, Mycologia 50: 471. 1958.
Illustrations: Figs. 83, 85 (cheilocystidia).

Pileus 7–16 mm broad, obtusely conic, expanding to campanulate or expanded-umbonate, surface glabrous, moist and hygrophalous, rusty to tawny when fresh, scarcely paler when dried, margin at times fringed with a few fibrils; odor and taste not recorded.

Lamellae close, narrow, narrowly adnate, dull ochraceous tawny, edges even.

Stipe 25–40(50) mm long, 1–2 mm thick, honey color above, soon *dark rust-brown* below and darkening to red-brown over all in drying, veil fairly well developed, grayish pallid, leaving a faint superior zone or only with scattered fibrils above.

Spores 7–9 × 4–4.5 μ, smooth, narrowly ovate to elliptic in face view, obscurely inequilateral in profile view, near “ochraceous tawny” in KOH. Basidia 2- and 4-spored. Pleurocystidia none. Cheilocystidia abundant, ventricose at base (8–12 μ) neck 2–3 μ and apex acute to capitate, capitellum 4–5 μ, overall length 20–28 μ, hyaline in KOH, thin-walled and yellowish. Gill trama subregular, central strand more or less cinnamon in KOH, subhymenium gelatinous and yellowish-hyaline. Pileus trama homogeneous and cinnamon in KOH, cuticle of radial non-gelatinous hyphae 4–7 μ. Clamps present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on conifer logs, Granite Creek, Nordman, Idaho, Oct. 9, 1956, Smith 54347-*type*.

OBSERVATIONS: The specimens have dried cinnamon in color with the stipes a darker red-brown. The lack of a distinct gelatinous pellicle separates this species from *G. stylifera* and related species, and the darker colors and more fulvous spores, from *G. pseudo-badipes*. It is also very close to *G. fusco-brunnea* from which the habitat and rusty brown pileus (contrasted to blackish brown) separate it.

64. *Galerina pseudo-badipes* Josserand, Bull. Soc. Myc. Fr. 71: 111. 1955.

Illustration: Josserand, op. cit. fig. 11. Fig. 86 (cheilocystidia).

Pileus 7–15(30) mm, at first convex-subglobose, then convex, then broadly convex; sometimes not mammillate but generally the umbo quite evident; regular, quite soft, very hygrophalous, very watery when humid but not viscid; when wet perfectly unicolorous and at first pale beige-blond, then dingy beige ochraceous, yellowish-ochre-beige, beige-chamois (russet); when faded glabrous, opaque and much paler, blond-beige, blond-white, whitish (chamois), whitish cream. Margin thin, at first very incurved then

simply rounded, finally rounded-substraight; varying from non-striate to striatulate; with a white-beige edge on young material, cuticle not defined. Context thin or moderately thick (except in center where the pileus is mammillate), concolorous with pileus and stipe, unchanging; odor and taste none.

Lamellae either close or medium close, 3 tiers of lamellulae; simple, medium broad, medium thick, a little arcuate when young, later profile scarcely defined, sometimes slightly concave near margin and somewhat convex near stipe, either rounded at the stipe or if not plainly adnate; rather seceding, at first blond, beige blond, then distinctly ochraceous yellow, then deep yellow, then ochraceous (brownish) and finally sometimes with a very subtle rosy (flesh-colored) hue which does not always appear but which is well noted on specimens from Lyon as well as others from the Vosges; edge entire, paler.

Stipe of a fibrous aspect but not very tough, 15–40 × 2–3(4) mm, generally equal although at the base, sometimes attenuated or, on the contrary, a little inflated-white-cottony; solid then fistulous; beige, ochraceous, with the top pale cream-yellowish and the base bister-brown or brown-bister (reddish), this tint spreads progressively over the entire length of the stipe; at first entirely silvery striate or fibrillose or fibrillose-furfuraceous from the veil, then subglabrous; dry. Veil white-blond, filamentous, definite, but disappears entirely.

Spores, in mass, a beautiful yellow-ochraceous color quite warm and deep, not brown-rusty; spores under the microscope a beautiful golden yellow, 6.5–7.5(8) × 4–4.5(4.8) μ , elliptical, at top \pm attenuated, (rarely to pointed), most often elliptical-subamygdaliform; often with 1–2 scarcely visible guttulae; smooth, with a definite pore but so small that it does not appear present in many of the spores in a single spore deposit. Basidia 4-spored, 22–28 × 6–7 μ , with slender sterigmata. Pleurocystidia none. Cheilocystidia numerous, \pm ninepin-shaped, dilated at base, straight at top and terminating in a head which is often very defined; sometimes the variations on a single edge are considerable (fusiform, snout-like, \pm capitate, even totally irregular, etc.; see illustration), (20)30–40 × 4–6(12) μ . Gill trama with a large mediostratum, rather regular, hyphae 4–13 μ . Hairs on stipe: simple tips of hyphae straightened in their extremity, cylindrical or capitate, 20–40 × 5–10 μ . Cuticle filamentous, 4–10 μ , radial, radial-subentangled in spots. Clamps scattered here and there (trama, cuticle, pileus and stipe).

HABIT, HABITAT AND DISTRIBUTION: On rotten stumps, on mossy trunks of conifers. In the entire region of Plombières (Vosges, France), for the first time on Aug. 16, 1935 but found again the following year; also in the region of Lyon, for example at Poule (Rhône), on Sept. 7, 1938, (type Herb. Jossierand). It is known from Michigan and Washington in North America.

OBSERVATIONS: Smith has found a single fruiting body (Smith 50947) at Tahquamenon Falls State Park, Michigan, which apparently belongs here. The cheilocystidia are mostly capitate. Smith 56424 from a conifer log at Trinidad, California had the aspect of *G. mammillata* but extremely

variable cheilocystidia and spores golden ochraceous in KOH. No gelatinous pellicle was found on the pileus. We have not studied the type, but there is scarcely any doubt but that our collections belong here. Smith 62327 appears to belong here but in it the pilei were up to 40 mm broad, the veil was so thin that it did not cause the surface to appear silvery, and the cheilocystidia were remarkably constant in being capitate. The pileus clearly lacked a gelatinous epicutis. Our description above is a translation of Josserand's original description.

MATERIAL EXAMINED: Smith 41091; 48725; 50856; 50947; 56424; 62327 (variant).

We append this Latin description in order to validate the name given the species by Josserand.

Pileo 7–30 mm lato, margine primum incurvato, interdum mammillato, subochraceo; stipite exannulato; sporis in cumulo ochraceoluteis, $6.5\text{--}8 \times 4\text{--}4.8 \mu$, levibus; pleurocystidiis nullis; cheilocystidiis plerumque capitatis, hyphis fibulatis, epicute haud gelatinosa. Ad truncos. Typus in Gallia a M. Josserand collectus et in eiusdem herbario conservatus est.

65. *Galerina agloea* Smith & Singer, Mycologia 47: 574. 1955.
Illustrations: Fig. 87 (cheilocystidia).

Pileus 8–15(25) mm broad, obtuse with a bent-in margin young, convex to nearly plane in age, at times with a slight umbo, surface glabrous, moist, hygrophorous, tawny to ochraceous tawny moist, near pinkish buff when faded, striate when moist; flesh thin, odor and taste not recorded.

Lamellae close, narrow to moderately broad, adnate, ochraceous tawny mature, when young near pinkish buff, edges even.

Stipe 40–60 mm long, 1–2 mm thick, equal, not markedly fragile, darkening to bistre starting at the base and progressing upward, apex dingy honey color, veil slight and leaving thin coating of grayish fibrils over the lower portion.

Spores $7\text{--}8.5 \times 4\text{--}4.5 \mu$, ovate in face view, obscurely inequilateral in profile, pale ochraceous tawny in KOH, smooth. Basidia 4-spored. Pleurocystidia none. Cheilocystidia fusoid-ventricose with subacute apex, rarely somewhat capitate, $26\text{--}40 \times 5\text{--}9 \mu$, hyaline in KOH. Gill trama somewhat interwoven, pale cinnamon to pallid revived in KOH, subhymenium thin and not distinctive. Pileus trama homogeneous, dull cinnamon to pallid in KOH, no appreciably differentiated pellicle. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on conifer needles, Washington.

OBSERVATIONS: The incurved margin of the pileus, and the darkening stipe separate this species from *G. fuscobrunnea*. *G. agloea* can easily be mistaken in the field for *G. stylifera*, but the cap of the latter is viscid. The same character separates *G. agloea* from *G. mammillata*. Smith 47703 appears to be a 2-spored form of *G. agloea*. No veil was seen, the stipe was honey color over all, but only two fruiting bodies were found. The collection is placed here on the basis of the cheilocystidia and the lack of a pellicle.

MATERIAL EXAMINED: Smith 31612; 40462-*type*; 41003; 47536; 47703 (2-spored form); 49407; 50823.

Subsection *Bulluliferinae* Smith & Singer, *Sydowia* 11: 450. 1957.

This subsection, although monotypic, has been separated from the others with warty to smooth spores and lacking pleurocystidia because of the shape of the cheilocystidia. In many species of *Galerina* one observes vesiculate bodies near the margin of the pileus but in the present species, these bodies are not limited to that region and assume the position of the cheilocystidia. These vesiculose-pedicellate cheilocystidia appear sufficiently distinct in this section to justify the establishment of a subsection.

Type species: *Galerina bullulifera* Singer, *Lilloa* 25: 374. 1952.

66. *Galerina bullulifera* Singer, *Lilloa* 25: 374. 1952.
Illustrations: Fig. 43, 88 (cheilocystidia).

Pileus 7–15 mm broad, conic-papillate, later convex with declivous margin and a rather persistent papilla, glabrous, transparently striate over one half to two-thirds of the radius of the pileus when wet, drying from the umbo outward, ochraceous brown (*oak briar* to *burnt umber*) on disc and striae, usually slightly paler between striae, hygrophamous, fading to much paler (between *sunlight* and *chamois*, nearer the latter) flesh paler than the surface, with a slight raphanaceous odor.

Lamellae ocher brownish to brown (between *centennial brown* and *desert*), slightly more rusty from the spores in age, adnexed to adnate, rather narrow to rather broad (1.5–2.5 mm), close to subdistant, more often moderately close to subdistant than close.

Stipe 14–19 mm long, 0.7–1.5 mm thick, either tapering upward or subequal with a slight bulb at the base (1.7 mm), more or less concolorous with the pileus (*oak briar* at apex, *burnt umber* at base), the base eventually as deep as *Mandalay*, sometimes slightly striate near base, with fibrillose-pruinose apex, glabrescent; veil sordid pallid, forming narrow apical annulus, annulus appressed and soon evanescent.

Spores 8–9 × 4.8–5.2 μ, verrucose, with well marked plage and callus, with no or only indistinct suprahilar depression, but often with a distinct applanation, ellipsoid, with thick double wall, well-colored. Basidia 23–29 × 6.5–7.2 μ, four-spored, ventricose in the middle with a constriction below, fewer clavate. Pleurocystidia none. Cheilocystidia globose, with pedicel (7–14 × 2–3.5 μ), globular portion about 7–17.5 μ diam. Gill trama regular, consisting of stramineous to light rusty brownish hyphae of rather large diameter; epicutis of pileus consisting of pigmented or non-pigmented narrow hyphae, all repent; hypodermium more irregular and consisting of hyphae with a more variable diameter (often broader than those of epicutis) and strongly beset with incrusting pigment; flesh

underneath of similar hyphae but with less incrusting pigment. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: Gregarious on trunks of undetermined hardwood near *Phoebe porphyria* in the subtropical forest in winter (July), Selva Tucumano-Boliviana, Parque Aconquija near Tucuman, Argentina; Singer T-600-type (MICH).

Subsection *Mycenopsidae* Smith & Singer, *Sydowia* 11: 449. 1957.

This subsection has cheilocystidia with thicker necks than those of subsection *Tibiicystidiae*. The following three stirpes are recognized by the characters given in the following key.

Type species: *Galerina mycenopsis* (Fr.) Kühner, *Ency. Myc.* 7: 190. 1935.

Subsection *Mycenopsidae*

Key to Stirpes

1. Regularly associated with living *Sphagnum* and typically with elongated stipes ----- Stirps *Sphagnorum*
1. Habitat various, if on *Sphagnum* in bogs not regularly attached to sphagnum gametophytes ----- 2
 2. Spores distinctly roughened under oil immersion and plage distinctly delimited ----- Stirps *Hypnorum*
 2. Spores smooth to very faintly marbled or punctate; plage boundary absent or faint ----- Stirps *Mycenopsis*

Stirps *Sphagnorum*

Habitat on *Sphagnum*, veil typically present, cheilocystidia typically with necks 3 μ or more thick. The species grouped here have stipes characteristically elongated because of the habitat in deep moss. The spores are smooth or nearly so and pleurocystidia are absent. Stirps *Tibiicystis* contains species quite similar to the above but the necks of the cheilocystidia are typically 1.5–3 μ thick and the apices generally more capitate.

Key to Species

1. Veil copious, leaving zones over lower part of stipe or stipe often annulate near apex ----- 2
1. Veil thin to rudimentary or at times apparently lacking ----- 3
 2. Stipe 50–100(160) mm long; several zones of fibrils on stipe ----- 67. *G. paludosa*
 2. Stipe about 20 mm long; a single thin annular fibrillose zone ----- 68. *G. andina*
3. Spores 9–12 \times 4.5–6 μ ; veil present ----- 69. *G. norvegica*
3. Spores 8–10 \times 4–5 μ ; veil absent ----- 4
 4. Taste strongly farinaceous ----- 70. *G. gibbosa*

4. Not as above 5
5. Cheilocystidia 26–44 μ long, 8–14 μ broad 6
5. Cheilocystidia 30–65 μ long, 5–8 μ broad 7
6. Pileus 10–35 mm broad; cheilocystidia lacking a filamentose apical proliferation 71. *G. sphagnum*
6. Pileus 3.5–5.5 mm broad; cheilocystidia with an apical filamentose prolongation 72. *G. taimbesinhoensis*
7. Spores 8–9.5 μ long 73. *G. uchumachiensis*
7. Spores 9–12 μ long 8
8. Many spores with a thickened zone in the wall near the apex
..... see *G. allospora* (97)
8. Spores not as above 9
9. Pileus ochraceous tawny to tawny; stipe about 35 mm long; South American 74. *G. semiglobata*
9. Pileus pale to dark cinnamon brown young; stipe 50–70 mm long 10
10. Cheilocystidia enlarged at apex (apex typically 5–9 μ broad)
..... see *G. cainii* (106)
10. Cheilocystidia subacute to obtuse varying to subcapitate (3.5–6 μ broad at apex) 75. *G. septentrionalis*

67. *Galerina paludosa* (Fr.) Kühner, Encyc. Myc. 7: 184. 1935.

Agaricus paludosus Fries, Epicr. Myc. p. 209. 1838.

Galera paludosa Kummer, Führer in Pilzk. p. 75. 1871.

Tubaria paludosa (Fr.) Karst. Hattsv. 1: 445. 1879.

Illustrations: Pl. 10. Fig. 89 (cheilocystidia).

Pileus (0.5)10–25(30) mm broad, obtusely conic to convex young, margin incurved against the gills, rarely acutely conic, expanding to campanulate or broadly convex to nearly plane, usually retaining a conic umbo, surface moist and hygrophorous, “ochraceous tawny” to “tawny” when fresh, fading to “ochraceous buff” or a duller yellow, at first with a thin coating of white velar fibrils which soon separates into appressed to recurved hyphal fascicles that eventually disappear, margin translucent striate before fading; flesh thin, fragile, more or less concolorous with surface, odor and taste not distinctive.

Lamellae broad, close to subdistant, adnate or with decurrent tooth, melleous to pallid brownish (*chipmunk*) young, ochraceous tawny or darker in age, edge whitish and even to minutely crenulate.

Stipe (50)70–160(200) mm long, (1)1.5–3(4) mm thick, equal, watery fragile, usually undulate, watery ochraceous (*hazel* or *noisette*), usually with a superior to apical submembranous white annulus or fibrillose zone and with scattered bits of the veil adhering irregularly or in zones below the annular ring, in age more or less glabrescent, base at times pubescent to mycelioid down in the moss.

Spores (8)9–10.5(11) \times (5)6–7(8) μ , broadly ovate in face view and varying to subelliptic, in profile slightly inequilateral, apical callus present,

tawny and smooth to very slightly punctate to rugulose as revived in KOH, color practically the same in Melzer's sol., plage distinct. Basidia 4-spored, projecting half their length when sporulating. Pleurocystidia none. Cheilocystidia (25)30–44.5 × 6–12 × 3–5 × 3.5–9 μ, abundant, fusoid-ventricose with obtuse apices or if subcapitate 6.7–9 μ at apex, rarely cylindrical, thin-walled or rarely with slight thickenings in the wall or with incrustations, hyaline to pale melleous in KOH. Gill trama of subparallel hyphae yellow in KOH. Pileus trama homogeneous, no distinct cuticle differentiated, hyphae 8–15 μ in diam. and with clamps at the cross walls, yellow to pale tawny in KOH from thin incrustations of pigment and the presence of pigment in the walls. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: This is the most common species in the sphagnum bogs throughout the United States and Canada. It may be expected from late spring to late fall. In the southern part of Michigan it is most abundant from late May through June. It is also well known in Europe, and is very likely circumpolar in distribution.

OBSERVATIONS: In small isolated drier patches of *Sphagnum* the carpophores tend to be small and with thin stipes. The suprahilar area on the spore is smooth and flattened slightly but can hardly be described as a depression. With a good oil immersion lens it can be shown that the surface of the spore varies from slightly ornamented to smooth. The presence of the white fibrillose zone left by the veil and the variously distributed veil remnants below it is a distinctive field character among the long-stiped species on *Sphagnum*. Old fruiting bodies in which the hymenium has suffered damage from insects or other sources frequently develop pleurocystidia, similar to the cheilocystidia, over the damaged areas. However, we have not found pleurocystidia in young or maturing pilei in which the hymenium was undamaged. The walls of the cheilocystidia frequently show local thickenings; these are not regularly present at the base of the neck but we have observed them in the upper part of the neck as well as in the apex, and occasionally below the ventricose portion. In *G. tibiicystis* the cheilocystidia are distinctly and constantly more capitate, the spores have much more roughened walls, and there is no veil.

In some collections the spores are almost lentiform (more strongly inequilateral) and broader in face view than in other collections. We refer particularly to some northern and montane populations of North America (Singer N-957, W-18, 34, 35). These are also usually collections with more noticeable exosporial ornamentation and more distant and subdecurrent lamellae.

In Smith 61251 from Sheephead Lake Area, Chippewa County, Michigan, the cheilocystidia have narrower necks than usual. However, in Bigelow 4970 we found short fat cheilocystidia 22–40 × 11–14 × 4–6 × 5–8 μ and some of them were vesiculose and 12 μ broad. In view of the lack of macroscopic data we hesitate to give taxonomic status to Bigelow's variant. In other collections we have found the ventricose portion of the cheilocystidia up to 12 μ broad (6–12 μ in some fruit bodies).

MATERIAL EXAMINED: Bigelow 2981; 2983; 2984; 2985; 2986; 3008:

3106; 3222; 4970; 4971; 4976; 4977; 6042; 6457; 6625 (?); 7536 (MICH). J. Favre, Joux Valley, Switzerland, June 9, 1946 (MICH). Hesler 18195 (TENN). Josserand, France, 7-8-37 (MICH). Kauffman, two collections as *Galera sphagnorum* (MICH). E. B. Mains 32-109 (MICH). L. H. Pennington, Mud Lake Bog, Whitmore Lake, Michigan, June 2, 1906 (MICH). Isle of Eigg, Scotland, 7-29-51, communicated by R. W. Dennis (MICH). Singer W-18; W-34; W-35; N-957; N-1228a; N-1228c; also material from both Europe and North America examined previously. Smith, Mud Lake Bog, Whitmore Lake, Michigan, 8-16-29; Rock River, Michigan, Sept., 1929; 32-33; 32-109; 33-33; 33-400; 33-522; 33-897; 19 (typical); 36; 67; 144; 260; 6249; 25810; 33552; 37010; 38975; 40253; 40260; 41242; 41243; 41295; 41296; 41389; 41725; 42177; 42578; 42580; 42581; 42582; 49558; 49843; 61251(?); 61682. Thiers 615; 2976 (MICH). Tuomikoski, Finland, 6-16-52 and 7-29-52 (H). L. Wehmeyer 508 (MICH).

68. *Galerina andina* Singer, sp. nov.

Illustrations: Fig. 90 (cheilocystidia).

Pileo 2.5 mm lato, ferrugineo-brunneo vel ochraceo-brunneo, alto, campanulato, striatulo; lamellis aureo-brunneis, ascendentibus, mediocriter latis vel latis, confertis, adnexis; stipite 20 × 0.7 mm concolori cum lamellis sed basin versus subpallido; annulo apicali sericeo praesente; sporis 8.8–11.3 × 6–6.5 μ, melleis in alkali, levibus vel sublevibus, zona suprahilari bene delimitata praeditis; basidiis 4-sporis; 20 × 3.3 × 4.7 μ vel 33–42 × 6.5–7.8 μ, cheilocystidiis plerumque ventricosus ad basin ampullaceisque, apice cylindraceutis vel subcylindraceutis obtusis; pleurocystidiis nullis; hypodermii cellulis admodum incrustatis pigmento; epicute haud bene evoluta; hyphis omnibus fibulatis.

Pileus 2.5 mm broad, 2.8 mm high, campanulate, glabrous, naked, with long translucent striations when moist, hygrophanous, rusty-ochraceous tawny, *Peruvian brown* on disc and striae, bronze yellow *snow shoe* to *nugget* between striae, paler when faded; context inodorous.

Lamellae ascending, medium broad, close, adnexed, with pallid edges, faces bronze yellow *nugget* or *antique gold*.

Stipe 20 mm long, 0.7 mm thick, filiform, unicolorous (*nugget* or *antique gold*) except for an almost pallid extreme base, usually with a distinct annulus showing when young.

Spores 8.8–11.3 × 6–6.5 μ, ellipsoid, some slightly beaked at apex, smooth or practically so but with a fine ragged line marking the plage, melleous in KOH or NH₄OH. Basidia 4-spored, very few 2-spored, 29–31 × 7.7–9.7 μ. Pleurocystidia none. Cheilocystidia 33–42 × 6.5–7.8 μ, ventricose to only slightly enlarged at the base, ampullaceous, neck up to 20 μ long and 3–4.7 μ thick, apex 3.3–4.5 μ in diam.; paraphysoid balloon-shaped cells present on edge near cap margin, often brownish, (27–28 × 13–14 μ). Epicutis poorly developed (only a very thin layer of hyaline hyphae present), non-gelatinized; hypodermium consisting of a cutis of elongated hyphae with a sordid cinnamon (in NH₄OH), beige, pale bister

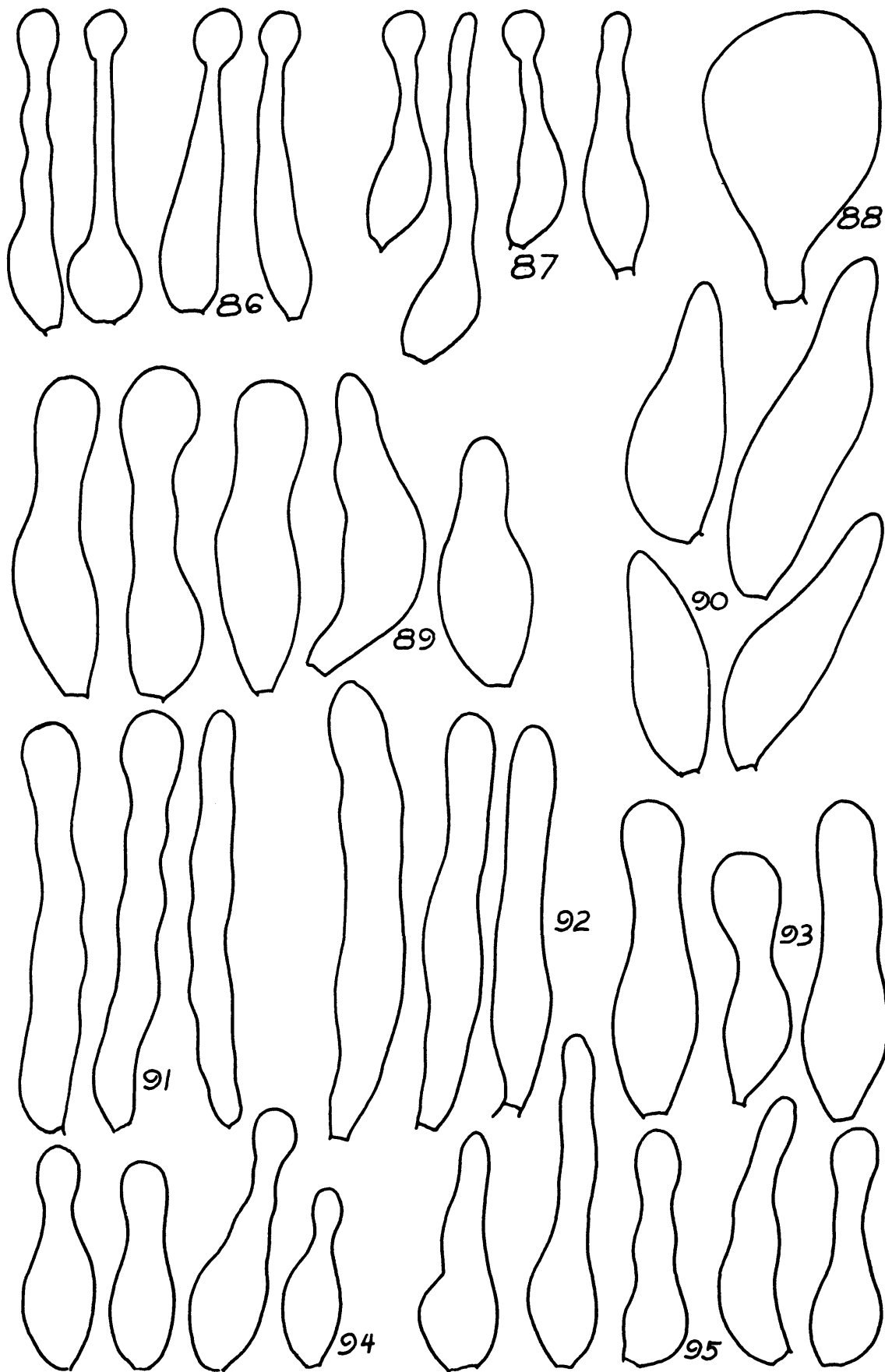


Fig. XI

Cystidia: Fig. 86, cheilocystidia of *G. pseudo-badipes*; 87, cheilocystidia of *G. agloea*; 88, cheilocystidium of *G. bullulifera*; 89, cheilocystidia of *G. paludosa*; 90, cheilocystidia of *G. andina*; 91, cheilocystidia of *G. norvegica*; 92, cheilocystidia of *G. gibbosa*; 93, cheilocystidia of *G. sphagnum*; 94, cheilocystidia of *G. ferruginea*; 95, cheilocystidia of *G. decipiens* var. *decipiens*.

or melleous-bister (in KOH), dissolved intracellular pigment, and a brown to melleous-ferruginous heavily incrusting epicellular pigment. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On *Sphagnum* in open places in the Cejas region (at about 3000 m. alt.), fruiting in the summer, Cotapata, prov. Nor-Yungas, Depto. La Paz, Bolivia, Singer B-509-*type* (MICH).

OBSERVATIONS: The habit of this tiny silky-annulate species, in connection with the shape of the cheilocystidia and the smoothness of the spores, is characteristic. It appears to be closest to *G. dicranorum* in the characters of the spores and cheilocystidia but differs in being annulate and, as far as known, characteristically found on *Sphagnum*.

69. *Galerina norvegica* Smith, sp. nov.

Illustrations: Fig. 91 (cheilocystidia).

Pileus 5–10 mm latus, obtuse conicus, glaber, hygrophanus, striatus; lamellae subdistantes latae fulvae; stipes 3–4 cm longus, \pm 1 mm crassus, deorsum sparsim fibrillosus; sporae 8–10 \times 4–5 μ , leves; cheilocystidia 50–70 \times 5–8 μ . Specimen typicum legit Jens Stordal (No. 1548), Norway, 2 Sep. 1948.

Pileus 5–10 mm broad, obtusely conic expanding to campanulate, glabrous, moist, hygrophanous, ochraceous tawny moist, translucent-striate before fading.

Lamellae subdistant, broad, ascending, ochraceous tawny, edges fimbriate.

Stipe 3–4 cm long, \pm 1 mm thick, equal, pale buff above, somewhat darker below (as dried) pruinose above and with traces which may indicate that a thin veil is present.

Spores 8–10 \times 4–5 μ , subelliptic in face view, somewhat inequilateral in profile, *smooth*, pale tawny to ochraceous tawny in KOH, wall thickened but no apical pore visible. Basidia 4-spored, hyaline to ochraceous in KOH. Pleurocystidia none. Cheilocystidia 50–70 \times 5–8 μ , filamentose to filamentose-subcapitate, often with flexuous walls, hyaline or rarely filled with ochraceous pigment as revived in KOH, thin-walled. Pileus trama with hyphae having encrusted pigment, ochraceous in KOH. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Collected on *Sphagnum* by Jens Stordal (No. 1548-*type*) in Norway, Sept. 2, 1948 (O).

OBSERVATIONS: The greatly elongated cheilocystidia and small smooth spores are distinctive, together with the habitat.

70. *Galerina gibbosa* Favre, Bull. Soc. Myc. Fr. 52: 140. 1936.

Galera gibbosa (Favre) Kühner in Kühner & Romagnesi, Flore Anal. Champ. Supér. p. 319. 1953.

Illustrations: Fig. 92 (cheilocystidia).

Pileus up to 16 mm broad, ordinarily smaller, at first conic-campanulate, then with spreading margin and ordinarily with a sharply projecting umbo, hygrophanous, evenly colored, honey color or pale honey color, when moist and translucent striate to umbo, paler and opaque when faded, glabrous, very fleshy on disc and thin on margin; flesh concolorous at stipe, with a strong farinaceous odor and taste.

Lamellae crowded (13–20 reach the stipe, 1–3 tiers of lamellulae), rather thin, ordinarily very broad and triangular, adnate and decurrent by a tooth, rarely slightly emarginate, at first concolorous with pileus but becoming slightly more ochraceous.

Stipe long, up to 70 mm or more, cylindrical or very gradually narrowed toward apex, up to 3 mm thick, slightly flexuous, fistulose, pallid, with thin remnants of a veil some distance from apex in young specimens, fibrillose-pruinose at apex, glabrous over all when veil remnants are gone.

Spores 9–12 × 4.5–6 μ, inequilateral in profile view, subelliptic in face view, smooth (under oil). Basidia 4-spored, 27–34 × 8–10 μ. Pleurocystidia none. Cheilocystidia 40–85 μ long, very slightly differentiated; cylindrical to flexuous, apex obtuse to subcapitate, rarely enlarged below, thin-walled. Gill trama regular. Pileus trama homogeneous. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious in alpine bogs, Switzerland and Scandinavia in Europe, Michigan in North America.

OBSERVATIONS: We have one collection from North America which apparently belongs here. The undulating stipe was a pronounced feature of the Michigan collection. *G. sphagnicola* is similar in taste, odor and habitat, but its spores are calyptrate.

MATERIAL EXAMINED: Smith 43917. Stordal 8010.

71. *Galerina sphagnorum* (Fr.) Kühner, Ency. Myc. 7: 179. 1935.

Agaricus hypnorum var. *sphagnorum* Fries, Syst. Myc. 1: 267. 1821.

Agaricus sphagnorum (Fr.) Lasch, Linnaea 3: 417. 1828.

Galera hypnorum var. *sphagnorum* (Fr.) Quélet, Enchir. Fung. p. 107. 1886.

Galera sphagnorum (Fr.) Sacc. Syll. Fung. 5: 869. 1887.

Conocybe sphagnorum (Fr.) Murrill, Mycologia 4: 248. 1912.

Galerula sphagnorum (Fr.) Murrill, N. Am. Fl. 10: 167. 1917.

Illustrations: Pl. 3, fig. D, pl. 11. Fig. 93 (cheilocystidia).

Pileus (6)10–35 mm broad, conic, becoming campanulate to hemispheric and often papillate, sometimes becoming plano-umbonate but usually remaining unexpanded, glabrous moist, translucent-striate almost to disc, hygrophanous, fulvous to pale fulvous (“tawny” to “ochraceous tawny” or *desert* to *sorrel*), the margin paler (*raw sienna* to *mast color*), fading to a very pale yellow or cinnamon buff (*pl. 9 F 4* or *10 F 5*), often with scattered fibrils from the veil along the very young margin, soon naked; flesh fragile, thin, hygrophanous, concolorous with surface or when faded paler, odor none to slightly farinaceous or slightly raphanaceous, taste mild to weakly farinaceous.

Lamellae broad (up to 4 mm), close to subdistant, broadly adnate or more rarely with a slight tooth, eventually seceding or else merely rounded-adnexed and at first subascendant, eventually practically horizontal and subventricose, pallid ochraceous ("cream buff"), becoming ochraceous tawny (*Saratoga* to *Yucatan*), with even or slightly fimbriate edges.

Stipe 30–100(120) mm long, 1–3 mm thick, equal or nearly so, sometimes flexuous, concolorous with the pileus (more nearly "warm buff" when young), moss-covered portions usually paler, sometimes (Brazilian collection) assuming a yellow (*jonquil* to *pl. 10 I 5*) tone, with scattered fibrils or delicate white flecks from the rudimentary veil at first, but soon glabrescent, pruinose at apex but with the margin of the pileus sometimes (rarely) forming a fugacious single apical annular belt, never several belts.

Spores 8–11 × (4)5–6.5 μ, slightly inequilateral in profile view, ovate-subamygdaliform in face view, tawny in KOH (well pigmented), almost smooth to very slightly uneven but circumference appearing smooth, with a demonstrable plage but the boundaries very indistinct. Basidia four-spored, 24–33 × 7–10.3 μ. Pleurocystidia none or like the cheilocystidia and very near the edge. Cheilocystidia fusoid-ventricose to cylindrical, more rarely cylindrical-clavate, a smaller or larger percentage subcapitate, 30–65 × 8–12 × 4–6 × 6–9 μ, the subcylindrical to clavate ones 30–65 × 5–10 μ, all hyaline and thin-walled, obtuse to enlarged at apex.

Gill trama subparallel becoming more interwoven, ochraceous from incrusting pigment. Pileus trama homogeneous, ochraceous tawny or yellow in KOH, with incrusting pigment; epicutis poorly differentiated, its hyphae slightly less pigmented and thinner on the average but not loosely arranged or gelatinized. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on various species of *Sphagnum*, widely distributed, Europe, North America, Brazil, Japan, etc. Common late in the season at times. It is the only species which reaches the warm portions of the South.

OBSERVATIONS: During the late fall of 1953, which was a warm relatively dry season, this species fruited in quantity in Mud Lake Bog, Cheboygan County, Mich., and it may well be that it is a common species in bogs during such seasons. It is interesting to note that as far as our information goes it is the one species of the group occurring in the warm areas of the South as well as in boreal bogs.

G. sphagnorum has frequently been confused with *G. tibiicystis* Atk. in North America, and for good reason. They grow in identical habitats and have much the same appearance. They differ from *G. paludosa* in lacking any appreciable veil remnants in mature carpophores, though in button stages a rudimentary veil can be demonstrated for *G. sphagnorum*, whereas in *G. tibiicystis* none is present. The cheilocystidia in *G. sphagnorum* vary around the typical fusoid-ventricose pattern whereas in *G. tibiicystis* they are typically capitate. It is a common thing to find stray carpophores of *G. sphagnorum* mixed in with collections of *G. tibiicystis* and vice versa. The fruiting periods of the two overlap, but when one species is abundant, the other

is usually rare. We have no evidence that a single mycelium will produce fruiting bodies with the characters of both species.

Since Fries (1821) described the stipe as "obsolete fibrillosus", we have adhered to the concept of a poorly developed veil in this species, a concept in line with current interpretations based on Kühner's monograph.

MATERIAL EXAMINED: Bigelow 6222 (MICH). Hesler 21037 (TENN). Hongo Herb. No. 1111; 1354; (MICH). Lundell 1475 (MICH). Mains 6043 (MICH). Singer, various collections from Europe and an ample collection from Brazil, Serra (1000 m elev.) at Taimbesinho, 29° and 50.5° Rio Grande do Sul, Sept. 5, 1951 (LIL). Smith, Mud Lake Bog, Whitmore Lake, Michigan, July 21, 1929; 33-524; 33-614; 11034 (typical); 33908; 36077; 37016; 41268; 43912; 44016; 44020; 44021; 44029; 44031; 44034; 44037. E. West, Beville's Road near Gainesville, Fla., Dec. 2, 1938 (FLAS).

72. *Galerina taimbesinhoensis* Singer, Lilloa 26: 148. 1953 (1954).
Illustrations: Fig. 96 (cheilocystidia).

Pileus 3.5–5.5 mm broad, about as high as broad, varying from campanulate to campanulate-papillate and eventually becoming broadly campanulate and subumbonate, transparently striate over about one half of the radius, color of *G. sphagnorum* but often more yellow than ochraceous brown, in many caps at least partly ochraceous brown; flesh inodorous.

Lamellae ventricose and subascendant, adnexed, rather distant or subdistant, moderately broad to broad, ochraceous brown.

Stipe 20–35 mm long, 1 mm thick, tapering upward, pruinose at the apex, with extremely fugacious scanty veil, soon glabrous or innately sericeous, yellowish pallid, in some cases eventually becoming brown.

Spores 8.2–11 × 5.2–6.2 μ, some elongated and subfusiform-subcylindric and reaching 11.7 × 4.5 μ, typically on 4-spored basidia, subfusoid-ellipsoid, moderately well colored (in NH₄OH), with extremely fine punctation, practically smooth as viewed in optical section, without a distinct plage, with double but moderately thick wall, with a slight suprahilar depression or applanation, often with a knob-like mucro at the apex, with apical callus. Basidia 20.5–25 × 6.8–9.7 μ, mostly clavate, hyaline or melleous, 2-, 3-, or 4-spored, the majority 4-spored. Pleurocystidia none, or in occasional fruit bodies present near the gill edge. Cheilocystidia characteristically ventricose below and long-efilate cylindrical above, usually with a filamentous upper portion longer than the ventricose portion, rarely with a slight to distinct (but then shapeless) swelling at the apex, never truly capitate, swelling where present up to 6.2–10.3 μ in diameter, usually equal above and about 2.3 μ thick, 31–51 × (7)9.5–13.8 μ, numerous but with some occasional basidia intermixed, and, near margin of pileus, also with some pseudoparaphysoid brownish broadly fusoid rounded bodies. Gill trama regular, its hyphae narrow near the basidia and broad and pigment-incrusted (melleous in the middle layer). Clamp connections present in the

connective as well as in the fundamental hyphae and at the base of the basidia and cheilocystidia.

HABIT, HABITAT AND DISTRIBUTION: Exclusively on *Sphagnum* in partly burned-over treeless bog in the montane zone together with *G. sphagnorum* and *G. semiglobata*, Taimbesinho, Rio Grande do Sul, Brazil Singer B-101-type (LIL) (isotype MICH).

OBSERVATIONS: This species as well as the preceding one is remarkable for the poor development of the plage in correlation with the numerous clamp connections.

73. *Galerina uchumachiensis* Singer, sp. nov.

A *Galerinis sphagneti* vicinis differt pileo obtuse conico stipite ochraceo-luteo, cheilocystidiis ampullaceis apice cylindraceo praeditis nec non sporis minoribus. Pileo 6 mm lato; stipite 23×0.4 mm. Ad sphagna in Bolivia leg R. Singer B-1470. Typus in Herbario Michiganensi conservatur.

Pileus up to 6 mm broad and 5 mm high, obtusely conic or in some the disc slightly depressed but still conic-campanulate, translucent striate over half way to disc, hygrophanous, ochraceous brown to golden brown (between *raw sienna* and *Yucatan*), fading to much paler, glabrous; context with very weak raphanaceous odor and taste.

Lamellae golden ochraceous brown, *antique gold*, distant, broad, rather narrow, adnexed and rounded at the stipe.

Stipe 23 mm long, 0.4 mm at apex, 1 mm at base, evenly ochraceous yellow (*honey sweet*), apex mealy-pruinose; no veil evident.

Spores $8.3\text{--}9.2 \times 5\text{--}5.8 \mu$, with a complex and somewhat thickened wall, usually without a suprahilar depression, often with an apical beak terminated with a distinct callus, elliptic to ovate-beaked in face view, somewhat inequilateral in profile, plage smooth and well-defined by a ragged line, with an exosporial ornamentation which is finely punctate causing the spore to appear finely roughened in optical section, rather light colored (brownish-yellow to yellowish-cinnamon in KOH), the exosporial ornamentation hardly much deeper colored than the episporium, without any strong perisporial ornamentation or loosening. Basidia $16\text{--}21 \times 7\text{--}8 \mu$, 4-spored, rarely 2-spored, hyaline, ventricose, tapering both ways from mid-portion. Pleurocystidia none. Cheilocystidia $28\text{--}35 \times 6.3\text{--}8 \mu$, (gill edge nearly heteromorphic), not incrustated, thin-walled throughout, hyaline but base (including lower part of enlarged portion) often stramineous or pale brownish to yellowish, ampullaceous from a basal enlargement, neck elongate and $3.2\text{--}3.8 \mu$ in diam., apex obtuse to rarely subacute (not capitate or subcapitate). Hymenophoral trama pale melleous, with a slight to distinct thin granular pigment incrustation, regular, with hyaline to yellowish hyphal walls, the wall thin, the diameter variable. Hypodermium of densely packed hyphae with the walls heavily incrustated with rusty brown pigment, the whole layer very deeply colored ferruginous-fulvous, forming a cutis;

epicutis consisting of a lower layer next to the hypodermium but of slightly narrower hyphae and a fugacious and extremely thin outermost layer of hyaline slightly gelatinous hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On *Sphagnum* in the fog forest (Cejas) formation at 2200 m. alt., R. Singer B-1470-*type*, Cerro Uchumachi, prov. Nor-Yungas, Depto. La Paz, Bolivia (MICH).

OBSERVATIONS: This species has smaller spores than *G. hypnorum* and its variants, and no veil was evident. The habitat on sphagnum may also be distinctive. *G. carbonicola* has much more highly pigmented spores as revived in KOH and they are narrower in relation to their length. Actually *G. uchumachiensis* is very close to *G. decipiens* but occurs on sphagnum, the spores are somewhat beaked, and the cheilocystidia are narrower. *G. semiglobata* differs in the raphanaceous odor and taste and in the presence of a veil.

74. *Galerina semiglobata* Singer, Lilloa 26: 147. 1953 (1954).

Pileus about 10 mm broad, hemispheric-convex and remaining so, only in age the margin sometimes reflexed or less declivous, with long transparent striations when moist, glabrous, colors as in *G. sphagnorum*; odor not distinctive.

Lamellae as on *G. sphagnorum*, between *nugget* and *old gold*.

Stipe 35 mm long, 1.5 mm thick, subequal, not pruinose, with white fibrillose veil but evelate in adult material, eventually more ocher-brownish than in *G. sphagnorum*.

Spores $9-11.7 \times 5.5-7.3 \mu$, rarely a few $12 \times 5 \mu$, with extremely fine punctation from the exosporial ornamentation, some without any ornamentation, without a distinct plage, fusoid ellipsoid, with distinct epi- and endosporium, not collapsing. Basidia $22.5-32 \times 8-9 \mu$, 4-spored, a few 2-, 3-spored. Pleurocystidia none. Cheilocystidia $28-44 \times 5.5-7.3 \mu$, mostly $8-8.5 \mu$ below, with a long equal neck $2.7-3.7 \mu$ broad, slightly capitate or subcapitate or varying to equal (not as in *tibiicystis*), rarely up to 7μ broad at apex, numerous and making the edge almost heteromorphous, hyaline or more rarely ochraceous brownish. Gill trama regular, consisting of hyaline to melleous hyphae which are slightly pigment incrustated. Cuticle of pileus consisting of greatly elongated hyaline hyphae, all appressed-repent; hypodermium with broad hyphae, incrustated by the ochraceous brown pigment, forming a well-differentiated layer. Clamp connections at base of basidia and cheilocystidia, also on tramal hyphae.

HABIT, HABITAT AND DISTRIBUTION: In treeless sphagnetum of the montane zone, in denser groups than *G. taimbesinhoensis* and *G. subtibiicystis* which grow nearby, also in a burned over part of the bog, Taimbesinho, Rio Grande do Sul, Brazil, Nov., Singer B-101-*type* (LIL) (isotype MICH).

OBSERVATIONS: The thin veil, the small to medium-sized cheilocystidia, and relatively small spores are distinctive. In contrast to *G. taimbesinhoensis* the plage of the spore is well delimited and smooth.

75. *Galerina septentrionalis* Smith, sp. nov.

Illustrations: Pl. 13, fig. A. Fig. 97 (cheilocystidia).

Pileus 6–15(20) mm latus, obtusus demum campanulatus, lubricus, saepe nitens, cinnamomeo-brunneus (Ridgway); stipes 5–8 cm latus, submelleus, deorsum saepe fulvus, subfibrillosus; velum albidum, sparsum; sporae 9–12 × 5–6 μ, leves vel subleves; cheilocystidia ad apicem 3.5–6 μ lata, obtusa vel subcapitata. Specimen typicum legit Smith 61768 (MICH) prope Mare du Sault, Laurentide Park, Quebec, Canada, 2 Sep. 1959.

Pileus 6–15(20) mm broad, obtuse with a straight margin young, expanding to broadly campanulate, umbo obtuse, surface smooth and when moist somewhat shining, at times lubricous to subviscid, "cinnamon brown" or paler and grayish brown, hygrophanous and dingy buff when faded; context thin, fragile, odor and taste slight and hardly distinctive.

Lamellae broad, close, ascending adnate, dull tawny brown mature, at first dingy buff, edges even.

Stipe 50–80 mm long, 1–2 mm thick, equal, undulating, dingy melleous over all or paler above, base at times dull fulvous but color typically fading in drying process and hence base of stipe often pallid as dried, veil thin to rudimentary and leaving a faint evanescent medial to superior fibrillose zone.

Spores 9–12 × 5–6 μ, inequilateral in profile view, subelliptic in face view, smooth or nearly so, plage line absent to very faint (in only a few spores), color in KOH ochraceous to brownish ochraceous, in Melzer's solution dark red-brown, and apical pore small but often fairly distinct under oil immersion. Basidia 4-spored, rarely 2-spored. Pleurocystidia none. Cheilocystidia 27–39 × 5–8 × (2.5)3–4 × 3–6 μ, thin-walled, smooth, hyaline; epicutis of pileus of slightly narrower hyphae than the hypodermal zone and not more than subgelatinous as revived in KOH. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on *Sphagnum* and on other mosses with some *Sphagnum* intermingled, Laurentide Park, Quebec, Canada, late summer, common in 1959.

OBSERVATIONS: This species at times almost approaches in color *G. stagnina*; the small apical germ pore may have some significance from the standpoint of evolution, but is not sufficiently well developed to place the species in *Porospora*. *G. septentrionalis* is readily distinguished from *G. cainii* by the narrower apex of the cheilocystidia and the narrower basal ventricose portion. The colors of the two are quite similar. In both the spores are smooth for all practical purposes and the plage line, when one is present, is extremely faint. *G. allospora* var. *laurentiana* has microscopic characters quite similar to those of *G. septentrionalis* but is short-stiped, and has the appearance of a small *Cortinarius*. *G. septentrionalis* may have colors very similar to *G. sphagnorum* (see Smith 44016) but this is usually seen if the caps are remoistened after fading. The cheilocystidia with their narrower apices will distinguish such collectons from *G. sphagnorum*. Smith 61666 from Mercier, Laurentide

Park, Quebec, had a pallid stipe and no veil. The pileus was “snuff brown” and faded to a grayish buff or finally whitish. The cheilocystidia were up to 15 μ broad in the ventricose part, but the apices were subacute to obtuse and 3–5 μ broad. We place this collection here provisionally.

MATERIAL EXAMINED: Smith 44016; 61508; 61512; 61577; 61578; 61585; 61589; 61595; 61644; 61666; 61681; 61739; 61742; 61746a; 61753; 61756; 61757; 61760; 61768-type; 61838.

Stirps *Hypnorum*

Pileus typically conic to convex and the margin straight when young; pleurocystidia absent; cheilocystidia present; spores as seen under oil immersion distinctly (though at times weakly) ornamented.

Species with the habit and appearance of *G. marginata* should be looked for in section *Naucoriopsis* (especially *G. wellsiae*).

Key to Species

1. Stipe of immature carpophore with a membranous to fibrillose annulus ----- 2
1. Carpophore evelate or veil thin to rudimentary ----- 4
 2. Spores 10–13 \times 6–7 μ (2-spored) ----- [see also *G. wellsiae* (148)] 76. *G. jaapii* f. *jaapii*
 2. Spores smaller ----- 3
3. Spores 8–11 \times 4–5 μ (4-spored); pileus often acutely umbonate ----- 76a. *G. jaapii* f. *mamillata*
3. Spores 7–9.5 \times 5–5.5 μ ----- [see *G. minima* (173)] 77. *G. bryophila*
 4. Pileus dull ferruginous red; plage of spores not perfectly smooth; on burned peat ----- 78. *G. ferruginea*
 4. Not with above combination of characters ----- 5
5. Spores 5.5–8 μ long ----- 6
5. Spores longer ----- 7
 6. Cheilocystidia cylindric with obtuse apices ----- 80. *G. glacialis*
 6. Cheilocystidia with acute apices (see *G. minima*) -- 79. *G. californica*
7. Pileus yellowish to fulvous or tawny ----- 8
7. Pileus orange-brown to dark rusty brown (badius) to cinnamon brown at least at first ----- 14
 8. Spore ornamentation loosening variously; cheilocystidia 38–60 \times 8–13 μ ; stipe reddish brown below ----- 82. *G. rugisperma*
 8. Not with above combination of characters ----- 9
9. Spores pale yellow in KOH ----- 85. *G. mniophila* sensu Kühner
9. Spores pale to dark fulvous in KOH ----- 10
 10. Cheilocystidia typically with acute to obtuse apices; spore surface marbled to slightly roughened; spore color in KOH pale fulvous (not darker) ----- 87. *G. hypnorum*
 10. Cheilocystidia obtuse to capitate; spores often with heavier ornamentation and often darker than pale fulvous in KOH ----- 11

11. At maturity the stipe darker toward the base than near the apex -- 12
11. Stipe more or less evenly colored ----- 13
12. Spore surface distinctly warty-rugulose but not blistered
----- 84. *G. alluviana*
12. At least some spores showing a tendency to form blisters along the
plage line ----- 83a. *G. decipiens* var. *separans*
13. Spores 8–10 × 4.5–5.5 μ ----- 83. *G. decipiens* var. *decipiens*
13. Spores 9–12 × 5–7 μ ----- 89. *G. subbadipes*
14. Pileus orange brown; epicutis of pileus somewhat gelatinized; spores
10–13 × 6–7.5 μ ----- see *G. longinqua* (176)
14. Not with above combination of characters ----- 15
15. Lamellae russet when young; cheilocystidia subacute to obtuse; grow-
ing on burned areas ----- 81. *G. carbonicola*
15. Not as above ----- 16
16. Stipe pallid; spores 5–6 μ broad ----- 86. *G. hypnicola*
16. Stipe more pigmented; spores often broader ----- 17
17. Cheilocystidia not capitate; veil practically absent ---- 88. *G. obscurata*
17. Cheilocystidia generally capitate to subcapitate; veil at least in buttons
visible as a cortina ----- 18
18. Stipe eventually deeper brown at base; spores often over 6 μ broad;
alpine species growing among small mosses ----- 90. *G. hypsizyga*
18. Not combining these characters ----- 19
19. Apex of cheilocystidia as broad or broader than ventricose part; stipe
gradually strongly darkening, with belt-like zone of appressed fibrils;
growing on heaps of *Carex* and *Typha* ----- 89. *G. subbadipes*
19. Apex of cheilocystidia considerably narrower than ventricose portion;
stipe not strongly darkening, without belt-like fibrillose zone; growing
among mosses ----- 87. *G. hypnorum*

76. *Galerina jaapii* Smith & Singer, *Mycologia* 47: 574. 1955.

f. *jaapii*

Illustrations: Pl. 12, figs. A & F. Fig. 98 (cheilocystidia).

Pileus 6–18 mm broad, broadly conic, expanding to plano-umbonate, rarely mammillate, surface glabrous, lubricous, nearly “cinnamon brown” on disc or over all when young, soon dull tawny to ochraceous tawny over the margin, conspicuously translucent striate, hygrophanous, fading on disc first to pinkish buff; flesh very soft and watery, odor and taste none.

Lamellae broad, subdistant, horizontal, bluntly adnate, cinnamon buff young, finally dark ochraceous tawny, edges even.

Stipe 30–100 mm long, 1–2.5 mm thick at apex, equal or slightly larger downward, surface glabrous, naked and moist except for a thin white submembranous annulus, honey color near the apex or over all at first, ochraceous tawny over lower half in age.

Spores (9)10–13(15) × 6–7 μ, narrowly inequilateral in profile, elongate-ovate in face view, minutely roughened over all except the smooth

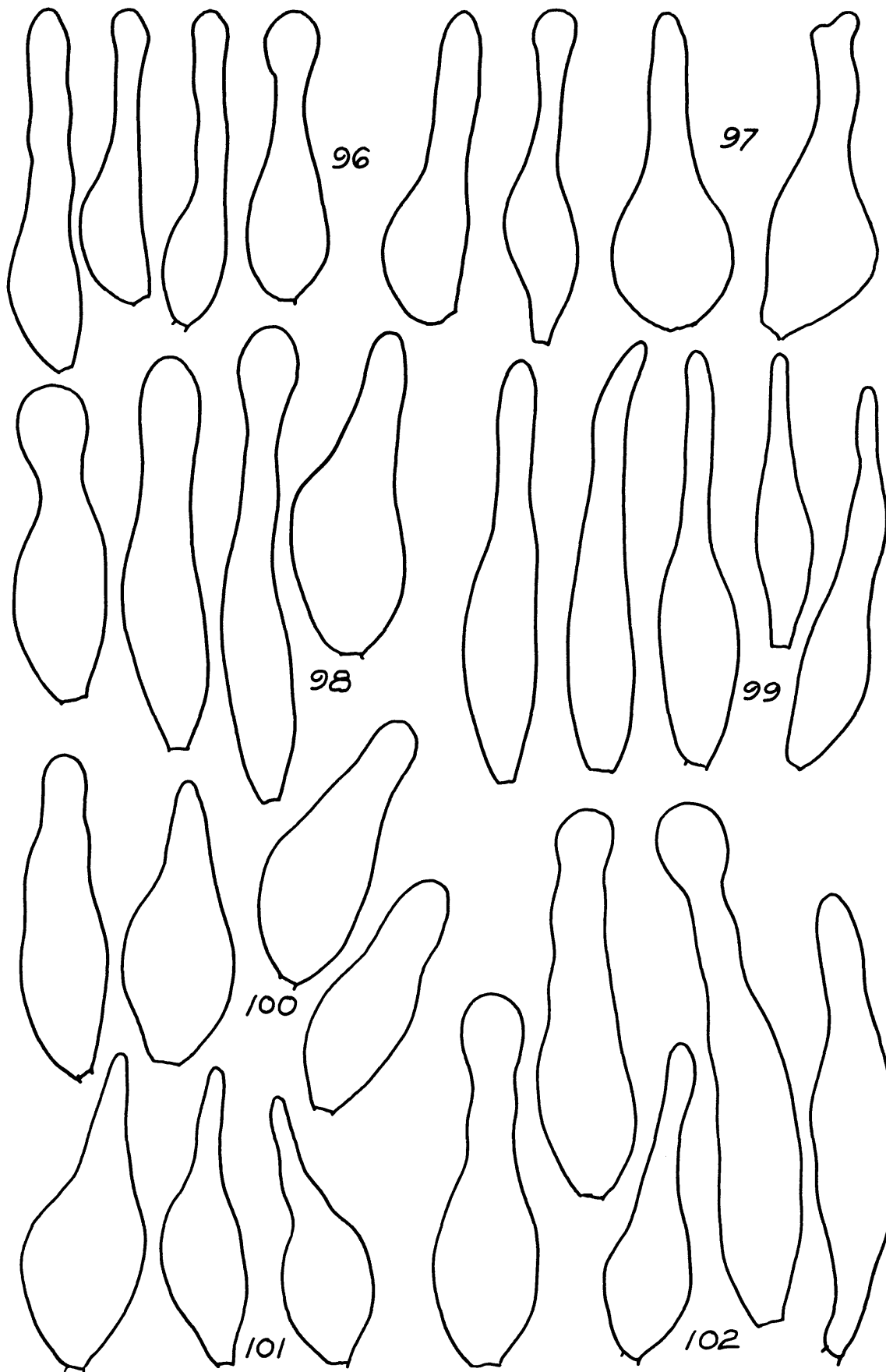


Fig. XII

Cystidia: Fig. 96, cheilocystidia of *G. taimbesinhoensis*; 97, cheilocystidia of *G. septentrionalis*; 98, cheilocystidia of *G. jappii* f. *jappii*; 99, cheilocystidia of *G. californica*; 100, cheilocystidia of *G. carbonicola*; 101, cheilocystidia of *G. alluviana*; 102, cheilocystidia of *G. rugisperma*.

suprahilar area. Basidia 2-spored. Pleurocystidia none. Cheilocystidia 36–54 \times 8–11 μ , somewhat ventricose below with a neck 4–6 μ thick and an obtuse to subcapitate apex (5–10 μ thick), hyaline but often with refractive granular material in the apex (revived in KOH). No pilocystidia seen. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On moss, scattered to gregarious in small bogs or along the margins of swamps, summer and fall. It is known from Europe (France and Germany) and North America (Pacific Northwest and Great Lakes Region).

OBSERVATIONS: The above description was drawn mainly from an abundant fruiting found in a pothole bog near Pike Lake, Luce County, Michigan (Sm-42568). Additional data, which agreed in all details with the Smith collection, were obtained by Singer (e.g. C 3037) on material from Tirol. We have also examined Jaap's exsiccatum, and compared our data with Kühner's description of material collected in France. There is essential agreement of diagnostic characters in all of these. Certain slight variations were noted, however. The spores of the European collections are slightly larger, the fruiting bodies are also a little larger, and so are the cheilocystidia, but in no case is the difference sufficient to form a base for a taxonomic distinction.

A curious feature of some collections (e.g., Smith 49864) is that a small number of giant spores are present. These measure 14–18 \times 5–6.5 μ and are narrowly ovate.

Kühner calls his species *Galerina mycenoides*, transferring the Friesian *Agaricus mycenoides* to *Galerina*. Before Kühner (1935) published his new interpretation of *A. mycenoides* Fr. this species was well established in the literature in the sense of Boudier and later Overholts (1928). The concept of Overholts clearly is of a fungus of the *Conocybe* type, i.e., with truncate spores. In the character of the annulus also this concept is in perfect agreement with the Friesian descriptions ("annulo integro"). It was unquestionably the well-formed entire membranous annulus which led Fries to place the species in *Pholiota*. Such an annulus is not a character of *G. jaapii*. Since there can be only one *A. mycenoides* Fries we take the position that a well established earlier concept is to be preferred.

MATERIAL EXAMINED: Jaap, Fungi Sel. Exsic. 10, VIII, 1903-*holotype* (MICH) paratype FH. E. B. Mains 5114 (MICH). D. A. Reid, England, 28 Aug. 1935. Singer C3037 (Pitztal, Tirol) (LIL). Smith 4118; 24497; 42568; 49731; 49864; 50258; 50443; 50859; 57989.

76a. *Galerina jaapii* f. *mamillata* (Sing.) Singer, comb. nov.

Galerina mycenoides f. *mamillata* Singer, Trudy, Bot. Inst. Akad. Nauk. S.S.S.R. 6: 480. 1950.

Pileus 3–15 mm broad, obtusely conic when young, becoming plane, with an abrupt conic umbo, some caps remaining conic-campanulate, moist, glabrous, hygrophanous, "ochraceous tawny" over disc and striae,

paler tawny between them, transparently striate to disc, fading to pale buff and becoming almost smooth to slightly sulcate when faded; flesh very thin and watery, soft, odor none; taste perfectly mild.

Lamellae distant to subdistant (12–15 reach the stipe), with one tier of lamellulae, broadly adnate, moderately broad (1–3 mm), with even edges, concolorous with the pileus or paler, finally ocher brown.

Stipe 20–30 mm long, 1–1.5 mm thick, equal, tubular, soft and fragile but young fresh stipes snapping when broken, concolorous with pileus or paler over lower portion, dingy light ochraceous at apex sometimes unicolorous, glabrous except for the apical zone or annulus which is white fibrillose and at times evanescent, smooth, at first distant from apex of stipe, eventually disappearing.

Spores 8–11 \times 4–5 μ in 4-spored caps, and (8)10–16(20) \times 5.5–8(8.5) μ in 1-, 2-spored caps, obscurely inequilateral in profile view narrowly ovate in face view, tawny in KOH, with slightly rugulose exosporial ornamentation, with an apparently smooth but poorly marked plage, with apical callus or a minute germ pore. Basidia 25–33 \times 6.5–8.5 μ , some caps 4-spored, some 2-spored, some very irregular (1-2-4-spored); sterigmata in 2-spored form 6.5–8.5 μ ; pleurocystidia none. Cheilocystidia abundant, 28–45(65) \times 8–14 μ , fusoid-ventricose below with attenuate or cylindric obtuse apex or with constriction to 2.5–4 μ diam. underneath a subcapitate tip, capitellum 5–9.5 μ in diam., thin-walled, mostly hyaline but occasionally a few with smoky yellow content when revived in KOH. Pileus trama homogeneous, pale ochraceous toward the surface; no pellicle differentiated. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on wet soil, along ditches and often among mosses such as *Bryum* and *Helodium*. Known from Karelia and Tataria (U.S.S.R.) and Washington in North America. Very likely this form has a wider distribution in Northern Europe and northwestern North America, but apparently it is not common.

OBSERVATIONS: This form is interesting not so much because of the small abrupt conic umbo of the pileus but because, in Washington, 4-spored specimens were found almost side by side with those bearing 1- and 2-spored basidia. A comment, also, on the shape of the apex of the cheilocystidia is in order. We have one collection of two carpophores from Lac Sept-Isle, Laurentide Park, Quebec, Aug. 30, 1959 (Smith 61593) in which the cheilocystidia were mostly subacute, rarely subcapitate. They measured 35–55 \times 6–9 \times 3.5–4 \times 3–4(5) μ . A thin fibrillose annulus was present on the stipe and the spores measured 10–11 \times 5–6 μ . The basidia were 4-spored. This may represent a distinct taxon but more data are needed to establish it.

MATERIAL EXAMINED: Singer & Freindling, Kivatch, Karelia, Sept., 1936-*type* (LE). Smith 16302; 61593. Vasilieva, near Kazan, Tataria (LE).

77. *Galerina bryophila* (Murrill) Smith & Singer, *Sydowia* 11: 449. 1957.

Pholiota bryophila Murrill, *Mycologia* 5: 33. 1913.

Pileus about 20 mm broad, plane or slightly depressed, surface smooth, dry, glabrous, isabelline, margin regular, appearing rather obtuse because of the broad gills.

Lamellae yellowish to brown, broad, adnate, ventricose.

Stipe 20 mm long, 2 mm thick, cylindric, equal, often curved, smooth, glabrous, subconcolorous, slender and rather tough; annulus white conspicuous, persistent, median.

Spores $7-9.5 \times 5-5.5 \mu$, ochraceous tawny in KOH, oval in face view, obscurely inequilateral in profile view, plage smooth, outer membrane wrinkled-tuberculate and loosening to form blisters. Basidia 4-spored. Pleurocystidia none. Cheilocystidia fusoid-ventricose, $28-36 \times 8-11 \mu$, some with irregular thickening, the apex obtuse but unenlarged. Gill trama subparallel. Pileus trama with incrusting pigment on the hyphae; clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Type collected among mosses on a moist limestone cliff at Orizaba, Mexico, 4000 ft. elevation, Jan. 10-14, 1910, Murrill 806-*type* (NY).

OBSERVATIONS: This species is very close to *G. minima* but the two species are readily separated on the basis of their spores. Not much weight can be given the presence or absence of pleurocystidia here as only the type has been examined.

78. *Galerina ferruginea* Smith, Mycologia 45: 900. 1953.
Illustrations: Fig. 94 (cheilocystidia).

Pileus 8-12 mm broad, conic with straight or connivent margin young, expanding to broadly conic, campanulate or convex at maturity, glabrous, moist, "Hay's russet" to "cinnamon rufous" or "ferruginous", subhygrophanous and reddish tan faded, when moist only faintly translucent-striate; flesh thin, concolorous with surface, odor and taste slightly farinaceous.

Lamellae broad, becoming ventricose, subdistant, adnate, seceding, pale brown at first, ochraceous orange at maturity, edges even to irregular.

Stipe 20-35 mm long, 1-1.5 mm thick, equal or enlarged above, tubular, lower half concolorous with pileus, upper portion paler, glabrous except for scattered fibrils over lower portion representing the remains of the rudimentary veil.

Spores $8-10(11) \times 4-5 \mu$, inequilateral in profile, ovate in face view, tawny or darker in KOH, minutely tuberculate, exospore loosening somewhat over suprahilar area but that area not entirely smooth, with apical callus. Basidia 4-spored, hyaline in KOH, $23-26 \times 6-7 \mu$; pleurocystidia none. Cheilocystidia abundant, $26-34(46) \times 7-10 \mu$, fusoid-ventricose with wavy necks and obtuse to capitate apices, thin-walled, hyaline in KOH. Gill trama subparallel to interwoven, dull yellow (near ocher yellow) in KOH from incrusting pigment, gradually fading to pallid, pileus trama homogeneous, yellow in KOH but fading to pallid as in the gill trama. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on burned peat, Mud Lake Bog, Whitmore Lake, Michigan, Sept. 25, 1933.

OBSERVATIONS: Aside from the dull red color, the curious feature of this species is the manner in which particles of the exosporium adhere over the suprahilar depression. As a result, the boundary of the depression varies greatly in position from spore to spore, and it also varies in size and degree of irregularity. The fact that there is a tendency for the plage area to become smooth is considered a valid reason for referring the fungus to *Galerina*. In addition to the color, the farinaceous taste and habitat aid in distinguishing it in the field.

MATERIAL EXAMINED: Smith 33-1016-*type*; 33-1018; 33-1023.

79. *Galerina californica* Smith & Singer, sp. nov.

Illustrations: Fig. 99 (cheilocystidia).

Pileo 4–6 mm. lato, obtuse conico vel convexo, dein late convexo, hygrophano, primum fibrillis alutaceis sparsis in zona marginali ornato, striato, cinnamomeo in centro, ochraceo-brunneo ad marginem. Lamellis confertis, latis, adnatis, carneocinnamomeis dein cinnamomeis. Stipite 15–20 × ± 0.5 mm., aequali, badio ad basin, apice lamellis concolori, primum tenuiter tecto veli vestigiis vel fibrillis sparsis alutaceis, apice pruinoso. Sporis 6.5–8 × 4–4.5 μ, cinnamomeis in KOH minute asperulatis et disco levi suprahilari paulum manifeste delimitato linea subtilissima, exosporio haud separabili; basidiis tetrasporis; pleurocystidiis nullis; cheilocystidiis 40–60 × 3–7 μ, anguste fusoides, apice acutis; tramate hymenophorali cinnamomeo (KOH). Hyphis fibulatis. Caespitose ad terram in sequoietis. Specimen typicum A. H. Smith (56299, MICH) prope Trinidad, California, legit.

Pileus 4–6 mm broad, obtusely conic to convex, becoming broadly convex with a spreading margin, surface moist and hygrophanous, at first with scattered buff fibrils over margin, striate to the disc, cinnamon on disc and ochraceous tawny margin; odor and taste not recorded.

Lamellae close, broad, adnate, pinkish buff becoming “cinnamon”, edges even and in some pallid.

Stipe 15–20 mm long, ± 0.5 mm thick, equal, curved bay-brown at base, apex concolorous with gills, at first with a thin coating or merely scattered buff fibrils from a rudimentary veil, apex pruinose.

Spores 6.5–8(9) × 4–4.5 μ, ovate in face view, somewhat inequilateral in profile, *cinnamon* in KOH, surface slightly roughened and plage boundary a faint line, no separations noted. Basidia 4-spored. Pleurocystidia none. Cheilocystidia 40–60 × 3–7 μ, narrowly fusoid, hyaline, or walls faintly yellow over basal area, thin-walled, apices acute. Gill trama regular, *cinnamon* in KOH; pileus trama dark cinnamon in KOH, hyphae not incrustated or only slightly so, epicutis of appressed non-gelatinous hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Cespitose on soil in a trail under redwoods, Trinidad, California. Dec. 4, 1956, Smith 56299-*type*.

OBSERVATIONS: This species is closest to *G. subbadia* but the boundary of the plage is less distinct, no pilocystidia were found, a pale buff veil was present, and no capitate cheilocystidia were seen. It is close to *G. humicola* but that has smaller spores, subcapitate cheilocystidia, a whitish veil and a sharply conic pileus.

80. *Galerina glacialis* Singer, Akad. Nauk. S.S.S.R. Bot. Inst. Not. Syst. e Sect. Crypt. p. 92, No. 7-9. 1941 (publ. 1950).

Pileus about 5 mm wide, brownish ochraceous to yellow, striate, convex, then more flattened, disc often depressed, rarely papillate, hygrophanous. Context pale, moderately fragile, inodorous.

Lamellae bright rusty brown, subdistant, moderately broad to broad (1.5-2.5 mm), ventricose, subsinuate-adsnate.

Stipe 20-23 mm long, about 1 mm thick, equal but with slightly broadened base, tubular, concolorous with pileus, appressed silky fibrils, very pale above, pruinose above, no annulus or zone of veil fibrils present.

Spores $5.5-7 \times 3.3-4.2 \mu$, honey-color in NH_4OH , outer wall slightly roughened, plage line not sharply delimited, ellipsoid to amygdaliform. Basidia $28 \times 4 \mu$, 4-spored. Cheilocystidia cylindrical, not pointed, hyaline, about 3μ diam., with some incrusting material present. Pleurocystidia none. Epicutis of hyaline filamentous hyphae, those of hypodermium pigment-incrusted.

HABIT, HABITAT AND DISTRIBUTION: Near Aktura Glacier, Chuiskeye Alpy, on glacial deposits near dwarf willows in alpine zone, July to Aug. 1937, Altai Mountains, Asia, 2500 m. elev. (LE).

OBSERVATIONS: We have not restudied this interesting alpine species and reproduce here the description given in Acta Inst. Kom. Acad. Scient. U.R.S.S. Ser II 6: 479-480. 1950. Since the cheilocystidia were poorly developed or poorly conserved and the spores were studied in ammonia we only tentatively assign it here. Study of better material, when it is available, may show that it belongs in the *Sideroides* group, or elsewhere.

81. *Galerina carbonicola* Smith, Mycologia 45: 896. 1953.
Illustrations: Figs. 259-262 (spores); 100 (cheilocystidia).

Pileus 8-17 mm broad, conic-campanulate to convex and with a small obtuse papilla when young, margin often curved in against the gills, glabrous, hygrophanous, when moist "russet" or "tawny", when faded "ochraceous buff" (yellowish), striate nearly to apex, opaque when faded; flesh thin, fragile, watery-cinnamon brown moist yellowish faded, odor and taste not distinctive.

Lamellae adnate to slightly adnexed, close, rather narrow (± 2.5 mm)

but finally somewhat ventricose near stipe, concolorous with pileus both when young and mature, edge minutely fimbriate.

Stipe 40–60(80) mm long, 1.5–2.5 mm thick, concolorous with pileus or a little paler above and darker below, minutely pruinose above, scantily appressed fibrillose below, some appearing longitudinally striate from appressed fibrils, base usually slightly bulbous to evenly enlarged.

Spores $8\text{--}10.5 \times 4.5\text{--}5.5 \mu$, narrowly subinequilateral in profile, narrowly ovate in face view, russet in KOH at maturity, the outer layer present as irregular warts or deeply wrinkled, with a smooth plage, apical callus inconspicuous. Basidia 4-spored, $24\text{--}28 \times 7\text{--}8 \mu$, hyaline in KOH, projecting half their length when sporulating. Pleurocystidia, none seen. Cheilocystidia abundant, $35\text{--}45 \times 9\text{--}12 \mu$, fusoid-ventricose, the necks often flexuous, the apices subacute to obtuse. Gill trama more or less interwoven, rusty brown to yellow when revived in KOH. Pileus trama homogeneous, hyphae loosely interwoven and rusty brown from incrusting pigment, becoming pallid ochraceous on standing in KOH; no pellicle differentiated but hyphae of cuticular region radially arranged and many narrower than those of the tramal body. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Under bushes on burned area. Mud Lake Bog, Whitmore Lake and Tahquamenon Falls State Park, Michigan, Sept.

OBSERVATIONS: The russet to tawny color of the pileus, gills and stipe, the rudimentary veil, spores narrowly ovate in face view, and fusoid-ventricose cheilocystidia are distinctive along with the carbonicolous habitat. Some pleurocystidia similar to cheilocystidia are to be found around portions of damaged hymenium.

MATERIAL EXAMINED: Smith 33-1032-*type*; 33-1040; 42910; 50801; 50905; 61764; 62086.

82. *Galerina rugisperma* Smith, Mycologia 45: 915. 1953.

Illustrations: Figs. 260–261 (spores); 102 (cheilocystidia).

Pileus 8–15 mm broad, obtuse expanding to plane or nearly so, surface glabrous, moist, hygrophalous, striate, ochraceous tawny fading to pinkish buff but drying darker.

Lamellae broad, horizontal, narrowly adnate, edges slightly fimbriate, faces ochraceous tawny at maturity.

Stipe 20–40 mm long, ± 1 mm thick, equal, pale honey color above, becoming reddish brown from base up in age, veil thin and leaving scattered appressed patches of fibrils over lower portion.

Spores $8\text{--}10 \times 5\text{--}6 \mu$, inequilateral in profile, in face view ovate, nearly russet in KOH, with a wrinkled outer layer variously loosened over the surface. Basidia 4-spored. Pleurocystidia none. Cheilocystidia abundant, $38\text{--}60 \times 8\text{--}12 \mu$, ventricose to narrowly ventricose and with a capitellum $4\text{--}7 \mu$ broad, or subcylindric-capitate, hyaline but, as revived in KOH, with

a colloidal content. Gill trama somewhat interwoven, ochraceous in KOH. Pileus trama homogeneous, ochraceous in KOH. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on wet earth along edge of swamp, Longmire, Washington. Known only from Mt. Rainier National Park.

OBSERVATIONS: The large, capitate cheilocystidia, very loose exosporium, the darkening stipe, obtuse pileus and thin veil are characteristic. In spore characters this species is distinct from the *G. hypnorum* complex but resembles *G. subpectinata* and *G. helvoliceps*. In its other characters, however, it does not appear closely related to these southern species. Since the spores of *G. decipiens* var. *separans* show a tendency to have blisters, we feel justified in placing the species in this stirps until its range can be established and more is known of the pattern of variation.

MATERIAL EXAMINED: Smith 40146-*type*; 40147.

83. *Galerina decipiens* Smith & Singer, Mycologia 47: 577. 1955.
var. *decipiens*

Illustrations: Pl. 12, fig. E. Fig. 95 (cheilocystidia).

Pileus (3)5–10(12) mm broad, 3–7 mm high, very variable in shape, acutely to obtusely conic with a straight margin, later campanulate with or without a small and often acute papilla, glabrous, sometimes slightly sulcate, moist and hygrophanous, pale fulvous (“ochraceous tawny” or *Peruvian brown*), margin paler at times, usually paler between the striae, transparently striate up to three quarters of the radius, fading to buff or pale pinkish buff and smooth when dry; flesh thin and only moderately fragile, odor none, taste mild.

Lamellae narrow to broad, ascending, adnate with a tooth, rounded-adnexed, adnate, at times seceding, moderately close to distant, pale buff when young, near tawny at maturity, edges even.

Stipe 10–30 mm long, 0.7–1.2 mm thick, reaching 1.2–2 mm at base, nearly equal, pruinose above, glabrous below (veil absent in mature carpophores), pallid ochroleucous or stramineous pallid to pale sordid cinnamon (*Pablo*) throughout and not darkening appreciably from the base upward in age but sometimes in the middle or below staining brown (*Russian calf* or *hazel*) where handled; veil consisting of faintly marked silky hyaline fibrils which are soon evanescent leaving the lower part of the stipe perfectly glabrous.

Spores (7)8–10(11) \times 4.5–5.5 μ , inequilateral in profile view, ovate in front view, tawny to ochraceous tawny in KOH, with a smooth plage and a wrinkled, distinctly punctate-rough to verrucose exosporial ornamentation covering the remainder, at times this layer showing a slight tendency to separate forming blisters, but these not confined to the plage-border area. Basidia 21 \times 6.8–7.5 μ , 4-spored. Pleurocystidia none. Cheilocystidia abundant, ventricose below, with obtuse tips, often subcapitate, more rarely capitate, 32–44 \times 6.8–10(11) μ , neck usually 3–5.3 μ thick and often flex-

uous, capitellum 4.3–6.8 μ in diam., wall thin, hyaline, rarely yellowish in the ventricose part in KOH. Caulocystidia similar to cheilocystidia and present mostly at apex of stipe. Hyphae of pileus trama rather heavily incrustated with tawny to yellowish pigment; epicutis poorly developed, not gelatinized, without pilocystidia. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Solitary to gregarious on moss (so far never on *Polytrichum* or *Sphagnum*) over soil or rotten wood, not uncommon during the summer (June–September) in northern Michigan.

OBSERVATIONS: *G. hypnorum* is, perhaps, the most closely related species but differs in the consistently larger spores which are much less ornamented, and in that more of the cheilocystidia are non-capitate. Our abundant collections have established beyond the shadow of a doubt that *G. decipiens* is a constant and readily recognizable species in the Great Lakes Region agaric flora. Although we have encountered a number of variations, these have not shown an intergradation with *G. hypnorum*. A number of the variations are known from single collections and, because of the small number of carpophores involved and the nature of the characters, we do not care to give them formal designations at this time. They are, however, worth putting on record.

Smith 41666 and 49717 had spores 7–8.5 \times 4.5–5 μ , stipe pale yellow over all and no veil present in buttons. Smith 41666 grew on moss over sandy soil, Tahquamenon Falls State Park, July 23, 1953; 49717 grew on a mossy conifer log, July 6, 1955, also at Tahquamenon. Some of Bigelow's collections from Maine also lacked a veil, but the spores were typical.

It may develop that the veil-less collections admitted here should be recognized as an autonomous species but we are not prepared to adopt this solution at present.

The following data were taken from Singer N-537, another variant collection. Pileus 6–10 mm broad, soon conic-applanate to convex with a broad obtuse umbo, color rather dark (*tortoise* tinged *gypsy*, umbo *cowboy* or lighter), with a tendency to become deep badious around the margin in drying out, when moist transparently striate over three-fourths of the radius and only slightly paler between striae; odor none, taste mild; lamellae horizontal, distant, ventricose, rounded-adnate, 2.2 mm broad, ochraceous brownish; stipe 23–25 mm long, 0.8–1.2 mm thick, pale dingy cinnamon buff (*pl. 12 F 6*), with a tendency to eventually become deeper colored (*Russian calf*) over midportion, base sub-bulbose, apex pruinose, with slightly silky fibrils from the veil.

Spores 8.3–9.8 \times 5.3–5.5 (–12 \times 5.7) μ , strongly pigmented, with well-developed adherent exosporial ornamentation. Basidia 21 \times 6.8 μ , 4-spored. Cheilocystidia mostly subcapitate, 24–42 \times 5–9 μ , minority ampullaceous, neck 3–5.3 μ thick, capitellum 4.5–6.8 μ broad; cuticle of pileus poorly developed, hyaline, thin, not gelatinous, without pilocystidia. Clamps present. Collected on Ferry Island, Douglas Lake, Michigan, Cheboygan County, on rotten trunk covered by *Heterophyllum haldanianum* and other hypnaceous mosses. This collection has many of the characters of *G. rugisperma* but the exosporium does not loosen and that species, as far

as is known, is western. If the color of the spores and the adherent exosporium of Singer's N-537 are found to be constant, the variant should be given formal recognition as a taxon. It should also be pointed out that the trend of variation here is not toward the characters of *G. hypnorum*.

In Smith 57305 many of the cheilocystidia have an ochraceous content as revived in KOH. In Smith 57275a many long narrow spores ($9-13 \times 3.5-4.5 \mu$) were present.

MATERIAL EXAMINED: Bigelow 3826 (no veil); 3924; 4208; 4271; 4371 (no veil); 4594; 4687 (no veil); 5071; 5567; 5686; 5875; 5930; 6294; 6332; 6551; 6580; 6620; 7273; 7517; 7601; 7602; 7635; 7768; 7770; 8022; 8177; 8233; 8563; 8564 (MICH). Singer N-91; N-431-*type*; N-1277; N-1277a; N-1278a; N-1278b; N-1279c (CF). Smith 41444; 41516; 41527; 41666 (?); 41875; 41876; 41897; 41899; 42000; 42009; 42155; 42165; 42166; 42171; 42172; 42173; 42178; 42179; 42196; 42199; 42268; 42271; 42272; 42273; 42587; 42590; 42591; 42672; 42906; 43013; 43033; 44024; 47291; 49717 (same as 41666); 49959; 49987; 51158; 52294; 57141; 57275a; 57305; 57306; 57349; 61716; 61720; 61723; 61725; 61727; 61791; 61792; 62329; 62462; 63400. Thiers 3436; 3448; 3999; 4006; 4201; 4313 (MICH).

83a. *Galerina decipiens* var. *separans* Smith & Singer, Mycologia 47: 579. 1955.

Pileus 6–10 mm broad, obtusely conic with a straight margin, glabrous, moist, hygrophanous, dark ochraceous tawny over the disc, paler on margin, translucent striate when moist, fading to pinkish buff or paler; flesh very thin, odor and taste not distinctive.

Lamellae subdistant to close, ascending adnate, moderately broad, ochraceous tawny.

Stipe 10–25 mm long, 0.7–1 mm thick, equal, glabrous, naked, dingy honey color to watery ochraceous above, darker ochraceous tawny below.

Spores $8.5-11 \times 5-5.5 \mu$, inequilateral in profile view, narrowly ovate in face view, ochraceous tawny or a little darker in KOH, wrinkled-warty over all except for the smooth plage, exosporium separating around the edge of the plage forming loose flaps or small blisters and also separating slightly in various places over the spore surface. Basidia 4-spored. Pleurocystidia none. Cheilocystidia $30-46 \times 7-11 \mu$, slightly ventricose below and with an elongated neck and obtuse to capitate apex, hyaline, smooth, thin-walled. No pilocystidia seen. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on mossy logs, Wilderness Park, Emmet County, Michigan, July 29, 1953, Smith-41739-*type*.

OBSERVATIONS: The spores of *G. rugisperma* which this variety closely resembles, are darker in KOH and the exosporium envelops the spore loosely. That species, in addition, has a distinct veil and horizontal gills. The lack of a veil, slightly larger spores, and the readily recognizable tendency for blister formation on the spores distinguish var. *separans* from the type variety. We have observed considerable intergradation between

this and the type variety, however, in spore characters and in the presence of a very thin veil. Bigelow 3639 has spores $9-12 \times 5-6.5 \mu$ in which the outer wall separates only slightly and the cheilocystidia vary from obtuse to subcapitate. A thin white veil is present. In view of this, it hardly seemed justifiable to place the type of var. *separans* in *Calyptrospora* where it would have to be recognized as a species. We have found both varieties in the same habitats and at the same time of year. *G. hypnorum* differs in having larger, smoother spores in which loosening of the episporium is lacking or very slight.

MATERIAL EXAMINED: Bigelow 3185; 3639; 3642; 4339; 8310; 8562; 8584 (variant) (MICH). Smith 40996; 41739-*type*; 41847; 41883; 41900; 42007; 42016; 42042; 42180; 42197; 42198; 57717; 57981; 61598. Thiers 2991 (MICH).

84. *Galerina alluviana* Smith, sp. nov.

Illustrations: Fig. 101 (cheilocystidia).

Pileus 5–10 mm latus, obtuse conicus vel convexus, udus fulvus, demum subalutaceus; lamellae latae pallide fulvae; stipes 2–3 cm longus, 0.5 mm crass, fragilis, glaber, sursum luteus, deorsum fulvus. Sporae $8-10 \times 5-6 \mu$, ovatae, rugulosae; cheilocystidia fusoid-ventricosa, $30-40(54) \times 9-14 \times 3-4.5 \times 3-4(6) \mu$. Specimen typicum legit Smith 30819, 1 Sept. 1948, Longmire, Washington (MICH).

Pileus 5–10 mm broad, convex to obtuse and only slightly expanding, color evenly tawny, with conspicuous translucent striations, hygrophane and fading to pinkish buff eventually; context very thin and fragile, odor and taste mild.

Lamellae moderately close to about subdistant, broad, ascending and adnate to apex of stipe, broadly ventricose in age, ochraceous tawny becoming tawny, edges even.

Stipe 2–3 cm long, 0.5–1 mm thick, equal, fragile, flexuous to strict, naked and moist, yellowish at apex, fulvous like the pileus near the base.

Spores $8-10 \times 5-6 \mu$, distinctly and broadly inequilateral in profile, ovate to a blunt beak at apex, plage area distinct and smooth, remainder of surface distinctly warty-rugulose, pale rusty-brown in KOH and in Melzer's reagent. Basidia 4-spored. Pleurocystidia none. Cheilocystidia fusoid-ventricose, $30-40(54) \times 9-14 \times 3-4.5 \times 3-4(6) \mu$, with obtuse apex or rarely apex slightly enlarged, thin-walled, smooth. Gill trama interwoven, yellowish in H₂O. Pileus trama homogeneous, a differentiated epicutis absent or of a few appressed thinner hyphae. Clamps present.

HABIT, HABITAT AND DISTRIBUTION: Scattered on *Polytrichum* over an alluvial outwash, Longmire, Washington, Sept. 1, 1948, Smith 30819-*type*.

OBSERVATIONS: *G. alluviana* is similar in many respects to *G. emmetensis* but lacks a veil, has a darkening stipe and much more conspicuously ornamented spores. It differs from *G. hypnorum* in having smaller, much more prominently ornamented spores.

McKnight found one collection on a mossy rotten log at Tahquamenon Falls State Park, Michigan, which apparently belongs here. The carpophores have darker colors than those of *G. emmetensis*, the spores have more conspicuous ornamentation, and no veil was present. The only discordant character is that the cheilocystidia measure $24\text{--}35 \times 6\text{--}8.5 \times 3.5\text{--}4 \times 4.5\text{--}7 \mu$, hence they are shorter and not quite as thick in the ventricose part. This may represent a distinct taxon at a varietal level, but more data are needed to establish the constancy of its characters.

MATERIAL EXAMINED: McKnight, Tahquamenon Falls State Park, Michigan, July 25, 1953. (MICH). Smith 30819-*type*.

85. *Galerina mniophila* (Lasch) Kühner, *Encyc. Myc.* 7: 192. 1935.
Agaricus mniophilus Lasch, *Linnaea* 3: 417. 1828.
Galera mniophila (Lasch) Karsten, *Bidr. Finl. Nat. Folk.* 32: 441. 1879.
 Illustrations: Kühner, *op. cit.* fig. 63.

Pileus 12–30 mm broad when completely expanded, usually remaining narrowly campanulate to conic campanulate and 7–16 mm across the base, apex more or less obtuse, striate to disc (sometimes strongly, or even almost sulcate), color dingy honey-yellowish, to dingy honey-brownish, sometimes paler on the margin, with the disc hyaline and much paler than remainder of pileus, frequently shining, radially fibrillose under a lens, glabrous, margin at times extended beyond the gills by minute teeth (denticulate); context very thin, hyaline, concolorous, lacking any distinct farinaceous odor, taste mild or slightly farinaceous especially in the stipe.

Lamellae 11–18, lamellulae 1–3, brownish cream to pale brownish, light brownish yellow and tending to be bright, clear tawny and duller or concolor with pileus, ascending, linear or \pm ventricose, rather broadly adnate.

Stipe 20–70 mm long, 1–2 mm thick, subequal or a little inflated to bulbilose at base, at times curved, at times undulating, hyaline whitish above at first, coloring in the lower part first, and sometimes almost entirely, to pallid honey color or more rarely honey brownish to tawny yellowish, whitish pruinose above, sometimes only at the apex, fistulose. Cortina white, thin, distinct on young specimens, but very fugacious, usually leaving a few white fibrils more or less appressed, but not sufficient to form an annular zone.

Spores $9.2\text{--}11.5(13.5) \times 5.7\text{--}7.2(8) \mu$, inequilateral in profile, ovate in face view, clear yellow under microscope when fresh, wall almost smooth or very slightly irregularly rugulose, with a smooth plage more or less distinctly delimited. Basidia 4-spored, $26\text{--}34 \times 7.5\text{--}8.7(9) \mu$. Pleurocystidia none. Cheilocystidia narrowly fusoid-ventricose about 8μ long or more, base $6.5\text{--}11.5 \mu$ thick, neck $3\text{--}9.5 \mu$ thick, apex subacute to obtuse, rarely capitate. Epicutis of pileus of clamped hyphae $3.5\text{--}6 \mu$ diam. (apparently not gelatinous).

HABIT, HABITAT AND DISTRIBUTION: On mosses in moist woods, France, August–December.

The foregoing description is adapted from Kühner (op. cit.); the following is a description of what we consider to be the American form of this species.

Pileus 6–10(15) mm broad, 8–12 mm high, obtusely conic becoming obtusely campanulate (shape resembling cap of *Mycena epipterygia*), surface glabrous, and lubricous moist, hygrophanous, watery-translucent around the disc at maturity when moist, dingy pale ochraceous tawny to “cinnamon buff” fading to pallid (almost white in some); odor none, taste mild.

Lamellae ascending, broad, nearly free, close, pallid buff young to cinnamon buff or pale tawny when mature, edges even.

Stipe 30–50 mm long, 1–1.5 mm thick, equal, pallid when young, finally honey color overall or base slightly darker but not darkening in typical manner, apex faintly pruinose, with a few fibrils from a rudimentary veil lower down, or soon entirely glabrous, veil appearing to be absent to rudimentary.

Spores $9\text{--}12.5 \times 6\text{--}7 \mu$, ovate in face view, somewhat inequilateral in profile, pale tawny in KOH, dark red-brown (mature spores) in Melzer's, with a faintly delimited plage and faintly marbled surface (under oil immersion). Basidia 4-spored. Pleurocystidia none. Cheilocystidia abundant, fusoid-ventricose, $30\text{--}42 \times 6\text{--}10 \times 3\text{--}4 \times 4\text{--}6 \mu$, apices obtuse to slightly enlarged ($4\text{--}6 \mu$), hyaline, thin-walled, smooth; gill trama subregular, hyaline to yellowish in KOH. Pileus trama with a thin pellicle of subgelatinous hyphae $4\text{--}7 \mu$ in diam. over a hypoderm of yellow-walled hyphae $9\text{--}16 \mu$ in diam. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on moss in conifer forests, northern United States and Canada, Europe and Asia.

OBSERVATIONS: The concept accepted here for *G. mniophila* is that of Kühner (1935). Singer (1950) reported it in the Altai Mountains. We have been able to examine specimens under this name from the European U.S.S.R. [coll. Freindling & Singer (MICH)] and found that the collection consisted of *G. heterocystis* and *G. pumila* var. *pumila*. Hesler 11793 appears very close in that it is a large *Galerina* 10–25 mm broad across the cap, which was apparently rather well pigmented, but its cheilocystidia are $23\text{--}30 \times 5\text{--}8 \times 4\text{--}5 \times 4\text{--}8 \mu$, when capitate the capitellum may be as broad as the ventricose part, and only a few have apices that are subacute. The spores are tawny in KOH, minutely roughened, and with a distinct plage line. It was found on a mossy log.

The American variant described here in detail is a more slender agaric, apparently, than the one Kühner described but is certainly similar in all essential characters. It should be noted that the spore color given here is that observed in KOH, whereas Kühner's observations were on fresh material, apparently in water, hence, they are not comparable. The slightly gelatinous pellicle gives a shiny appearance to the cap.

MATERIAL EXAMINED: Smith 40863; 49403; 54335; 54336; 54594; 54653; 54725; 54726; 54938; 54981; 54996; 55179; 61509; 61549; 61683; 61715; 61719; 61832; 61833.

86. *Galerina hypnicola* (Karsten) Smith & Singer, comb. nov.

Galera hypnicola Karsten, Acta Soc. Fauna et Flora Fenn. 9, Symb. Fenn. 32: 9. 1893.

Illustrations: Fig. 103 (cheilocystidia).

Pileus 10–20 mm broad, membranous, conic-campanulate, obtuse, except for the gibbous disc deeply lineate-striate, fuscous-livid, soon livid-pallid, glabrous, naked.

Lamellae adnate to the disc of the pileus but free from the stipe, ascending, close, ventricose, pale cinnamon.

Stipe 50–90 mm long, 1.5–2.5 mm thick, equal, lax and flaccid, apex pruinose, from there downward floccose silky from the veil, soon glabrous, hyaline-pallid, becoming pallid.

Spores 9–11 × 5–6 μ, ovate to elliptic in face view, somewhat inequilateral in profile, ochraceous tawny in KOH, under oil immersion outer wall distinctly rugulose-wrinkled and plage smooth, very few spores showing any tendency toward being calyptrate, no apical pore visible. Basidia 4-spored, 23–30 × 7–9 μ, hyaline in KOH. Pleurocystidia none. Cheilocystidia fusoid-ventricose, 30–40 × 6–11 μ, apices obtuse, walls thin, hyaline and smooth, pileus trama with ochraceous incrusting pigments on hyphal walls of the hypodermal zone. Clamps present.

HABIT, HABITAT AND DISTRIBUTION: On moss in Finland, Karsten, Sept. 9, 1892, *type* (H).

OBSERVATIONS: This species is clearly in the *G. hypnorum* complex and is closest to *G. obscurata*. It differs in the paler incrusted pigment of the hyphae of the pileus trama, in the pallid stipe which does not darken, and in the presence of a fibrillose veil. From *G. decipiens* and *G. rugisperma* it differs in having non-capitate cheilocystidia. It is difficult to be sure of the color of the fresh cap, but if any inference is permitted from the original Latin the color must also be rather distinctive.

MATERIAL EXAMINED: Bigelow 4519 (?) (MICH). Karsten, Finland, Sept. 9, 1892, lectotype (H).

87. *Galerina hypnorum* (Schrank ex Fr.) Kühner, Ency. Myc. 7: 194. 1935.

Agaricus hypnorum Fries, Syst. Myc. 1: 267. 1821.

Galera hypnorum Kummer, Führer in Pilzk. p. 75. 1871.

Derminus hypni (Batsch ex) Schröter in Cohn, Krypt. Fl. Schlesien p. 579. 1889.

Conocybe hypnorum (Fr.) Murrill, Mycologia 4: 75. 1912.

Galera hypni (Schröt.) Sacc. Fl. Ital. Crypt. p. 782. 1916.

Galerula hypni (Schröt.) Murrill, N. Am. Fl. 10: 163. 1917.

Galerula hypnorum (Fr.) Atkinson, Proc. Am. Philos. Soc. 57: 360. 1918 (non sens. Atk.).

Galerula subhypnorum Atkinson, Proc. Am. Philos. Soc. 57: 363. 1918.

Illustrations: Fig. 104 (cheilocystidia).

Pileus 4–15 mm broad, 3–6.5 mm high, obtusely conic, with appressed margin when young, expanding to broadly conic, campanulate or finally convex, surface glabrous, moist, hygrophanous, sordid honey yellow to ochraceous tawny when moist, fading to pale buff (“pale ochraceous buff”).

Lamellae moderately close to subdistant, ascending, adnate, narrow, ochraceous tawny when mature, with even edges.

Stipe 15–40 mm long, 0.7–2 mm thick, equal, fragile, pruinose above, naked and glabrous below, base sometimes slightly enlarged and pallid, or pale yellowish over all, drying slightly darker, not changing color appreciably in age or on drying except for a slightly darker shade in the lower portion in age or where handled; veil rudimentary, silky and all remnants soon vanishing.

Spores $9\text{--}12 \times 5.5\text{--}7 \mu$, inequilateral in profile view, ovate in front view, ochraceous tawny (moderately well colored) in KOH, very minutely roughened and with a smooth suprahilar depression, apical callus present (abnormal spores also observed, some $12\text{--}14 \times 5.5\text{--}6 \mu$). Basidia 4-spored, $23\text{--}30 \times 7\text{--}8.5 \mu$, hyaline in KOH, sterigmata prominent; pleurocystidia absent. Cheilocystidia abundant, $33\text{--}54 \times 6\text{--}9 \times 3\text{--}5 \times 3\text{--}4 \mu$, fusoid-ventricose, with elongated necks and subacute to acute varying to obtuse, apices (Singer’s material), hyaline, thin-walled. Gill trama interwoven, yellowish and not distinctive in KOH. Pileus trama pale ochraceous in KOH, homogeneous, epicutis poorly developed. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered on old mossy logs, Michigan to Quebec and Massachusetts, summer and fall; also in Europe.

OBSERVATIONS: This concept of *G. hypnorum* has been the one most widely used both in North America and Europe. It is the “*Galerula hypni*” of Murrill and *G. subhypnorum* of Atkinson, who used the name *G. hypnorum* for our *G. vittaeformis*. It is evident from the Friesian description that the name *Galerina vittaeformis* must be used for a species with caulocystidia over most of the stipe. This rules out the use of the name *G. hypnorum* for that species. Kühner’s concept of *G. hypnorum* included species with calyptrate spores. We restrict our concept to collections in which the spores are not calyptrate, thus narrowing the concept further. Fries (Syst. 1, p. 267) in his account of *A. hypnorum*, gave the pileus as “subochraceo” and we have limited our concept to a species with a cap having such a color. Restricted in this manner, *G. hypnorum* is a very distinct, readily recognizable species both in northern Europe and North America, but it is, of course, by no means as common as reports of the name in the literature would indicate, since these cover almost any “*Galera*” known to grow on moss.

A number of collections which we have referred to *G. hypnorum* depart in minor details from our description. In two of Bigelow’s collections from Massachusetts there apparently was no veil, but the material was not abundant, since veil material may have been present on buttons we are loath to emphasize this supposed difference. The cheilocystidia in Smith 42194 are $20\text{--}32 \mu$ long but are typical in shape. In one of Smith’s 1929 collections, identified by Kauffman, the spores are $8\text{--}10 \times 5\text{--}6.5 \mu$, but the material is

typical otherwise. It was found on mixtures of *Sphagnum* and other mosses.

From Smith's observations in Michigan, it would appear that *G. hypnorum* is most frequently found when wet fall seasons are followed by hot dry summers.

Singer has recorded the following data from collections in England in 1954.

Pileus rather deep ochraceous brown or tawny to more ochraceous in a single group of otherwise macro- and microscopically identical carpophores, transparently striate, glabrous, hygrophanous, fading pale tan, glabrous, 3–5 mm broad, mostly obtusely conic or campanulate, but somewhat variable in shape; flesh without odor.

Lamellae ochraceous tawny, moderately close, subadnate, ascendant, rather broad.

Stipe pale stramineous at the apex, white at the base, otherwise light ochraceous brown, under a lens distinctly but very finely pubescent down one third from the apex to the base but not further, 12–19 × 0.7–1 mm; veil extremely fugacious much as in *G. cerina*, not seen in mature and rarely in young specimens, whitish sericeous.

Spores 9.8 × 5.5–6 μ, ellipsoid to almond shaped, ochraceous tawny, distinctly marbled by a thin exosporial ornamentation, with a ragged line delimiting a distinct plage. Basidia 26.5 × 6.8–9 μ, 4-spored. Cheilocystidia 30–40 × 7.5–8.3 μ; ventricose in lower half or thickened both at base and at apex, most with a subcylindrical "neck" which is about 4.5 μ thick but with an apical thickening which may reach up to 5.3–7.3 μ diam. i.e., slightly subcapitate, rather numerous, hyaline, thin-walled. Hypodermium consisting of strongly pigment-incrusted hyphae forming a cutis, consequently deep ochraceous brown; epicutis formed by thinner but otherwise poorly differentiated hyphae which are also pigmented, repent and not gelatinized; all hyphae with clamp connections.

On small mosses (neither *Sphagnum* nor *Polytrichum* present) of various genera growing around tree trunks in beech woods over chalk, Singer, collected east of Haslemere, Surrey, England. Aug. 1, 1954.

MATERIAL EXAMINED: Bigelow 3600; 3641; 4378 (MICH). Singer N-122; N-1325 (F). Smith, Cady's Woods, Mich., 8-1-29; Rock River, Mich., 9-19-29; 33-781; 4437; 23424; 40863; 41154; 41273; 41274; 41276; 41335; 42006; 42017; 42174; 42192; 42193; 42194; 42195; 42905; 47405; 47410; 48958; 50793; 50811; 61670; 61663a. Singer, Surrey, England (LIL).

88. *Galerina obscurata* Smith, sp. nov.

Illustrations: Pl. 14, fig. C. Fig. 105 (cheilocystidia).

Pileus 8–15 mm latus, conicus, udus, striatus, subbadius, demum fulvus; lamellae subdistantes, latae; stipes 20–25 mm longus, 1–1.5 mm latus, deorsum subfulvus, sursum pallide cinnamomeus, pruinosis, velum nullum; sporae 9–12 × 6–6.5 μ; cheilocystidia 40–54 × 8–12 × 4–5 × 4–6 μ. Specimen typicum legit Smith 38231 (MICH) prope Tahquamenon Falls State Park, Mich. 29 Aug. 1951.

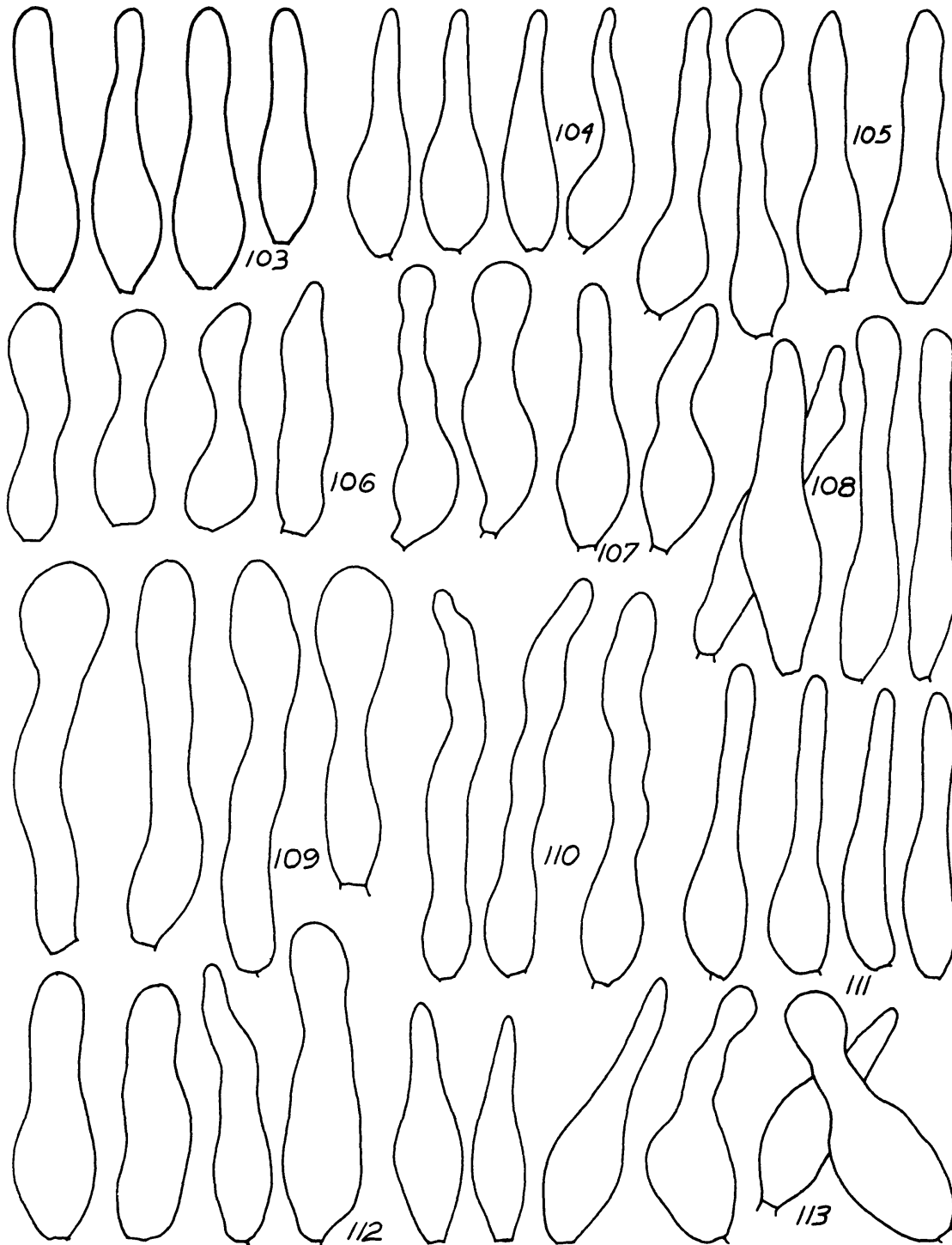


Fig. XIII

Cystidia: Fig. 103, cheilocystidia of *G. hypnicola*; 104, cheilocystidia of *G. hypnorum*; 105, cheilocystidia of *G. obscurata*; 106, cheilocystidia of *G. subbadipes*; 107, cheilocystidia of *G. leucobryicola*; 108, cheilocystidia of *G. lubrica*; 109, cheilocystidia of *G. lacustris*; 110, cheilocystidia of *G. vexans*; 111, cheilocystidia of *G. rostrata*; 112, cheilocystidia of *G. naucorioides*; 113, cheilocystidia of *G. laeta*.

Pileus 8–12(15) mm broad, conic with a straight margin, glabrous, moist, hygrophamous, widely translucent-striate, "Mars brown" on umbo (very likely so over all when young), marginal area tawny to ochraceous tawny, fading on disc first to ochraceous buff or near cinnamon buff; flesh thin, fragile; odor and taste not distinctive.

Lamellae cinnamon buff, bluntly adnate, subdistant, nearly horizontal at maturity, broad, edges even.

Stipe 20–35 mm long, 1–1.5 mm thick, no evidence of a veil seen, flexuous, pallid to watery cinnamon buff over all at first, soon dingy tan or darker brown from the base up, apex faintly pruinose from caulocystidia.

Spores 9–12 × 6–6.5(7.5) μ , slightly inequilateral in profile view, ovate to narrowly ovate in face view, very minutely warty or with an occasional spore showing a loosening (rough area) of wall around the plage under oil, ochraceous tawny in KOH. Basidia 22–26 × 8–9 μ , 4-spored, hyaline in KOH. Cheilocystidia 40–54 × 8–12 × 4–5 × 4–6 μ , forming a sterile band, ventricose with greatly elongated neck and obtuse to subacute apex, hyaline, thin-walled, smooth. Pleurocystidia none. Gill trama ochraceous revived in KOH, somewhat interwoven. Pileus trama homogeneous, in KOH tawny to rusty brown from incrusting pigment. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious to scattered on mossy hummocks under hemlock, Tahquamenon Falls State Park, Michigan, Aug. 29, 1951, Smith 38231-*type*.

OBSERVATIONS: The following variant was found by Claire Brown at Lake Quinault, Washington.

Pileus 5–15 mm broad, obtusely conic with an appressed margin, expanding to broadly conic or campanulate, surface glabrous, moist, hygrophamous, tawny or darker rusty brown over the disc and striae, fading to buff but drying tawny.

Lamellae broad, close, ascending adnate, concolorous with pileus dried, edges white fimbriate.

Stipe 30–50 mm long, \pm 1 mm diam., equal, fragile, yellowish above, reddish brown below, darker over all as dried, glabrous below or faint fibrils (presence of a veil doubtful), pruinose above.

Spores 9–10.5 × 6–7.5 μ , inequilateral in profile, broadly ovate in face view, ochraceous tawny in KOH, surface rugulose to warty from wrinkled exospore but exospore not separable as sheets or in blisters, suprahilar depression smooth, apical pore present but inconspicuous. Basidia 4-spored, hyaline in KOH. Pleurocystidia none. Cheilocystidia abundant, 38–52 × 9–12 μ , fusoid ventricose with obtuse to subacute apices, thin-walled, hyaline in KOH. Gill trama somewhat interwoven, yellow to pale ochraceous tawny in KOH. Pileus trama homogeneous, ochraceous tawny to darker in KOH from incrusting pigment. Clamp connections present.

On mosses, Lake Quinault, Washington, Oct. 31, 1925. C. A. Brown. This differs from *G. hypnicola* in the dark rusty brown pileus, in having scarcely any veil, and in the well colored stipe. *G. hypsizyga* differs in its capitate cheilocystidia and distribution (South American).

The dark brown (almost russet) umbo, cinnamon buff lamellae which

are horizontal at maturity, lack of veil, and darker spores make this species easily recognizable. The Nyberg collection has cheilocystidia with rather broad apices, but otherwise apparently belongs here.

MATERIAL EXAMINED: Bigelow 4147 (MICH). C. A. Brown, 10-31-25 (MICH). Nyberg, Finland, 10-22-33 (H). Smith 38231-*type*; 50745; 51030.

89. *Galerina subbadipes* Huijsman, Fungus 25: 21. 1955.
Illustrations: Fig. 106 (cheilocystidia).

Pileus 7–20 mm broad, semiglobate to convex when young, expanding, umbo slight, hygrophanous, glabrous, translucent-striate up to the disc, when moist rather dark rusty cinnamon, when dry dingy ochraceous-fulvous to alutaceous with a tinge of orange in the centre, edge somewhat crenulate. Context concolorous or somewhat paler than the surface, rather thin, odor slightly mealy when cut, taste none.

Lamellae not crowded, about 15, adnate to emarginato-adnate, lamellulae of 2(3) ranks, regularly alternating with lamellae reaching the stipe, golden-fulvous to fulvous-cinnamon with fimbriate edges.

Stipe 18–30 mm long, 1–2.5 mm thick, equal, stuffed to fistulose, subtenacious, upper part honey to honey-fulvous, gradually darkening toward the rusty-brown, fuliginous brown or even almost black, obsoletely white-mycelioid base, lower half to two thirds with some superimposed belts made up of white appressed longitudinal fibrillae, top slightly pruinose.

Spores 9.2–10.9(11.8) × 5.0–5.8(6.8) μ, pale ochraceous brown in KOH under high power, narrowly amygdaliform, inconspicuously roughened to smooth, with a suprahilar plage. Basidia 26–30 × 8–9 μ, with a clamp connection at the base, 4-spored, subclaviform, sterigmata about 4 μ long. Pleurocystidia absent. Cheilocystidia abundant, 28–50 μ long, thin-walled, generally ventricose-capitate, neck broad (2.5–4 μ near the capitellum), up to 16 μ long, but in general much shorter, diameter of capitellum often exceeding the breadth of the ventricose part; trama of the gills composed of 10–20 μ broad, subparallel and brown-walled hyphae. Hyphae of pileus-trama interwoven, with incrusting pigment, superficial hyphae radially arranged, repent, not gelatinized, 3–6 μ broad, provided with clamp connections and heavily incrustated with a brown pigment. Caulocystidia at the apex of the stem similar to cheilocystidia, but capitellum often less pronounced.

HABIT, HABITAT AND DISTRIBUTION: "On a heap of decaying *Carex* and *Typha*, also on wet soil among moss; Netherlands, 24 Oct. 1953, Huijsman (L)". Type not seen.

OBSERVATIONS: It seems likely that this species occurs in North America. We were at first inclined to describe our American material as a variety of *G. hypnorum*, or as an autonomous species, but comparing our description with that of Huijsman, we find that the main differences are in the paler color of the pileus and particularly the stipe, and in a slightly less conspicuous veil development. The American collections differ in habitat also, as far

as the type is concerned, but Huijsman himself considers a European collection "on a wet heath among moss" (para-type) as conspecific. We add a separate description of the American collections; these and the European type have what we consider the essential characters in common, (broad tips of cheilocystidia, minutely marbled spores), and consequently, may very well be conspecific.

Pileus 10–12 mm broad, conic, glabrous, moist, hygrophanous, striate moist, pale dull cinnamon brown; lamellae close, ascending-adnate, broad, dull ochraceous tawny, edges minutely fimbriate under a lens; stipe 20–25 mm long, ± 1 mm thick, fragile, equal, pale dull cinnamon brown overall, at first with a few fibrils from the veil but soon naked to the pruinose apex.

Spores $9\text{--}12 \times 5\text{--}6.5(7) \mu$, inequilateral in profile, ovate in face view, near Mars brown in KOH, merely pale tawny in Melzer's solution, surface minutely marbled (roughened), plage very distinctly marked off, some separation showing in a few spores. Basidia 4-spored. Pleurocystidia none. Cheilocystidia $28\text{--}40 \times 6\text{--}12 \times 4\text{--}7 \times 6\text{--}11 \mu$, ventricose, and with obtuse to oval tips or broadly rounded, $30\text{--}36 \times 10\text{--}15 \mu$ and clavate, all hyaline smooth and thin-walled in KOH, some almost filamentous. Pileus trama ochraceous in KOH, with slight pigment incrustations, cuticle not gelatinous. Clamp connections present.

MATERIAL EXAMINED: Idaho, Smith 54649. Michigan, Thiers 2974. Washington, Smith 47406. Canada, Quebec, Smith 61599; 61692.

90. *Galerina hypsizyga* Singer, sp. nov.

Pileo $3.5\text{--}14 \times 3\text{--}7$ mm, forma variabili, ochraceo-ferrugineo vel atro ferrugineo-brunneo, striato, haud viscido; lamellis ochraceis dein ferrugineis adnatis, latis, distantibus; stipite margini pilei concolori, obscuriore in vetustis et exsiccatis, praesertim basin versus, velo subtili cortiniformi, sericeo, hyalino, fugaci ornato, exannulato, aequali vel apicem versus subattenuato, 18–24 mm longo, 1–2(3) mm crasso; sporis $8.5\text{--}11.3 \times 5.7\text{--}7.5 \mu$, ornamentatione exosporiali colore ab episporio haud discernibili, marmorata vel verrucosa; basidiis plerumque tetrasporis; cheilocystidiis $25\text{--}42(50) \times 4.7\text{--}8.5 \mu$, subcapitatis vel capitatis, rarius ampullaceis; hyphis fibulatis. Ad humum terramque lapidosam inter muscos (numquam *Sphagna*) locis declivibus vel ad marginem viarum montanarum in zona nebularem et in zona alpina sed hic in umbra saxorum, aestate autumnoque, andicola et hypsizyga (3000 m. alt. et ultra), Argentina et Venezuela et Bolivia(?), Singer (T-1916)-*Typus* (LIL).

Pileus 3.5–14 mm broad, 3–7 mm high, 0.5–1 times as high as broad, varying from globose to conic-papillate when young, becoming broadly campanulate to semiglobose in age, with or without a papilla and if without often becoming umbilicate, deep rusty brown, the center between *Sudan brown* and *burnt umber* or *kis kilim*, the margin near *oak*, often *Pablo* between the striae, about half to two-thirds of radius translucent-striate, hygrophanous and fading to buff and then very slightly sulcate, not viscid; when

dried still visibly striate and rather deep colored; context lacking a distinctive odor or taste.

Lamellae adnate, broad, distant, ochraceous then ferrugineous.

Stipe 18–24 mm long, 1–2(3) mm thick, equal or slightly attenuated upward, brownish (*oak*, apex *Pablo*), eventually much deeper brown near base, apex concolorous with cap margin; veil slight, soon evanescent, cortinate, not leaving an annulus or conspicuous zone when fading.

Spores $8.5\text{--}11.3 \times 5.7\text{--}7.5 \mu$, varying from verrucose-rough (rather heavily so at times) to faintly marbled but ornamentation never very conspicuous, with a well defined plage, moderately well pigmented (ochraceous brown or in large accumulations almost chestnut-ferruginous), elliptic in face view, somewhat inequilateral in profile. Basidia 4-spored or (rarely) 2-spored, $25\text{--}29 \times 8.8\text{--}10 \mu$. Cheilocystidia $25\text{--}42(50) \times 4.7\text{--}8.5 \times 1\text{--}3.5 \times 4\text{--}5 \mu$ ($1\text{--}3.5 \mu$ at constriction below capitellum), or some attenuated toward the apex. Gill trama regular, hyphae hyaline but some becoming incrustated with rust colored pigment in age. Epicutis of pileus rather poorly developed; hypodermium almost deep fulvous but pigment incrustation and hyphae not conspicuous. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious or solitary on humus or stony earth in the fog zone and in the alpine zone in low moss cushions on steep slopes and on roadsides; outside the fog zone always in shaded places at elevations above 3000 m; fruiting from Jan. until March; from the Aconquija Massive of Argentina north to the Páramos of Venezuela.

OBSERVATIONS: This species was at first assigned to *G. hypnorum* as a high mountain variety, but after continued study it seemed best to regard it as a species in its own right. The dark fulvous-ferruginous pileus distinguishes it from *G. hypnorum*. For further comment see discussion of *G. obscurata* and *G. tundrae*. Since some of the cheilocystidia have narrow necks, the species may be sought for in stirps *Triscopa*.

MATERIAL EXAMINED: Singer T-1916-*type* (from Minas Capillitas, Catamarca, Argentina); T-1931; T-1925 (LIL). Venezuela; Mérida; Sierra de Santo Domingo, alpine zone (3600 m. alt.) 22-VII-1958, Dennis 1700 (LIL, K).

Stirps Mycenopsis

Pileus conic, campanulate, or convex, margin typically straight at first (incurved in *G. naucorioides*); pleurocystidia lacking; spores smooth or nearly so, ornamentation most often in the form of a faintly delimited plage line.

The members of this stirps form a progression from the stirps *Hypnorum* to a group in which the spores are typically unornamented. We believe this change in spore character is of considerable significance in the phylogeny of the rusty brown spored agarics. The taxonomic value of the distinction lies chiefly in the fact that it divides a large assemblage of species into two manageable groups.

Key to Species

1. Spores 7–9 μ long ----- 2
1. Spores 9–12 μ or longer ----- 5
 2. Pileus dark chestnut brown (see 108a. *G. emmetensis* var. *intermedia* also) ----- 109. *G. aberrans*
 2. Pileus yellow-brown to ochraceous ----- 3
3. Veil yellowish, thin, evanescent, cheilocystidia often with yellow content ----- 108. *G. emmetensis* var. *emmetensis*
3. Veil absent or whitish ----- 4
 4. Veil absent ----- see *G. fallax* (25)
 4. Veil present and whitish; in KOH many of the cheilocystidia with pale cinnamon walls in pedicel or including the ventricose part ----- 91. *G. leucobryicola*
5. Pileus viscid to lubricous or shining when fresh ----- 6
5. Pileus merely moist, lacking a fatty lustre ----- 11
 6. Cheilocystidia typically with some incrustation over the neck, the apex usually enlarged ----- 92. *G. lacustris*
 6. Cheilocystidia not as above ----- 7
7. Spores 11–15 \times 6.5–8 μ ; cheilocystidia 40–55 \times 9–12 \times 5–7 μ ----- 93. *G. lubrica*
7. Not as above ----- 8
 8. Pileus a pale rather bright yellow; stipe 40–60 mm long ----- 94. *G. vexans*
 8. Pileus ochraceous tawny, tawny or smoky cinnamon ----- 9
9. Pileus when fresh pale smoky cinnamon brown (see *G. septentrionalis* (75) also) ----- 106. *G. cainii* 9
9. Pileus some shade of fulvous ----- 10
 10. Pileus plano-umbonate; stipe 20–25 mm. long ---- 95. *G. rostrata*
 10. Pileus obtusely campanulate (subelliptic when young as in *Mycena epipterygia*); stipe 30–50 mm long ----- see *G. mniophila* (85)
11. Margin of pileus incurved at first; pileus russet, convex to plane; narrow brown clavate bodies imbedded in the hymenium of fresh specimens ----- 96. *G. naucorioides*
11. Not as above ----- 12
 12. Many spores with a slight band-like extra thickening in the wall near the apex (in optical section appearing as two swellings opposite each other, in surface view the band showing as a darker strip) ----- 97. *G. allospora*
 12. Spores not as above ----- 13
13. Pileus ferruginous to rich rusty brown or bright tawny orange ---- 14
13. Pileus dingy cinnamon, ochraceous tawny, clay color or paler ---- 15
 14. Spores 9–11 \times 6–7 μ ----- 99. *G. laeta*
 14. Spores 10–13 \times 5–6 μ ----- 98. *G. tundrae*
15. Cheilocystidia filamentous to filamentous-subcapitate, 24–35 \times 4–5 \times 3–5 \times 6–8 μ ----- 100. *G. dicranorum*
15. Not as above ----- 16
 16. Many spores with a cap-like thickening of wall material over the apex; stipe darkening below ----- 101. *G. fennica*

16. Not as above ----- 17
17. Spores with a faint ornamentation, plage line typically demonstrable 18
17. Spores truly smooth, plage line absent or at most very faint in a few spores ----- 26
18. Cheilocystidia 28–40 × (4)6–12 × 4–7 × 6–11 μ
----- see *G. subbadipes* (89)
(but see *G. perangusta* (53), *G. fallax* (25) and *G. cerina* var. *longicystis* (22d) also).
18. Cheilocystidia narrower at apex or equal to the apex ----- 19
19. Pileus whitish faded; stipe 30–60 mm long, 1–2 mm thick
----- 102a. *G. pumila* var. *subalpina*
19. Pileus buff faded; stipe filiform ----- 20
20. Stipe pallid when young; a fair number of cheilocystidia subacute
----- 104b. *G. subfiliformis* var. *pallidipes*
20. Not as above ----- 21
21. Pileus typically dark ochraceous brown and stipe a paler shade; typically among mosses on logs of frondose trees ----- 110. *G. proxima*
21. Pileus ochraceous to pale tan or pale fulvous moist ----- 22
22. Spores 10–14 μ long ----- 23
22. Spores 8–11 μ long ----- 25
23. Pileus obtusely conic to convex; stipe 1–2.5 mm thick
----- 102a. *G. pumila* var. *subalpina*
23. Pileus conic (often sharply so); stipe 1 mm or less thick ----- 24
24. Stipe pallid young; cheilocystidia often with an acute apex
----- 104b. *G. subfiliformis* var. *pallidipes*
24. Stipe yellowish when young; cheilocystidia mostly enlarged at apex ----- 104. *G. subfiliformis* var. *subfiliformis*
25. Odor and taste not distinctive ----- 102a. *G. pumila* var. *subalpina*
25. Odor and taste pungent farinaceous ----- 105. *G. polytrichorum*
26. Stipe soon distinctly darker colored at base than in the upper half 27
26. Stipe approximately concolorous over all ----- 28
27. Stipe typically chestnut below, lacking a distinct fibrillose annual zone
----- 107. *G. embolus*
27. Stipe bistre below, typically with a grayish fibrillose annular zone
----- 111. *G. tatooshiensis*
28. Veil absent ----- 104a. *G. subfiliformis* var. *cucullata*
28. Veil present (check buttons) ----- 29
29. Spores 8–11 × 5.5–6 μ, pale yellow in KOH, changing slowly
----- 103. *G. luteolosperma*
29. Spores 10–12 × 6–7 μ, fulvous when mounted in KOH
----- 102. *G. pumila* var. *pumila*

91. *Galerina leucobryicola* Smith & Singer, sp. nov.

Illustrations: Fig. 107 (cheilocystidia).

Pileo 6–12 mm lato, margine primum haud incurvato, ochraceobrunneo vel fulvidobrunneo; lamellis distantibus; stipite 20–30 × 1 mm aequali,

ex integro pallide melleo, sparse pallide fibrilloso veli teneri causa; sporis 7–9 × 4.5–5.5 μ, levibus vel minutissime marmoratis, pseudoamyloideis; basidia tetrasporis; cheilocystidiis 30–40 × 7–10 × 6–7 μ, ad basin sub-ventricosis, apice obtusis vel subcapitatis, tramate lamellarum pileique fortiter incrustato pigmento ochraceobrunneo vel rubiginoso (KOH); hyphis fibulatis. Ad *Leucobryum* gregatim. Specimen typicum leg. Smith (no. 49533, MICH) prope Dexter, Michigan.

Pileus 6–12 mm broad at base, obtusely conic to convex, broadly convex in age, surface glabrous, moist, hygrophorous, translucent striate and ochraceous tawny to tawny at first, near pinkish buff faded; flesh thin, concolorous with surface, fragile; odor and taste not recorded.

Lamellae distant, moderately broad, broadly adnate, ochroleucous young, tawny in age from the spores, edges white fimbriate.

Stipe 20–30 mm long, up to 1 mm thick, equal, pallid honey color over all and with a few pallid fibrils from the remains of the thin veil, apex pruinose from caulocystidia.

Spores 7–9 × 4.5–5.5 μ, ovate in face view, inequilateral in profile, smooth or very minutely marbled, plage not delimited or only very faintly so in a few spores, tawny in KOH, *deep reddish brown* (pseudo-amyloid) in Melzer's solution. Basidia 4-spored, 22–25 × 7–8 μ, hyaline but many basidioles with yellowish-cinnamon content in KOH. Pleurocystidia none. Cheilocystidia 30–40(50) × 7–10 × 6–7 μ, base slightly ventricose, neck 5–6 μ thick and obtuse to subcapitate apex 6–7 μ, thin-walled, hyaline or a tinge of cinnamon in the wall at the base. Gill trama heavily incrustated with ochraceous pigment. Pileus trama with a thin non-gelatinous pellicle and beneath it heavily incrustated (tawny to rubiginous in KOH) hyphae bearing clamps at the cross walls.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on *Leucobryum glaucum*, Pinckney Recreation Area, Dexter, Washtenaw County, Michigan, May 29, 1955, Smith 49533-*type*.

OBSERVATIONS: The smooth to practically smooth spores which give a strong pseudo-amyloid reaction, the evenly colored stipe and thin veil, and the heavy pigment incrustations of the hyphae of the pileus trama are distinctive. It is close to *G. naucorioides* but has smaller spores, a paler stipe, a straight pileus margin and a very different habitat. In Smith 49533 the fruiting bodies were definitely attached to the moss gametophytes. It differs from *G. aberrans* in its paler color and less conspicuous spore ornamentation.

MATERIAL EXAMINED: J. W. Groves, Paradise, Nova Scotia, 8-29-53 (MICH). Smith 49533-*type*; 62781.

92. *Galerina lacustris* Smith, Mycologia 45: 905. 1953.
Illustrations: Fig. 109 (cheilocystidia).

Pileus 10–15 mm broad, obtusely conic, expanding to broadly campanulate, at times umbo obsolete and cap convex, surface glabrous, lubricous to viscid to the touch when wet, shining, striate to disc, moist, bright "ochra-

ceous tawny”, disc a little darker; flesh soft and fragile (but fleshy for the genus), concolorous with surface; odor and taste mild.

Lamellae broad, close to subdistant, broadly adnate and readily seceding, “cinnamon buff” at maturity (paler than cap and duller), paler when young, edges even.

Stipe 40–60 mm long, 2–3 mm thick, equal, very soft and fragile, hollow, at first with a few faint appressed fibrils below, apex faintly pruinose, concolorous with margin of cap over all or in some the apex a little paler but no true color change present, often translucent and undulating, with scattered fibrils from rudimentary veil.

Spores $10\text{--}12.5 \times 5\text{--}6.3 \mu$, elongate-inequilateral in profile view, narrowly ovate in face view, smooth except for a ragged line around the depression, ochraceous tawny in KOH. Basidia 4-spored. Pleurocystidia, none seen. Cheilocystidia abundant, $38\text{--}60 \times 8\text{--}11 \mu$, mostly clavate with flexuous pedicel but some \pm ventricose at base and some \pm filamentose, apical enlargement often oval, the neck often somewhat incrustated. Gill trama somewhat interwoven, ochraceous in KOH. Cuticle of pileus a thin poorly formed subgelatinous pellicle (in KOH); tramal body ochraceous tawny and homogeneous in KOH. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered among mosses and sedges at low water level of Lake George, Mt. Rainier National Park, Washington.

OBSERVATIONS: The incrustation over the upper part of the neck of the cheilocystidium is peculiar to this species in the genus. The line marking the plage on the spore is very faint but can be observed on most properly oriented spores. For further comments see *G. vexans*.

MATERIAL EXAMINED: Smith 40848-*type*; 40866.

93. *Galerina lubrica* Smith, sp. nov.

Illustrations: Fig. 108 (cheilocystidia).

Pileus 10–20 mm latus, obtuse conicus, demum campanulatus, glaber, nitens, fulvus; lamellae latae, adnatae, confertae fulvae; stipes 30–60 mm longus, 1–1.5 mm latus, ochroleucus, deorsum primum fibrillosus; spores $12\text{--}15 \times 6\text{--}7.5 \mu$, leves; cheilocystidia $40\text{--}55 \times 9\text{--}12 \times 5\text{--}7 \mu$. Specimen typicum legit Smith 51977 (MICH) prope Ophir, Colorado, 8 August 1956.

Pileus 10–20 mm broad, obtusely conic becoming campanulate, surface glabrous, moist shining and hygrophanous, dull ochraceous tawny or paler, drying dull cinnamon, faintly striate moist.

Lamellae broad, adnate, close, concolorous with pileus and like it drying dull cinnamon, edges slightly floccose.

Stipe 30–60 mm long, 1–1.5 mm thick, equal, undulating, dull honey color over all and not darkening below, upper region pruinose, lower part at first with a few pallid fibrils from the rudimentary veil.

Spores $12\text{--}15 \times 6\text{--}7.6 \mu$, obscurely to distinctly angular-ovate in face view, obscurely inequilateral in profile varying to elliptic—and angular or

not, dull yellow brown to pale "cinnamon brown", smooth under oil but a faint plage-line visible on spores where granular content does not obscure it, thick-walled, callus indistinct. Basidia 2-spored. Pleurocystidia none. Cheilocystidia $40\text{--}55 \times 9\text{--}12 \times 5\text{--}7 \mu$, apices obtuse or rarely obscurely spear-headed, thin-walled, yellowish to hyaline in KOH, smooth. Epicutis of pileus of narrow hyphae ($3\text{--}5 \mu$), subgelatinous in KOH, hypoderm of broad pigment-incrusted hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on wet moss, Ophir, Colorado, Aug. 8, 1956, Smith 51977-*type*.

OBSERVATIONS: The dried specimens are dull cinnamon; the obscurely angular spores, and the dull colors of the pileus also aid in distinguishing it. The subgelatinous cuticle would relate the species to *G. lacustris* but the dull colors of the spores and fruiting body, as dried, distinguish it, as do the smooth cheilocystidia. This species is close to *G. pumila* but differs in the more angular spores which often do show a faint plage line, and in the color of the dried specimens.

94. *Galerina vexans* Smith & Singer, Mycologia 47: 583. 1955.

Illustrations: Pl. 14, figs. A & B. Fig. 110 (cheilocystidia).

Pileus 10–15 mm broad, obtusely conic the margin straight when young, expanding to obtusely campanulate or plano-umbonate, at first with a faint zone of veil fibrils along the margin, soon glabrous, shining and lubricous when wet (buttons slightly viscid), color pale yellow to ochraceous ("antimony yellow" to near "ocher yellow") over all when young, disc finally becoming darker (near "buckthorn brown"), conspicuously translucent striate; flesh thin, dull yellow, odor and taste mild.

Lamellae pale pinkish buff becoming pale ochraceous tawny, adnate, moderately broad and becoming ventricose, subdistant.

Stipe 40–60 mm long, 1.5–2.5 mm thick, equal or thickened slightly downward, base hyaline whitish, middle portion watery ochraceous, apex pallid honey color, surface fibrillose from remains of a thin yellowish-pallid veil, apex pruinose.

Spores $9\text{--}11(12) \times 5\text{--}6 \mu$, smooth (no plage line seen under highest magnification), dark red-brown in Melzer's reagent, fulvous in KOH. Basidia 4-spored. Pleurocystidia none. Cheilocystidia abundant, $(28)36\text{--}58(70) \times 5\text{--}8 \times 3\text{--}5 \times 5\text{--}8 \mu$, slightly ventricose at base and with an elongated flexuous neck and a subacute to obtuse or subcapitate apex, at times apex mucronate, smooth, hyaline, thin-walled. Epicutis a thin somewhat gelatinous layer of appressed hyphae; all hyphae of pileus context with incrusted pigment or yellowish walls. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on moss in open but shaded areas, typically under conifers, late summer and fall.

OBSERVATIONS: This species differs from *G. lacustris* in having smooth cheilocystidia mostly with no apical enlargement, spores which lack a plage line, and a truly yellow pileus when young. The yellow of the veil is distinct in good material but is pale and easily overlooked. In the field *G. pumila*

var. *subalpina* is readily distinguished by its more dingy colors. Dried specimens of it are readily distinguished from *G. vexans* by their much paler spores both in Melzer's reagent and KOH. Also, *G. pumila* var. *subalpina* is characteristic of cold, montane habitats and seems to fruit best after light frosts. Actually *G. vexans* is difficult to distinguish, in the field, from *G. heterocystis*. At Wilderness Park in 1953 it was found impossible to distinguish them at sight. They are, of course, very distinct under the microscope.

Bigelow 4718 and 4721 appear to belong here but data are lacking on the color of the cap when fresh. As dried the caps are dull tawny. The veil remnants in the dried specimens appear yellowish. The cheilocystidia are the one character which indicates a possible significant difference. They are capitate to subcapitate much as in *G. tibiacystis*.

Tuomikoski sent a collection from Finland, made Sept. 17, 1954, consisting of two immature carpophores which fit this species well except that the cheilocystidia eventually become sub-capitate to capitate. The microscopic characters are as follows:

Spores $8-10 \times 5-6 \mu$, inequilateral in side view, ovate in face view, smooth, wall thickened, near ochraceous tawny in KOH. Basidia 4-spored, $28-33 \times 8-9 \mu$, hyaline in KOH (all young). Pleurocystidia none. Cheilocystidia abundant, at first fusoid-ventricose and $28-36 \times 6-9 \times 4-5 \mu$, apices blunt and not enlarged, in age elongating to $40-60 \times 5-6 \times 3-4 \times 4-5 \mu$, the neck becoming narrower causing the apex to appear somewhat capitate, hyaline, thin-walled, smooth. Gill trama parallel, of hyaline thin-walled, smooth hyphae. Gill trama parallel, of hyaline thin-walled hyphae. Pileus trama covered by a gelatinous cuticle of appressed narrow hyphae ($4-5 \mu$ in diam.) with hyaline or with dingy ochraceous contents and clamps at the cross walls; hypoderm of rusty-ochraceous hyphae with incrusting pigment, beneath this the hyphae paler and less incrustated. Clamps present.

There were clear indications of a fibrillose veil on the dried carpophores and the fibrils were pallid as dried. The viscid pileus, fibrillose veil, smooth spores, and cheilocystidia which become capitate mainly through the elongation and thinning of the neck, relate the collection to *G. vexans*.

Smith collections 61660 and 61662 may represent a large-spored variant as in them the spores were $10-13 \times 5-6 \mu$ and showed a distinct suprahilar depression (but no plage line).

MATERIAL EXAMINED: Bigelow 4476; 4568; 4718; 4721; 4775 (MICH). Smith 42824-type; 42825; 42963; 42964; 43005; 43008; 43472; 43495; 43715; 43717; 43719; 43844; 43921; 44033; 44035; 50959; 50964; 50967; 50968; 50970; 58052; 61505; 61511; 61533; 61539; 61590; 61603; 61630; 61631; 61633; 61636; 61651; 61660; 61661; 61662; 61673; 61804; 61807; 61808; 62123; 62795; 63264; 63395. Stordal 7206 (O). Tuomikoski, Finland, 9-17-54 (H).

95. *Galerina rostrata* Smith & Singer, Mycologia 50: 484. 1958.

Illustrations: Pl. 13, fig. F. Fig. 111 (cheilocystidia).

Pileus 6-12 mm broad, plano-umbonate young and with a slightly incurved margin, becoming campanulate or remaining plano-umbonate,

surface glabrous, subviscid, "tawny" on disc and "ochraceous tawny" over striate margin; flesh very thin and soft; odor and taste mild.

Lamellae subdistant, broadly adnate, broad, dingy pale ochraceous tawny.

Stipe 20–25 mm long, ± 1 mm thick at apex, slightly enlarged downward, with a few scattered fibrils when young, soon naked throughout, concolorous with gills above, base darker and concolorous with disc of pileus.

Spores $9\text{--}11.5 \times 4.7\text{--}5.5 \mu$, more or less inequilateral in profile, in face view ovate, some obscurely angular-ovate, pale ochraceous tawny in H_2O fresh, tawny in KOH, dark red-brown in Melzer's, smooth or practically so (under oil) but plage delimited by a faint line. Basidia 4-spored. Pleurocystidia none or only near gill edge and similar to cheilocystidia. Cheilocystidia abundant, $35\text{--}50 \times 6\text{--}10(11) \mu$, slightly ventricose at the base or over lower part, tapered to a long narrow ($3\text{--}4 \mu$) neck which ends in an obtuse or rarely slightly enlarged apex, walls thin, smooth, hyaline in KOH. Gill trama subparallel, walls of hyphae ochraceous to pale cinnamon in KOH (good sections showing almost hyaline walls), incrustations absent to inconspicuous. Pileus trama with a pellicle of slightly gelatinous hyphae $4\text{--}8 \mu$ in diam., walls incrustated with pigment (no true differentiation of the pellicle), flesh beneath of larger more highly colored (in KOH) hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on a mossy log, Prairie Creek State Park, California, Dec. 5, 1956, Smith 56364-*type*.

OBSERVATIONS: The rostrate cheilocystidia, practically smooth spores and subviscid pileus are distinctive. The smoother spores distinguish it from *G. uncialis* which, in addition, does not have a subviscid pileus.

MATERIAL EXAMINED: Bigelow 5679; 5810; 6638 (MICH). Smith 56364-*type*.

96. *Galerina naucorioides* Smith & Singer, Mycologia 47: 584. 1955.
Illustrations: Fig. 112 (cheilocystidia).

Pileus 8–15 mm broad, convex to plane or slightly umbonate, margin incurved when young, slightly fibrillose young, glabrescent, moist and hygrophanous, dark brown (near "russet") fading to pale tan.

Lamellae narrow, distant, adnate, concolorous with pileus, edges even.

Stipe 10–20 mm long, 1–2 mm thick, contorted to curved, narrowed at base, enlarged at apex, concolorous with pileus, pruinose above, sparsely fibrillose toward the base.

Spores $10\text{--}12(13) \times 5\text{--}6 \mu$, narrowly subinequilateral in profile, narrowly ovate in face view with an apical callus, ochraceous tawny in KOH, smooth or slightly rugulose, plage marked by a ragged line. Basidia $30\text{--}32 \times 8\text{--}9 \mu$, hyaline in KOH, 4-spored. Pleurocystidia present only near edges, similar to cheilocystidia. Cheilocystidia $32\text{--}44 \times 7\text{--}11 \mu$, fusoid-ventricose with obtuse apices and flexuous necks, hyaline and thin-walled in KOH. Gill trama subparallel to interwoven, yellow-brown in KOH from incrust-

ing pigment. Pileus trama homogeneous, darker yellow brown in KOH than gill trama. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Single to gregarious on debris and sticks on moist soil, Huron Mountains, Michigan, Sept., Smith 33-995-*type*.

OBSERVATIONS: This is a *Naucoria*-like species with the cap margin incurved, dark brown color, and nearly smooth narrow, non-calyptrate spores. *G. carbonicola* appears to be closely related in its incurved pileus margin and dark colors but differs in habitat and smaller spores, which are conspicuously roughened.

The pleurocystidia are so close to the gill edge that we are inclined to regard them as cheilocystidia in classifying the species as to section.

97. *Galerina allospora* Smith & Singer, Mycologia 47: 585. 1955.
var. *allospora*

Illustrations: Pl. 13, fig. H. Figs. 280–283 (spores); 114 (cheilocystidia).

Pileus 8–15(20) mm broad, sharply to obtusely conic with bent-in margin, becoming conic campanulate to expanded-umbonate, surface glabrous, moist, hygrophanous, “cinnamon brown” to tawny on the umbo, “ochraceous tawny” and translucent-striate over the margin, or dull ochraceous tawny over all when fresh; flesh thin and fragile, odor and taste mild.

Lamellae close to subdistant, ascending, adnate, narrow to moderately broad, ochraceous tawny, edges even or nearly so.

Stipe 20–30 mm long, \pm 1 mm thick, equal, very fragile, with scattered pallid fibrils from a very thin veil, soon glabrescent, honey color near apex, rusty brown to bister over basal part.

Spores 9–12 \times 5–6 μ , slightly inequilateral in profile, in face view narrowly ovate, smooth to very faintly ornamented by a faint jagged line delineating the plage, many appearing obscurely angular near apex because of a slightly thickened band of wall material deposited in that zone, in optical section the spore appearing to have two inconspicuous swellings—one opposite the other, apical callus present. Basidia four-spored, not infrequently with yellow content as revived in KOH. Pleurocystidia, none seen. Cheilocystidia abundant, (25)36–44(52) \times 5–10(13) \times (2)3.5–4(5) \times 4–6(9) μ , ventricose, below and with a long neck, apex obtuse to subcapitate or capitate, rarely subacute above the apical enlargement, hyaline, thin-walled; hyphae incrustated with pigment. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on debris and dead sphagnum under spruce or on lightly burned over areas in bogs, Michigan.

OBSERVATIONS: This species does not appear to be closely related to *G. naucorioides* and *G. tundrae*, the other dark brown species of this group. *G. naucorioides* has a convex pileus, is evenly dark colored over pileus and stipe, and the spore-wall does not show the curious sub-apical thickening. *G. tundrae* has more red in the fresh pileus and the stipe is not bister at the base in age but instead a dark red brown. Its spores also lack the subapical thickened zone of wall material. The spore characters definitely recall those

of *G. insignis* but the structure of the surface layer of the pileus, the absence of pleurocystidia, and the color of the fibrils on the stipe distinguish it from *G. insignis*. *G. allospora* is similar in many respects to *G. septentrionalis* but, in addition to spore characters, is distinguished by its shorter stipe and more varied habitat. Smith 50567 had the shining pileus of *G. septentrionalis* but its spore characters place it here. In Smith 36045, however, the stipes were elongated. The specimens came from deep *Sphagnum*, hence there is some intergradation with *G. septentrionalis* and in such collections the spores furnish the distinguishing character.

MATERIAL EXAMINED: Smith 18924; 31891; 36043; 36044; 36045; 36054; 36055; 36056; 36065; 44022; 44027; 44032; 44035; 44038-*type*; 44039; 50567; 50804.

97a. *Galerina allospora* var. *laurentiana* Smith, var. nov.

Pileus cinnamomeo-brunneus, striatus, demum sordide fulvus; sapor mitis; stipes deorsum subcastaneus, sursum ochroleucus, fibrilloso-zonatus; sporae 9–12 × 5–6 μ; cheilocystidia 36–45 × 6–9 × 2–3.5 × 4–6 μ, non capitata. Specimen typicum legit Smith 61632 (MICH) prope Le Guite, Laurentide Park, Quebec, 30 Aug. 1959.

Pileus cinnamon brown, translucent striate moist, hygrophanous and fading to dingy fulvous; taste mild; stipe with a fibrillose zone from the thin pallid veil, becoming nearly chestnut brown over lower part, upper part pale to dark honey color. Spores 9–12 × 5–6 μ. Cheilocystidia 36–45 × 6–9 × 2–3.5 × 4–6 μ, noncapitate.

A fair number of spores show an obscure angularity in face view, and on some of these a slight additional thickening in the wall near the apex may be observed. It is this feature which leads us to attach this variant to *G. allospora* as a variety. Also, there is enough of an apical pore in a few species to suggest a relationship to species of Section *Porospora*. There are no gelatinous layers in or on the pileus and the spore wall is smooth. The aspect of the fruiting body is of a small *Cortinarius*, a character which quickly separates this variety from *G. septentrionalis*. *G. perangusta* differs in having a farinaceous taste.

98. *Galerina tundrae* Smith & Singer, Mycologia 47: 584. 1955.
Illustrations: Pl. 13; fig. B. Fig. 115 (cheilocystidia).

Pileus 10–20 mm broad, obtusely campanulate, “hazel” to deep “tawny” on disc, paler over the broadly striate margin, surface moist but dull (not at all lubricous), “ochraceous tawny” faded; flesh fragile, soft, odor and taste not distinctive.

Lamellae distant to subdistant, broad, ventricose, ascending-adnate and soon seceding, ± ochraceous tawny, edges fimbriate under a lens.

Stipe 10–20 mm long, ± 2 mm thick, equal, hollow, fragile, concolorous with gills above and with cap below, veil remnants faint, pallid.

Spores $10\text{--}13 \times 5\text{--}6 \mu$, inequilateral in profile, ovate in face view, nearly smooth, plage faintly outlined in a few, tawny in KOH, with an apical callus. Basidia 4-spored. Pleurocystidia none. Cheilocystidia abundant, of two types, fusoid ventricose with elongated necks and obtuse apices, $42\text{--}60 \times 8\text{--}10 \mu$, and elongated individuals with oval heads $8\text{--}12 \mu$ broad and equal or merely slightly ventricose below. Gill trama yellowish cinnamon in KOH, of enlarged more or less regularly arranged cells. Pileus trama homogeneous, cinnamon in KOH, pigment incrustated. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on tundra-like bank, below Goble's Knob, Mt. Rainier National Park, Washington, Oct. 12, 1952. Additional collections were from Snow Lake.

OBSERVATIONS: The ferruginous to tawny pilei, distant gills, the stipe darker at the base than at apex, and the long cheilocystidia with obtuse to capitate or oval apices are distinctive. In the 2-spored form from Snow Lake the spores measured $11\text{--}15 \times 6\text{--}7.5 \mu$ and were often obscurely angular in face view. In these the line marking the plage showed more readily than in the type. Occasional spores were forked, an abnormality not uncommon in *Coprinus* and *Psathyrella*.

G. hypsizyga differs from *G. tundrae* in its shorter, broader spores and shorter cheilocystidia. *G. hypsizyga* from comparable habitats in the Andes may appear similar to *G. tundrae*, especially where collections with weakly ornamented spores are concerned. The North American species differs from the South American one, in having shorter cheilocystidia, as well as spores longer in relation to their width.

MATERIAL EXAMINED: Smith 40351 (2-spored); 40353 (2-spored); 40361; 40858-*type*; 40865 (2-spored).

99. *Galerina laeta* Singer, sp. nov.

Illustrations: Fig. 113 (cheilocystidia).

Pileo 7–8 mm alto et lato, centro brunneolo, obtuse campanulato, hygrophano, glabro, aurantio-cinnamomeo, centro sordide luteo brunneolo, haud viscido, vix striatulo, magis acuto in siccis sulculatisque, lamellis brunneo-flavis, ascendentibus, adnatis, angustis vel mediocriter latis, subconfertis vel confertis; stipite lamellis subconcoloribus, subtiliter sericeo-pruinoso, velo haud viso; sporis $10\text{--}11 \times 6.3\text{--}7 \mu$; cheilocystidia variabilissimis, $33\text{--}45 \times 7\text{--}11 \mu$; caulocystidiis coacervatis; epicute haud bene evoluta; hyphis fibuligeris, in cortice stipitis admodum pigmento-incrustatis.

Pileus 7–8 mm broad and about as high, campanulate with an obtusely conic umbo, appearing somewhat papillate when dried, hygrophanous or scarcely so, not viscid, sulcate when faded, bright tawny orange (*Eldorado*) with the disc dingy yellow-brown (*chipmunk*); context lacking a distinctive odor, taste not recorded.

Lamellae dingy yellow brown (*spruce Y*), ascendant, adnate, rather narrow to medium broad, close or nearly so.

Stipe about 40 mm long, 3 mm thick, slightly attenuated toward the apex, pale clay-color above, darker orange-brown below, finely silky pruinose; veil, none seen.

Spores $9-11 \times 6-7 \mu$, slightly angular-ovate to ovate in face view, obscurely to slightly inequilateral in profile near tawny in KOH and in Melzer's slightly reddish-tawny to red-brown, smooth or nearly so and plage faintly delimited, outer layer rarely separating slightly around the plage (no conspicuous "ears" formed). Basidia clavate, 4-spored or rarely 2-spored, $24-30 \times 9-11 \mu$. Pleurocystidia, none seen. Cheilocystidia $26-40 \times (4)7-12 \mu$, variable as to type: 1) fusoid-ventricose with obtuse to acute apices, or apex enlarged slightly, 2) ventricose capitate with the neck $2.5-5 \mu$ thick, or 3) filamentose-capitate and $3-7 \mu$ broad at apex, all types hyaline and thin-walled; caulocystidia in clusters, extremely variable, hyaline to colored, most abundant near apex (the clusters consist of interwoven or tangled hyphal ends which are here interpreted as cystidioid). Hyphae of the cortex of the stipe heavily incrustated with pigment. Epicutis of pileus poorly developed; hypodermium of hyphae incrustated with brown pigment and with a distinct yellow tinge underneath. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On *Sphagnum* sp. but not always attached to the *Sphagnum* gametophytes, but to other mosses instead. Cotapata, prov. Nor-Yungas, Depto. La Paz, Bolivia, 3000 m. alt., fruiting in Jan., Singer B-626-type (MICH).

OBSERVATIONS: This species belongs in *Mycenopsis* near *G. tundrae* (which is also characterized by rich colors) but differs from *G. tundrae* in having smaller and more variable cheilocystidia. The spores, likewise, are somewhat variable and, since some of them are almost calyptrate, the species is also keyed out in Section *Calyptróspora*.

100. *Galerina dicranorum* Smith & Singer, Mycologia 50: 474. 1958.
Illustrations: Pl. 15, fig. A. Fig. 116 (cheilocystidia).

Pileus 7-15 mm broad, conic to convex, surface glabrous, moist and hygrophanous, striate, margin straight when young, near ochraceous-tawny moist, fading from disc out to a bright yellow-brown.

Lamellae sinuate, distant at maturity, 2-3 mm broad, nearly concolorous with pileus dried, edges even or nearly so.

Stipe 40-50 mm long, 1.5-2 mm thick, hollow, cartilaginous, apex pruinose, dingy honey-color, scarcely darker below, base covered with a thin tomentum, veil none.

Spores $9-11 \times 5-6 \mu$, elliptic to slightly oval in face view, in profile obscurely inequilateral, practically smooth and plage very faintly delimited, ochraceous-tawny in KOH, dark reddish-brown in Melzer's sol.; no distinct apical pore present. Basidia 4-spored. Pleurocystidia none. Cheilocystidia $24-35 \times 4-5 \times 6-8 \mu$, filamentous to filamentous-subcapitate, in some the basal part slightly ventricose but head usually the broadest part, hyaline, smooth, thin-walled; gill trama interwoven, yellowish in KOH. Pileus

trama with a thin pellicle of narrow (3–5 μ) hyphae, laticiferous hyphae present and dark red brown in Melzer's sol.; pellicle not gelatinous, color of hyphae pale ochraceous, clamp connections present at the cross wall.

HABIT, HABITAT AND DISTRIBUTION: On a species of *Dicranum*, gregarious, south of Sinclair, Maine, Aug. 27, 1956, Bigelow 4421, *type*.

OBSERVATIONS: This species appears to be close to *G. vexans* but differs sharply in the characters of the cheilocystidia. In revived material the pellicle appeared slightly translucent, which would indicate that the cap when fresh was slightly lubricous. The filamentose subcapitate cheilocystidia might cause one to seek for this species in the stirps *Sideroides*, but it is not related there by its other characters. The largest specimen of Bigelow 4144 had scattered fibrils on the stipe but the collector stated that no veil was present. These specimens are about the stature of *G. hypnorum*.

MATERIAL EXAMINED: Bigelow 3280; 4144; 4421-*type*; 4592; 4648; 4719; 5290 (MICH). Cotner 57113 (MICH). Smith 28439.

101. *Galerina fennica* Smith, sp. nov.

Pileus 5–12 mm latus, campanulatus, glaber, hygrophanus, fulvus. Lamellae latae, confertae vel subdistantes, adnatae. Stipes 20–25 mm longus, 1.5 mm crassus, deorsum fibrillosus. Sporae 8–9.5 \times 4.5–5 μ , leves, subangulares. Cheilocystidia 40–60 \times 6–9 \times 4–5 μ . Specimen typicum legit. Tuomikoski 13 July 1942, Finland (H).

Pileus 5–12 mm broad, obtusely conic to campanulate, surface glabrous moist and hygrophanous, more or less tawny when moist, translucent striate.

Lamellae moderately broad, close to subdistant, ascending adnate, more or less ochraceous tawny.

Stipe 20–25 mm long, \pm 1.5 mm thick, lower portion coated with fibrils from a thin veil, apparently darkening at base in age, paler above.

Spores 8–9.5 \times 4.5–5 μ , appearing smooth under high dry magnification, basically \pm inequilateral in profile, ovate in face view, many showing a faint obscure angularity in either view, and a fair number with apex having a "snub-nosed" aspect (caused by a thin cap-like thickening of outer wall material), generally relatively thick-walled and lacking an apical pore, pale ochraceous tawny in KOH, a smooth plage present but faintly delimited, surface smooth to slightly uneven. Basidia 4-spored, hyaline or with ochraceous content, 25–30 \times 7–8 μ . Pleurocystidia none. Cheilocystidia 40–60 \times 6–9 \times 4–5 μ , base narrowly ventricose, neck long and slender, apex slightly enlarged, hyaline, smooth. Hyphae of cap trama with a distinct incrusting ochraceous pigment, pellicle of \pm appressed hyaline to yellowish hyphae. Clamps present.

HABIT, HABITAT AND DISTRIBUTION: Tuomikoski, Finland, July 13, 1942, on old *Sphagnum*, *type* (H).

OBSERVATIONS: The thickening at the apex of the spore is not like that of *G. allospora*, but fits over the apex as a cap. This feature, the slight angu-

larity of the spore, and the very faint plage, are distinctive. The description is drawn entirely from dried material.

102. *Galerina pumila* (Pers. ex Fr.) M. Lange, Medd. Grøn. 148(2): 37. 1957 ex Singer, Persoonia 2: 41. 1961.

var. *pumila*

Agaricus pumilus Pers. ex Fries, Syst. Myc. I. 263. 1821, non sensu Møller nec. M. Lange nec. Bas.

Galerina mycenopsis (Fr.) Kühner sensu Ricken, Ency. Myc. 7: 190. 1935.

Illustrations: Kühner, op. cit. f. 62.

Pileus 10–16 mm broad, convex to obtusely conic young, expanding to broadly conic to subelliptic or obtusely campanulate, surface glabrous, margin at first with scattered fibrils from the thin veil, moist, striatulate to near disc, hygrophanous, ochraceous tawny and fading to “warm buff” (pale yellow); context very thin and fragile, odor and taste not distinctive.

Lamellae subdistant at maturity, ascending-adnate, seceding, moderately broad, broadest toward stipe and tapered toward cap margin, concolorous with pileus or nearly so, edges even.

Stipe 30–50 mm long, 1.5–2.5 mm at apex, equal, tubular, fragile, at first with a few fibrils at or above the middle from a thin veil, glabrescent, near ochraceous tawny over all or base pale yellowish, not discoloring in age.

Spores 10–12(13.5) \times (5.5)6–7 μ , in face view subelliptic to obscurely ovate, in profile obscurely inequilateral to subelliptic (plage area very slightly depressed), smooth, plage line not visible, fulvous in KOH, darker to deep red-brown in Melzer’s solution with a very minute apical pore (under oil immersion). Basidia mainly or all 4-spored, 21–35 \times 5.5–9.5 μ . Pleurocystidia none. Cheilocystidia abundant, 33–50 \times 4.5–9.5 \times (1.7)4–5 \times (2.5)4–7 μ , apex ovate-capitate to rounded-capitate or merely obtuse, at times with a beak-like apical projection, smooth, thin-walled, hyaline in KOH; epicutis of pileus consisting of a thin layer of hyaline appressed, narrow (2–4 μ) non-gelatinous hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on mossy soil, often among lichens, fall, Oregon and Washington in North America, also in Europe and Asia (Altai Mts.), rare but abundant locally during some seasons.

OBSERVATIONS: We have studied a collection by Favre from Switzerland and Smith (25023) from Oregon, both of which check exactly with Kühner’s account. This establishes the occurrence of the type variety in North America. Var. *pumila* differs from *G. borealis* in the thicker necks and larger size of the cheilocystidia of the former, and the presence of a faint plage line at times on the spores of the latter.

What must be considered the type or authentic material of *A. pumilus* from the Persoon Herbarium was studied by Singer (1961); the specimen checks perfectly with what we previously called *G. mycenopsis* in the sense

of Kühner, except that the cheilocystidia are somewhat narrower; however, it does not key out with any known American or European species in the neighborhood of *G. sideroides*, so one would have to assume either that this is a new European species or that the cheilocystidia do not fully "revive" (or that the broader cells had collapsed completely). Since we are dealing with material collected probably more than 150 years ago, in which such behavior has been observed frequently, we do not hesitate to accept the latter solution as the likely one, inasmuch as it is very improbable that one of the three earliest collections of *Galerinas* now preserved, from a place where innumerable collections have since been made, should have been overlooked until now.

It must be kept in mind, however, that although M. Lange made the transfer to *Galerina*, his interpretation of *G. pumila* was not based on the Persoon material and is different from ours; it was not validly published.

MATERIAL EXAMINED: Bigelow 4541 (variant); 4726 (variant); 6170 (MICH). Favre, near Nyon, Switzerland, 10-19-47 (MICH). Persoon Herbarium (L) type (or authentic material from Germany or France). Singer & Freindling (as *G. mniophila*) Karelia, URSS, 1937 (MICH). Smith 25023; 40242.

102a. *Galerina pumila* var. *subalpina* Smith, var. nov.

Illustrations: Pl. 6, fig. D. Fig. 117 (cheilocystidia)

Sporae 9–13 × 5.5–7.5 μ, subleves; cheilocystidia elongata, 32–62(70) × 7–11 × 3–5 × 4–7 μ. Specimen typicum legit A. H. Smith 39834, Reflection Lake, Mt. Rainier National Park, Washington, 13 Sept. 1952 (MICH).

Pileus (3)4–7(10) mm high, 5–10(16) mm broad at base, obtusely conic and not expanding, surface at first with scattered fibrils from the veil but soon glabrous, moist and hygrophanous, usually lubricous to slightly viscid to the touch, dull watery ochraceous tawny and striate when moist, disc usually distinct as a watery-pallid area or with an olive buff cast, fading to yellowish white (on disc first); flesh thin, odor and taste not distinctive.

Lamellae close to subdistant, broad, ascending-adnate, buff when young, near ochraceous tawny at maturity.

Stipe (10)20–40(70) mm long, 1–2(3) mm thick, equal, fragile, ± evenly concolorous with young cap at first, fading to pallid, often remaining dingy honey-color over midportion but base regularly pallid, thinly coated with pallid fibrils from the thin veil.

Spores 9–13(15) × 5.5–7.5(8) μ, ovate in face view, distinctly inequilateral in profile, plage line typically present, surface smooth to faintly marbled or wrinkled over all except plage, very pale ochraceous in KOH. Basidia (3-)4-spored, 24–35 × 7–9.5 μ. Pleurocystidia, none seen. Cheilocystidia abundant, narrowly fusoid-ventricose, 32–62(70) × 7–11 μ, narrowest when fully elongated, apices typically obtuse to rounded but rarely capitate or subacute, occasionally beaked at apex. Pileus trama appearing

homogeneous in structure but as revived in KOH with a hyaline surface layer at times one third the diameter of the flesh, dingy ochraceous in the remainder. Gill trama of floccose interwoven hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on moss beds, especially *Dicranum* in North America, at elevations supporting alpine fir, Alaska yellow cedar, etc. (Hudsonian zone); also in Europe and Asia (Altai Mts.).

OBSERVATIONS: This agaric is characteristic of the cold wet moss beds of the Hudsonian zone in the mountains of the Pacific Northwest. It was especially abundant on much decayed, moss-covered, fallen tree trunks, at the base of old snow slides, late in the season when the nights had become frosty. Its outstanding field characters are the dingy honey-colored stipe with its pallid base, and the watery-translucent disc of the pileus. Under the microscope the faintly ornamented very pale spores with a demonstrable plage line, and the elongated cheilocystidia are distinctive. Possibly the hyaline region over the surface of the cap is also distinctive, however, this character is variable in the collections available to date. This variety has smoother spores than *G. mniophila* which may also have a translucent disc on the pileus, but they are more ornamented than in var. *pumila*. For further comments see *G. vexans*.

MATERIAL EXAMINED: Bigelow 8701 (MICH). Finland, 10-17-49 (H). P. A. Karsten, Finland, Sept., 1892, labelled *G. hypnorum* var. *longipes* Karst. (H). B. Knowles 1 (MICH). H. J. Oswald, Mt. Hood National Forest, Ore., 10-10-54 (MICH). Singer, Leningrad Region & Altai Mts.; Mordovski National Park (LE). Smith 17163; 28559; 39834-*type*; 40121; 40456; 40460; 40616; 40827; 40829; 40861; 40894 (typical); 40895; 40896; 40897; 40898; 40899; 40903; 40923; 41004; 41071; 41158; 47717; 47736; 48027; 48050; 48062; 48069; 48082; 48424; 48425; 48485; 48599; 48741; 48790; 48880; 48897; 48937; 49392; 49393; 49399; 49402; 49433; 54571; 55660; 55661; 56053; 56363; 61672 (MICH). Stordal 8267 (O).

103. *Galerina luteolosperma* Smith & Singer, .Mycologia 47: 570. 1955.

Illustrations: Fig. 118 (cheilocystidia).

Pileus 8–10 mm broad, conic with a straight margin, becoming conic-campanulate, surface glabrous, moist, hygrophanous, color an even dull ochraceous tawny when moist, dingy tan faded and near cinnamon brown dried, conspicuously striate when moist; flesh thin, fragile, odor and taste not recorded.

Lamellae close, moderately broad, hooked, ascending, \pm ochraceous tawny.

Stipe 40–50 mm long, about 1 mm thick, equal, fragile, “pinkish buff” overall, with pallid fibrils from veil over lower half at first, apex pruinose.

Spores 8–11 \times 5–5.5 μ , slightly inequilateral in profile, ovate in face view, *pale yellow* when first revived in KOH and only gradually becoming ochraceous tawny, smooth or nearly so, and plage area not distinctly

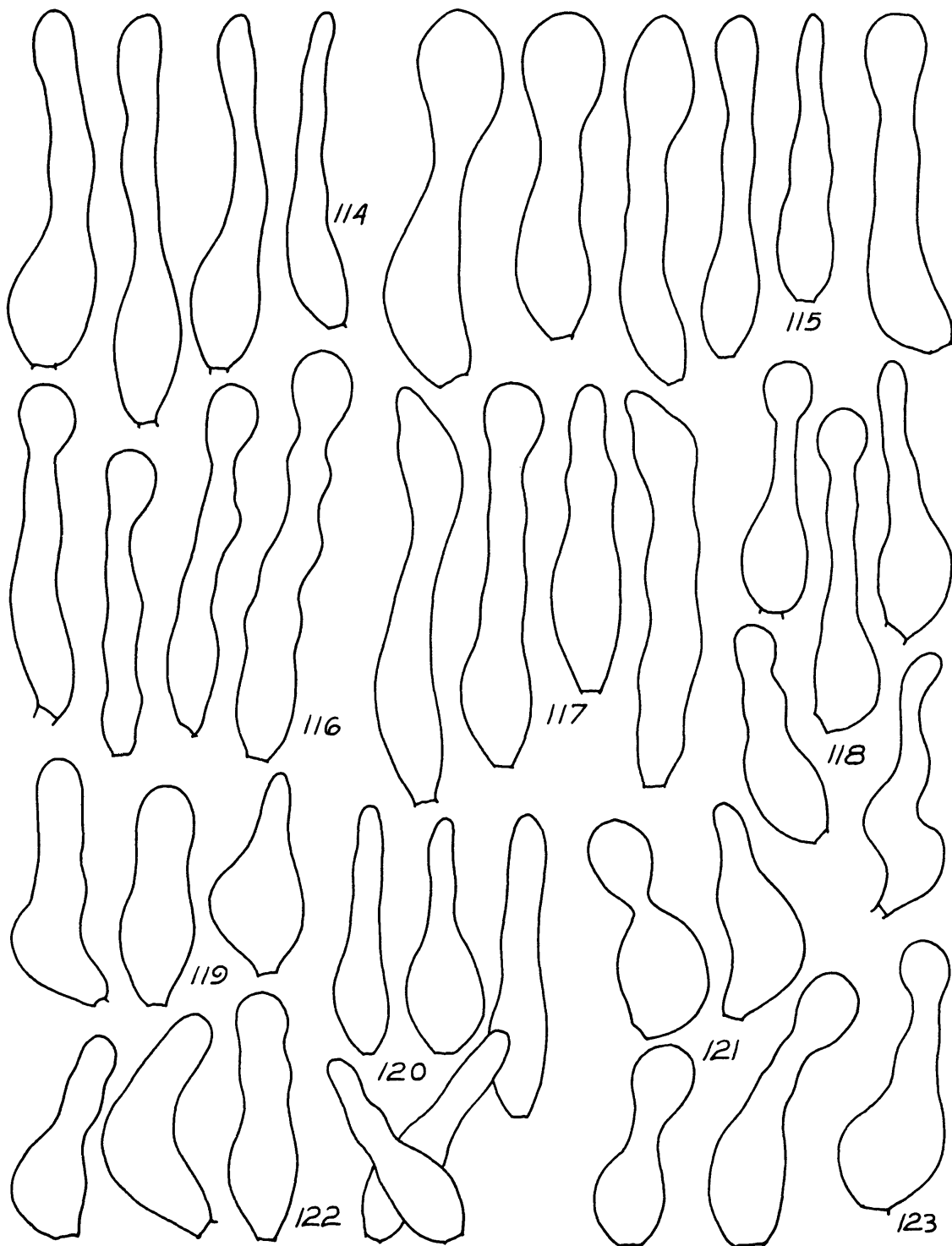


Fig. XIV

Cystidia: Fig. 114, cheilocystidia of *G. allospora*; 115, cheilocystidia of *G. tundrae*; 116, cheilocystidia of *G. dicranorum*; 117, cheilocystidia of *G. pumila* var. *subalpina*; 118, cheilocystidia of *G. luteolospema*; 119 & 122, cheilocystidia of *G. subfiliformis*; 120, cheilocystidia of *G. polytrichorum*; 121 & 123, cheilocystidia of *G. cainii*.

delimited or a few spores showing a faint ragged boundary line. Basidia 4-spored. Pleurocystidia none. Cheilocystidia $28-36 \times 8-11 \times 3-4 \times 3-7$ (10) μ , ventricose-capitate as in *G. heterocystis*; hyphae of cap trama with heavy incrustations. Clamp connections present but not abundant.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on *Sphagnum*, Trout Lake, Michigan, Oct. 4, 1953.

OBSERVATIONS: This species differs from *G. sphagnorum* in the capitate cheilocystidia and from *G. tibiicystis* in the presence of a veil and nearly smooth spores. The heads of the cheilocystidia are about 5–8 μ in diam. and the necks about 3 μ . For a comparison with *G. borealis* see that species.

MATERIAL EXAMINED: Smith 43722-type; 61502; 61596; 61743; 61745; 61759; 62150.

104. *Galerina subfiliformis* Smith, Mycologia 45: 917. 1953.

var. *subfiliformis*

Illustrations: Figs. 119, 122 (cheilocystidia).

Pileus 5–8 mm broad, 6–8 mm high, sharply conic, remaining unexpanded, surface glabrous, moist, hygrophorous, striate when moist, dingy yellowish to near cinnamon buff moist, pale pinkish buff to whitish faded; odor and taste not recorded.

Lamellae broad, ascending adnate, subdistant to distant, pale ochraceous tawny in age.

Stipe 10–30 mm long, almost filiform (less than 1 mm thick), equal, fragile, very pale honey color over all, apex pruinose, base with pallid fibrils from the thin veil.

Spores $10-14 \times 6-7 \mu$, pale ochraceous tawny in KOH, smooth, ovate in face view, obscurely inequilateral in profile. Basidia 4-spored. Pleurocystidia none. Cheilocystidia $26-46(57) \times 7-11 \times 3.5-4.5(5) \times 3.5-6(8) \mu$ fusoid-ventricose with narrow necks and unenlarged to slightly enlarged to subcapitate apices. Gill trama somewhat interwoven, hyaline in KOH. Pileus trama homogeneous, hyaline to yellowish in KOH; clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered on mossy conifer logs, Mt. Rainier National Park, Washington and Michigan.

OBSERVATIONS: The large, pale ochraceous tawny, smooth spores, the pale pileus and stipe, and the thin veil are distinctive, together with the small conic cap. It fruits on wet logs in cold localities. It has the aspect of *G. hypnorum* but the spores distinguish it and cause it to be placed in this stirps.

In Smith 16210 from Shuksan, Washington, many abnormal spores were produced on some caps. The abnormality consists of an extreme elongation and narrowing of the spore, with an accompanying tendency toward angularity. This same type of abnormality is not uncommon in the genus *Psathyrella*, among the species related to *P. candolleana*. The type of

spore produced is very similar in shape to that found characteristically in certain species of *Inocybe*, which are somewhat intermediate between the smooth-spored and angular-spored species, for example, *I. Rennyi*. A faint boundary could be made out around the plage area of the spores in Smith 16210. This may indicate that the collection is an intermediate between *G. subfiliformis* and *G. hypnorum*.

MATERIAL EXAMINED: Bigelow 7866 (MICH). Smith 16210; 36897; 40607-*type*; 41072; 41135; 41165; 41390; 41465; 41620.

104a. *Galerina subfiliformis* var. *cucullata* Smith, var. nov.

Pileus 3–6 mm latus, conicus; stipes 20–30 mm longus, subfiliformis; sporae 8–11 × 5.5–6.5 μ; cheilocystidia 30–36 × 7–12 × 4–5 × 5–6(7) μ. Specimen typicum legit prope Guerrette, Maine, 4 Aug. 1956, Bigelow 3765 (MICH).

Pileus 3–6 mm broad, conic with a straight margin, becoming conic-campanulate, pale fulvous moist and somewhat striate.

Lamellae broad, subdistant, ascending adnate.

Stipe 20–30 mm long, almost filiform, pale honey color over all, pruinose at apex, naked elsewhere.

Spores 8–11(12) × 5.5–6.5 μ, ovate in face view, somewhat inequilateral in profile, rich tawny in KOH, smooth except for a faint ragged line marking the boundary of the plage, apex with a slight callus. Basidia 4-spored, yellowish hyaline in KOH. Pleurocystidia none. Cheilocystidia abundant, 30–36 × 7–12 × 4–5 × 5–6(7) μ, fusoid-ventricose with subacute apices (± 4 μ near apex), smooth, hyaline in KOH, thin-walled. Gill trama yellowish in KOH, hyphae subparallel to interwoven. Epicutis of pileus of appressed hyphae 4–6 μ diam., nongelatinous, pigment incrustations scanty. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On a mossy conifer log, Guerette, Maine, Aug. 4, 1956, Bigelow 3765-*type*.

OBSERVATIONS: This has the stature and color of the common *G. subcerina* of this region but differs sharply in spore characters. It differs from forms of *G. cerina* in lack of a veil and in non-calyptrate spores.

Smith 61685 had spores 10–11 × 5.5–6.5 μ with a faint plage line, and cheilocystidia 27–36 × 7–10 × 4–5 × 5–8 μ. The lack of blisters around the plage line indicates a relationship here. The absence of a veil and smoother spores distinguish var. *cucullata* from *G. mniophila*. Although in most species of *Galerina* differences in these characters are very important, the degree of difference in both here is so slight we hesitate to base taxa at the species level on them.

MATERIAL EXAMINED: Bigelow 3067; 3359; 3765-*type*; 8174 (MICH). Smith 55643; 55652; 55654; 61685.

104b. *Galerina subfiliformis* var. *pallidipes* Smith, var. nov.

Stipes pallidus; cheilocystidia subacuta. Specimen typicum legit Lac-Sept-Isle, Quebec, 30 Aug. 1959, Smith 61594 (MICH).

The cheilocystidia are $32-39 \times 8-9 \times 4-5 \times 3-4(5) \mu$, and are merely obtuse to subacute. In other characters it is much like var. *subfiliformis*.

MATERIAL EXAMINED: Bigelow 2927 (MICH). Smith 61594-*type*.

105. *Galerina polytrichorum* Singer, sp. nov.

Illustrations: Fig. 120 (cheilocystidia).

Pileo 5–12 mm lato, obtuse conico demum campanulato, subaureo, centro ochraceo-brunneo, hygrophano; lamellis brunneolis, ascendentibus, rarius oblique horizontalibus, adnatis, subconfertis vel subdistantibus; stipite sienni-colori, apice aeneo pruinatoque, 40–80 mm longo, 1.5–2.5 mm lato, deorsum subfibrilloso; odore nullo; sapore farinaceo et raphanaceo; sporis $9.5-11.5 \times 6.3-7 \mu$, sublevibus, admodum subtiliter punctulatis marmoratisve, disco suprahilari levi bene delimitato, raro una vesicula auriformi perisporiali ornatis (KOH, 3%), cinnamomeis vel melleis; basidiis 4-sporis; cheilocystidiis $37-46 \times 6-10 \mu$, ampullaceis, apice cylindraceo-filamentosis et saepe subcapituliformiter dilatis; hypodermio fulvo-castaneo 3% KOH; hyphis fibulatis. Inter Polytrichos in Yungis Boliviae leg. Singer B619-*typus* (MICH).

Pileus 4–9 mm high, 5–12 mm broad, obtusely conic becoming campanulate, rarely with an obscure umbo or shallow depression, bright ochraceous brown over disc and striae, elsewhere orange-buff (*gold leaf*), soon becoming more dingy-ochraceous on disc and striae and paler elsewhere, fading to dingy orange-buff from the center outward, glabrous except for pallid evanescent veil fibrils along the margin; context inodorous, taste raphanoid and at the same time farinaceous.

Lamellae dingy ochraceous tawny (*chipmunk*), ascending, rarely oblique (45° with stipe), finally subhorizontal, adnate, close to subdistant.

Stipe 40–80 mm long, 1–2 mm thick, dingy yellow brown below, paler and yellower above (*raw sienna* below, near *brass* above), at times darkening over all, apex pruinose, glabrous downward or with a few scattered fibrils from the veil.

Spores $9-11.5 \times 6-7 \mu$, pale tawny to melleous in KOH, dark red-brown in Melzer's sol., somewhat inequilateral in profile, ovate in face view, a few showing a tendency toward a beaked apex, surface typically marbled to nearly smooth (in KOH), with a clearly defined smooth plage, scarcely showing any suprahilar depression. Basidia $24-35 \times 7.7-10 \mu$, (3)4-spored. Pleurocystidia none. Cheilocystidia (20) $37-46 \times 6-10 \mu$, fusoid-ventricose, the neck (7) $17-30 \times 3.5-5 \mu$ thick, cylindrical, apex obtuse to subacute (very rarely capitate). Pseudoparaphysoid cells at the cap margin sometimes present, balloon-shaped; subhymenium consisting of very narrow irregular

elements, hyaline. Gill trama regular, somewhat ochraceous from incrusting pigment. Pileus trama with an epicutis of nearly hyaline hyphae having only slight pigment incrustations, narrower than hyphae of hypodermium and not gelatinous; hypodermium reddish tawny in KOH, incrustated with ochraceous-brown pigment. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious in large numbers, sometimes in large groups, sometimes isolated but forming extensive populations in the cloud forest (Cejas) formation in open places over stony earth and rocks, Singer B-619-*type*, from Cotapata, prov. Nor-Yungas, Depto. La Paz, Bolivia, 3000 m. alt. (MICH).

OBSERVATIONS: The pungent-farinaceous taste and fairly well-developed veil distinguish it from *G. subfiliformis*. The collector indicates that the veil may at times leave a fibrillose zone or annulus as it breaks but this appears to be very inconstant and cannot now be observed on any of the dried specimens.

106. *Galerina cainii* Smith, sp. nov.

Illustrations: Figs. 121, 123 (cheilocystidia).

Pileus 6–15 mm latus, obtuse conicus, demum campanulatus, dilute cinnamomeo-brunneus; sapor insipidus, odor nullus; lamellae sordide ochroleucuae; stipes 5–7 cm longus, 1.5–2 mm crassus, fragilis, deorsum subfibrillosus glabrescens, sursum ochroleucus, deorsum fulvus vel dilute-fulvus; sporae 9–12 × 5–6 μ leves; cheilocystidia 23–38 × 6–9 × 3–5 × 4–8 μ . Specimen typicum legit prope Mare du Sault, Laurentide Park, Quebec, Canada, 2 Sep 1956, Smith 61738 legit R. Cain (MICH).

Pileus 6–15(20) mm broad, obtusely conic becoming campanulate, rarely convex-umbonate, glabrous moist and hygrophane, when young pale dull cinnamon brown, ochraceous tawny with a smoky tinge in age, fading to dingy pinkish buff, translucent striate moist; context thin, watery-brown, fragile, odor and taste not distinctive.

Lamellae close to subdistant, adnate with a tooth, dingy buff young, finally almost concolorous with mature cap (with a smoky tinge), edges even.

Stipe 50–70 mm long, 1.5–2 mm thick at apex, equal, hollow, fragile, with very slight pruina over apical portion, at first with scattered fibrils from the thin white veil over lower region, glabrescent, pale buff above, dull tawny below.

Spores 9–12 × 5–6 μ , inequilateral in profile view, in face view ovate, wall appearing smooth under oil and no plage line visible, dull rusty brown in KOH, dark red-brown in Melzer's reagent, apical pore very minute to absent. Basidia 4-spored, about 25 × 9 μ . Pleurocystidia absent. Cheilocystidia abundant, 23–38 × 6–9 × 3–5 × 4–8 μ , the basal inflated portion often about as broad as the head but the neck typically more than 3 μ thick. Pellicle of pileus of appressed yellowish to hyaline narrow non-gelatinous hyphae, with clamps.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on *Sphagnum* and other deep moss and on needles of *Larix* on ground in mossy places, Quebec. It was a common species in the Laurentide Park, Quebec during late Aug. and early Sept., 1959.

OBSERVATIONS: This species occurs in a variety of habitats but is often abundant on *Sphagnum*. It differs from *G. sphagnorum* in that the spores lack a plage line, and in the duller color of both fresh and dried material. The cheilocystidia intergrade a good deal but those of *G. cainii* are generally more capitate. We at first considered this to be a variant of *G. semiglobata* Singer, but the distribution seems to indicate otherwise, especially since it is correlated with other differences such as the color and shape of the cap, and a slight difference in spore ornamentation.

MATERIAL EXAMINED: Smith 61500; 61738-*type*; 61746; 61749; 61750; 61763; 61831; 61834.

107. *Galerina embolus* (Fr.) Orton, Trans. Brit. Myc. Soc. 43: 176. 1960.

Agaricus embolus Fr. Epicr. p. 206. 1838.

Tubaria embolus (Fr.) Karst. Hattsv. 1: 446. 1879.

Galera embolus (Fr.) Quél. Enchir. p. 107. 1886.

Illustrations: Orton (lc) figs. 43-46; 27, 416.

Cap 4-15(20) mm, convex then expanded-plane, sometimes papillate or with small obtuse umbo at first or becoming slightly umbilicate when old, tawny-honey or date-brown, sometimes paler yellowish honey at margin, drying yellowish or yellowish ochraceous from center, striate when moist (usually to center), striae dark brown, matt or slightly silky-scurfy in places when dry; flesh thin, concolorous, odor none, taste none or faint fungussy.

Lamellae adnate, often broadly so and with tooth, or subdecurrent, from almost triangular to ventricose, pale ochraceous or yellowish honey then deeper ochre to tawny-honey or rusty-honey, subdistant L (12)16-20 1 (0) 1-3, rather thick, sometimes forked near margin of cap or veined on sides or interveined, edge paler flocculose at first.

Stipe 10-25 × 0.5-1.5 mm, attenuated downwards, more rarely almost equal, often flexuose, occasionally compressed, date-brown or tawny-honey, usually becoming chestnut, bay or dark reddish brown from base, minutely whitish silky fibrillose striate, apex slightly whitish pruinose when fresh, solid, spongy-fibrous inside, often rather tough, base when growing in sand often encircled by compacted mass of mycelium and sand.

Spores ellipsoid, slightly amygdaliform, smooth sub immers., (8)9-11 (12) × 4.5-6(6.5) μ, rusty ("antique brown" Ridgway) in mass. Basidia (2-)4-spored, 36-46 × 8-10 μ. Cheilocystidia from clavate or ± cylindric to lageniform, 44-86 × 8-11 μ, apex 5-12(17.5) μ. Pleurocystidia none. Hyphae of cap cuticle filamentous, branched, sometimes clamped, hyaline

or incrustated-pigmented, 7–15(22) μ diam., cells often rather short (30–80 μ long).

HABIT, HABITAT AND DISTRIBUTION: In moss and lichens or in grass, especially on sand dunes. Braunton Burrows, Devon, 29 Oct. 1950 (legit R. R. Elliston-Wright); Berrow, Somerset, 3 Oct. 1952 (legit T. J. Wallace); Rock, Cornwall, 9 Nov. 1957.

OBSERVATIONS: This fungus was recorded by Pearson as '*Tubaria embola*' but Orton has transferred it to *Galerina* on account of the rusty spore print and colored walls of spores, preferring to restrict *Tubaria* to fungi with spores with almost colorless thin walls, such as are found in *T. furfuracea*, and a correspondingly paler ochre or rusty-ochraceous spore print. Gill shape is not diagnostic in *Galerina*, which includes species with sometimes decurrent gills (e.g., *G. paludosa*), nor is smoothness or roughness of spores (e.g., *G. pumila* has smooth spores). *G. embolus* may be distinguished by its spores, dark colored stem (at least below), variable cystidia and perhaps by its habitat. The illustration by J. Lange (L 127 B) is not very good; the accompanying description indicates Orton's interpretation of this fungus. It should be noted that the epithet *embolus*, being a noun, should not be made to agree in gender with the genus with which it is combined.

The above description is adapted from Orton (Trans. Brit. Myc. Soc. 42: 239. 1960).

MATERIAL EXAMINED: None.

108. *Galerina emmetensis* Smith & Singer, Mycologia 47: 580. 1955.
var. *emmetensis*

Illustrations: Fig. 124 (cheilocystidia).

Pileus 2–11 mm broad, obtusely conic to campanulate to nearly convex, glabrous, moist and hygrophorous, dull tawny to pale cinnamon brown (*Saratoga*, disc and striae *raw sienna*), only moderately striate when moist, fading to near cinnamon buff or light ochraceous; flesh thin, odor none, taste mild to farinaceous.

Lamellae buff yellow (*spruce y*), pale cinnamon brown at maturity with fimbriate edges in many carpophores, broad, ventricose, ascending to nearly horizontal, medium close to distant, adnexed or adnate.

Stipe 13–25 mm long, 0.8–1.2 mm thick, equal or with a slightly thickened base, dingy melleous over all (*pl. 11 H 7*) but not darkening at the base, slightly pruinose at the apex with a faint yellowish pallid silky veil which soon disappears entirely.

Spores (7)8–9(10.2) \times (3)4.5–5.2(5.5) μ , smooth to faintly marbled-subpunctate, slightly inequilateral in profile, ovate and some mucronate in face view, with faintly bounded plage, smooth in the plage area, with apical callus. Basidia 20–24 \times 6.7–7.5, 4-spored, or rarely varying 1-, 2-, 3-spored. Pleurocystidia none. Cheilocystidia 28–36(44) \times 6–12 \times 3–5 \times 4–6 μ (20 \times 8 \times 6 \times 8 μ), ventricose at base; neck elongated, often flex-

uous and usually 3–5 μ thick; apex at times nearly as broad as in the ventricose part and in these with scarcely any narrowing in the neck; sometimes subclavate; at other times fusoid-ventricose with subacute apices; thin-walled, hyaline when fresh but often with yellow contents when revived in KOH. Caulocystidia similar to cheilocystidia (some vesiculose cells present in both areas). Tramal hyphae strongly pigment incrustated. Pilocystidia lacking. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on *Bryum* and *Sphagnum* over humus and rotten needles, in wet places (around dried up pools in a bog), between Brutus and Pellston, Emmet County, Michigan, June–July, 1953.

OBSERVATIONS: This differs from *G. hypnorum* in having decidedly smaller spores and from *G. decipiens* in its color and more faintly ornamented spores.

MATERIAL EXAMINED: Bigelow 6640; 8021 (MICH). Singer N-83-type (F). Smith 41245; 41420; 41421; 47303; 62330.

108a. *Galerina emmetensis* var. *intermedia* Smith & Singer, Mycologia 47: 581. 1955.

Illustrations: Fig. 274 (spore).

Pileus 5–10 mm broad, obtuse to convex, margin straight at first, glabrous except for faint fibrils along the margin in young caps, color “Hay’s russet”, “auburn” to “ochraceous tawny” (*Alamo* to *hazel*), transparently striate finally over three-fourths the radius, hygrophanous, paler when faded; flesh thin, fragile, odor none, taste farinaceous.

Lamellae pallid ochraceous becoming tawny, broad, close to subdistant, ascending-adnate becoming horizontal and adnexed, edges appear pubescent under a lens.

Stipe 10–20 mm long, 1–1.5 mm thick, slightly attenuated upward or equal, fragile, pruinose above, not distinctly discoloring at base in age, stramineous-melleous over all and in age dingy ochraceous to brownish (reaching *hazel*); veil rudimentary, silky, white, appressed, rarely forming an indistinct apical zone.

Spores (6)7–9 \times (3.5)4–4.5 μ , slightly inequilateral in profile, ovate in face view, smooth to faintly marbled but with a faint line bordering the plage area and occasionally with one or more small blisters (separations) over the remainder, dark ochraceous tawny in KOH. Basidia 14–17 \times 6–8 μ , 4-spored. Pleurocystidia absent. Cheilocystidia (22.5)30–42(56) \times 7–10 μ , narrowly fusoid-ventricose to subclavate and then usually with flexuous walls or constrictions, some subcapitate, hyaline in KOH. Pileus trama with pigment incrustated hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered among sedges and wet moss in a recently dried up bog pool in a *Polytrichum* bog, near Brutus, Michigan, July and Aug.

OBSERVATIONS: *G. aberrans* has a truly darkening stipe, its habitat is on burned moss, and it fades to a vinaceous brown instead of the usual buff color of most species of *Galerina*, but is quite similar in the initial cap color. The taste of *G. aberrans* was not recorded. Var. *intermedia* differs from var. *emmetensis* in the tendency of the spores to blister, in the veil being whitish, and in the darker rusty brown color of the pileus.

MATERIAL EXAMINED: Singer N-1248; N-1250 (F). Smith 41515-*type*; 49886; 49951 (MICH).

109. *Galerina aberrans* Smith & Singer, Mycologia 47: 582. 1955.
Illustrations: Figs. 284, 285 (spores); 125 (cheilocystidia).

Pileus 5–10 mm broad, obtusely conic young, expanding to obtusely umbonate or convex, surface moist and hygrophonous, glabrous, “chestnut brown” to “auburn” (bay) fading to vinaceous brown (“Pecan brown”), striate moist, opaque faded; flesh thin, fragile, concolorous with surface, odor and taste not recorded.

Lamellae close to subdistant, adnate, seceding, color of pileus, edges white floccose.

Stipe \pm 20 mm long, 1.5 mm thick, enlarged above and narrowed at base, pruinose above, with scattered appressed fibrils from the remains of the rudimentary veil, sordid ochraceous above, darker (umber brown) below.

Spores 7–8(9) \times 3.5–4 μ (10.5 \times 5) μ , very slightly inequilateral to subovate in profile, subelliptic to narrowly ovate in face view, plage with a distinct boundary, remainder of surface faintly marbled to smooth, cinnamon tan revived in KOH, apical pore not apparent under oil. Basidia 18–20 \times 5–6 μ , sub-cylindric, 4-spored and 2-spored. Pleurocystidia none. Cheilocystidia 26–34(40) \times 6–12 μ , abundant, subcylindric to subventricose with flexuous neck and obtuse apex, hyaline, thin-walled and smooth in KOH. Gill trama of interwoven hyphae with brown incrusting pigment in KOH. Pileus trama homogeneous, the cells near the surface with dark rusty brown incrusting pigment. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on *Polytrichum* in a burned area, Mud Lake Bog, Whitmore Lake, Michigan, Sept. 25, 1933, Smith 33-1024-*type*.

OBSERVATIONS: Although the spores are small and nearly smooth, and the cheilocystidia fairly narrow, the fungus does not belong in the stirps *Sideroides*. The rich dark colors, nearly smooth inequilateral spores with a definite suprahilar depression, the fusoid-ventricose, obtuse cheilocystidia, and habitat are a distinctive combination of characters. It is close to *G. paludosa* but lacks the veil development of that species. It does not appear to be closely related to the other members of stirps *Hypnorum*. It may be closely related to *G. minima* but differs in lacking pleurocystidia and in the more vinaceous brown color of the pileus.

110. *Galerina proxima* Singer, sp. nov.

Pileo 5–9 mm lato, conico demum convexo, saepe umbonato ochraceo-brunneo, hygrophano; lamellis adnatis, secedentibus subdistantibus, latis; stipite 12–23 × 0.7–1.5 mm, subochraceo, sursum pruinoso, deorsum sparse fibrilloso, velo albofibrilloso. Sporae 10–12.5 × 6–7 μ , sublevibus; cheilocystidiis 35–65 × 6–11 × 3.5–5.5 × 5–8 μ . Specimen typicum legit R. Singer M187 (LIL), Tierra del Fuego, Argentina.

Pileus 5–9 mm broad, 3.5–4.5 mm high, conic or convex, becoming convex-applanate, usually with an umbo, rather deep ocher brown over all (much deeper than *Alamo*), hygrophaneous, drying from center outward and fading to buff, transparently striate over one-half to two-thirds of the radius, smooth when dry, not viscid or even lubricous.

Lamellae ochraceous brown with pallid edges, adnate, eventually separating from the apex of the stipe, rather thickish, subdistant, moderately broad.

Stipe 12–33 × 0.7–1.5 mm, lighter colored than the pileus, equal or slightly tapering upward, with pruinose apex, usually slightly appressed fibrillose from the veil which is distinct in young carpophores and rarely forms an inconspicuous apical belt of ascending fibrils.

Spores 10.2–12.3 × 6.2–6.8 μ , with moderately thick and medium deep-colored smooth to sub-smooth wall, exosporial ornamentation lacking in some spores, in others forming a slight but concolorous (with episporium) punctation, especially outlining the hilar spot and thus delimiting a faint but demonstrable plage, very few spores with clearly visible perisporial layer. Basidia 24–30 × 8.2–10.3 μ , 4-spored, a few 2-spored intermixed, sometimes very few 3-spored ones present, hyaline or melleous in NH₄OH. Pleurocystidia none. Cheilocystidia 35–55 × 6–11 × 3.5–5.5 × 5–8 μ , hyaline, few brownish, most of them with thickened base (6–11 μ in diam.), all ampullaceous with neck 3.5–5.5 μ , those with scarcely thickened base about 4 μ in diameter below, a majority with subcapitate tips (up to 7.5 μ in diam.). Pilocystidia none. Caulocystidia near apex and similar to cheilocystidia. Hyphae of the trama hyaline, epicutis of pileus consisting of hyphae which are comparatively thin, somewhat rusty incrustated, radially arranged, non-gelatinized; hypodermium with similar but more irregularly arranged thicker and more pigmented hyphae; with swollen subhyaline elements scattered over the surface. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Among mosses on rotten trunks of *Nothofagus pumilio*, February, Tierra del Fuego.

OBSERVATIONS: The two collections from the Laurentide Park, Quebec, lacked the swollen cells found on the cap of the Antarctic collections, and hence may not actually be properly placed here, though in all other characters they checked rather well.

MATERIAL EXAMINED: Singer M-187-type; M-168 (LIL). Smith 61674; 61695.

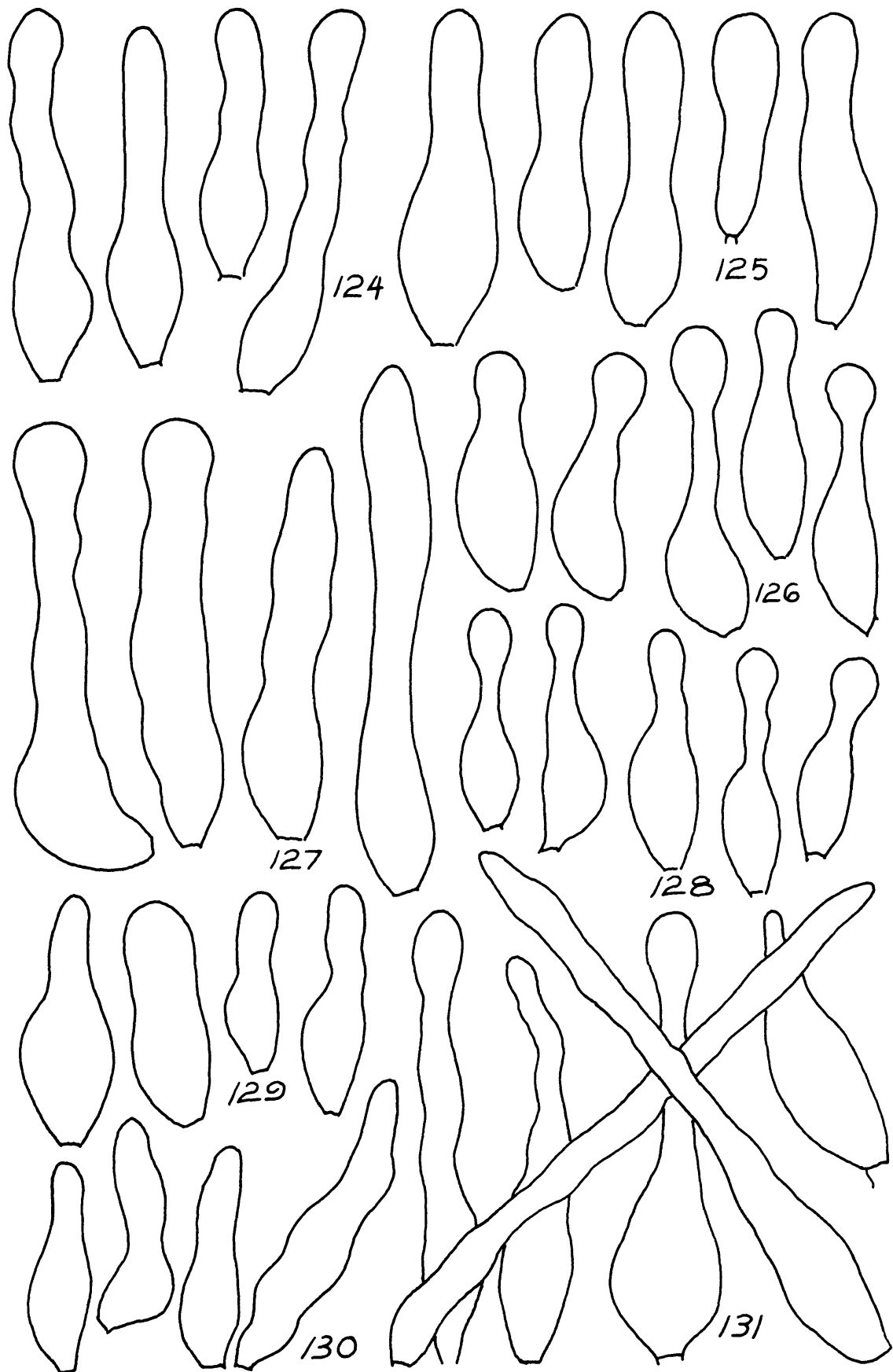


Fig. XV

Cystidia: Fig. 124, cheilocystidia of *G. emmetensis* var. *emmetensis*; 125, cheilocystidia of *G. aberrans*; 126, cheilocystidia of *G. stordalii*; 127, cheilocystidia of *G. tatooshiensis*; 128, cheilocystidia of *G. lateritia*; 129, cheilocystidia of *G. subdecurrrens*; 130, cheilocystidia of *G. stagninoides*; 131, cheilocystidia of *G. stagnina* var. *stagnina*.

111. *Galerina tatooshiensis* Smith, sp. nov.

Illustrations: Fig. 127 (cheilocystidia).

Pileus 10–25 mm latus, obtuse umbonatus, glaber, udus, laeto-brunneus demum pallide aegillaceus; lamellae confertae vel subdistantes, late adnatae, latae, pallide fulvae. Stipes 15–30 mm longus, 1.5–3 mm crassus, fibrillose annalatus, deorsum griseo-fibrillosus, sursum sericeus. Sporae 8–11 \times 5.5–6.3 μ , leves; cheilocystidia 38–56 \times 7–11 \times 2.5–5 \times 5–8 μ . Specimen typicum legit prope Castle Peak, Tatoosh Range, Mt. Rainier National Park, Washington, 29 Sept. 1952, Smith 40305 (MICH).

Pileus 10–25 mm broad, obtusely umbonate with an incurved margin, glabrous except for slight veil remnants along the margin, buckthorn brown to ochraceous tawny moist and then striatulate, hygrophane and fading to cinnamon buff.

Lamellae close to subdistant, broadly adnate to adnexed, moderately broad, ochraceous tawny.

Stipe 15–30 mm long, 1.5–3 mm at apex, equal, sheathed with pallid gray fibrils up to the superior fibrillose annulus, appressed fibrillose above the annulus, base bister, apex pallid ochraceous.

Spores 8–11 \times 5.5–6.3 μ , inequilateral in profile, ovate in face view, pale ochraceous tawny, smooth; basidia 4-spored. Pleurocystidia none. Cheilocystidia abundant, 38–56 \times 7–11 \times 2.5–5 \times 5–8 μ , fusoid-ventricose to ventricose at base and with an oval head. Gill trama regular, ochraceous in KOH. Pileus trama homogeneous, ochraceous in KOH. Pellicle poorly formed and not gelatinous. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Single on moss, north side of Castle Peak, Mt. Rainier National Park, Washington, Sept. 29, 1952, Smith 40305-*type*.

OBSERVATIONS: The fruiting body looks like a small *Galerina marginata* with a fibrillose annulus, but it differs in lacking pleurocystidia and in having smooth spores. It appears to be a short stiped species closely related to *G. paludosa*, but not particularly resembling it superficially. This is the closest species we have found to *G. pseudopumila* (see *G. unicolor*) Orton, but it differs in having smaller more capitate cheilocystidia with thicker necks, and a grayish fibrillose veil.

Section *Porospora* Smith & Singer,
Sydowia 11: 450. 1957.

Spores smooth or nearly so, with a distinct apical germ pore but not distinctly truncate; pleurocystidia usually absent; cheilocystidia present; stipe typically with remains of an evanescent veil; hyphae with clamps. In *G. pulchra* and a few other rough-spored species there is actually a small apical pore as seen under oil.

TYPE SPECIES: *Galerina stagnina* (Fr.) Kühner Ency. Myc. 7:187. 1935.

Key to Species

1. Spores 7–10 μ long ----- 2
1. Spores 10 μ or more long ----- 3
 2. Cheilocystidia typically capitate ----- 113. *G. lateritia*
 2. Cheilocystidia obtuse to subacute ----- 114. *G. subtruncata*
3. Basidia 2-spored; spores 15–25 \times 7–11 μ ----- 115. *G. macrospora*
3. Basidia 4-spored, or spores smaller ----- 4
 4. Spores 12–16 \times 7–10 μ ----- 5
 4. Spores narrower than above ----- 6
5. Veil copious, leaving zones or patches on stipe; on *Sphagnum*
----- 116. *G. stagnina*
5. Veil rudimentary, leaving only traces on stipe; habitat not on *Sphagnum*
----- 117. *G. stagninoides*
6. Veil absent; spores smooth ----- 118. *G. nybergii*
6. Veil absent, spores obscurely angular and faintly marbled
----- 112. *G. stordalii*
6. Veil present (check unexpanded specimens) ----- 7
7. Cheilocystidia 20–30 \times 6–9 μ ; spores 4–5 μ wide -- 119. *G. subdecurrens*
7. Cheilocystidia larger, spores wider ----- 8
 8. Pleurocystidia present ----- see *G. unicolor* (149)
 8. Pleurocystidia absent ----- 9
9. Cheilocystidia 35–65 \times 9–16 μ ; spores minutely roughened
----- see *G. moelleri* (140)
9. Cheilocystidia 40–60 \times 6–7 μ , spores smooth -- 120. *G. pseudomycenopsis*

112. *Galerina stordalii* Smith, sp. nov.

Illustrations: Fig. 126 (cheilocystidia).

Pileus circa 10 mm latus sordide fulvus; lamellae subfulvae, latae, subdistantes, stipes 10–20 mm longus, circa 1 mm crassus, sursum pruinosis, deorsum glaber; sporae 9–11 \times 5–5.5 μ , subangularis, sublaeves; cheilocystidia 20–26 \times 6–10 \times 5–6 \times 5–7 μ . Specimen typicum in Herb. Univ. Mich. conservatum est; legit Stordal 376, Odden Lars, Norway, 3 June 1947.

Spores 9–11 \times 5–5.5 μ , inequilateral in profile, narrowly ovate in face view and often obscurely angular, faintly marbled as seen under oil immersion, plage not evident, wall slightly thickened, apical pore distinct under oil, pale ochraceous tawny in KOH. Basidia 4-spored 23–27 \times 6–7 μ , hyaline in KOH. Pleurocystidia none. Cheilocystidia ventricose-capitate, 20–26 \times 6–10 \times 5–6 μ , head often mucilaginous or the wall appearing slightly thickened, otherwise thin-walled and smooth. Pileus trama of interwoven hyphae, near the surface the hyphae with ochraceous brownish incrustations. Pilocystidia scattered, similar to the pale cheilocystidia. Clamp connections present.

The specimens were collected by J. Stordal in Norway, 3. VI. 1947.

No. 376. Additional collections are: "Blandt mose Hedmark: Trysil hd., Odden Lars." Stordal 1177, 1792. On *Sphagnum* and other mosses (O).

The dried specimens indicate fruiting bodies with cinnamon brown caps 5–15 mm in diam. and a stipe 10–20 mm long by ± 1 mm thick. No veil remnants were evident but there is evidence of pruinosity. As dried the cap gills and stipe are dark tawny. The lamellae are broad and possibly subdistant. Data on fresh specimens are needed.

Stordal-376 had very few clamps, Stordal-1792 showed them on many hyphae and in Stordal-1177 from *Sphagnum* (Fordsland) they were numerous. The carpophores look about like those of *G. decipiens*. The caps are 5–10 mm, conic, glabrous, striate, probably ochraceous tawny fresh; stipe not darkening below, ± 1 mm diameter. The distinct but small apical pore puts the species into section *Porospora*.

113. *Galerina lateritia* (Murrill) Singer, Trudy Bot. Inst. Akad. Nauk. S.S.S.R. Ser. 2(6): 466. 1950.

Naucoria lateritia Murrill, N. Am. Fl. 10: 173. 1917.

Galerula subannulata Atkinson, Proc. Am. Philos. Soc. 57: 365. 1918.

Illustrations: Fig. 128 (cheilocystidia).

Pileus 10–15 mm broad, conic to campanulate, not fully expanding, with a prominent umbo, surface hygrophorous, striate when fresh, glabrous, lateritious, fading in herbarium specimens, margin entire, concolorous.

Lamellae sinuate, ventricose, subdistant, entire and concolorous on edges.

Stipe about 30 mm long, and 1.5 mm thick, subequal, rather slender, cartilaginous, smooth, glabrous, bay.

Spores 7–8 \times 4.5–5 μ , elliptic to subovoid, smooth, ochraceous in KOH, wall slightly thickened, apical pore present but narrow, apex not truncate. Basidia 4-spored, 18–23 \times 6–7 μ , pallid in KOH. Pleurocystidia none. Cheilocystidia abundant, ventricose-capitate, 28–35 \times 6–10 \times 3–5 \times 4–7 μ . Gill trama more or less interwoven, ochraceous in KOH, subhymenium of narrow ramose hyphae but not gelatinous. Cuticle of pileus of narrow (2–3 μ), hyaline, non-gelatinous hyphae forming a thin pellicle; context ochraceous to fulvous from pigment incrusting the hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Type collected on dead wood by the roadside in woods at Lake Placid, Adirondack Mountains, New York, 3–14 Oct. 1912, W. A. Murrill 559 (NY).

OBSERVATIONS: The type has been studied. The spores when mounted in Melzer's reagent and viewed under oil, show a faint marbling and in some a faint but distinct plage was discerned. The narrow apical pore which is not broad enough to cause the spore to appear truncate, can be readily seen under oil immersion. It is not as conspicuous as that of *G. stagnina*, however. The stature of the fruiting body and type of cheilocystidium suggest a relationship to *G. triscopa*.

114. *Galerina subtruncata* Smith & Singer, Mycologia 50: 486. 1958.

Pileus 10–25 mm broad, convex, expanding to broadly convex, surface glabrous, moist and hygrophanous, tawny to ochraceous tawny when moist, fading to pinkish buff and appearing slightly fibrillose, striate moist; flesh thin, odor and taste not recorded.

Lamellae broad, subdistant, broadly adnate to short decurrent, ochraceous tawny, edges even.

Stipe 2–3 cm long, 2–2.5 mm thick, equal, fragile, yellowish above, dark reddish brown below, thinly fibrillose up to near apex from remains of a thin pallid veil.

Spores 7–9.5(10.5) \times 4.5–5 μ , obscurely inequilateral to subovate in profile, ovate in face view, thick-walled, smooth, tawny to ochraceous-tawny in KOH, with a distinct apical pore causing apex to appear obscurely truncate. Basidia 4-spored, 20–23 \times 7–8 μ , hyaline in KOH. Pleurocystidia absent. Cheilocystidia 23–34 \times 7–9 μ , narrowly ventricose with a slightly narrowed neck and obtuse apex, hyaline, thin-walled, smooth. Gill trama somewhat interwoven, yellowish to hyaline in KOH. Pileus trama hyaline and homogeneous beneath a surface layer of ochraceous-tawny incrustated hyphae, with single hyphae or fascicles appressed to surface and the cells cylindrical to somewhat inflated. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered on wet soil among mosses in a wet area, St. Andrew's Creek, Mt. Rainier National Park, Sept. 24, 1952, Smith 40199-*type* (MICH).

OBSERVATIONS: The short relatively thick stipe which becomes dark reddish brown below, the thin veil, small spores and very ordinary color of the pileus (for a *Galerina*) are its distinctive features. It appears to be closely related to *G. lateritia* and *G. subdecurrans*.

The elements of the epicutis and their arrangement, as well as the smooth spores and the fibrillose pileus as dried, suggest, in Singer's opinion, a species of *Phaeomarasmius* rather than of *Galerina*. A small germ pore has been observed in several species of the former genus (e.g. *P. curcuma*, *muricatus*, *rufolateritius*, *spadiceospinulosus*, *suberinaceellus*), and a reduced covering of the pileus is not uncommon in certain otherwise typical species (*P. malvacearum*, *P. rostratus*, *P. tubaria*). The species is inserted here because it was first published in *Galerina*, and, if looked for in this genus, would be expected to key out in *Porospora*.

115. *Galerina macrospora* (Velen.) Singer, Trudy Bot. Inst. Akad. Nauk. S.S.S.R. Ser 2(6): 473. 1950.

Galera macrospora Velenovský, České Houby p. 546; pl. 85, p. 538. 1921.

Illustrations: Velenovský, op. cit. fig. 10, pl. 85, p. 538; Singer, op. cit. fig. 2, p. 474.

Pileus 15–20 mm broad, campanulate, then semiglobose or merely convex, without an umbo, deep brown, not viscid, with striate margin, very

hygrophanous, pale alutaceous when dry; flesh somewhat paler than the surface, inodorous.

Lamellae brownish, with pallid edges, rather distant, 2 mm broad, sinuate-adnexed or attenuate-adnexed, rarely with a slight decurrent tooth.

Stipe 45–53 mm long, 2–3.5 mm thick, cylindrical above the annulus and pale alutaceous, below deeper colored and at the base blackish brown, above somewhat fibrillose or entirely smooth and glabrous, tubulose; annulus consisting merely of a narrow white zone or entirely absent; context concolorous with the surface.

Spores 15–25 × 7.5–11 μ; smooth or virtually smooth, smooth in the plage region, cylindrical-ellipsoid, brownish. Basidia 38–43 × 10–11 μ, 2-spored. Cheilocystidia 33–71 × 9–16 × 3.5–8.5 μ (rarely 65 × 22 × 10 μ), often ampullaceous with a long neck, the neck often only 10% or less of the total length of the cell and irregular in outline (with outgrowths or with constrictions), otherwise as in *G. stagnina*, some vesiculose-clavate cells also present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious among various mosses especially *Sphagnum*, on boggy acid soil, central (Czechoslovakia) and northeastern (Leningrad region) Europe. The latter station is an open place (outside the woods) but not far from *Picea*, *Abies*, *Salix*, *Betula* and *Pinus silvestris*. The brown form of *Naematoloma myosotis* (Fr.) Smith, *N. elongatipes* (Pk.) Singer, *Lactarius helvus* Fr., *Cystoderma amianthinum* (Fr.) Fayd, *Laccaria laccata* (Fr.) Berk. & Br., *Cortinarius malicorius*, Fr., *Omphalina* sp. and *Paxillus involutus* Fr. were also present, thus, not a typical *Sphagnum* bog association, yet every single carpophore had at least some *Sphagnum* attached.

OBSERVATIONS: The germ pore is not indicated here, but some of the original drawings and notes show that there was an apical discontinuity without truncation, and, just as in *G. stagnina*, this was originally interpreted as a callus. Nevertheless, this opening is perhaps not sufficiently different from the non-truncate germ pores found in some species of *Pholiota* to be classified differently. *G. macrospora* might be a bisporous form of *G. stagnina*, but since there are several other characters not quite in agreement with that species, we prefer to consider it distinct.

The spores of *G. macrospora* are among the largest in the *Agaricales* and certainly the largest known in *Galerina*.

MATERIAL EXAMINED: Singer, European material (LE).

116. *Galerina stagnina* (Fr.) Kühner, Ency. Myc. 7: 187. 1935.

var. *stagnina*

Agaricus stagninus Fries, Syst. Myc. 1 268. 1821.

Galera stagnina Kummer, Führer in Pilzk. p. 75. 1871.

Psilocybe stagnina (Fr.) Lange, Medd. Grønl. 148(2): 65. 1957.

Illustrations: Fig. 131 (cheilocystidia).

Pileus 10–25 mm broad, obtusely conic young, often becoming hemispheric to convex, finally plane or with disc depressed and margin uplifted, surface glabrous, subviscid but pellicle not separable, usually with a few white floccose patches of veil remnants along the margin at first, hygrophanous, “russet” and translucent striate moist, fading to “clay color” or sordid buff and opaque; flesh thin and fragile, concolorous with surface or slightly paler, odor and taste not distinctive.

Lamellae broadly adnate-subdecurrent, subdistant to (more rarely) close, moderately broad (broad near stipe, 3–6 mm), seceding readily, cinnamon-brown, darker when mature, edges even and pallid.

Stipe 55–150 mm long, 2–4 mm thick, equal, fragile, (some were enlarged upward slightly and somewhat contorted), concolorous with pileus or a darker chestnut brown, often darker below, near apex usually ochraceous tawny, often undulating, base white-cottony, lower half with scattered fibrils or patches of veil remnants, sometimes with a whitish annular zone, apex pruinose.

Spores 12.5–16(18) \times 8–10.5 μ , smooth, tawny in KOH, with a distinct apical pore as seen under oil, and occasional spores with a lateral pore in addition, ovate to subovate in face view, in profile elliptic or with the ventral line slightly flattened, some with a slight suprahilar depression. Basidia 4-spored or some 2-spored, 28–35 \times 7–11 μ , projecting slightly when sporulating. Pleurocystidia none. Cheilocystidia abundant, 30–80 \times 6–12 μ , narrowly ventricose at base and tapered evenly to a subacute to subcapitate apex, neck flexuous in some, hyaline and thin-walled in KOH or with a slight refractive thickening in or near apex. Hyphae of gill trama parallel becoming sub-interwoven, pale tawny in KOH, pigment incrustated. Pileus trama homogeneous beneath a thin non-gelatinous pellicle of hyaline to yellowish hyphae 5–7 μ in diam. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On wet mossy stream beds, often among *Sphagnum riparium*, Quebec and Ontario in Canada, and Michigan in the United States, and also in most of Northern, Western and Central Europe.

OBSERVATIONS: The Tahquamenon collection (Michigan) was the one in which the spores showed a lateral pore in addition to the apical one. The Ontario collection agrees best with the material cited by Darimont, M. Herregods and L. Imler (1950). They noted the lubricous pileus, the stipe usually darkening at the base, the thin veil remnants, the apical germ pore of the spores and the elongated cheilocystidia; however, our material did not have a bitter taste. As Darimont et al (1950) pointed out, this fungus checks very well in its characters with the Friesian description.

Stordal 7413 appears to be a form without a veil, found on moss in a *Carex* bog in Norway. The spores seldom measure more than 8 μ broad. It needs further study in relation to *G. stagninoides*. The fungus which Hongo (1960) referred to *G. stagnina*, having spores 7–7.5 \times 5.5 μ (collected by Kobayasi) is obviously a different species. We can find no justification for placing *G. stagnina* in *Psilocybe*.

MATERIAL EXAMINED: Singer, Leningrad Region (LE), Smith 4595 57667; 61651; 61735 (all MICH).

116a. *Galerina stagnina* var. *pallida* (Favre) Smith & Singer, comb. nov.

Galera stagnina var. *pallida* Favre, *Ergeb. Wiss. Unters. Schweiz. Nat. Parks* 5 (nf) 33: 204. 1955.

Illustrations: Favre op. cit. fig. 140 and pl. xi, fig. 9.

Pileus up to 20 mm broad, hemispheric-convex, center at times depressed, very hygrophanous, translucent-striate at the margin only when young but to the disc when mature, moderately pale reddish brown (near tawny), fading to ochraceous buff; context thin, taste insipid (mild).

Lamellae subdistant (13–20: 1–3), fairly broad (up to 4 mm), shallowly emarginate or slightly decurrent by a tooth, pale ochraceous brown, edge finely fimbriate under a lens.

Stipe about 32 mm long, 2.5 mm thick above, flexuous, fistulose, gradually narrowed downward, concolorous with pileus or slightly darker (somewhat rusty ferruginous), faintly fibrillose but with whitish floccosity at apex.

Spores 11.5–16 × (6.5)7–9.5 μ, brownish red, either broadly elliptic or broadly rounded at both ends, or, less often, elliptic-elongate, smooth, wall very slightly thickened, apical pore inconspicuous, apiculus a little knob. Basidia 4-spored, clavate, 38–45 × 11–12 μ. Cheilocystidia very polymorphic, most often irregularly vermiform-lanceolate or apex rounded to subacute, with a short pedicel, 50–70(80) × 7.5–11 μ, but also short and ventricose (35–50 × 9–15 μ). Cutis of pileus of clamped hyphae, interwoven, 3–8 μ in diam. or the cells shorter and broader (8–12 μ), wall pale brownish red (fulvous) with incrustated pigment. Floccons on stipe of septate elements with clamps.

HABIT, HABITAT AND DISTRIBUTION: On moss other than *Sphagnum*, 2400 m. elev., Switzerland, Favre.

OBSERVATIONS: We have examined material from Favre and drawn our account from his description and illustration. This variety, in addition to being paler than the type variety, is short-stiped, has a more poorly developed veil, and apparently the pileus is not shiny or subviscid. Favre shows the colors to be tawny to ochraceous tawny in our terminology, which is much paler than in the var. *stagnina*, and we find the spores almost lack a germ pore.

116b. *Galerina stagnina* var. *zetlandica* (Orton) Smith & Singer, comb. nov.

Naucoria zetlandica Orton, *Trans. Brit. Myc. Soc.* 43: 326. 1960.

Illustrations: Orton op. cit. l.c., figs. 336 & 458.

Pileus 8–25 mm broad, convex then expanded, sometimes slightly depressed or with a wavy margin, only in age becoming fully expanded, tawny date-brown or deep tawny honey to almost chestnut, duller when old, drying pale ochraceous or dirty yellowish from center, striate when moist, slightly viscid when fresh, margin with appendiculate white veil at first, which sometimes forms dentate scales at edge; context concolorous, odor and taste none.

Lamellae adnate, sometimes with a slight tooth, \pm ventricose, watery buff or pale honey then pale tawny honey, finally ochre honey to almost amber, subdistant, 16–26 reach stipe, 1–3(7) tiers of lamellulae, edge whitish then paler flocculose.

Stipe 25–135 mm long, 1.5–3 mm thick, equal or thickened at base up to 7 mm, often flexuose, honey or tawny honey, then tinged vandyke or almost amber, only slightly paler when dry, apex with a silky floccose ring zone from veil at first and sometimes a few scattered patches below this, otherwise nearly smooth, veil traces disappearing with age, hollow, base slightly whitish tomentose.

Spores $11-15 \times 7-9.5 \mu$, ellipsoid or ellipsoid-oblong, without visible or with indistinct germ pore, smooth. Basidia 4-spored, $36-44 \times 9-11 \mu$. Cheilocystidia $36-82 \times 5-20(28) \times 4-16(20) \mu$, cylindric-flexuose, sometimes slightly swollen at base or apex or intermediately, or lageniform. Pleurocystidia absent. Cuticle of cap layered: (1) a thin layer of narrow hyaline almost gelatinized hyphae $1-6 \mu$ diam. (2) hyphae with cylindric or slightly fusiform or sausage-shaped cells $6-16(20) \mu$ diam., often incrustated with pigment, occasionally clamped. Hyphae of veil $3-6 \mu$ diam., hyaline, clamped.

HABIT, HABITAT AND DISTRIBUTION: On *Sphagnum*, England, Shetlands and Herefordshire, July 1958 (K, *type*) and Oct. 1959.

OBSERVATIONS: We are recognizing this taxon on the basis of Orton's account. It would seem to be very close to *G. stagnina*, but apparently differs in the indistinct germ pore, and in that a fair number of cheilocystidia have a very large capitellum (up to 20μ). For the remainder of the characters it is apparently so like *G. stagnina* that we consider it merely as a variety of that species. *G. stagnina* var. *pallida* has a thinner veil and scarcely any apical pore.

117. *Galerina stagninoides* (Orton) Smith & Singer, comb. nov.
Naucoria stagninoides Orton, Trans. Brit. Myc. Soc. 43: 321. 1960.
Illustrations: Fig. 130 (cheilocystidia).

Pileus 7–22 mm, convex then expanded and slightly depressed, not or only slightly umbonate, deep chocolate or dark vandyke, drying from center, and then yellowish, not striate when moist, matt when dry, margin at first with traces of whitish silky veil; context concolorous, drying pale dirty ochraceous in center of pileus and stipe, odor and taste none to faintly fungoid.

Lamellae 12–14(13), adnate with tooth, sometimes becoming sub-decurrent when pileus is expanded, more or less ventricose, pale dirty buff then sometimes tinged with the color of the pileus especially at the base, or pallid-buff, subdistant.

Stipe 20–30 mm long, 1.5–3 mm thick, equal or slightly thickened at apex or base, concolorous but paler above, apex white silky-pruinose, when young with white or whitish veil traces at apex, then matt, narrowly hollow, base slightly whitish tomentose.

Spore deposit snuff brown to cigar brown. Spores 12–15 × 8–9 μ , ellipsoid, smooth, with germ pore. Basidia 4-spored, rather large, 46–52 × 12–14 μ , sterigmata stout, 5–8 μ long, 2.5–3 μ broad at base. Cheilocystidia 40–66 × 5–10 × 4–7 μ , mostly narrowly lageniform, often with long flexuous neck, with a few cylindrical-flexuose in the neck or neck thickened here and there; some similar rather shorter or narrower cells at stipe apex (caulocystidia). Pleurocystidia absent. Cuticle of pileus heterocellular of (1) cylindrical often pigment-incrusted hyphae 4–8 μ in diameter and (2) hyphae with shorter broader slightly clavate, ellipsoid or sausage-shaped, usually hyaline, sometimes branched cells about 40–80 × 6–20(24) μ . No clamps seen.

HABIT, HABITAT AND DISTRIBUTION: On mossy, peaty soil, England, Shetlands (type at Kew).

OBSERVATIONS: In vertical section of the pileus a few of the clavate cells can be seen to project slightly above the surface of the cuticle. Derek Reid, Royal Botanic Garden, Kew, England, has kindly checked the details of the type of *Naucoria stagninoides* and reports the following: Clamp connections are present on the swollen hyphae in the stipe and on the hyphae of the gill trama. The spores are rather thick-walled with a small oblique apiculus and a distinct germ pore. They appear quite smooth and measure 12–18.2 × 8–10 μ . The basidia are 4- or (occasionally) 2-spored. The cheilocystidia are up to 64 μ over all and 10 μ wide in widest part with a tendency to be capitate. The greatly reduced veil, the habitat (not on *Sphagnum*), and the scattered clavate pileocystidia appear to distinguish it from *G. stagnina* and its variants. Stordall 7413 may be this species.

118. *Galerina nybergii* Smith, sp. nov.

Pileus 10–15 mm latus, obtuse conicus vel convexus, glaber, subfulvus; lamellae subdistantes, latae, secedentes; stipes 20–40 mm longus, 1–1.5 mm crassus, glaber, sursum pruinosis; sporae 9–12 × 5–6 μ , leves, anguste ellipsoideae; cheilocystidia 30–45 × 6–10(12) × 4–8 μ , fusoid ventricosa. Specimen typicum legit Nyberg 20 Oct. 1937, Booga, Mustalia (H).

Pileus 10–15 mm broad, obtusely conic to convex, drying as if tawny and striate when fresh, glabrous.

Lamellae broad, subdistant, ochraceous tawny, adnate but seceding at least in drying.

Stipe 20–40 mm long, \pm 1–1.5 mm thick, reddish brown near apex

when dried and paler (more ochraceous) below, apex pruinose, glabrous below, veil none.

Spores $9-12 \times 5-6 \mu$, smooth, pale ochraceous tawny in KOH, with a minute apical pore and, especially in old spores, a rather thick wall, narrowly elliptic to narrowly ovate in face view, practically elliptic in profile. Basidia $20-25 \times 7.5-9 \mu$, 4-spored, hyaline in KOH. Pleurocystidia none. Cheilocystidia $30-45 \times 6-10(12) \times 4-8 \mu$, fusoid-ventricose, hyaline in KOH, readily collapsing, apices obtuse or in age subcapitate; pileus trama ochraceous in KOH, no gelatinous pellicle present. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On moss in Finland, Oct. 20, 1937. Known only from the collection by Nyberg.

OBSERVATIONS: This species appears to be close to *G. subdecurrens* but has slightly broader spores, a less conspicuous apical pore, and a stipe which does not become darker at the base. Since we have seen only dried specimens all macroscopic data given in the description need to be checked. The species was mistaken for *G. hypnorum* when fresh. *G. pseudomycenopsis* has a distinct veil according to Pilát and the cheilocystidia are different.

119. *Galerina subdecurrens* Smith, Mycologia 45: 916. 1953.

Illustrations: Fig. 129 (cheilocystidia).

Pileus 5–15 mm broad, obtuse to convex when young, expanding to broadly convex, surface glabrous, moist, hygrophanous, dingy ochraceous tawny to clay color moist, dingy pinkish buff faded, striate when moist; flesh thin and fragile, odor and taste not recorded.

Lamellae broad, subdistant to distant, broadly adnate to subdecurrent (approaching the condition found in *Xeromphalina picta*), seceding at times, edges even, dingy buff at first, \pm ochraceous tawny when mature.

Stipe short, $10-25 \times \pm 1$ mm, equal, pale honey color above, dark reddish brown below and lower half with pallid to grayish appressed fibrils (veil remnants?).

Spores (9) $10-12.5(13) \times 4-4.8 \mu$, narrowly oblong, some in face view narrowly ovate, smooth, pale cinnamon in KOH and becoming pale ochraceous on standing, apical pore present but apex not truncate under ordinary magnifications, obscurely so under oil immersion. Basidia 4-spored, hyaline in KOH. Pleurocystidia none. Cheilocystidia fusoid ventricose, small, $20-30 \times 6-9 \mu$, narrowly ventricose and apices obtuse. Gill trama hyaline in KOH, somewhat interwoven. Pileus trama homogeneous in structure, hyphae of the upper half with ochraceous incrusting pigment. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Cespitose-gregarious under alder on soil at edge of road, Lower Tahoma Creek (old camp ground), Mt. Rainier National Park, Washington. Known only from type locality. (Smith 41225-type, MICH).

OBSERVATIONS: The long narrow smooth pale cinnamon to ochraceous

spores, thin veil, and darkening stipe are distinctive. When viewed under oil a very faint ragged line can be made out delimiting the suprahilar area, but it cannot be demonstrated on all spores. As interpreted in this work, the species is a typical *Galerina* of the section *Porospora*. In this respect it resembles *G. stagnina*. The faint plage line is important here because it clearly connects the members of this section to *Galerina*. *G. subtruncata* has smaller spores and a more expanded pileus. Collections 40199 and 41225 may represent extremes of a single species but to date our observations do not indicate it.

120. *Galerina pseudomycenopsis* Pilát, in Pilát & Nannfeldt *Friesia* 5: 19. 1954.

Pileus 10–25 mm broad, flat-campanulate or convex, apex rounded, not umbonate, becoming nearly flat over disc, rarely in age with the center slightly depressed, smooth, hygrophanous, margin slightly translucent-striate from the lamellae, rather fleshy and elastic, fairly brightly colored pale fulvous, moist but not viscid, glabrous; context comparatively thick and elastic, odor not distinctive.

Lamellae broadly adnate, subdistant, whitish becoming yellowish-fuscous, at maturity pale yellowish fulvous, almost concolorous with stipe.

Stipe 30–40 × 2–4 mm, straight or undulating, subelastic, hollow, subconcolorous with pileus, when young paler and white fibrillose cortinate from a veil, glabrescent, becoming nearly naked, smooth and glabrous, base whitish tomentose, tomentum white and connected to mosses.

Spores 11 × 7 μ, smooth, ferruginous, apex with a small but distinct pore. Basidia 4-spored, 20–30 × 6.5–8 μ. Pleurocystidia none. Cheilocystidia 40–60 × 6–7 × 2.5–3.5 μ, apex obtuse but not capitate, hyaline and thin-walled.

HABIT, HABITAT AND DISTRIBUTION: On mosses (*Tomenthypnum trichoides* et *Aulacomnium palustre*) 21. VI. 1948. Pilát & Nannfeldt. (9084, *typus*). Sweden.

OBSERVATIONS: We have seen no material of this species but include it on the basis of the original description, even though that is inadequate on a number of points. The narrower cheilocystidia distinguish it from forms of *G. moelleri*, in which pleurocystidia are rare.

Section *Inoderma* Smith & Singer
Sydowia 11: 451. 1957.

Pileus dry and innately fibrillose, or if moist and hygrophanous appearing distinctly innately fibrillose when faded, or with colored fibrils at least over the marginal zone of the pileus and then these also often visible on the basal portion of the stipe. Spores almost smooth (only a ragged line around the plage is usually demonstrable in mounts in chloral hydrate).

Hyphae of the outer layer of the cuticle (or at least the fibrillose portion of it) with cystidioid terminal members or with crooked, or *Phaeomarasmium*-like hyphae. Pleurocystidia present or absent. It is remarkable that all except the most atypical species come from the Pacific Coast area.

TYPE SPECIES: *Galerina fibrillosa* Smith, Mycologia 45: 901. 1953.

This section is clearly connected to the genus *Galerina* by spore characters, but the appearance of the carpophores is quite atypical, resembling more the fruits of *Inocybe* or small *Cortinarii*, in fact one could defend rather easily the thesis that the smooth spored species of *Inocybe* were derived from *Galerina*.

Key to Species

1. Pileus hygrophanous, translucent striate moist 2
1. Pileus dry and matted, fibrillose from the first 3
 2. Cheilocystidia with a long flexuous neck; lamellae narrow to moderately broad. On rotten logs of *Tsuga canadensis* 121. *G. tsugae*
 2. Cheilocystidia not with conspicuously flexuous necks; lamellae broad; growing on duff under *Vaccinium* near or above timber-line in mountains 122. *G. vaccinii*
3. Pileus dark vinaceous cinnamon; pleurocystidia none; taste mild 123. *G. fibrillosa*
3. Pileus ± clay color; pleurocystidia present; taste of raw cucumber 124. *G. insignis*

121. *Galerina tsugae* Smith & Singer, Mycologia 47: 586. 1955.

Illustrations: Pl. 13, fig. G. Figs. 272, 273 (spores); 132 (cheilocystidia).

Pileus 5–12 mm broad, obtusely conic with a straight margin, expanding to plane or remaining broadly conic, color “cinnamon-brown”, hygrophanous, when faded near tawny on disc and paler over margin, conspicuously striate when moist, at first with a thin layer of fibrils over margin or margin faintly fibrillose fringed, fibrils cinnamon buff to pallid buff, soon glabrous; context very thin and fragile, no odor or taste.

Lamellae distant, narrow to moderately broad, adnate, concolorous with pileus.

Stipe 10–20 mm long, less than 1 mm thick, equal, concolorous with pileus over all or base slightly darker cinnamon-brown, lower portion with scattered fibrils from veil at first, glabrescent, apex pruinose.

Spores 9–11(13) × 5–6 μ, narrowly inequilateral in profile, in face view narrowly ovate, rusty brown in KOH, smooth but with a ragged line marking the suprahilar depression and occasional spores showing 1–2

small blisters (loosening of exosporium) about 3–4 μ back of apex. Basidia 4-spored. Pleurocystidia none but some basidioles retaining a dark brown pigment when revived in KOH. Cheilocystidia 36–48 \times 7–12 μ , ventricose above a hyaline to fulvous pedicel and with a long flexuous neck scarcely tapered to an obtuse apex. Gill trama rusty brown from incrusting pigment; pileus trama homogeneous, darker in KOH than the gill trama, pigment incrustated. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious along rotten hemlock logs, Mud Lake Bog, Cheboygan County, Michigan.

OBSERVATIONS: This fungus has the stature of a small *G. triscopa* but lacks the acute umbo, has a well developed veil and is darker in color. The microscopic characters, of course, are totally different. As to its relationships, it appears to be close to *G. vaccinii* in pigmentation and spore characters. This is, then, the only Eastern representative of the section, and it is interesting to note that it is the species with the least development of the fibrillose covering.

MATERIAL EXAMINED: Smith 44017; 44028; 44070-*type*.

122. *Galerina vaccinii* Smith, Mycologia 45: 921. 1953.

Illustrations: Pl. 12, fig. D. Figs. 271, 277 (spores); 133 (cheilocystidia).

Pileus 6–12(15) mm broad, obtuse when young, becoming obtusely campanulate to plano-umbonate or umbo obsolete, dull tawny to dark ochraceous tawny and widely striate moist, near cinnamon buff faded, appearing glabrous when moist but when faded appearing fibrillose under a lens; flesh thin and very fragile, odor and taste not distinctive.

Lamellae close or finally distant, broadly adnate or with a decurrent tooth, broad, "cinnamon buff" when mature, paler when young, edges faintly fimbriate.

Stipe 10–20 mm long, about 1 mm thick, equal, fragile, concolorous with pileus but base darkening in age, thinly fibrillose over lower part from the pallid remnants of a veil, glabrescent.

Spores 10–12.5 \times 6–7 μ , elongate-ovate in face view, obscurely elongate-inequilateral in profile, smooth, but with a faint ragged line marking the boundary of the suprahilar depression, ochraceous tawny or slightly darker in KOH, in H₂O mounts of fresh material pale ochraceous. Basidia 4-spored. Pleurocystidia none, a few ocher brown basidioles present in hymenium. Cheilocystidia 38–50 \times 9–12 μ , fusoid-ventricose to subcylindric with obtuse apices, abundant. Pilocystidia present as hyphal end-cells. Pileus trama homogeneous but cells near surface enlarged giving almost the appearance of sphaerocysts. Tramal hyphae rusty in KOH from heavy pigment incrustations. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Cespitose-gregarious on duff under *Vaccinium deliciosum*, Snow Lake, Mt. Rainier National Park, Washington. Known only from the Park.

OBSERVATIONS: The spores are more like those of *Galerina* than *Cor-*

tinarius, and since cheilocystidia are typical of the former, the species is placed in *Galerina*. The dried specimens, however, remind one of *Cortinarius*.

MATERIAL EXAMINED: Smith 40798-*type*; 40892; 40901.

123. *Galerina fibrillosa* Smith, Mycologia 45: 901. 1953.

Illustrations: Fig. 134 (cheilocystidia).

Pileus 10–12 mm broad, obtuse when young, expanding to plano-umbonate or umbo obsolete, surface dry and coarsely matted-fibrillose, “Verona brown” to “snuff brown” (dark dull vinaceous cinnamon to dingy ocher brown) fibrils appearing coarse under a lens; context thin and soft, bister in KOH when fresh, odor and taste not distinctive.

Lamellae broad, close, ventricose in age, adnate, “Verona brown”, dark vinaceous brown when young and in age about concolorous with pileus, edges minutely fimbriate from cheilocystidia (use a hand lens).

Stipe 10–20 mm long, 1–1.5 mm thick at apex, slightly thicker downward, fragile, dull brownish beneath a hairy-fibrillose coating similar to that on pileus and covering the lower two-thirds, apex pruinose in age and lower portion somewhat glabrescent.

Spores dull ferruginous in deposits, dull cinnamon in KOH, 10–14 × 5.5–6.8 μ , inequilateral in profile, in face view narrowly ovate, smooth except for a rough border around the plage. Basidia 4-spored. Pleurocystidia none. Cheilocystidia 40–60 × 10–14 μ , fusoid-ventricose often with wavy necks and obtuse to slightly enlarged apices. Gill trama somewhat interwoven, dingy cinnamon in KOH. Epicutis of pileus consisting of loosely arranged crooked hyphae heavily banded with dull cinnamon pigment, tissue beneath this layer paler cinnamon and more compactly interwoven. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on wet earth, Gobler’s Knob, Mt. Rainier National Park, Washington, Oct. 12, 1952.

OBSERVATIONS: This species is most closely related to *G. insignis* but differs in its darker color, more coarsely matted-fibrillose pileus, darker gills and more well-developed, darker brown fibrillose covering of the stipe. The spores and cheilocystidia are somewhat similar in the two. The fruiting bodies are not at all “*Galerina*-like” in appearance, but the rough boundary of the plage would seem to exclude the species from *Phaeomarasmius* where it would otherwise go.

MATERIAL EXAMINED: Smith 40850-*type*.

124. *Galerina insignis* Smith, Mycologia 45: 904. 1953.

Illustrations: Pl. 13, fig. D. Figs. 288, 289 (spores); 135 (cheilocystidia).

Pileus 8–25 mm broad, obtusely conic expanding to broadly conic or margin spreading and umbo obtuse, surface dry and fibrillose, near “cin-

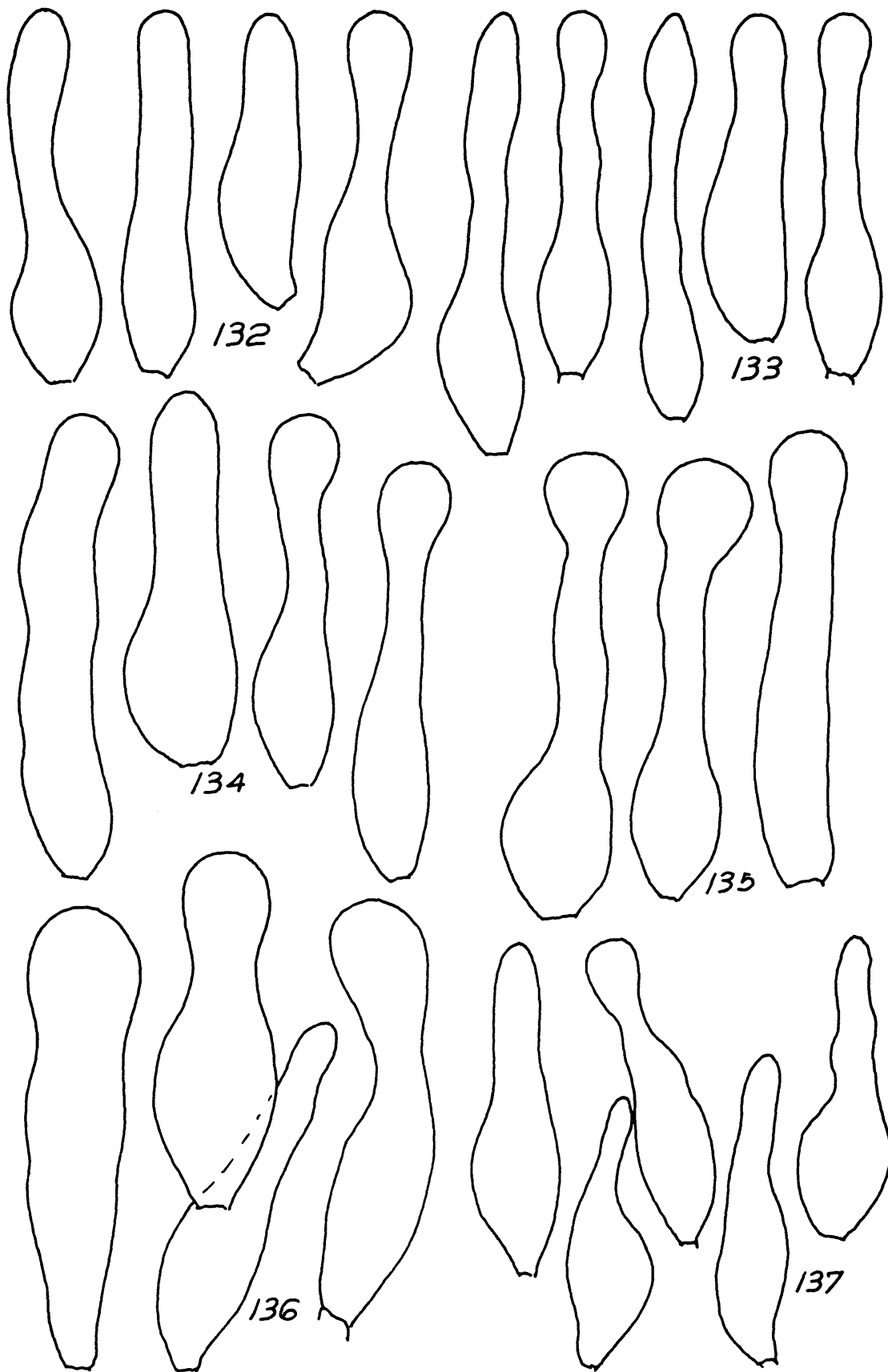


Fig. XVI

Cystidia: Fig. 132, cheilocystidia of *G. tsugae*; 133, cheilocystidia of *G. vaccinii*; 134, cheilocystidia of *G. fibrillosa*; 135, cheilocystidia of *G. insignis*; 136, pleurocystidia of *G. cingulata*, 137, cheilocystidia.

namon buff", in age paler and near pinkish buff; context moist, exceedingly fragile, odor slight, taste slightly of raw cucumber.

Lamellae broad, ascending adnate, close, pinkish buff when young, "Sayal brown" (cinnamon) at maturity, edges fimbriate.

Stipe 20–35 mm long, 1–1.5 mm thick, equal, lower part copiously fibrillose with "cinnamon buff" fibrils, pallid and silky to pruinose above, ground color brownish, base darker in age in some specimens.

Spores 12–15 × 5–6.3 μ , narrowly oblong in face view, obscurely oblong-inequilateral in profile, dull cinnamon in KOH, wall with a subapical band-like thickening as in *G. allospora*. Basidia 4-spored. Pleurocystidia scattered to rare, 40–56 × 10–13 μ , fusoid-ventricose with obtuse to slightly enlarged apices, hyaline, thin-walled, smooth. Cheilocystidia mostly ventricose-capitate, 36–48 × 8–11 μ , head often as broad as the ventricose part. Gill trama interwoven, ochraceous brown from incrustated pigment (darker in KOH). Pileus trama of two \pm equal parts, the upper of loosely arranged, widely spaced, heavily incrustated (dark cinnamon) hyphae 5–10 μ in diam., lower portion compactly interwoven and more ochraceous. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on soil in an old pile of debris from an avalanche, Green Lake, Mt. Rainier National Park, Washington, Oct. 17, 1952.

OBSERVATIONS: The spores and cystidia are those of a *Galerina* but the duplex structure of the pileus is not typical of any genus known to us. Under a good oil immersion lens the suprahilar depression is seen to be marked off faintly, but the outer spore layer is practically smooth. In optical section the subapical thickening of the outer wall gives the impression of a pair of earmuffs. The thickening extends completely around the spore, as evidenced by the slightly darker color band in this region. This character is more pronounced here than in *G. allospora*.

MATERIAL EXAMINED: Smith 41067-type; 41096; 41155; 41159.

Section *Physocystis* Smith & Singer
Sydowia 11: 451. 1957.

Pleurocystidia present and mostly broadly rounded to capitate at apex, neck thick, up to 12 μ or more in some; spores ornamented but not calyptrate; clamps present.

TYPE SPECIES: *Galerina pruinatipes* Smith, Mycologia 45: 912. 1953.

Key to Species

1. Veil in young carpophores distinctly glaucous; caespitose; stipe 1.5–4 mm thick ----- 127. *G. microcephala*
1. Not as above ----- 2
 2. Veil leaving an annular zone on stipe, at least for a time ----- 3
 2. Veil thinner, remnants adhering variously to lower part of stipe or apparently absent ----- 9

3. Pileus subviscid from a gelatinous pellicle; veil pale tan
----- 125. *G. cingulata*
3. Not with above combination of characters ----- 4
4. Spores distinctly warty-rugulose ----- 5
4. Spores finely punctate ----- 8
5. Lignicolous ----- 6
5. Terrestrial ----- 7
6. Hymenophoral trama bright yellow in KOH from pigment in the wall, no appreciable incrusting pigment present; some pleurocystidia pale brown ----- 128. *G. subpapillata*
6. Hymenophoral trama rusty brown in KOH from incrusting pigment; pleurocystidia all hyaline ----- 135. *G. papillata*
7. On sandy soil; tropical; annulus well developed and persistent
----- 126. *G. arenaria*
7. On dead herbaceous stems in cold mountain habitats; annulus merely a fibrillose zone which is often evanescent ----- see *G. mollis* (174)
8. Veil yellowish at first; stipe 1.5–3(4) mm thick -- 129. *G. salicicola*
8. Veil whitish; stipe about 1 mm thick (see *G. subannulata* (170) also)
----- 133. *G. subbullulifera*
9. Growing on rotten conifer wood; taste bitter ----- 10
9. Not as above ----- 11
10. Cheilocystidia typically hyaline
----- 130. *G. pruinatipes* var. *pruinatipes*
10. Many cheilocystidia with dull ochraceous brown content
----- 130a. *G. pruinatipes* var. *fulvipes*
11. Stipe bister beneath a dense pruinose-tomentose coating; pilocystidia numerous ----- 131. *G. farinosipes*
11. Not as above ----- 12
12. Veil fibrils yellowish to yellow ----- 13
12. Veil fibrils grayish, whitish or lacking ----- 14
13. Lamellae distant and thin; odor and taste raphanoid
----- see *G. heimansii* (199)
13. Lamellae subdistant to close, thickish; odor and taste mild
----- 132. *G. olympiana*
14. Stipe velvety at least over lower half; taste farinaceous
----- see *G. velutipes* (163)
14. Not as above ----- 15
15. Stipe dark brown below; lamellae close; on soil as far as is known
----- 134. *G. viatica*
15. Stipe not conspicuously darker below; lignicolous ----- 16
16. Pileus chestnut color fresh; veil lacking ----- 137. *G. victoriae*
16. Pileus fulvous; veil present ----- 17
17. Spores 9–11 × 5.5–7 μ; lamellae close ----- 135. *G. papillata*
17. Spores 8–9.5 × 5.5–6.5 μ; lamellae distant ----- 136. *G. minor*

125. *Galerina cingulata* Singer, sp. nov.

Illustrations: Figs. 136 (pleurocystidia), 137 (cheilocystidia).

Pileo 11–12 mm lato, castaneo-ferrugineo, longe striato, conico-campanulato, papillato; lamellis confertis, angustis; stipite annulato, elongato; sporis $9.3\text{--}10.5 \times 5.7\text{--}7 \mu$, verrucosis, disco levi suprahilari praeditis; basidiis bisporis, sed basidiis 1-, 3-, 4-sporis quoque praesentibus; cheilocystidiis $30\text{--}50 \times 6.5\text{--}15 \mu$ polymorphis; pleurocystidiis ventricosis voluminosisque et sub apicem iterum incrassatum constrictis; tramate hymenophorali vix pigmentato; hypodermii hyphis flavidis et pigmento incrustatis melleo, epicute semi-gelatinosa; hyphis fibulatis. Specimen typicum legit R. Singer (B 1536), Februario in Yungis Boliviae.

Pileus 11–12 mm broad, conic campanulate with a narrow prominent acute papilla, subviscid, cinnamon brown (between *cochin* and *kis kilim*) hygrophanous, buff when faded; odor weak and insignificant.

Lamellae dingy ochraceous tawny (chipmunk) close, narrow, adnate.

Stipe 46 mm long, 2 mm thick, equal, near cinnamon brown (*cochin*), pallid longitudinally fibrillose with appressed fine fibrils; annulus well developed, pale tan, more or less appressed when mature.

Spores $9.3\text{--}10.5 \times 5.7\text{--}7 \mu$, with well-developed exosporial ornamentation which projects 0.7μ beyond the episporium, apex with a small callus and often slightly beaked, ovate in face view, somewhat inequilateral in profile, plage well defined. Basidia (1-) 2-, 3-, or 4-spored, mostly 2-spored, $13\text{--}23 \times 6\text{--}7.3 \mu$. Pleurocystidia numerous, $30\text{--}50 \times 6.5\text{--}15 \times 5.7\text{--}10$ (below capitulum, and diameter of mucro) $\times 8.5\text{--}12.5 \mu$ (capitulum), usually broadly capitate with strongly ventricose base. Cheilocystidia of several types: 1) similar to pleurocystidia; 2) cylindrical-capitate with a constriction under the capitulum, $35\text{--}49 \times 6\text{--}9.2$ (capitulum) $\times 8.3\text{--}10 \mu$, (ventricose part); 3) ampullaceous with elongated neck ($29 \times 8.5 \mu$); 4) merely more slender than the pleurocystidia with the capitulum 5.7μ broad and below about $3\text{--}4 \mu$ broad; 5) filamentous and originating from hyphal ends which are prolongations of the gill trama; 6) pseudoparaphysoid cells near the cap margin, $14 \times 8.5 \mu$, hyaline to brown and broadly clavate. Hymenophoral trama subhyaline, lacking wall or incrusting pigments. Epicutis only about 10μ thick, gelatinized and hyaline at least in the surface region, toward the hypodermium less or not gelatinized; hypodermium of hyphae of variable diameter, non-gelatinous, and with melleous pigment incrustations. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On leaf mold in tropical montane forest and attached to fallen leaves of dicotyledonous trees, fruiting in summer, solitary, Singer B 1536 and 816, Carmen Pampa, prov. Nor-Yungas, Depto. La Paz, Bolivia, 2000 m. alt. (MICH).

OBSERVATIONS: This differs from all other annulate species of the tropics in having a gelatinized layer on the pileus. The subhyaline hymenophoral trama, the relatively elongate habit, and the brownish veil are further distinctive characters.

126. *Galerina arenaria* Singer, Lilloa 26: 124. 1953 (1954).
Illustrations: Fig. 138 (pleurocystidia and cheilocystidia).

Pileus 7–12 mm broad, convex then applanate with a small but prominent acute papilla, brown (*burnt umber, kis kilim*), in dry condition light ochre brown, rarely somewhat olive (*fox*), transparently striate when wet, not sulcate when dry.

Lamellae brownish (*buckthorn brown or chipmunk*), rather broad, moderately close, adnate.

Stipe 23–25 mm long, 1–1.5 mm thick, equal except for a somewhat broadened base (to 3 mm), concolorous with pileus, young with a paler pruinose apex, silky below annulus, the latter sordid whitish to gray, well developed, persistent.

Spores 7.5–9.7 × 5–6.3 μ, strongly warty, the warts deep rust on paler ground, with a distinct plage, ellipsoid. Basidia 19–32 × 6.5–7.8 μ, clavate, hyaline, (1-)2-(3-) spored. Cystidia 27–54(71) × (9)11–15 μ on sides and edges of lamellae, all with rather thin walls, easily collapsing, some with scanty ochraceous to hyaline incrustations near the tip which is always rounded-obtuse, lower portion ventricose, sometimes with a mucro which usually is very short, at times with a subcapitate mucro especially near edges, hyaline, moderately numerous on sides, numerous on edges but even there interrupted by numerous basidia. Gill trama regular, consisting of elements which are not glassy-refrangent, somewhat incrustated by a rusty or ochraceous pigment, broad, elongate. Hyphae of the hypodermium of pileus broad, repent, forming a cutis, pigment incrustated; above it an epicutis which consists of less colored to subhyaline repent hyphae of smaller diameter. Caulocystidia at apex of stipe 57–71 × 12–13(19) μ, often brownish or incrustated, many capitate-ventricose. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on wet sandy earth near a spring in dense subtropical forest and on heaps of dead *Gramineae* in fog forest vegetation. Southern Brazil and Yungas (Bolivia).

OBSERVATIONS: Although most of the annulate members of this section appear to be lignicolous this one seems not to be. The small well-ornamented spores, and the habitat are distinctive.

MATERIAL EXAMINED: Singer B-70-*type* (LIL, MICH); Singer B 635.

127. *Galerina microcephala* (Speg.) Singer, Lilloa 25: 510. 1952.
Inocybe microcephala Spegazzini Anal. Mus. Nac. Buenos Aires 6: 127. 1899.
Illustrations: Fig. 139 (pleurocystidia and cheilocystidia).

Pileus 10–12(20) mm broad, conic-ovoid to broadly campanulate-umbonate, then subappanate with declivous margin, eventually concave with uplifted margin, umbonate even in the later stage, deep chestnut color, hygrophanous, much paler brownish when dry, glabrous, up to one-third of the radius transparently striate when wet, smooth when dry, naked; flesh paler than the surface, odor none.

Lamellae light brownish as those of *Alnicola*, adnate with decurrent

tooth but in age separating from the apex of the stipe, the ridges still continuing the lamellae on the apex of the stipe, medium broad (2 mm), sub-close to more often subdistant, forked or simple.

Stipe 30–40 mm long, 1.5–4(5) thick, equal, with a sub-bulbous base; brownish or brown, appressedly fibrillose, with or without (in age without) a fibrillose annular zone, paler to almost pallid at apex which may be slightly pruinulate, glabrescent, fasciculate to cespitosely connected, at the base with whitish basal tomentum, stuffed, then tubulose; veil at first covering the hymenophore, more or less cortinoid but dense and conspicuous because of its glaucous (*mermaid*) color, later disappearing and leaving the carpophores with banal colors.

Spores 8–9.8 × 5.5–7.3 μ, ellipsoid, strongly warty from a deep rusty exosporium, with poorly outlined smooth plage, with rather thick walls, with or without conspicuous perisporium. Basidia 26–32 × 6–7.5 μ, (1-), 2-, (3-) spored, clavate; cystidia 29.5–50 × 5.3–13.7 μ, on edges and sides similar, not very numerous, some capitate without a ventricose portion below, or ventricose in the middle with a constriction above this and subcapitate above the constriction, hyaline, lowest portion often pale rusty, capitellum often about as broad as the ventricose portion (where present), 5.7–13 μ in diam.; hyphae of the stipe and of the regular trama incrustated by a rusty pigment, the hyphae of the latter with thickened highly refractive walls when studied in KOH. Epicutis of the pileus consisting of parallel to subparallel pigment-incrustated hyphae with the epicuticular layer obsolete in mature specimens. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: This is a typical species of the La Plata region, growing fasciculately on dead wood and buried wood debris in the soil of plantations, sometimes on *Ulmus* or *Salix*, in winter (June–Sept.).

OBSERVATIONS: This is the only species with a glaucous veil; young specimens are therefore very easily recognizable.

MATERIAL EXAMINED: Singer S-94 (MICH); S-103 (LIL). Spegazzini's type, No. 18669 (LPS).

128. *Galerina subpapillata* Singer in Dennis, sp. nov.

Carpophora ab eis *G. papillatae* simillimae differunt altitudine pilei convexi reducta; lamellis angustioribus confertioribusque, sed ceterum, praecipue coloribus cum hac specie bene concordante; stipite plerumque exannulato sed zona annuliformi sat persistente frequenter obnata; sporis (7)8.3–10.3 × (5)5.3–6.7 μ, verrucosis; basidiis plerumque bisporis, numquam tetrasporis; cystidiis latiusculis voluminosis typi eorum *G. papillatae*; tramate flavo; epicute haud gelatinosa; hyphis fibulatis.

Ad ligna putrescentia in silva tropicali Boliviae. Typus (Bolivia, Singer B 816) in Herb. Lilloano conservatus est.

Pileus 6–12 mm broad, convex and low, with a central papilla, glab-

rous, not viscid, short transparently striate (less so in fleshier caps), *Mohawk* or *Sudan brown* on disc and striae, very little paler space between the striae; odor none or very weakly raphanaceous.

Lamellae *chipmunk*, adnate, close or nearly so, rather narrow or in small caps rather broad.

Stipe 10–30 mm long, 1–2 mm thick, entirely *spruce y*, or *Santos* with the apex *chipmunk* and pruinose, browner in older and larger specimens, veil well-developed in larger specimens and with a tendency to form an annular zone near the apex at lower edge of the pruinosity, below this typically appressed silky with white veil remnants, basal mycelium usually abundant, tomentose, white or whitish.

Spores (7)8.3–11(11.5) × (5)5.3–7(7.5) μ, broadly almond shaped, with heavy verrucose exosporial ornamentation, warts in KOH much deeper colored than the epispodium, plage sharply delimited, distinct apical callus present. Basidia either all 2-spored, or a few 1- or 3-spored, 18 × 6–7 μ. Pleurocystidia 26–43 × 11–15.8 × 5.5–8.8 × 10–13 μ, broadly ventricose below, with a broad-cylindric neck or more frequently with a subcapitate apex above a constriction, hyaline or yellowish to pale brown. Cheilocystidia similar to pleurocystidia but some are longer and narrower, and occasionally ampullaceous cells with long cylindric necks also occur. Gill trama regular, bright yellow from wall-pigment (rarely yellowish intracellular pigment also present) and also in age some thin finely granular inconstant honey yellow incrusting pigment also present, hyphae with relatively thin (0.5–0.7 μ) walls. Epicutis of pileus poorly differentiated from hypodermium, on the average consisting of narrower, less incrustated hyphae which are repent and not gelatinized; hypodermium similar to gill trama but hyphae more compactly interwoven and somewhat more incrustated (but never as much as in *G. papillata*). Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Solitary to gregarious on wood of all kinds in tropical montane forests, summer, Yungas (Bolivia) and Sierra de Santo Domingo (Venezuela).

OBSERVATIONS: This differs from *G. papillata* in the characters indicated in the key.

MATERIAL EXAMINED: BOLIVIA: La Paz: Nor-Yungas, Carmen Pampa, 17-II-1956, 2000 m. alt. Leg. Singer B 1240 (LIL)-*typus*. 1-II-1960, B 816 (LIL)-*para-typus*. VENEZUELA: Merida: Sierra de Santo Domingo, 3440 m. alt., 1-VII-1958 Leg. Dennis No. 1774 (LIL, K).

There is a colored picture by Dr. Dennis, the collector of the Venezuelan material, preserved at Kew, and a copy at the Instituto Lillo.

129. *Galerina salicicola* Orton, Trans. Brit. Myc. Soc. 43: 242. 1960. Illustrations: Orton op. cit. figs. 35–38, 279.

Pileus 10–25 mm broad, convex then expanded, generally papillate or acutely umbonate, less commonly obtusely umbonate, yellow rusty,

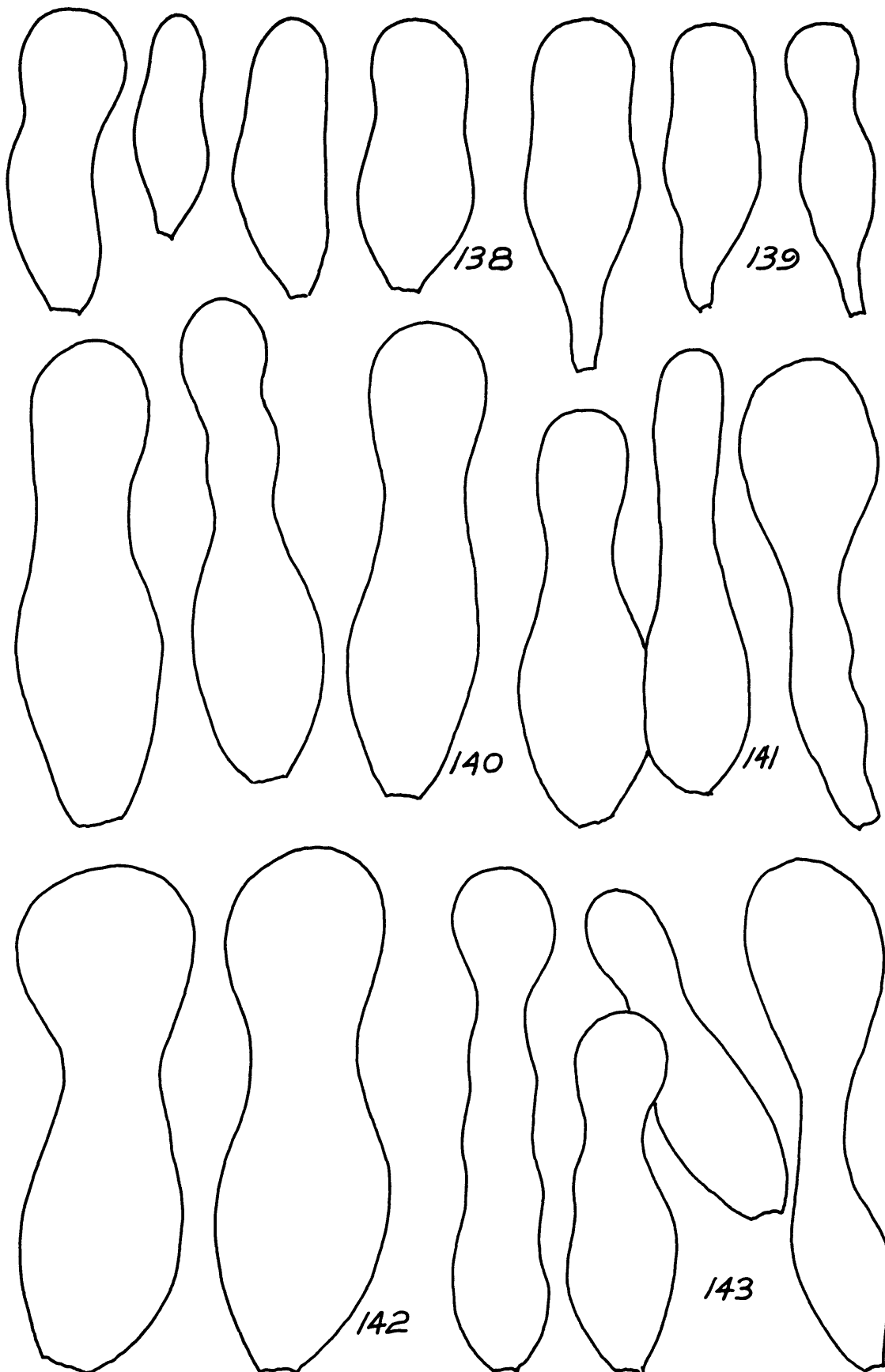


Fig. XVII

Cystidia: Fig. 138, pleurocystidia and cheilocystidia of *G. arenaria*; 139, pleurocystidia and cheilocystidia of *G. microcephala*; 140, pleurocystidia of *G. pruinatipes* var. *pruinatipes*; 141, cheilocystidia of *G. pruinatipes* var. *pruinatipes*; 142, pleurocystidia of *G. pruinatipes* var. *fulvipes*; 143, cheilocystidia of *G. pruinatipes* var. *fulvipes*.

tawny honey or tawny rusty, often with yellower margin or date-brown at center, drying (fading!) yellowish with tawny tinge at center or entirely yellowish, striate when moist, margin with a few yellowish fibrils from veil when young; context concolorous, drying yellowish in center of cap and stipe, odor and taste farinaceous.

Lamellae adnate, often with tooth or adnate-decurrent, yellowish honey then rusty honey, subdistant (14–24:1–3), rarely veined on the sides, edges even or becoming flocculose.

Stipe 15–35 mm long, 1.5–3(4) mm thick, equal or slightly swollen at base, often flexuous, honey or concolorous with cap, soon date-brown or bay from the base, whitish or yellowish veil forming a rather fugacious ring-zone and patches below this, stipe later appearing yellowish striate in lower part, apex yellowish pruinose at first, stuffed or slightly hollow.

Spores amygdaliform, (7)7.5–9(10) × (4)4.5–5(5.5) μ, punctate, sometimes a small germ pore is visible (callus?). Basidia 4-spored, 20–28 × 5–7 μ. Cheilocystidia 30–40 × 8–12 × 6–9 μ, utriform or broadly lageniform, rarely somewhat cylindric. Pleurocystidia numerous, 36–50 × 8–16 × 8–11 μ, utriform or vesiculose-fusiform. Epicutis of pileus of filamentous hyphae 5–25 μ in diameter.

HABIT, HABITAT AND DISTRIBUTION: About base of willows or an old willow stump, England (K).

OBSERVATIONS: We have included this species on the basis of Orton's description and illustrations. The drawings do not show a plage delimited on the spores and no mention is made of clamps. We tentatively include this species here on the characters of the pleurocystidia, assuming that clamps are present on the hyphae. *G. subbullulifera* Singer appears to be similar but is from southern Brazil and apparently has a heavier veil and different pleurocystidia.

130. *Galerina pruinatipes* Smith, Mycologia 45: 912. 1953.

var. *pruinatipes*

Illustrations: Pl. 12, fig. B. Fig. 140 (pleurocystidia), 141 (cheilocystidia).

Pileus 10–15(20) mm broad, obtuse, expanding to plane, surface glabrous, moist, hygrophanous, rich tawny fading to pinkish buff, translucent striate moist; flesh very delicate and fragile, odor none, taste bitter.

Lamellae close, broad, bluntly adnate and readily seceding, pale ochraceous tawny young, between cinnamon buff and "cinnamon" mature, edges crenulate.

Stipe 10–30 mm long, ± 1 mm thick, equal except for a slight bulb at base, fragile, dark reddish brown below, pallid and coarsely pruinose above, with scattered pallid fibrils downward, base with a slight tawny pubescence.

Spores 10–12.5 × 6.3–8 μ, inequilateral in profile, in face view ovate, warty-roughened and outer layer separable around the depression, near russet in KOH. Basidia 2-spored. Pleurocystidia scattered, 40–55 × 10–18

μ , ventricose with broadly-rounded to capitate apices, hyaline, thin-walled. Cheilocystidia $36\text{--}44 \times 9\text{--}13 \mu$, mostly cylindrical-capitate but some fusoid-ventricose elements present. Pilocystidia similar to cheilocystidia but in general more variable in shape, dull cinnamon to hyaline in KOH, many projecting filaments also present. Gill trama of enlarged hyphal cells \pm ochraceous in KOH, subregular. Pileus trama homogeneous, elements mostly enlarged but some hyphae $5\text{--}10 \mu$ in diam. present over surface, pigment incrusting; clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered on rotten wet conifer logs in cold places, Green Lake, Mt. Rainier National Park, Washington, October.

OBSERVATIONS: The broadly-rounded to capitate cystidia together with the dark colored rough spores with their conspicuous plage, are distinctive. The stipe as revived in KOH becomes very dark. There is considerable variation in the cheilocystidia, some are fusoid-ventricose with merely obtuse apices whereas others are almost cylindrical capitate. All those observed were hyaline or at the most only faintly ochraceous at the very base. The outstanding field characters are the obtuse to plane pileus, the stipe coarsely pruinose over upper half, pallid fibrils over lower half, the darkening from the base up, the tawny mycelium matted around the base, and the bitter taste.

MATERIAL EXAMINED: Smith 41029-*type*; 41160; 41220.

130a. *Galerina pruinatipes* var. *fulvipes* Smith, Mycologia 45: 913. 1953.

Illustrations: Fig. 142 (pleurocystidia), 143 (cheilocystidia), 144 (pilocystidia), 145 (caulocystidia).

Pileus $15\text{--}30$ mm broad, obtusely conic becoming broadly conic or nearly plane with an obtuse umbo, glabrous, "tawny" when moist, translucent striate, hygrophanous and fading to "ochraceous buff"; flesh concolorous with surface, thin but not fragile, odor not distinctive, taste bitter.

Lamellae close (± 20 reach the stipe), narrow to moderately broad (± 3 mm), squarely adnate but soon seceding, nearly equal but broadest near stipe, dark ochraceous tawny, pruinose under a lens, edges fimbriate.

Stipe $50\text{--}60$ mm long, ± 2 mm thick, slightly enlarged at base, dark reddish brown over all (all mature), surface covered to near apex with sordid tawny appressed fibrils, apex pruinose.

Spores $10\text{--}12.5 \times 5.5\text{--}7 \mu$, slightly inequilateral in profile, in face view ovate, dark tawny and warty in KOH, but suprahilar depression smooth, with apical callus. Basidia 2-spored, $26\text{--}29 \times 7\text{--}8.5 \mu$, hyaline in KOH. Pleurocystidia present, $38\text{--}52 \times 12\text{--}18 \mu$, ventricose with broadly-rounded apices or apices capitate and as broad as the ventricose part, thin-walled and hyaline in KOH. Cheilocystidia abundant, $40\text{--}65 \times 9\text{--}15 \mu$, ventricose to cylindrical below a capitate apex, broadest at apex, hyaline as revived in KOH or with a dull ochraceous to brown content. Pilocystidia

scattered, similar to cheilocystidia or with slightly thickened ochraceous walls at least near base. Caulocystidia in fascicles, \pm like the cheilocystidia but often more elongated, walls of some colored near base. Gill trama interwoven, pale ochraceous tawny in KOH from incrusting pigment. Pileus trama darker than gill trama, homogeneous. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On conifer logs, Hoh River above Jackson Guard Station, Olympic National Park, Washington. May.

OBSERVATIONS: This is a robust variety with tawny fibrils over lower half of stipe and with a tendency for many of the cheilocystidia to be colored. It may be a distinct species by virtue of the colored veil, but we feel that more collections from other localities are needed to establish this.

MATERIAL EXAMINED: Smith 13398-*type*.

131. *Galerina farinosipes* Smith, Mycologia 45: 899. 1953.

Illustrations: Figs. 247–248 (spores); 146 (pilocystidia), 147 (pleurocystidia), 148, 149 (cheilocystidia).

Pileus 10–20 mm broad, oval to convex young, the margin straight, expanding to campanulate to broadly convex, surface at first conspicuously white-hoary from a dense coating of fine white fibrils, margin usually decorated with patches of the thin veil, glabrescent, surface moist, hygrophanous, “ochraceous tawny” and faintly striate to opaque on the margin, fading to near “warm buff”; flesh rather thick and firm, near ochraceous tawny and fading to buff, odor and taste not distinctive.

Lamellae moderately broad, adnate with a decurrent line, soon seceding, close to subdistant, pallid brown becoming ochraceous tawny, edges white floccose.

Stipe 40–60 mm long, 2–4 mm thick, equal, hollow, cartilaginous-fragile, usually somewhat twisted, densely pruinose-tomentose over all from a dense grayish white tomentum, interior dark brown to bister in basal part, yellowish above, veil lacking.

Spores $9\text{--}12 \times 6\text{--}7 \mu$, inequilateral in profile, ovate in face view, ochraceous tawny or paler in KOH, nearly smooth (as seen under oil minutely warty-rugulose), with a ragged line marking the plage, with a slight apical callus. Basidia 2-spored, $26\text{--}32 \times 7\text{--}8 \mu$, hyaline. Pleurocystidia scattered to abundant, $44\text{--}56 \times 9\text{--}12 \mu$, ventricose-subcapitate to subcylindric-capitate or at least the apices broadly rounded, hyaline, thin-walled. Cheilocystidia abundant, $40\text{--}65(75) \times 8\text{--}10 \mu$, cylindrical-subcapitate or the elongated part flexuous, hyaline and thin-walled; gill trama interwoven, yellowish in KOH. Pileus trama homogeneous, yellowish in KOH. Clamp connections present but rare. Pilocystidia cylindrical-subcapitate, $100\text{--}300 \times 7\text{--}10 \mu$ and often appearing to form a non-gelatinous pellicle.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on soil under redwoods, California, fall.

OBSERVATIONS: This species is grouped with *G. pruinatipes* because of the broadly-rounded pleurocystidia and cheilocystidia and the presence of

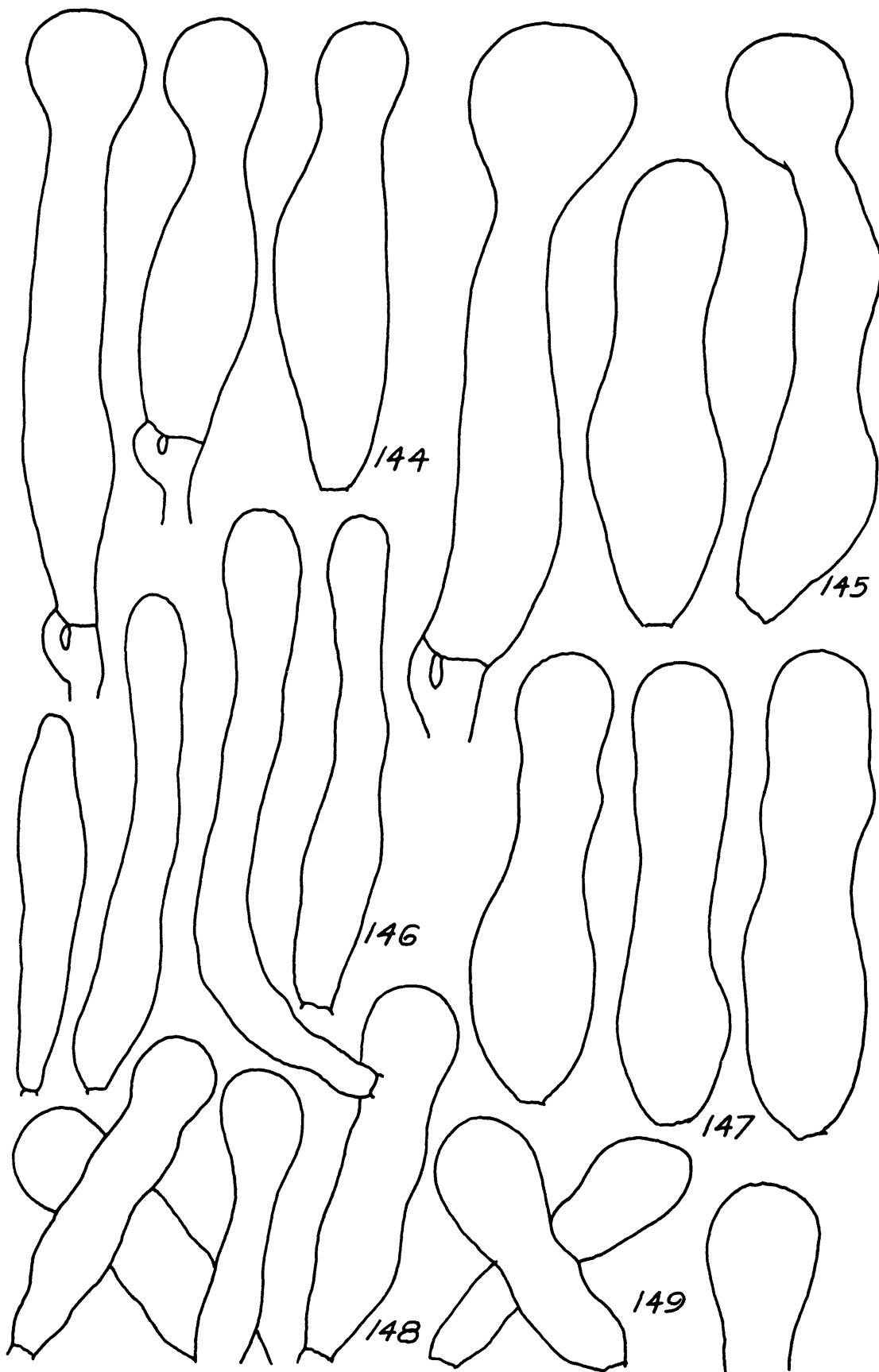


Fig. XVIII

Cystidia: Fig. 144, pilocystidia of *G. pruinatipes* var. *fulvipes*; 145, caulocystidia of *G. pruinatipes* var. *fulvipes*; 146, pilocystidia of *G. farinosipes*; 147, pleurocystidia of *G. farinosipes*; 148–149, cheilocystidia of *G. farinosipes*.

pilocystidia. Actually, however, they are quite different in appearance. *G. farinosipes* has a rather heavy sheath of white veil fibrils over the lower part of the stipe. The pilocystidia of *G. farinosipes* cause the white-hoary appearance of young caps. In age these elements are considerably elongated and matted down into a layer that can easily be mistaken for a pellicle if only cross sections of the gills and pileus are cut. The spores of *G. farinosipes* are scarcely roughened (as seen under oil) but the suprahilar depression is clearly bounded by a ragged line. The spores of *G. pruinatipes* are, relatively speaking, conspicuously roughened. The pleurocystidia and pilocystidia in old specimens collapse and may be difficult to demonstrate; Smith 56485 may be such a specimen. The following is a description of it:

Pileus 18 mm broad, broadly conic, glabrous, moist, hygrophorous, ochraceous tawny fading to pale pinkish buff, striate when moist; odor and taste not recorded.

Lamellae close, broad, ascending-adnate, ochraceous tawny, margins whitish.

Stipe 50 mm long, 1.5 mm thick, bister or darker below and coated thinly with grayish fibrils, apex pruinose and paler in color (honey color or darker).

Spores $10-13 \times 6-7.5 \mu$, in face view ventricose-ovate to ovate, with a snout-like apex, distinctly ventricose-inequilateral to inequilateral in profile, pale ochraceous or with a tinge of ochraceous tawny (in KOH), dark red brown in Melzer's, wall thick and distinct, smooth to faintly marbled and plage line visible in only a few spores, apical callus present. Basidia (1-) and 2-spored. Pleurocystidia present and similar to cheilocystidia (1-spored basidia may also remind one of cystidia). Cheilocystidia abundant, $30-50 \times 7-11 \times 8-11 \mu$, cylindrical-subcapitate to capitate or slightly ventricose below and apex obtuse to capitate, apex rarely under 5μ , hyaline to yellowish in KOH. Pileus trama pallid to yellowish in KOH, pellicle thin and not gelatinous. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Solitary under redwood, Prairie Creek State Park, Orick, California, Dec. 9, 1956, Smith 56485.

In the field, I mistakenly thought that this specimen was a large carpophore of *G. cedretorum*. The cheilocystidia resemble those of *G. triscopa* except their necks are much thicker. They are also identical with those of *G. farinosipes* and the spores are also similar to those of that species. However, no pilocystidia or pleurocystidia were observed. With the material available we cannot be sure whether this is an autonomous species or an abnormal fruiting body of *G. farinosipes*.

MATERIAL EXAMINED: Smith 3649-type; 56485; 56494.

132. *Galerina olympiana* Smith, Mycologia 45: 909. 1953.
Illustrations: Fig. 150 (pleurocystidia), 151 (cheilocystidia).

Pileus 5-10 mm broad, convex with a slightly incurved margin, expanding to plane or nearly so, surface glabrous, hygrophorous, when fresh

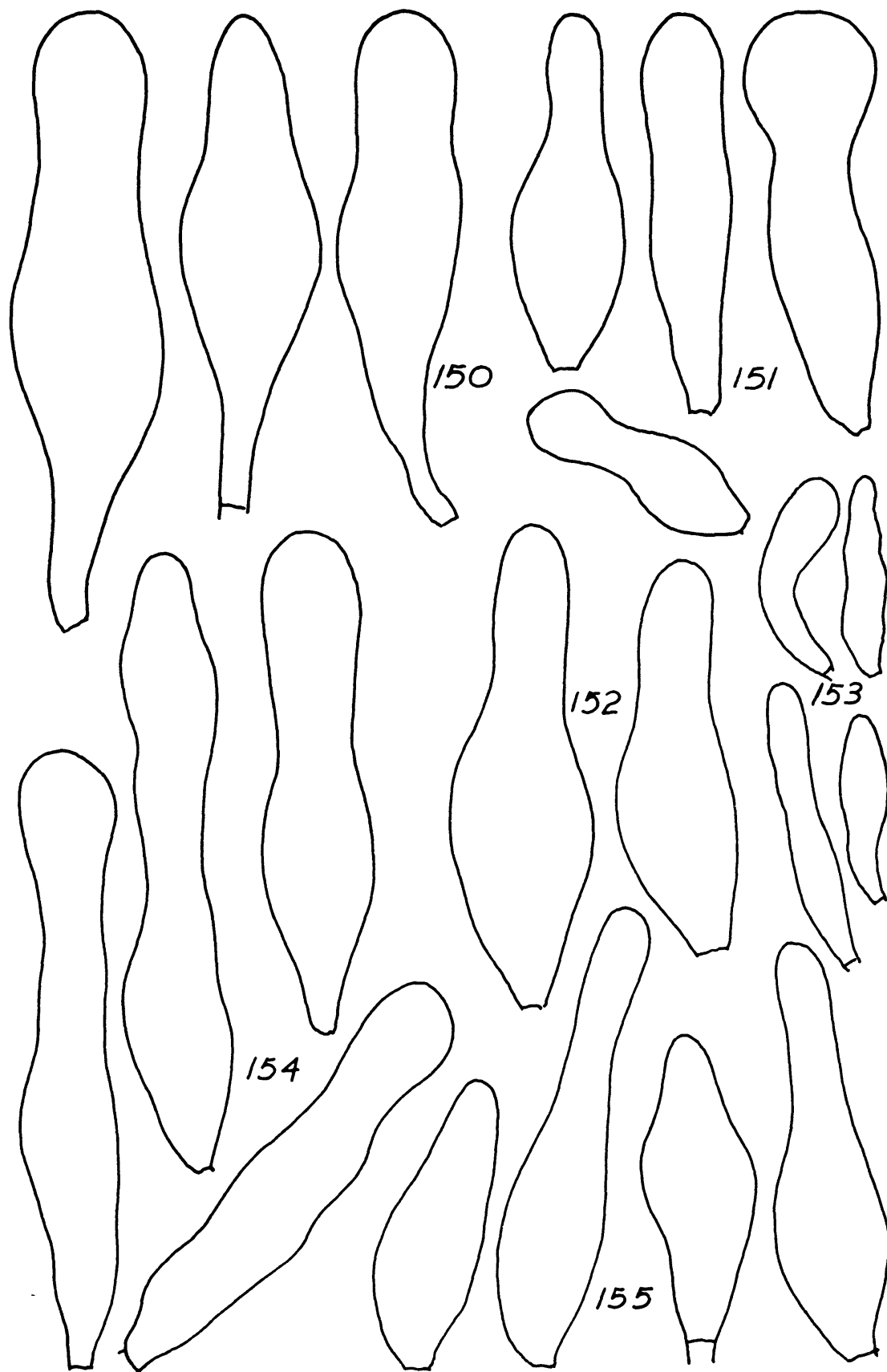


Fig. XIX

Cystidia: Fig. 150, pleurocystidia of *G. olympiana*, 151, chielocystidia of *G. olympiana*; 152, cheilocystidia of *G. velutipes*; 153, pilocystidia of *G. velutipes*. 154, pleurocystidia of *G. velutipes*; 155, cheilocystidia of *G. viatica*.

and moist "tawny" and opaque, becoming "ochraceous tawny" and conspicuously striate before fading to "warm buff" (pale yellow) or paler; flesh thick (for such a small fungus) and firm, concolorous with surface, odor and taste not distinctive.

Lamellae subdistant to close (13–15), narrow, horizontally adnate or at times slightly toothed, rather thick, concolorous with pileus and pruinose.

Stipe 10–20 mm long, 1 mm thick, equal, crooked to undulating, with a narrow tubule, concolorous with pileus or darker reddish brown below, apex coarsely pruinose. Lower portion with scattered patches of appressed yellowish fibrils.

Spores $8\text{--}10 \times 4.5\text{--}5.5 \mu$ ($10\text{--}12 \times 6\text{--}7 \mu$), ovate in face view, subinequilateral in profile, tawny as revived in KOH, pale yellow fresh, slightly rugulose-roughened, with apical callus, suprahilar depression both slight and smooth. Basidia 4-spored or 2-spored, $17\text{--}20 \times 7\text{--}7.8 \mu$, clavate, slightly projecting. Pleurocystidia abundant, $35\text{--}56 \times 9\text{--}15 \mu$. Gill trama parallel, tawny in KOH from heavily incrusting pigment. Pileus tawny to russet in KOH, the incrusting pigment heavy, homogeneous, no pellicle differentiated but occasional pilocystidia similar to pleurocystidia present. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on wood of *Populus trichocarpa*, Hoh River, Olympic National Park, Washington, June 6, 1939.

OBSERVATIONS: Small metuloid cysts $6\text{--}8 \mu$ broad and of variable length are also present in the hymenium. These do not appear to be typical gloeocystidia, but may be an additional distinctive feature of this very unusual little agaric. They are rare, and, since there is a strong tendency for both basidia and cystidia to have colored or granular-refractive content, these may simply be basidioles in a certain stage of development.

The distinguishing field characters are the small size, habitat on cottonwood, thickish gills, and yellowish veil fibrils. Microscopically the pleurocystidia are most like those of *G. pruinatipes* but the markings on the spores are faint, as in *G. farinosipes*. In addition, there is more tendency for the cystidia to have colored content than in either of the others. There are a large number of hyaline fusoid-ventricose caulocystidia (with obtuse apices) mixed with the capitate caulocystidia. Both varieties of *G. pruinatipes* are distinct from *G. olympiana* by the markings on the spores.

MATERIAL EXAMINED: Smith 14116-*type*.

133. *Galerina subbullulifera* Singer, Lilloa 26: 137. 1953 (1954).

Pileus 13 mm broad, convex, papillate, melleous (*pl. 11 I 7*) hygrophanous, much paler when dry (lighter yellow), sulcate (but not transparently striate) in a narrow marginal zone.

Lamellae *spruce y* with a more yellow edge, adnate, moderately close, medium broad.

Stipe 21 mm long, 1 mm thick at apex, base 4 mm, *spruce y* above the

annulus, *hazel* below, with pallid appressed fibrils up to the annulus, equal to the bulbous base.

Spores $8.2-9 \times 5-5.5 \mu$, with fine exosporial punctation and distinctly marked plage, some however somewhat auriculate, rather well colored. Basidia $23-24 \times 6.8-8.2 \mu$, usually subclavate, 4-spored. Pleurocystidia $27-37 \times 9.5-13.7 \mu$, very rarely with a short mucro, short-ampullaceous, often merely vesiculose-globose pedicellate, hyaline and a few brownish, thin-walled. Cheilocystidia abundant, $19-28 \times 9.5-12.3 \mu$. Gill trama regular, consisting of broad and comparatively short elements with rather thick walls, yellow, not incrustated by pigment. Hyphae of the pileus spreading radially and subparallel with each other or at places rather irregularly arranged, with often short and broad elements; extreme margin of pileus formed by cystidioid hyphal ends which are thin-walled, hyaline, clavate; epicutis hyaline, consisting of repent hyphae which are thin-walled, smooth and filamentous; hypodermium hardly differentiated from the trama of the pileus, consisting of yellow but non-incrustated hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Solitary on rotten wood in subtropical forest, known only from southern Brazil.

OBSERVATIONS: The stipe which is dark below, the fine elements of the spore ornamentation, and the numerous globose-vesiculose cheilocystidia, some of which have brownish contents, are distinctive.

MATERIAL EXAMINED: Singer-*type* (LIL).

134. *Galerina viatica* Singer, sp. nov.

Illustrations: Fig. 155 (cheilocystidia), 156 (pleurocystidia).

Pileo 11 mm lato, papilla haud elevata, subobtusa praedito, ferrugineo-brunneo, levi, haud viscidio; lamellis siennicoloribus, subconfertis, arcuatis, adnatis; stipite 14×2 mm, aequali, ferrugineo-brunneo, basi fusco, appresse sericeo; velo haud manifesto; sporis subamygdaloideis, obscure brunneis, disco suprahilari bene evoluto praeditis, $9-11 \times 6-7 \mu$, depressione suprahilari nullo, manifeste asperulatis ex ornamentatione exosporiali qua ob re crude verrucosis; basidiis $18-23 \times 7-8 \mu$, (2-) 4-sporis; cystidiis ad aciem lateraque lamellarium identicis, $34-60 \times 9-16 \times 4-7 \times 6.3-8 \mu$; epicute haud gelatinosa; hyphis fibulatis. Typus (leg. Singer B 1247 in Bolivia) in Herb. Lilloano conservatus est.

Pileus 11 mm broad, convex-papillate, the papilla low and obtuse or nearly so, dark dingy yellow brown (*Sudan brown*) over all, smooth, not viscid.

Lamellae close but not crowded, arcuate, adnate, dingy-yellow brown (*chipmunk*).

Stipe 14 mm long, 2 mm thick, equal, surface coated with appressed silky fibrils, color deep date-brown below (*biskra*), paler above (*Sudan brown*); no veil evident.

Spores $9-11 \times 6-7 \mu$, distinctly verrucose, with a tendency for the

outer layer to loosen and slough off (but spore never truly calyptrate), dull tawny in both KOH and Melzer's sol., broadly inequilateral in profile, broadly ovate in face view, plage sharply delimited. Basidia 18–23 × 7–8 μ, hyaline, 2- or 4-spored, typically clavate. Pleurocystidia 35–60 × 9–16 × 4–7 × 6.3–8 μ, ventricose at base, neck long, walls flexuous, tip equal in diameter to the neck or only slightly enlarged, thin-walled, hyaline to yellowish in KOH. Cheilocystidia similar to pleurocystidia or shorter (neck not as elongated), with hyaline to yellowish walls as revived in KOH. Gill trama weakly colored, hyphae lacking incrustated pigment, hyphal cells of variable shape and with walls 0.5–1 μ thick; epicutis of pileus without pigment in the hyphae but walls with rather heavy yellowish incrustations, not gelatinized; hypodermium of hyphae with heavy but pale colored incrustations and with a pallid orange intracellular pigment; context proper of nearly hyaline interwoven hyphae with walls about 0.5–1 μ thick. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Solitary on sandy soil rich in organic matter, along a road in Yungas forest zone where trees have been cut recently and charcoal produced, but no traces of charcoal or wood in the soil, summer. Singer B 1247-*type*, Carmen Pampa, Nor-Yungas, Depto. La Paz, Bolivia 2000 m. alt. (LIL).

OBSERVATIONS: This species, by its spores and pleurocystidia, is closely related to *G. marginata*, but would fall in the stirps *Cedretorum* because of the lack of an annulus. The aspect of the fruiting body and the obtuse pleurocystidia distinguish it from *G. cedretorum*. It differs from *G. saltensis* in spore characters. Because of the relationships pointed out above, we are not inclined to insist that the strictly terricolous habitat observed for the type will hold for future collections.

135. *Galerina papillata* Singer, Lilloa 25: 382. 1952.

Illustrations: Fig. 157 (pleurocystidia and cheilocystidia).

Pileus 6–13 mm broad, campanulate, then convex or flattened at the margin, the center always with a strong, usually acute prominent papilla, glabrous, hygrophorous, ocher brown (about *terrapin*, *pl. 15 H 12*—1st ed.), paler between the striae (*bronze* or between *kis kilim* and *Sudan*) or even paler, fading to *Chinese y* or *bronze*, transparently striate when wet, but smooth or slightly sulcate when dry; flesh subconcolorous but paler, with very indistinct odor or odor lacking.

Lamellae *antique gold* to *burnished gold* (1st ed.) *buckthorn brown* (2nd ed.) subclose to subdistant, ventricose or not, rather broad or broad (1–2 mm) rounded-adnexed, adnate, or sometimes adnate-subdecurrent or with decurrent tooth.

Stipe 7–25 mm long, 0.7–1.5 mm thick, equal or with thickened base or gradually and slightly thickened upward, rarely with enlarged apex, apex subconcolorous with the lamellae, or brownish like the lower portion (*cigarette*, *bronze* or *burnished gold* 1st ed.), slightly pruinose at apex or in upper

half, glabrescent in age but always showing the superficial vestiges of the veil in the lower four-fifths of the stipe surface (finely longitudinally appressedly fibrillose); veil always distinct but in most specimens not leaving a distinct annulus, rarely annulate (T 1895 Singer) and then with a narrow apical annular belt even in relatively mature specimens.

Spores $8.8\text{--}11.5 \times 5.5\text{--}7 \mu$, mostly $9.5\text{--}10 \times 5.8 \mu$, (giant spores up to 12.3μ long also occasionally observed*), with a strongly warty deep tawny ferruginous exosporial ornamentation and very well-developed sharply marked plage, the warts coarse and sometimes irregular, some spores with a conically protracted mucro, otherwise with a less conspicuous callus, ellipsoid-almond-shaped. Basidia $17.7\text{--}26 \times 5.5\text{--}8.2 \mu$, all 2-spored, clavate or cylindrical; pleurocystidia subampullaceous or ampullaceous-capitate, rather scattered to rather numerous, thin-walled and easily collapsing, thinnest portion of the rather short broadly rounded neck $5.5\text{--}7.5 \mu$ in diam., characteristically rather broad and short, hyaline, varying according to collections from $23\text{--}31 \mu$ long $\times 8\text{--}9 \mu$ broad to $40\text{--}50 \times 10\text{--}19.2 \mu$, capitellum where present $8.2\text{--}9.7 \mu$ in diameter, but sometimes reaching the diameter of the lower ventricose portion. Cheilocystidia much like the pleurocystidia, rather numerous; sometimes a few pseudoparaphyses present at the edge of the lamellae, these much like the basidioles in shape, clavate or ventricose, $13.6\text{--}15 \times 6.2\text{--}7 \mu$; hymenophoral trama regular brownish from an incrusting ocher brown pigment; hyphae of the epicutis of pileus repent, forming a cutis, pigment-incrusted, filamentous, not gelatinized. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Solitary or gregarious on dicotyledonous trees, rotten logs and trunks in the subtropical zone but also ascending to the montane zone (there on *Alnus jorullensis* var. *spachii*), in the Selva Tucumano-Boliviana, fruiting in summer (Dec. until March).

OBSERVATIONS: This species appears to be close to *G. triscopa* but the cystidial characters are quite different. The expanded, conic pileus, short stipe and veil are all suggestive.

MATERIAL EXAMINED: Singer T-294 (MICH); T-778; T-1375-type; T-1895 (LIL); T-2906 (MICH); T-3650 (LIL).

136. *Galerina minor* Singer, Lilloa 26: 125. 1953 (1954).

Illustrations: Fig. 158 (cheilocystidia and pleurocystidia).

Pileus 2–3 mm broad, convex to conic, mostly with a distinct papilla, ocher brown, hygrophanous, much paler when faded, transparently striate when wet.

Lamellae ocher brown, adnate, ventricose, distant.

* The existence of some larger spores in a homogeneously two-spored carpophore shows that, aside from the number of sterigmata per basidium, there must be other influences, unknown to us, which cause the formation of giant spores. Here, as in many other similar cases, the majority of the giant spores are less pigmented and thinner walled than the normal, mature spores.

Stipe ocher brown, 7–8 mm long, 0.5–0.7 mm thick, subequal, appressedly fibrillose but exannulate, with the apex paler in some carpophores.

Spores $8.2\text{--}9.5 \times 5.5\text{--}6.6 \mu$, well-pigmented and strongly warty with a well-marked plage, ellipsoid-amygdaliform. Basidia $26\text{--}27 \times 6.8\text{--}7.5 \mu$, clavate, mostly 2-spored, but with some 1-, 3-, 4-spored intermixed. Pleurocystidia and cheilocystidia similar, scattered, most of them with capitate apex, ventricose in the middle portion, some ampullaceous and non-capitate, somewhat pedicellate, rather short and broad and thin-walled, some slightly brownish, $28\text{--}44 \times 8\text{--}15 \times 5.5\text{--}7 \times 6.8\text{--}11 \mu$. At edge, especially near the margin of the pileus, there are numerous brown vesiculose bodies, like those of *G. physospora*. Gill trama consisting of elongated rather voluminous cells, many with brown pigment incrustations. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Among *Hepaticae* on very rotten wood, in subtropical forest, spring. Known only from southern Brazil.

OBSERVATIONS: As far as is known, this is the smallest species in the genus.

MATERIAL EXAMINED: Singer B-65-type (LIL, MICH).

137. *Galerina victoriae* Singer, Sydowia 8: 140. 1954.

Pileus 13–21 mm broad, convex, then repand, umbonate, deep reddish chestnut color, hygrophanous, *ferruginous* to *Formosa* when faded, with transparently striate margin, glabrous or subglabrous; flesh hygrophanous, fragile, inodorous.

Lamellae deep dusky rusty brown, close, adnate, moderately broad (2–3 mm broad).

Stipe 17–20 mm long, 1–2 mm thick, brownish (*mango*), pruinat at the apex, but slightly so and soon glabrescent, evelate, equal or slightly tapering downward, tubulose.

Spore deposit *raw sienna*.

Spores $6.5\text{--}8.2 \times 4.2\text{--}6 \mu$, with strong and distinct exosporial verrucose ornamentation, deep rust color in KOH, with distinctly marked plage, ellipsoid. Basidia $21 \times 5.3 \mu$, 4-spored. Pleurocystidia and cheilocystidia $(26)40\text{--}55 \times (6.3)12\text{--}21 \times 6\text{--}9 \mu$, hyaline, thin-walled or very frequently with thick-walled apex (wall double as often seen in *Inocybe metuloids*), ventricose in the middle and ampullaceous with the thinner apical portion short, often slightly subcapitate, rather numerous but not crowded. Epicutis of pileus consisting of repent hyphae, not gelatinized, not forming a loose trichodermium; fundamental hyphae in the trama mostly strongly ochraceous from a membrane pigment, some citrinous from a soluble pigment, some very broad (reaching 32μ in diam.), never hyaline. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Solitary on wood of myrtaceous and fagaceous hosts. Type on *Nothofagus dombeyi* late in the fall, Isla Victoria, Nahuel Huapi National Park, Northwest Patagonia, Argentina.

OBSERVATIONS: The spores are exceptionally broad for their length.

MATERIAL EXAMINED: Singer, M-699; M-710-*type*; both (LIL).

Section *Naucoriopsis* Kühner
Ency. Myc. 7: 212. 1935.

Margin of pileus typically incurved at first; carpophore with aspect of *Naucoria* or *Pholiota*; spores varying from nearly smooth to strongly verrucose from exosporial ornamentation and furnished with a smooth plage; cheilocystidia and pleurocystidia present but the latter never with thick necks or broadly rounded apices.

TYPE SPECIES: *Galerina marginata* (Fr.) Kühner, Ency. Myc. 7: 225. 1935.

Key to Stirpes

1. Pileus with a thin but distinct gelatinous pellicle, hence viscid to lubricous when moist ----- *Stirps Autumnalis*
1. Pileus merely moist at first; no gelatinous pellicle present ----- 2
 2. Fruiting body *Pholiota*-like; stipe usually with a distinct annulus
----- *Stirps Marginata*
 2. Fruiting body *Naucoria*-like; annulus if present merely a zone of fibrils ----- *Stirps Cedretorum*

Stirps Autumnalis

Pileus viscid to lubricous, stipe typically with a band-like membranous annulus or annular fibrillose zone; stipe usually darkening from the base upward.

The larger species closely resemble in stature and colors the members of *Stirps Marginata*, and *G. unicolor* represents an intermediate between the two stirpes.

Key to Species

1. Terrestrial: on barren sand often among lichens, on boggy soil among mosses in alpine-arctic stations, or on mossy rocks ----- 2
1. Lignicolous: on logs, stumps, bark, chip-dirt, etc. ----- 7
 2. Spores merely minutely asperulate under oil, exosporium not loosening ----- 3
 2. Spores wrinkled-warty and outer layer often showing some tendency to separate from inner layers ----- 4
3. Stipe not darkening appreciably below, 1–2 mm thick; spores 8–9.5 μ long (see *G. reflexa* (175) also) ----- 139. *G. subochracea*

3. Stipe darkening below, 2–7 mm thick; spores 9.5–12 μ long
 ----- 140. *G. moelleri*
 4. On sand among lichens; outer spore wall loosely enveloping the
 spore as in *G. helvoliceps*; spores 7–9 \times 5–6 μ ----- 138. *G. sabuletorum*
 4. Not as above ----- 5
 5. Spores 10–13 \times 6–7.5 μ ; ochraceous in KOH but slowly pale ochra-
 ceous tawny ----- see *G. unicolor* (149)
 5. Spores typically smaller and regularly darker in KOH ----- 6
 6. Spores (at least some) calyptrate; gelatinous epicutis of pileus with
 hyphae 1–2 μ thick ----- 141. *G. macquariensis*
 6. Spores not calyptrate; gelatinous epicutis of pileus with hyphae 4–7
 μ in diam. ----- see *G. unicolor* (149)
 7. Cheilocystidia dimorphic: 1) clavate to saccate or mucronate, and 2)
 fusoid-ventricose ----- 142. *G. viscida*
 7. Cheilocystidia not obviously dimorphic ----- 8
 8. Pleurocystidia 60–90 \times 10–15(20) μ ; stipe 5–11 mm thick; on wood
 of conifers ----- 143. *G. megalocystis*
 8. Not as above ----- 9
 9. Annulus typically thin but membranous; pleurocystidia mostly with
 enlarged apices; stipes 4–8 mm broad (see *G. helvoliceps* (158) also)
 ----- 144. *G. autumnalis*
 9. Annulus absent or present at first merely as a fibrillose zone (check
 young specimens) ----- 10
 10. Veil absent; spore ornamentation typically ending in a ragged line
 just short of spore-apex ----- 147. *G. castaneipes*
 10. Veil present and spores not as above ----- 11
 11. Spores 7–8.5 \times 4–5 μ , subellipsoid in profile view
 ----- 145. *G. oregonensis*
 11. Spores 8.5–11 \times 5.5–6.5 μ , inequilateral in profile view
 ----- 146. *G. cinnamomea*

138. *Galerina sabuletorum* Smith, sp. nov.

Illustrations: Fig. 159 (pleurocystidia and cheilocystidia).

Pileus 4–15 mm latus, late convexus vel subumbonatus, glaber, viscidus, pallide fulvus. Lamellae confertae, latae, subdecurrentes, pallidae demum subfulvae; stipes 20–40 mm longus, 1.5–2 mm crassus, deorsum subfuscus, sursum ochroleucus, sparsim fibrillosus; annulus membranaceus, fimbriatus; sporae 7–9 \times 5–6 μ , rugoso-verrucosae; pleurocystidia 50–80 \times 9–15 μ ; fusoido-ventricosa, subacuta; cheilocystidia 40–70 \times 8–13 μ . Specimen typicum: Wilderness State Park, Michigan, 8 Sept. 1951, Smith 38558 (MICH).

Pileus 4–15 mm broad, broadly convex with an incurved margin when young, becoming nearly plane or with an obscure umbo, glabrous or with slight veil remnants fringing the margin, dull fulvous moist (“buckthorn brown”), only slightly paler faded and drying near pale ochraceous tawny.

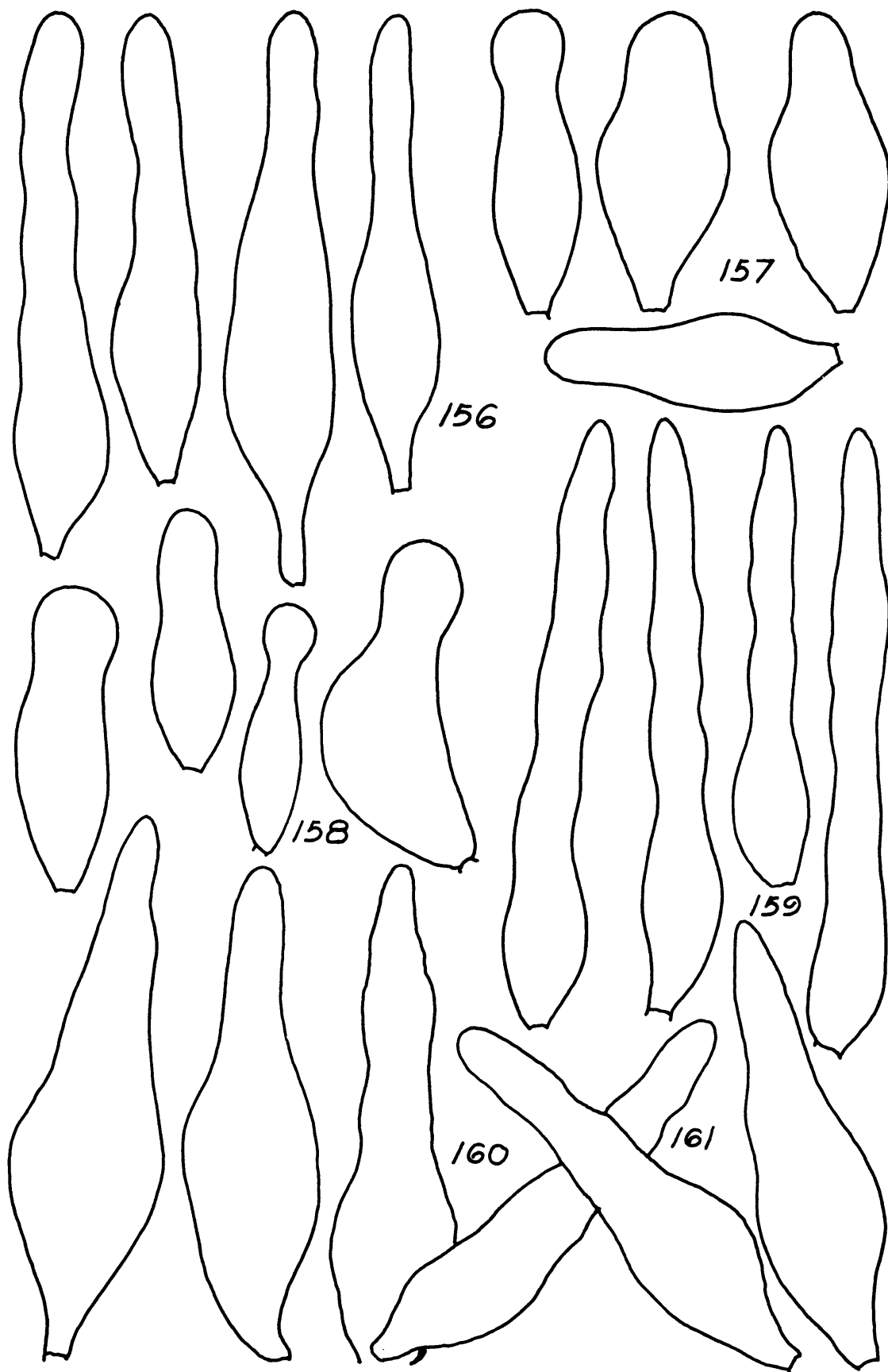


Fig. XX

Cystidia: Fig. 156, pleurocystidia of *G. viatica*; 157, pleurocystidia and cheilocystidia of *G. papillata*; 158, cheilocystidia and pleurocystidia of *G. minor*; 159, pleurocystidia and cheilocystidia of *G. sabuletorum*; 160–161; pleurocystidia and cheilocystidia of *G. subochracea*.

Lamellae close, moderately broad, adnate to subdecurrent, pallid becoming nearly concolorous with the pileus, edges minutely fimbriate.

Stipe 20–40 mm long, 1.5–2 mm thick, equal to slightly enlarged below, mummy brown (blackish brown) over lower part, ochroleucous near apex, thinly fibrillose below the subapical flaring membranous fimbriate annulus, base white mycelioid, apex silky.

Spores 7–9 × 5–6 μ , broadly ovate to elliptic in face view, in profile subelliptic to broadly inequilateral, dark tawny to russet in KOH, wall wrinkled-warty and loosely enveloping the spore as in *G. helvoliceps*, not calyptrate, no apical pore present. Basidia 4-spored, 18–24(30) × 6–8 μ , hyaline in KOH. Pleurocystidia 50–80 × 9–15 μ , fusoid-ventricose with a flexuous to straight neck tapered to a subacute to obtuse apex, hyaline and thin-walled. Cheilocystidia 40–70 × 8–13 μ , similar to pleurocystidia. Epicutis of pileus a distinctly gelatinous thick layer of hyphae 2.5–5 μ in diam. and often with pigment-incrusted walls causing them to be pale yellow in KOH; hypodermium of distinctly enlarged hyphal cells bright tawny in KOH; context proper of yellow short-celled hyphae variously interwoven. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On sand dunes among lichens, Wilderness State Park, Michigan, Sept. 8, 1951, Smith 38558. Known only from type locality.

OBSERVATIONS: Warty-rugulose spores, contrasted with minutely asperulate spores, distinguish this species from *G. subochracea*, even if one disregards the annulus. The slightly smaller spores with their coarser ornamentation, the habitat on sandy soil, and the better-developed gelatinous pellicle of the pileus, separate it from *G. autumnalis* but it is very close to this species nonetheless. *G. oregonensis* is also close in spore characters, but has cystidia frequently enlarged near the apex. It also has distant gills, a stipe which is reddish brown below (not blackish), spores only 4–5 μ broad, and a thin, fibrillose veil.

139. *Galerina subochracea* Smith, Mycologia 45: 917. 1953.
Illustrations: Figs. 160 (pleurocystidia), 161 (cheilocystidia).

Pileus 6–15 mm broad, obtusely conic to convex expanding to plane, the margin connivent at first, surface lubricous to viscid to the touch, glabrous or with veil remnants scattered along the margin at first, hygrophanous, “ochraceous tawny” moist, fading to orange buff or paler; flesh thin and fragile, odor and taste not recorded.

Lamellae moderately broad, broadly adnate, close to subdistant, pale ochraceous tawny with white fimbriate edges.

Stipe 30–50 mm long, 1–2 mm thick, equal or nearly so, tubular, fragile, yellow over all at first and with a distinct median fibrillose annulus, with scattered fibrils or patches below, somewhat darkening from base upward in age, but tending to fade again on drying.

Spores 8–9.5 × 4.5–5.3 μ , (9–11 × 5–6 μ , 2-spored) tawny ochra-

ceous in KOH, inequilateral in profile, ovate in face view, very minutely roughened to smooth; suprahilar depression evident under oil immersion; with a strong apical callus. Basidia 23–26 × 7–8 μ, 4-spored, sterigmata very indistinct. Pleurocystidia abundant, 45–66 × 10–18 μ, fusoid-ventricose with obtuse to subacute apices. Cheilocystidia abundant, similar to pleurocystidia or slightly more variable in shape. Gill trama parallel to somewhat interwoven, pale yellow to hyaline in KOH. Epicutis of pileus a thin surface layer of hyphae 5–7 μ in diam., with incrustated walls, these hyphae quite contorted and somewhat gelatinous, remainder of flesh homogeneous and hyphae broader, yellow in KOH near the pellicle, nearly hyaline toward subhymenium. Clamp connections present. No pilocystidia seen.

HABIT, HABITAT AND DISTRIBUTION: Scattered on debris on wet soil, Idaho and Oregon, summer and fall, rare.

OBSERVATIONS: The diagnostic characters are the viscid cap, fibrillose annulus, small nearly smooth spores with a smooth plage, and conspicuous pleurocystidia. In the dried state the fruiting bodies are concolorous throughout. The darkening of the stipe noted on the fresh material fades out in drying. Although *G. subochracea* is related to *G. marginata* in spore and cystidial characters, in the field one would be more inclined to class it as a *Cortinarius*. The smooth plage, of course, places the species in *Galerina*. Actually there are a number of characters which separate it from *G. marginata* and forms. The annulus is a fibrillose zone, the pleurocystidia are shorter and more ventricose, the spores and tramal tissues are paler in KOH, the darkening of the stipe is not so pronounced and is not retained in drying. The veil in collection 19904 dried yellowish, but notes on the color of the veil when fresh were not taken. Smith 47710 contains many 2-spored basidia.

MATERIAL EXAMINED: R. Oswald (12), Portland, Oregon, Oct. 1955 (MICH). Smith 19904; 24347-type; 44295; 47710 (MICH).

140. *Galerina moelleri* Bas, Persoonia 1: 310. 1960.

var. *moelleri*

Illustrations: Bas, op. cit. figs. 9–19; Moeller, Fungi of the Faeröes 1: 230, fig. 106. 1945.

Pileus 10–20(30) mm broad, hygrophanous, fatty-shiny, rusty chestnut colored (g-1 + h-1*) or ochraceous rusty (g-2) moist, opaque and ochraceous fulvous (k-5) when dry; convexo-plane, sometimes minutely umbonate, smooth; edge membranaceous, very slightly pellucid-striate when moist, at first inflexed and connected with the stem by a thin white, skin-like partial veil.

Gills at first deep ocher-yellow (e-2), turning brownish dirty clay-

* Colors as given in Lange's color chart.

colored (h-3), broad (3 mm), rounded in front, broadly adnate and slightly decurrent.

Stipe rather short and thick, 20–35 mm \times 2–7 mm, whitish above the ring, under the ring covered with a thin, whitish coating of silky fibrils through which the brownish content is seen, at last concolorous with the cap, commonly flexuose, often subfusiform, with the greater part hidden in moss-tufts; the base pallid, root-like pointed; the apex with a whitish ring (or brownish with the spore-print), skin-like, quite narrow, often obsolete or absent; tough, fistulose.

Flesh ochraceous rusty (g-2), especially near the pellicle in cap and stem, thin (2–3 mm in the disc); odor farinaceous when bruised, taste mild.

Spores 9.5–12.5(13.3) \times 6.5–8 μ , broadly ellipsoid-ovoid, sometimes with faint apical papilla, slightly, rarely moderately, roughened to nearly smooth, plage present and rather conspicuous, exospore not loosening, pale yellowish-brownish in NH_4OH , slightly to moderately darkening in KOH (paler than spores of *G. marginata* in KOH), slightly to moderately pseudoamyloid. Cheilocystidia 40–65 \times 5–14 μ , slender lageniform to subcylindric, rarely subcapitate. Pleurocystidia present but sometimes rare, 50–85 \times 7–14 (neck 3–5.5) μ , similar in shape to the cheilocystidia or more slender. Basidia 4-spored. Cuticle consisting of a layer of filiform hyphae, 2–5 μ wide, upper part gelatinized. Clamps present.

HABIT, HABITAT AND DISTRIBUTION: In subarctic-montane zone on moss tufts and in boggy places. Faeröes.

OBSERVATIONS: A complicated situation has arisen around the name as well as the concept of *Pholiota pumila* Fr. Orton, (1960 p. 176) gave the name "*Galerina pseudopumila* nom. nov." to "*Agaricus (Pholiota) pumilus* Fr. Elenchus Fungorum 1 (1828), 29." The microscopic characters of the actual fungus Fries had are not known. However, in the "Check List", *Galerina pseudopumila* Orton is listed, and Moeller's figures and description are cited. Bas (1960) described "*Galerina moelleri* Bas, spec. nov." also based on Moeller's description, and designated as the type the specimens from which Moeller's illustration was made. The microscopic data published by Bas are presumably from this specimen, and it seems logical, in compiling a description of *G. moelleri*, to use the macroscopic features published for "*Pholiota pumila*" by Moeller and add the data by Bas on microscopic characters. This is what we have done. We have not examined authentic material from the Faeröes Islands. Smith has studied dried material of "*Galera pumila* f. *oreina*" Favre from Switzerland.

The question arises as to what binomial should be applied to the species. We have selected the one proposed by Bas. The priority is very close, but apparently favors Orton's name by a week or so. Bas' binomial, however, has the virtue of being based on a type and practically complete data are available which must be considered authentic. Because we place more emphasis on accuracy of concept than on the letter of the International Rules as these might seem to operate here, we recognize *G. moelleri*. We insist that since Orton's name must go back to Fries, there is a possi-

bility that it actually applies to the fungus we have described under the binomial *Galerina unicolor*.

The concept Bas has established for his species appears clear. He illustrates the spores as having a callus, points out that pleurocystidia are present but rare in some cases, and in a letter to Smith stated that, typically, a thin gelatinous pellicle was present.

Singer has obtained specimens from Antarctica which fit into this complex. The following is a detailed account of the Antarctic form:

Pileus 8–14 mm broad, convex to campanulate, becoming convex with a slight obtuse umbo or papilla, finally applanate, brownish ochraceous to ochraceous brown, eventually with some watery-diluted areas, smooth, opaque to obscurely striatulate, apparently not viscid; context concolorous with surface, odor and taste not recorded.

Lamellae moderately broad to rather broad, close to distant, mostly subdistant, adnate, rusty ochraceous brown.

Stipe 20–27 mm long, 1–3 mm thick, subequal, more or less glabrous, hollow, with pallid basal mycelium, pallid to pale brownish, at apex paler, typically annulate with a well-developed membranous annulus; more rarely the annulus fugacious or failing to form (veil particles remaining on pileus margin), if present concolorous with the stipe surface, apical; context concolorous with surface.

Spores $9\text{--}11.7 \times 5.8\text{--}7.3 \mu$, pseudoamyloid, (endosporium especially), ellipsoid, with a well-developed plage, apical callus present, as seen in optical section, smooth or nearly so, with distinct exosporial ornamentation which appears as a fine punctation somewhat deeper in color than the subjacent episporium, typically with a tightly appressed perisporium and no loosening of external layers evident; episporium normally pigmented.

Basidia 4-spored, $27\text{--}28.5 \times 9\text{--}11 \mu$, pleurocystidia and cheilocystidia similar, $42\text{--}68 \times 9\text{--}13.5 \mu$, ampullaceous, with a cylindrical neck to a slightly enlarged to subcapitate apex, at times the neck with one to several constrictions, rarely forked at apex, mostly short-pedicellate, usually ventricose near the base, wall thin, hyaline and smooth.

Hymenophoral trama regular, stramineous, individual hyphae hyaline. Epicutis of pileus hyaline to pale stramineous, consisting of narrow filamentous somewhat wavy but appressed hyphae, forming a distinct but not gelatinous layer; hypodermium of broader repent elements with walls slightly pigment-incrusted, brownish ochraceous to fulvous ochraceous, not exuding any soluble yellow pigment in alkali; subhymenium not gelatinized; clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Antarctica: Costa Danco, Peninsula Antártica, Cabo Primavera region, $64^{\circ}\text{--}10'\text{--}5$ lat., $60^{\circ}\text{--}57'\text{--}10$ long. Leg. A. Corte no. 028, among and on mosses (apparently Polytrichaceae), collections of the Instituto Antártico, Buenos Aires and LIL; det. Singer.

OBSERVATIONS: On the basis of the Antarctic specimens we would not place the species in Section *Porospora*. Consequently we key-out the species

in two ways, in *Porospora* and in *Naucoriopsis* where, because of the large spores, it keys out with *G. platyphylla*.

140a. *Galerina moelleri* var. *oreina* (Favre) Smith & Singer, comb. nov.

Galera pumila f. *oreina* Favre, *Ergeb. Wiss. Unters. Schweiz. Nat. Parks* 5(NF) 33: 204. 1955.

Illustrations: Favre, *op. cit.* pl. 11, fig. 1.

Pileus up to 24 mm broad, fairly thick-fleshed, at first hemispheric then plano-convex, at times slightly umbonate, hygrophanous, somewhat shining, with short translucent striations only in expanded state, bay red young, then tawny, fading to ochraceous tawny, margin projecting slightly beyond the lamellae. Context at first bay in the cap, then tawny, odor weakly farinaceous.

Lamellae broad (up to 5.5 mm), thickish, subhorizontal at first, slightly decurrent, hardly crowded (15–21 lamellae, (3) 7 lamellulae, pale ocher then pale brownish ochraceous.

Stipe up to 35 mm long, 4 mm at apex and 6 mm at base, fulvous ochraceous above, darker reddish brown below with a membranous-fibrillose annulus well-marked and superior, stipe slightly floccose above, below the annulus patches of white fibrils, at the base cottony and whitish. (Data taken from Favre, *op. cit.*).

The following microscopic data are from specimens collected by Favre.

Spores 9–12 × 6.5–8 μ, broadly and obscurely inequilateral in profile, face view broadly ovate, tawny to reddish cinnamon in KOH, surface minutely marbled except for the smooth plage which is delineated by a faint though distinct line, with a distinct apical pore. Basidia 4-spored. Pleurocystidia none. Cheilocystidia scattered and difficult to revive, 36–45 × 7–12 μ, fusoid-ventricose with obtuse to subacute apices, thin-walled, hyaline. Favre gave slightly larger measurements. Pilocystidia none. Clamps present.

HABIT, HABITAT AND DISTRIBUTION: In the soaked mosses of small alpine bogs, along non-calcareous creeks (2550 and 2300 m. elev.) of the Swiss National Park, not known from elsewhere.

OBSERVATIONS: The dried carpophores more closely resemble specimens of a small *Gymnopilus*, than a member of the *G. marginata* group. In view of this feature and the lack of pleurocystidia we cannot agree with Bas (1960) that Favre's form is a synonym of his *G. moelleri* var. *moelleri*.

141. *Galerina macquariensis* Smith & Singer, *Mycologia* 50: 478. 1958.

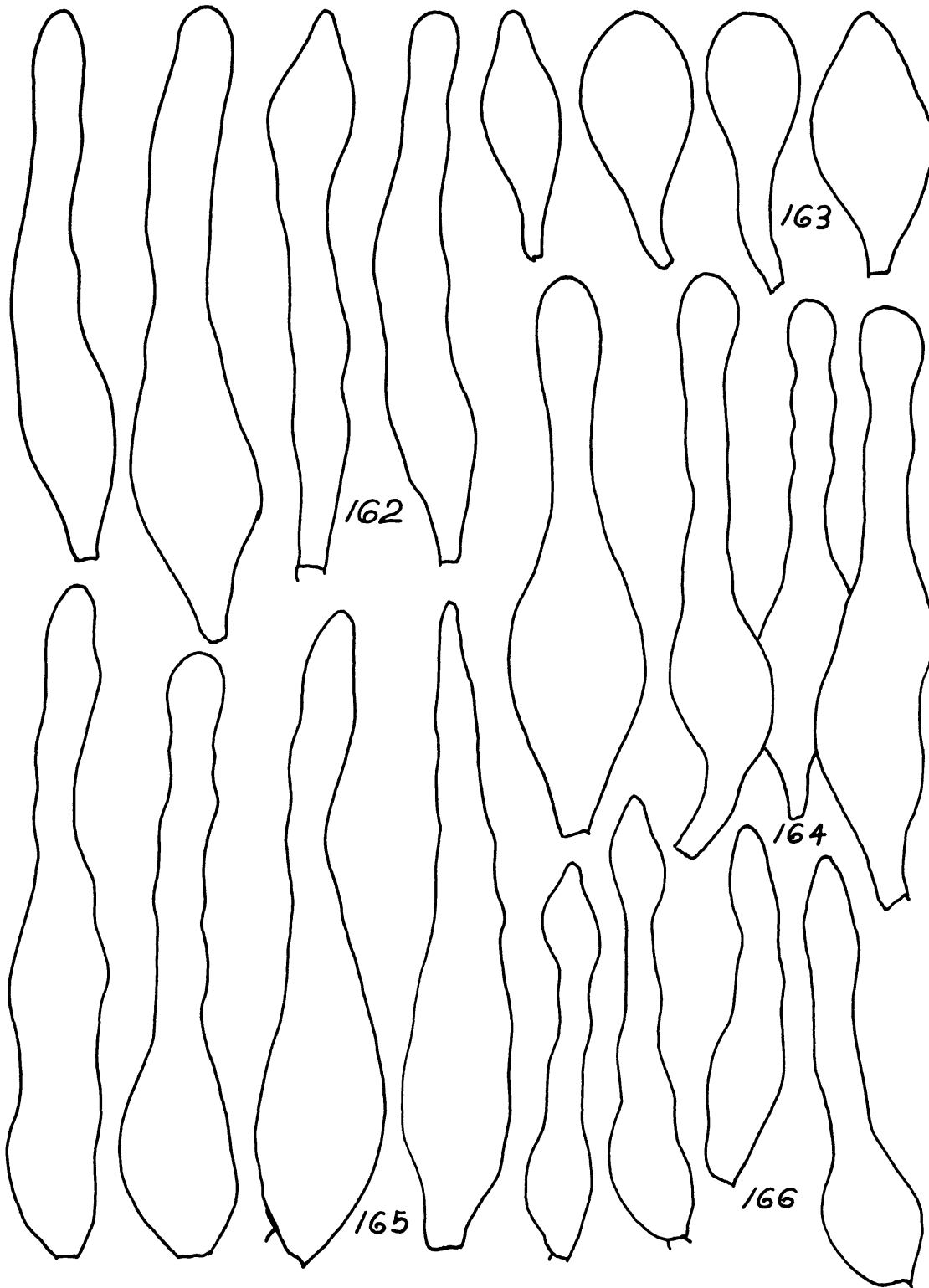


Fig. XXI

Cystidia: Fig. 162, pleurocystidia of *G. viscida*; 163, cheilocystidia of *G. viscida*; 164, pleurocystidia of *G. autumnalis* var. *autumnalis* (type); 165, pleurocystidia and cheilocystidia of *G. megalocystis*; 166, cheilocystidia of *G. autumnalis* var. *robusta*.

Pileus up to 25 mm broad, dull yellow, apparently viscid, often wrinkled, umbonate or papillate, with striate margin, convex, later flattened on middle portion.

Lamellae buff color, subdistant, broadly adnate, rather broad.

Stipe 20–45 × 3–5 mm, pale brown and not visibly darker below, cartilaginous, equal but at times with a tapering base, fistulose, with an apical annulus.

Spores 8.2–9.7 × 5.5–6.7 μ , ellipsoid or ellipsoid-ovoid, distinctly although slightly verruculose-rusty on pale ochraceous-melleous ground, this exosporial ornamentation sometimes missing, but always with a distinct and persistent perisporial covering offering exactly the aspect of the calyptrate spores of the *G. cerina* complex with its characteristic ears, with a very well-marked plage, binucleate. Basidia 4-spored, 20.5–23 × 6.5–8.3 μ , very rarely a few 2-spored basidia present. Pleurocystidia and cheilocystidia similar, scattered, hyaline to pale stramineous or brownish, 38–52 × 11–22 μ , always ampullaceous with more or less cylindrical neck 9.5–12 μ broad, apex obtuse or with up to 4 apical sterigmatoid but obtuse prongs, below always strongly ventricose. Subhymenium not gelatinized or not distinctly so in the material at hand; hymenophoral trama consisting of subparallel hyphae, regular, rather pallid stramineous or melleous-ochraceous, without incrusting pigment or with very little, in adult specimens its elements usually remarkably voluminous. Epicutis of the pileus well differentiated, hyaline or pale stramineous, with the uppermost layer showing signs of having been gelatinized although now rather dense except for the outermost hyphal ends, somewhat wavy hyphae with free ends and a diameter of only 1.5–1.7 μ numerous; hypodermium consisting of very voluminous and often short hyphal elements which are repent-appressed and parallel or subparallel with each other. Clamp connections regularly present.

HABIT, HABITAT AND DISTRIBUTION: On peats of raised coast terrace among various mosses, but carpophores, although attached to these, never seen attached to *Sphagnum*; Langdon Point, West Point, and Half Moon Bay, Macquarie Island, fruiting in March and April, J. Bunt, 1950–51 (LIL, MICH). The MICH collection is the holotype.

OBSERVATIONS: The “white bloom” on the stipe indicated by the collector, must refer to white fibrils from the veil below the annulus. There are no dermatocystidia at the middle of the stipe or on the pileus. The combination of thick annulate stipe, presence of pleurocystidia, and calyptrate spores make this a rather anomalous species.

142. *Galerina viscida* (Pk.) Smith & Singer, comb. nov.
Flammula viscida Peck, Ann. Rept. N.Y. State Mus. 51: 290. 1898.
 Illustrations: Fig. 162 (pleurocystidia), 163 (cheilocystidia).

Pileus 12–25 mm broad, hemispheric to convex, surface glabrous, pale

yellow, *viscid*, pellicle separable, margin obscurely striatulate when moist, incurved when young; context white.

Lamellae thin, crowded, emarginate, adnexed, whitish when young, becoming dark-ferruginous.

Stipe 25–50 mm long, 3–4 mm thick, equal, fibrous, hollow, the cavity small, sometimes squamulose, pallid or subferruginous.

Spores 7–10 × 5–6 μ , ovate in face view, inequilateral in profile, dark tawny in KOH, with a warty-rugulose outer layer except over the smooth plage, with a tendency for the outer layer to loosen around the base of the spore. Basidia 4-spored. Cheilocystidia of two types: 1) clavate to saccate or mucronate and 30–40 × 9–15 μ , content often yellowish in KOH; 2) fusoid-ventricose, 40–55 × 9–13 μ , hyaline, thin-walled, often flexuous. Pleurocystidia 45–65 × 9–13 μ , fusoid-ventricose with long neck and obtuse apices, thin-walled, content of some yellowish in the neck. Gill trama \pm interwoven, hymenopodium not distinctive. Epicutis of pileus a viscid gelatinous pellicle of narrow hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Cespitose on decaying logs of alder, North Elba, New York.

OBSERVATIONS: This species is recognized here because of the two types of cheilocystidia. The clavate to mucronate type was not present in the type of *G. autumnalis*, in addition, the latter typically has an annulus.

MATERIAL EXAMINED: Peck's type from North Elba. (NYS).

143. *Galerina megalocystis* Smith & Singer, Mycologia 47: 588. 1955.
Illustrations: Pl. 19. Fig. 165 (pleurocystidia and cheilocystidia).

Pileus 25–65 mm broad, convex then plane or with a slight obtuse umbo, glabrous, viscid, margin translucent striate when moist, “buckthorn brown” to “ochraceous tawny” moist, hygrophanous, fading to “warm buff” or paler yellow, disc in some remaining darker; context thick in the disc, tapered to cap margin, watery brown fading to pale buff, odor slightly farinaceous when context is crushed, taste mild.

Lamellae bluntly adnate or with a slight decurrent tooth, soon seceding, equal, moderately close and broad (about 4 mm), concolorous with pileus young, darker and more rusty brown at maturity.

Stipe 50–90 mm long, 5–11 mm thick at apex, with a thin apical evanescent almost fibrillose annulus, equal or subclavate downward, hollow, surface grayish brown from dense longitudinally appressed fibrils giving it a somewhat striate appearance, base white mycelioid.

Spores 8–10 × 5–6 μ , oval in face view, inequilateral in profile, dark rusty brown in KOH, surface warty-rugulose except over the suprahilar depression, with a slight tendency for blisters to form near hilar end on standing in KOH. Basidia 4-spored. Pleurocystidia abundant, 60–90 × 10–15(20) μ , fusoid-ventricose with long often wavy necks and obtuse to subacute apices, hyaline in KOH, thin-walled. Cheilocystidia similar to

pleurocystidia (fully as large), no clavate to mucronate cells present on gill edge. Gill trama parallel or nearly so, yellow in KOH, hymenodium and subhymenium not distinctive. Epicutis of pileus a well-defined gelatinous pellicle of hyphae 3–5 μ in diam., hyaline or nearly so; trama of pileus ochraceous in KOH. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on conifer wood and on soil rich in lignicolous material; California, Wyoming and Michigan.

OBSERVATIONS: This is a robust species with exceptionally long, broad cystidia, mild taste and viscid pileus. The tips of the cystidia show no tendency to enlarge, as is true of the type of *G. autumnalis*, and the pleurocystidia are more numerous and much larger.

Smith 55717, collected by Mr. Ben Pruitt near Canyonville, Oregon, Nov. 16, 1956, was found on silt along a creek. The following data were obtained from the single fruiting body: pileus 55 mm broad, broadly convex, buckthorn brown fading to orange-buff, margin striate, not viscid to the touch, taste mild; lamellae broad, horizontal, adnexed, close, pale cinnamon brown; stipe 100 mm long, 6 mm thick, equal, bister below, honey color above, apex pruinose; annulus superior, thin and appressed to stipe, stipe surface below annulus more or less fibrillose. The pileus has a thin gelatinous layer as revived in KOH but the pellicle is poorly developed—reminding one of the situation in *G. unicolor*. Pleurocystidia are rare to scattered, up to $80 \times 18 \mu$. Cheilocystidia are similar but often smaller. Spores are $9\text{--}11.5 \times 5\text{--}6.5 \mu$, dark red-brown in Melzer's and well ornamented with a distinct plage, callus also distinct. The thin pellicle, terrestrial habitat and rare to scattered pleurocystidia may indicate a distinct taxon but with only one specimen, even though perfect, we hesitate to give it status as even a minor taxon. The distinctive characters are quantitative and have been found variable in related species.

MATERIAL EXAMINED: Smith 3680-*type*; 23914; 31955; 35641; 41062; 42451; 55717.

144. *Galerina autumnalis* (Pk.) Smith & Singer, comb. nov.

var. *autumnalis*

Agaricus autumnalis Peck, Ann. Rept. N.Y. State Cab. 23: 92. 1872.

Naucoria autumnalis (Pk.) Saccardo, Syll. Fung. 5: 834. 1887.

Pholiota autumnalis (Pk.) Peck, N.Y. State Mus. Bull. 122: 156. 1908.

Gymnopilus autumnalis (Pk.) Murrill, N. Am. Fl. 10: 200. 1917.

Illustrations: Pl. 18, 20. Figs. 244–245 (spores); 164 (pleurocystidia).

Pileus 25–65 mm broad, convex, then plane or with a slightly obtuse umbo, glabrous, *viscid*, margin translucent striate when moist, “buckthorn brown” to “ochraceous tawny” (between *Amber glow* and *Arab*) moist, hygrophamous, fading to “warm buff” or paler (yellow), disc at times remaining darker; flesh rather thick on the disc, tapering gradually, watery brown fading to pale buff, taste mild to farinaceous, odor slightly farinaceous when flesh is crushed.

Lamellae bluntly adnate or with a slight decurrent tooth, soon seceding, equal, moderately close and broad (± 5 mm), concolorous with pileus at first, darker and more ferruginous at maturity.

Stipe (30)50–90 mm long, (3)4–8 mm thick at apex, equal to subclavate, hollow, base white mycelioid, above the base coated grayish with a thin evanescent layer of appressed fibrils, somewhat longitudinally striate, with a thin apical, evanescent, almost fibrillose annulus, practically naked above annulus to somewhat pruinose; typically darkening over lower part in age.

Spores 8.5–10(10.5) \times 5–6.5 μ , with a wrinkled exosporium, face view ovate, obscurely inequilateral in profile, with a slight suprahilar depression, dark tawny to russet as revived in KOH. Basidia 4-spored, projecting half their length in sporulating, subcylindric, 24–26 \times 7–8 μ . Pleurocystidia abundant to scattered, thin-walled, fusoid-ventricose with greatly elongated necks and slightly enlarged to obtuse apices, hyaline in KOH, 40–65 \times 9–12 μ . Cheilocystidia abundant but gill edge not completely sterile, similar to pleurocystidia but usually smaller. Gill trama parallel or in age somewhat interwoven, subhymenium filamentose-interwoven but very inconspicuous and not sharply distinct from trama proper, the hyphae of both yellow as revived in KOH. Epicutis of pileus with a gelatinous pellicle of hyaline hyphae 2–4 μ diam., incrusting pigment present but inconspicuous. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered to subcespitate on decaying hardwood and conifer logs, stumps, etc. It fruits most abundantly in the fall. Not uncommon throughout the United States and Canada; Smith has one collection from England, and Tuomikoski has collected it in Finland.

OBSERVATIONS: This is *Pholiota discolor* Pk. sensu Overholts, Kauffman, and Peck's later (1908) work. Peck's type of *Agaricus discolor* is not the same as his later collections under that name. Overholts (1927) based his concept not on Peck's type but on the species best represented (most numerous) among the collections under that name in Peck's herbarium. However, the name must go with the type.

We have studied a fragment of the type of *G. autumnalis* and obtained the following data: spores 8.5–10.5 \times 5–6 μ , oval in face view, slightly inequilateral in side view, with a warty-rugulose outer layer over all except the smooth plage, a tendency for blisters of loosened exosporial membrane to show in the vicinity of the plage, ochraceous rusty in KOH. Basidia 4-spored. Pleurocystidia and cheilocystidia similar, abundant, 40–65 \times 9–12 μ , ventricose near base, neck elongated and apex obtuse to slightly enlarged; gill trama pale ochraceous in KOH, somewhat interwoven, hymenopodium not distinctive. Cuticle a well formed pellicle of narrow (2–4 μ), appressed, hyaline to pale yellow hyphae which gelatinize appreciably in KOH (hence pileus must have been viscid). Trama beneath the cuticle ochraceous in KOH, interwoven, the pigment incrusting on the walls but not conspicuous. Clamp connections present.

A comparison of a part of the type with our own collections has convinced us that this is the *Pholiota discolor* of Overholts. Overholts and others

have considered *P. autumnalis* to be a synonym of *G. marginata*. Because of the well formed pellicle in *G. autumnalis* we do not accept this conclusion. For additional comments see *G. venenata*.

Smith 49425 on debris at Ashford, Washington, appears to be a form with a fibrillose rather than membranous annulus and a darkening stipe. In the field it was mistaken for *G. sideroides*. The following data were obtained from this collection:

Pileus 10–20 mm broad, convex, glabrous, viscid, tawny fading to cinnamon buff, drying somewhat darker. Lamellae ochraceous tawny, close, adnate, narrow. Stipe 30–50 mm long, 1.5–2 mm thick, equal or slightly enlarged downward, pale honey color above, bister from the base upward in age, with a superior fibrillose zone from the remains of the veil, pruinose above.

Spores $7-9 \times 4-5 \mu$, inequilateral in face view, ovate in profile, dull ochraceous tawny in KOH, with a coarsely wrinkled exosporium with a tendency to slough off (as revived in KOH), plage sharply delimited. Basidia 4-spored, $20-25 \times 5.5-7 \mu$, sub-cylindric, hyaline in KOH. Pleurocystidia scattered, $40-60 \times 9-15 \mu$, fusoid-ventricose, apices acute, hyaline, thin-walled. Cheilocystidia similar to pleurocystidia. Gill trama interwoven, pale ochraceous in KOH. Pileus trama homogeneous beneath a distinct gelatinous pellicle. Clamp connections present. The spore characters separate this variant from *G. cinnamomea*, and the gelatinous pellicle of the pileus separates it from *G. helvoliceps*.

G. autumnalis is a common species variable in nearly all the characters considered important in *Galerina*. The taste varies from mild to slightly farinaceous to that of raw cucumber. The cystidia have tips which are sub-acute, obtuse or slightly enlarged, and may be very rare to very abundant. The annulus is usually present on some specimens in a group, but at times it may seemingly be absent though we have never found young caps without a veil. The spore ornamentation may be quite adherent to almost as loose as in *G. helvoliceps*. In our estimation this species, *G. marginata* and *G. unicolor* should be studied in culture and carefully compared. Almost every region in which we collect has populations which differ to some extent in one or two characters.

MATERIAL EXAMINED: Bigelow 7855; 7912 (MICH). Burke, Ft. Toulouse, Alabama (MICH). Gruhzt, Grosse Point Woods, Michigan (MICH). Hesler 14129; 15904; 20782 (TENN). Kauffman, 9 colls. Kelly 1005; 1036; 1112. Marsden, Niagara Falls, New York (MICH). Oswald, 2 colls., Oregon. Parlin 15359. Singer N 210 (F). Smith 33-920; 33-1066; 942; 4594; 15484; 18923; 24245; 24689; 26787; 28105; 28215; 28536; 31702; 31887; 31919; 31974; 33922; 34203; 35343; 35614; 35883; 38876; 40711; 40753; 41049; 41073; 41092; 41133; 41149; 42567; 43957; 43958; 44052; 45397; 46296; 46413; 46812; 46815; 47042; 47048; 47085; 47164; 47286; 47402; 48239; 49009; 49011; 49178; 49425; 49472; 50616; 50618; 50619; 50646; 50655; 50858; 51541; 51869; 55443; 58350; 62077; 62209; 63219; 63411 (MICH). Tuomikoski, Finland. 9-1-54, (typical) (H).

144a. *Galerina autumnalis* var. *robusta* Thiers, var. nov.

Illustrations: Fig. 166 (cheilocystidia).

A forma typica habitu robusto et habitatione in lignis frondosis differt. Specimen typicum in Herb. Univ. Mich. conservatum; legit Thiers 1432 in Sam Houston Nat. Forest, prope Richards, Texas.

Pileus 50–65 mm broad when fully expanded; obtusely convex when young, becoming plano-convex to plane when mature, colored “ochraceous buff” to near “antimony yellow” to “ochraceous tawny” in all stages of development, surface dry (?), glabrous, margin incurved when young, becoming decurved to plane with age, entire; flesh thin, white, taste slightly farinaceous, odor not distinctive.

Lamellae adnate with short decurrent tooth, close to subdistant, narrow, “ochraceous tawny” to “buckthorn brown,” 3 tiers of lamellulae, margin entire, concolorous with gill faces.

Stipe 40–75 mm long, 4–8 mm thick, terete to flattened, cartilaginous, “ochraceous buff” toward the apex and “ochraceous tawny” toward the base, dry, glabrous, longitudinally striate, equal, hollow; basal portion usually covered with pallid hyphal tomentum; annulus represented by a fibrillose zone near apex of stipe.

Spores $7.5\text{--}9.5 \times 4.5\text{--}5.5 \mu$, dull cinnamon in deposits, appearing minutely roughened under oil immersion except for the plage, not truncate, apiculate, broadly ellipsoid to ovoid. Basidia short-clavate, 4-spored, $10\text{--}17 \times 6\text{--}9 \mu$. Pleurocystidia scattered, elongate fusoid-ventricose and often with somewhat enlarged apices, hyaline in KOH, $45\text{--}55 \times 8.5\text{--}10.5 \mu$. Cheilocystidia scattered to rare, similar to pleurocystidia, no clavate to vesiculose cells present. Gill trama parallel to subparallel, composed of large ($\pm 8 \mu$) filamentous hyphae; pileus trama interwoven, composed of large ($\pm 10 \mu$) filamentous hyphae, cuticle consisting of narrow band ($\pm 15 \mu$) of gelatinous narrow ($2.5\text{--}5 \mu$) hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Densely cespitose on dead hardwoods in a mixed forest. Texas.

OBSERVATIONS: A number of minor characters such as the small basidia, less roughened spores, and slightly more cinnamon color of the spore deposit, in addition to the habit, combine to make this form distinct. It should be studied further to test the value of the above noted differences.

MATERIAL EXAMINED: Thiers 1432-*type* (MICH).

144b. *Galerina autumnalis* var. *angusticystis* Smith, var. nov.

Illustrations: Fig. 167 (pleurocystidia and cheilocystidia).

Pileus 10–25 mm latus, campanulatus, glaber, viscidus; lamellae adnatae, latae, fulvae; stipes 30–50 mm longus, 2–3 mm crassus, membranaceo-annulatus, deorsum fuscescens; sporae $8\text{--}10 \times 5\text{--}6 \mu$; cystidia

40–65 × 9–13 × 3–6 × 2–3.5 μ , acuta vel subacuta. Specimen typicum legit prope Tahoma Creek, Mt. Rainier National Park, Washington, 21 Sept 1945, Smith 31554 (MICH).

Pileus 10–25 mm broad, campanulate, viscid, glabrous, ochraceous tawny to buckthorn brown; context fleshy, odor and taste not recorded. Lamellae adnate, broad, subdistant, fulvous (dull tawny). Stipe 30–50 mm long, 2–3 mm thick, with a membranous superior annulus, thinly fibrillose over basal area, merely silky-pruinose at apex, darkening from base upward.

Spores 7–10 × 5–5.5 μ , dark rusty brown in KOH, inequilateral in profile view, narrowly ovate in face view, with a callus at apex, surface minutely but distinctly roughened and with a distinct smooth plage but no separation of outer layers evident. Basidia 4-spored. Pleurocystidia 40–65 × 9–13 × 3–6 × 2–3.5 μ , fusoid-ventricose with long tapered necks and acute to subacute apices. Cheilocystidia similar, both types hyaline and thin-walled. Epicutis of pileus a distinct layer of gelatinous narrow (2–4 μ) hyaline to yellowish hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on rotting logs of hardwoods (?), Mt. Rainier National Park, Washington, and Tahquamenon State Park, Michigan.

OBSERVATIONS: We describe this variant as a variety rather than a species because there is so much variation in cystidial characters in this stirps. However, the variety is not based on the single character of acute cystidia with very narrow necks. The spores are smoother than in the type variety and the carpophores remind one more of *G. unicolor*. Many collections of *G. marginata* (for example Smith 17952) have cystidia as in this variety.

G. moelleri Bas seems very close to this variety but occurs on moss, and has spores with an apical pore. The drawings of the cystidia by Bas and Möller are not in agreement as to the shape of the apex, and neither is in agreement with the cystidia of var. *angusticystis*.

MATERIAL EXAMINED: Smith 31554; 37432.

145. *Galerina oregonensis* Smith, sp. nov.

Illustrations: Fig. 168 (pleurocystidia and cheilocystidia).

Pileus 12–15 mm latus, obtuse campanulatus, nitens, viscidus, pallide fulvus, lamellae latae subdistantes, subdecurrentes; stipes 10–20 mm longus, 1.5 mm crassus, sursum fibrilloso-zonatus, deorsum subbadius; sporae 7–8.5 × 4–5 μ , rugulosae; pleurocystidia 50–80 × 9–15 μ , apice submucronata. Specimen typicum legit prope Grants Pass, Oregon 14 Nov. 1956, Smith 55644 (MICH).

Pileus 12–15 mm broad, obtusely campanulate, expanding to umbonate, surface shining and viscid to lubricous when moist, glabrous, ochraceous tawny or slightly darker; odor and taste not recorded.

Lamellae broad, distant to subdistant, arcuate to short-decurrent, tawny at maturity, edges slightly fimbriate.

Stipe 10–20 mm long, 1.5 mm thick, equal, curved, pale honey color above, base darkening to reddish brown, surface with pallid grayish fibrils from the fibrillose veil and with a superior evanescent fibrillose annular zone at first.

Spores $7\text{--}8.5 \times 4\text{--}5 \mu$, ovate in face view, subelliptic to very obscurely inequilateral in profile, ornamentation relatively heavy, plage distinct, a slight tendency seen for ornamentation to separate, dark tawny-cinnamon in KOH. Basidia 4-spored, $24\text{--}33 \times 7\text{--}9 \mu$, yellowish in KOH. Pleurocystidia abundant, $50\text{--}80 \times 9\text{--}15 \mu$, fusoid-ventricose with the upper part often enlarged below the apex and then tapered sharply to a more or less pointed apex, varying to merely obtuse or capitate, hyaline to yellowish in KOH, smooth, thin-walled. Cheilocystidia similar to pleurocystidia. Gill trama yellow to ochraceous tawny in KOH. Pileus trama floccose and pale tawny in KOH, beneath a *thick* gelatinous pellicle of radial hyaline to yellowish narrow ($3\text{--}5 \mu$) hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered on mossy rocks, and possibly on wood, Washington and Oregon, rare.

OBSERVATIONS: In the field this species could be mistaken for *G. unicolor* except that the latter typically has a membranous annulus.

G. oregonensis has a thicker pellicle than most species of the stirps *Autumnalis* and in this respect is very distinct from *G. unicolor*. The pleurocystidia are closest to those of *G. megalocystis*. That species, however, has a membranous annulus and a much more robust stature. The heavy ornamentation of the spores and their dark color in KOH separate the species from *G. subochracea*, even if one disregards the pileus pellicle. There is a tendency in this species for some spores to be somewhat calyptrate. *G. praticola* has larger spores.

Smith 55705 on a mossy oak log has the small spores and cystidia with slightly enlarged apices as well as the very thick gelatinous pellicle. The large caps (25–30 mm) had close narrow gills, and a *thin* membranous annulus was present on the youngest specimens. The spores are practically elliptic in profile, and much smaller than in Peck's type of *G. autumnalis*.

MATERIAL EXAMINED: Smith 40373; 55644-*type*; 55705 (?).

146. *Galerina cinnamomea* Smith & Singer, Mycologia 50: 473. 1958.

Illustrations: Fig. 169 (pleurocystidia and cheilocystidia).

Pileus 10–20 mm broad, convex, glabrous, moist to slightly viscid (pellicle thin), color evenly cinnamon and drying only slightly paler; odor and taste not recorded.

Lamellae broad, arcuate, subdistant, concolorous with the pileus.

Stipe 30–35 mm long, 1.5 mm thick, equal, surface very dark cinnamon below, paler above, but reddish cinnamon over all when dried, with an apical or superior zone of fibrils which disappears in age.

Spores $8.5\text{--}11 \times 5.5\text{--}6.5 \mu$, ovate in face view, somewhat inequilateral in profile, dark cinnamon in KOH, heavily ornamented but with a smooth plage, the surface rugulose-verrucose and enveloping the spore comparatively loosely (not calyptrate, however). Basidia 4-spored, yellow in KOH. Pleurocystidia rare to scattered, $40\text{--}60 \times 9\text{--}14 \mu$, fusoid-ventricose, hyaline in KOH or content rarely yellowish, apices acute to subacute and neck often flexuous and only $3\text{--}5 \mu$ wide near apex. Cheilocystidia similar to the pleurocystidia, numerous. Gill trama regular, ochraceous to tawny in KOH. Pileus trama with a thin gelatinous pellicle of narrow ($3\text{--}5 \mu$) ochraceous-incrusted hyphae or hyphae hyaline and smooth. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Subcespitose on chipdirt in a slash and on rotting hardwood logs, Washington and Oregon, fall, rare.

OBSERVATIONS: The generally cinnamon colors, large dark colored spores of the *G. rugisperma* type, thin gelatinous pellicle, and scattered acute to subacute pleurocystidia, distinguish it as a species. It is close to *G. autumnalis* but lacks a membranous annulus and has more cinnamon colors. The spores remind one of those of *G. helvoliceps*, but it differs in having a thin but distinct gelatinous pellicle, more evenly cinnamon colors, and in lacking a membranous annulus.

MATERIAL EXAMINED: Smith 17734; 55422-type.

147. *Galerina castaneipes* Smith & Singer, Mycologia 50: 472. 1958.
Illustrations: Fig. 170 (pleurocystidia and cheilocystidia).

Pileus 8–16 mm broad, convex to broadly convex to plane, surface glabrous, viscid, ochraceous tawny moist, fading to near cinnamon buff or more yellow; odor and taste not recorded.

Lamellae close, broad, horizontal, bluntly adnate or with a decurrent tooth, near buckthorn brown at maturity, edges even or nearly so.

Stipe 10–20 mm long, 1.5–2 mm thick, equal to a slightly bulbous mycelial base, surface glabrous, dark rusty brown below, honey color above, darkening over all in drying.

Spores $7.5\text{--}9.5(10) \times 4\text{--}5.5 \mu$, slightly ovate in face view, subelliptic in profile, ornamentation well developed in the form of a warty-rugulose adherent layer, plage distinct and smooth, rusty brown (rather dark) in KOH, with a prominent callus (immature spores appearing to have an apical pore), ornamentation often ending in a ragged line just short of spore apex. Basidia 4-spored, hyaline, extending half their length when sporulating, $28\text{--}34 \times 6\text{--}7 \mu$. Pleurocystidia rare to scattered, $50\text{--}70 \times 9\text{--}14 \mu$, hyaline in KOH, thin-walled, fusoid-ventricose with long necks and obtuse apices, occasionally enlarged slightly below apex, rarely with one or more

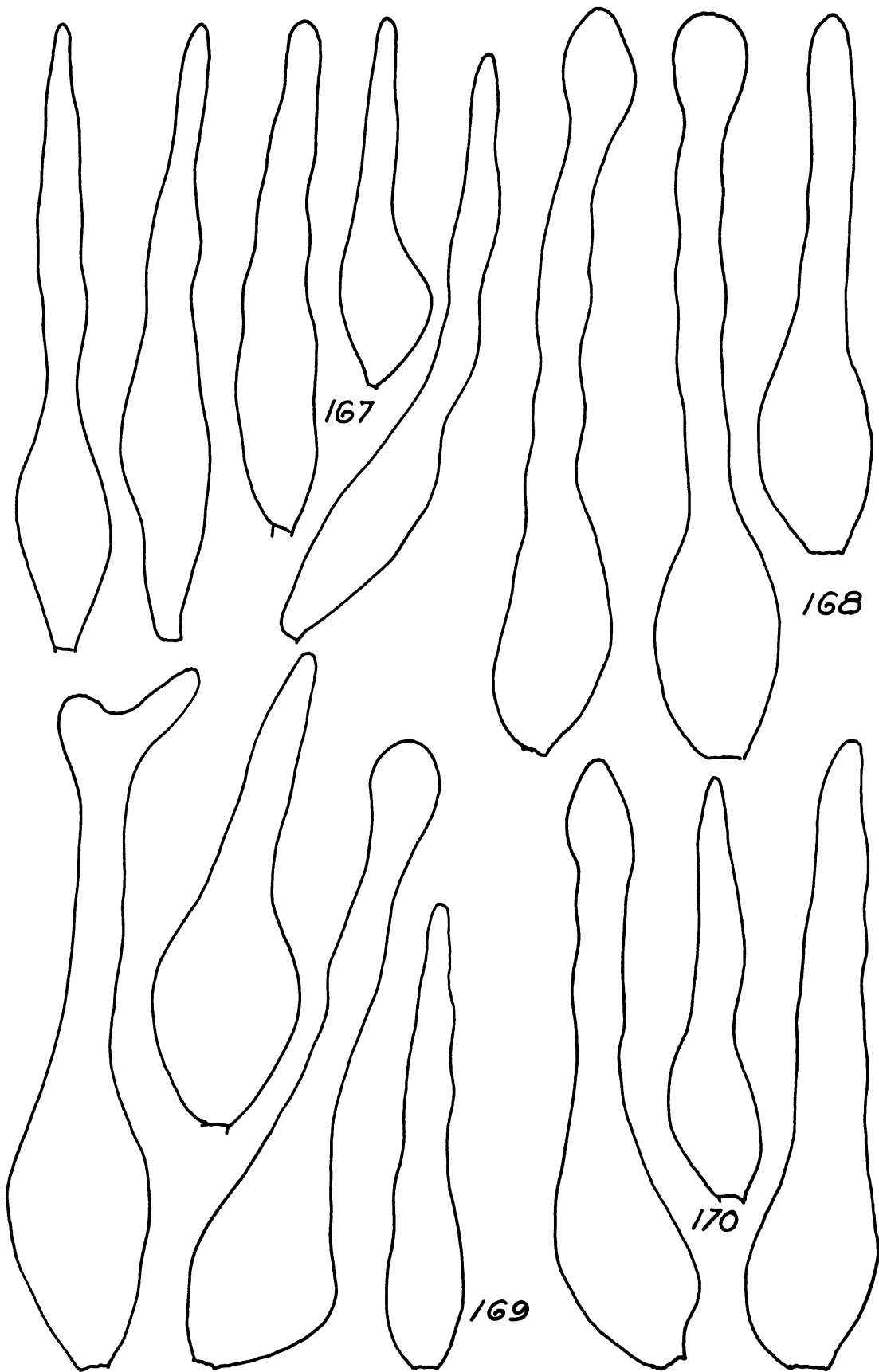


Fig. XXII

Cystidia: Fig. 167, pleurocystidia and cheilocystidia of *G. autumnalis* var. *angusticystis*; 168, pleurocystidia and cheilocystidia of *G. oregonensis*; 169, pleurocystidia and cheilocystidia of *G. cinnamomea*; 170, pleurocystidia and cheilocystidia of *G. castaneipes*.

short lateral projections near apex. Cheilocystidia similar to pleurocystidia (none seen with lateral projections). Gill trama parallel, hyaline to yellowish in KOH. Pileus trama yellow to fulvous in KOH, and with ochraceous incrusting pigment on hyphae, pellicle well developed and of hyaline to yellow gelatinous narrow (3–6 μ) hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Subcespitose on a rotting oak log, Grants Pass, Oregon, Nov. 12, 1956, Smith 55523-*type*.

OBSERVATIONS: The distinguishing field characters are the resemblance in appearance to *G. autumnalis*, and the absence of a veil. The shape of the spores is the same as in *G. oregonensis* but the spores are larger and have a more distinct apical pore, the fungus definitely occurs on rotting wood, and, of course, lacks a veil. We are not placing any taxonomic significance on the rare pleurocystidia which show short lateral protrusions since there were so few of them, but we believe it is important to note such abnormalities (see *G. patagonica*).

Stirps *Marginata*

Species with the aspect of a *Pholiota*, typically with a well-developed veil leaving a band-like annulus on the stipe in at least some specimens; caulocystidia absent from the lower two-thirds of the stipe; pileus margin incurved; stipe darkening in basal area in most species; spore ornamentation usually well-developed but spores not calyptrate though the ornamentation may loosen over entire spore in some species; epicutis of pileus not gelatinous.

Key to Species

1. Pleurocystidia absent; odor strongly farinaceous ---- 148. *G. wellsiae*
1. Pleurocystidia present ----- 2
 2. On lawns (grassy places); taste leaving a burning sensation in throat ----- 159. *G. venenata*
 2. Not with above combination of characters ----- 3
3. Spores with an outer, loosely enveloping very wrinkled layer, rather easily separated from the smooth endosporium ---- 158. *G. helvoliceps*
3. Spore ornamentation not as above, adherent to spore surface ----- 4
 4. In *Sphagnum* bogs or very old bogs with a *Sphagnum* base; South American ----- 156. *G. riparia*
 4. Habitat not as above ----- 5
5. On clumps of grass; alpine, South American ----- 157. *G. infernalis*
5. Typically on wood, moss, fallen needles or humus ----- 6
 6. Spores 10–13 \times 5–6.5 μ (4-spored); pleurocystidia hyaline; stipe with white fibrillose zone below annulus; on moss ----- 155. *G. platyphylla*
 6. Spores 7–10(11) μ long, (4-spored) ----- 7
7. Stipe with fibrillose squamules below the annulus; pleurocystidia mostly

- yellowish in KOH ----- 154. *G. vialis*
7. Not as above ----- 8
8. Spore ornamentation very fine (surface faintly marbled to asperulate) ----- 9
8. Spore ornamentation readily distinct under oil immersion lens ----- 11
9. On pine needles; spores pale ochraceous and with very thin walls ----- see *G. pinetorum* (168)
9. Not as above ----- 10
10. Many cheilocystidia vesiculose-pedicellate to clavate; lamellae close ----- 153. *G. physospora*
10. Cheilocystidia resembling the pleurocystidia in shape; lamellae distant ----- 151. *G. rudericola*
11. Pleurocystidia frequently showing one or more finger-like outgrowths from at or near the apex; annulus typically membranous ----- 152. *G. patagonica*
11. Not as above ----- 12
12. Pileus merely moist and hygrophanous; always lignicolous ----- 150. *G. marginata*
12. Pileus shining to subviscid; often found on debris, moss, or very rotten wood ----- 149. *G. unicolor*

148. *Galerina wellsiae* Smith, sp. nov.

Illustrations: Figs. 243 & 246 (spores).

Pileo sublubrico vel subviscido; pleurocystidiis nullis; ceterum a *G. marginata* vix differt. Specimen typicum leg. V. Wells in Alaska (MICH).

Pileus 30–50 mm broad, convex then plane, hygrophanous, orange-brown later pale orange, glabrous, tacky to subviscid when wet, unpolished when dry, margin slightly translucent striate moist; context pallid with a water-soaked line over gills; moderately thick at disc, attenuated sharply to cap margin, firm to pliant, odor strongly farinaceous, taste not distinctive.

Lamellae near cinnamon buff young becoming darker brown and with an orange-cinnamon cast in age, adnate to uncinata with a short tooth, narrow to moderately broad, close, entire, pliant, about three tiers of lamellulae.

Stipe 50–70 mm long, 4–6 mm thick at apex, nearly equal or enlarging slightly downward, pallid to pale orange above, darkening downward to dingy brown (darker at base and discoloration actually progressing from base upward), pruinose-punctate at apex, silky shining to coarsely fibrillose downward to the densely white mycelioid base (mycelium pale tawny in dried specimens); annulus superior, membranous but thin and evanescent or showing merely as a ragged line, often rusty orange from spores.

Spore deposit rusty yellow-brown. Spores 8.4–10.5 × 5.5–6.5 (10–12.5 × 6–7) μ, obscurely inequilateral to subelliptic in profile, oval to subelliptic

in face view, dark rusty brown in KOH, warty rugulose with a well-defined smooth plage, at times the ornamented layer somewhat separable but not as much so as in *G. helvoliceps*. Basidia 26–30 × 7.5–9 μ, clavate, 4-spored (2-spored), hyaline in KOH. Pleurocystidia none. Cheilocystidia 45–60 × 12–15 × 4–6 × 3–4(5–9) μ, fusoid ventricose with even to undulating necks tapering to an acute to subacute apex or in a fair number the apex oval to capitate, all hyaline and thin-walled. Gill trama regular (subparallel), pale yellow in sections but individual hyphae nearly hyaline. Pileus with a poorly defined epicutis of merely subgelatinous narrow hyphae (2–5 μ) nearly hyaline in KOH, hypodermium of orange-brown hyphae with some pigment incrustation on walls. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious to scattered on old wood (cottonwood?) late fall, near Anchorage, Alaska. Sept. 23, 1959, Virginia Wells, No. 6.

OBSERVATIONS: This species differs from *G. marginata* particularly in lacking pleurocystidia, but also in having a more lubricous and shining pileus when fresh. The specimens remind one of a *Cortinarius* more than do those of any other species in the stirps. There is very likely an additional difference between it and *G. marginata* in the color of the pileus, that of *G. wellsiae* being a more striking orange-brown, but this needs to be verified from actual comparisons with a color chart. In view of the importance of pleurocystidia in our classification it seems advisable to describe this as a distinct taxon. However, studies of such variants as this in culture are needed to finally assign them to their proper niche in the genus.

149. *Galerina unicolor* (Fr.) Singer, Trudy Bot. Inst. Akad. Nauk, S.S.S.R. 6: 468. 1950.

Agaricus unicolor Fries, Epicr. Syst. Myc. p. 170. 1838.

Pholiota unicolor (Fr.) Gillet, Champ. Fr. Hymen. p. 436. 1878.

Dryophila unicolor (Fr.) Quélet, Enchir. Fung. p. 69. 1886.

Galerina pseudopumila Orton (?) Trans. Brit. Myc. Soc. [43] (Suppl.): 68. 1960.

Pholiota praticola Møller, Fungi of the Faeröes, 1: 231. 1945.

Galerina praticola (Møller) Bas, Persoonia 1: 313. 1960.

Illustrations: Pl. 6, figs. B & C; pl. 14, fig. D; pl. 15, fig. B as *G. praticola* Møller, op. cit. fig. 107B; Bas, op. cit. figs. 20 & 21.

Figs. 171 (cheilocystidia), 172 (pleurocystidia).

Pileus 5–25(30) mm broad, conic becoming campanulate or expanded umbonate, at times convex, surface glabrous, shining, lubricous to subviscid (particles of dirt adhere to surface) or merely moist, with a fatty appearance although not distinctly viscid, “tawny” or more orange brown (between *chipmunk* and *raw sienna*) gradually darkening to near “cinnamon brown”, hygrophanous, fading to “clay color” or more ochraceous (*honey*

sweet) faintly transparently striate when moist; flesh thin, soft, odor and taste farinaceous.

Lamellae close to subdistant, medium broad to broad (3–4 mm), horizontal and squarely adnate or almost adnate-subdecurrent, seceding, near “cinnamon brown” (11-D-5 with *antique gold* shade) at maturity, dull ochraceous tawny before maturity, edges white fimbriate.

Stipe 20–50(80) mm long, 1–2.5 mm thick at apex, often thicker downward, tubular, concolorous with the lamellae above, soon bister or bister from base upward, thinly coated with grayish fibrils up to the annulus and these fibrils not breaking up and forming squamules but instead leaving inconspicuous appressed patches, grayish fibrillose-pruinose above the annulus; annulus at first more or less funnel-shaped, superior, narrow, smooth, white.

Spores 7–10(13.5) \times 5–7.5 μ , slightly inequilateral in profile, ovate in face view, warty-rugulose except over the smooth suprahilar depression, plage line distinct, many spores showing a tendency for the outer wrinkled layer to separate slightly, tawny to russet in KOH. Basidia 24–33 \times 8–11 μ , 4-spored. Pleurocystidia scattered, 40–65 \times 8–16 μ , thin-walled, fusoid-ventricose to ampullaceous with subacute apex (neck 4–6 μ in diam.), smooth, hyaline in KOH. Cheilocystidia similar to pleurocystidia. Gill trama regular, formed by parallel hyphae, cells 8–20 μ broad and short, ochraceous in KOH; hymenopodium and subhymenium not distinctive. Epicutis of pileus thin, poorly defined, gelatinous to subgelatinous when revived in KOH, its hyphae 4–8.5 μ in diam., yellow to nearly hyaline. Pileus trama and hypodermium more or less ochraceous in KOH, some incrusting pigment present on the walls of their hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Solitary or scattered on sterile or burned-over soil or on moss-covered outwash from glacial streams, but also on conifer debris, very old logs, etc.; more rarely on hardwood debris or decaying fern fronds in cold habitats; once on paper. In North America it occurs in northern regions and in the mountains. It is also known from Europe and Asia.

OBSERVATIONS: As species are recognized in this work, it appears that *G. unicolor* is the species which leads from *G. marginata* into the stirps *Autumnalis*. *G. unicolor* does not always show the gelatinization of the pellicle when fresh. Careful notes were taken at Mt. Rainier in 1952; it was observed that some specimens which were merely moist in the field showed some gelatinization of the pellicle after being dried, sectioned, and the sections mounted in KOH. Other collections from the same area were subviscid when fresh. The distinguishing feature, then, is the size of the hyphae of the cuticle—they are broader and with more color in the walls than in the members of the stirps *Autumnalis*. We regard this as a more primitive condition. The variable habitat also indicates a less specialized species.

In view of the varying concepts in the *G. marginata* group as a whole, it is hopeless to try to correlate our species concepts with anything in the

literature.* We are merely giving the results of our studies and correlating the taxa we can recognize with what can be found of value in the literature, and, where types are preserved, in herbaria. Consequently it would be unscientific to trace our units as adopted here in the earlier literature in order to plot distribution. Such would be pure guesswork. We suspect, however, that careful studies in the future will show a definite pattern of distribution for the species as they are presented here.

Through the kindness of Mr. C. Bas of the Rijksherbarium, Leiden, the problem of the identity of *Galerina praticola* sensu Orton and *Galerina praticola* sensu Möller (type) has been explored. Through information furnished by Bas and bits of gill tissue he sent us of the Möller type, and of a collection by Orton, we believe that *G. praticola* sensu Orton is identical with the fungus we recognize as *Galerina unicolor*. The characters in common are the greasy cap surface, farinaceous taste, stipe darkening below, spore size and ornamentation, similar pleurocystidia and cheilocystidia, and habitat. The spores of the Orton collection studied had a callus (our terminology), not an apical pore. Hence, we would not assign the species to *Porospora*, and when it is not placed in that section it immediately keys out to *G. unicolor* in *Naucoriopsis*.

As a supplementary note to the present species, we mention a collection from Florida which does not coincide with any other form we have studied, but may be considered closest to *G. unicolor*:

Pileus 8–9 mm broad, 6 mm high, campanulate convex without an umbo, transparently striate when wet, sulcate when dry, *Yucatan* to *antique gold* when wet, hygrophamous, paler (*pl. 10 H 4*) when dry; flesh rather thin, odor not distinctive, taste not recorded.

Lamellae characteristically distant and very broad, adnate, color of the spores.

Stipe light brown, deeper colored in age, annulate at the apex by a pale brown simple distant annulus which soon disappears completely leaving merely a slight fibrilosity.

Spores $8.5\text{--}10 \times 6\text{--}7 \mu$, but many strongly elongated to $12\text{--}15(17) \times 4.8\text{--}5.5 \mu$, some strangely doubled (V-shaped). Basidia mixed 2-, 4-, 3-, and 1-spored (in this order of frequency), $27\text{--}34 \times 7.5\text{--}8.2 \mu$. Pleurocystidia $47\text{--}61 \times 12.5\text{--}16.5 \mu$, ampullaceous with a broad apical neck ($7\text{--}11 \mu$ diam.), hyaline, rather numerous, thin-walled. Cheilocystidia similar to pleurocystidia. Hyphae of gill trama incrustated with yellowish pigment. Clamp connections present.

* Although no proof can be given, it nevertheless seems reasonable to assume that Fries' concept of what he called *Agaricus unicolor* (Monographia, p. 320) is actually *G. unicolor* as we have described it, because this species corresponds well with the Friesian description and is so close to *A. marginatus*. However, there are in Europe as well as in Asia, forms that do not quite coincide with the description of our narrow concept of *G. marginata* and which do not fully agree with *G. unicolor*. Such forms were enumerated under the heading "*Pholiota mustelina*" by Singer, but need further study especially in regard to the anatomy of the epicutis. The type of *Pholiota mustelina* was not available to us, and it may well be that one or the other of the forms described in this stirps or in the following stirps will be found to be a synonym of *P. mustelina*. Cf. also our note after *G. marginata*.

On wood of *Liquidamber styraciflua* in small group in a high hammock 12 miles south of Gainesville, Alachua County, Florida, Singer (FH).

The type of spore abnormality found in this collection is not infrequent in *Coprinus* and *Psathyrella* and does not represent a fusion of spores but rather a forking and resultant production of two apices, each with a germ pore, as seen by Smith in *Coprinus*. It is not to be regarded as a taxonomic character, but rather, possibly an abnormality resulting from cytological aberration.

MATERIAL EXAMINED: R. Oswald, Portland, Oregon, Oct., 1955, in cottonwood duff, 7 (MICH). Singer, W(Caucasus); C3038; 3081 (LIL), (Tirol), (Leningrad). Smith 35529; 40217; 40593; 40627 (typical); 40634; 40641; 40713; 40748; 40960; 41063; 42972; 42978; 43007; 43024; 43171; 43288; 43471; 43478; 43578; 43630; 43639; 46607; 46733; 47035; 47036; 47044; 47237; 51991; 51992; 52023; 52033; 52382; 52927; 53669 (MICH). Tuomikoski, Finland, 9-7-54 (H).

150. *Galerina marginata* (Fr.) Kühner, Ency. Myc. 7: 225. 1935.

Agaricus marginatus Fries, Epicr. Syst. Myc. p. 169. 1838.

Pholiota marginata (Fr.) Quélet, Champ Jura et Vosges, p. 127. 1872.

Dryophila marginata (Fr.) Quélet, Enchir. Fung. p. 69. 1886.

Illustrations: Pl. 17, fig. B. Fig. 173 (pleurocystidia and cheilocystidia).

Pileus 17–40 mm broad, obtuse to convex, the margin curved in against the gills at first, expanding to broadly convex, plane or slightly umbonate, glabrous, moist but not viscid, hygrophanous, pale to dark ochraceous tawny over disc, yellow (ochraceous) on margin at least when young, fading to dull tan (darker when dry—Kauff.), usually translucent striate when moist; flesh pale brownish ochraceous to nearly white, thin, pliant, odor and taste varying from very slightly to strongly farinaceous.

Lamellae typically narrow and crowded, broadly adnate to sub-decurrent, pallid brown young, tawny at maturity, edges even but whitish at times.

Stipe (20)30–60 mm long, (2)3–9 mm thick at apex, finally hollow, equal to slightly enlarged downward, with a more or less median to superior, submembranous to fibrillose annulus which often is evanescent, pruinose above and paler than cap, browner downward to the reddish brown to bister base inside and out, lower portion with a thin coating of pallid fibrils which eventually is evanescent and does not leave squamules as it breaks up.

Spores $8-10 \times 5-6 \mu$ ($11-15 \times 6.5-7.5 \mu$) slightly inequilateral in profile, ovate in face view, warty-rugulose and with a smooth suprahilar depression, tawny or darker rusty brown as revived in KOH, with apical callus. Basidia 4-spored, $21-29 \times 5-8.4 \mu$, rarely a very few 2-spored ones, subcylindric when sporulating but with slightly tapered base. Pleurocystidia (26)46–60(75) \times (7)9–12(16) μ , fusoid-ventricose with wavy necks and obtuse to subacute apices ($3-6 \mu$ diam. near apex), thin-walled, hyaline

in KOH. Cheilocystidia similar in shape but often smaller, fairly abundant, no clavate or mucronate cells present. Gill trama parallel, the hyphae with a pale yellow incrusting pigment in KOH. Pileus trama homogeneous, the hyphae with a pale ochraceous incrusting pigment, no pellicle differentiated. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On or near wood of conifers, gregarious to cespitose, North America, Europe, Japan, Continental Asia and the Caucasus, summer and fall.

OBSERVATIONS: As defined here, typical *G. marginata* lacks a differentiated pellicle, usually grows on or near the wood of conifers, has relatively few pleurocystidia, and spores which very rarely measure more than 11 μ long, on 4-spored basidia. The annulus soon collapses on the stipe.

In Spain as well as in the Caucasus, Singer found specimens which were then determined as *Pholiota mustelina* and were characterized by the following characters:

Pileus convex-applanate with *distinct small umbo*, dark tawny cinnamon yellow when dry, with smooth margin; lamellae cinnamon, submarginate-adnate; stipe brown, somewhat innately streaked, somewhat whitish fibrillose from the veil, with mealy apex, smooth applicate annulus, thickened downward toward the white bulb, 65 \times 3 mm; *odor none*. Spores as in *G. marginata* (9–10.8 \times 5–5.8 μ). Cystidia ampullaceous, about 50 \times 16 μ , cylindrical granular neck 3–7.5 μ broad. On wood of *Abies* and *Pinus*, Salardú, Spanish Pyrenees, Singer, C-623 (LE). Very similar collections from Abkhazia (Caucasus).

Further studies will show whether these collections can be separated from both *G. marginata* and *G. patagonica* on the one hand and *G. unicolor* on the other.

The species indicated and described under the name *G. marginata* by Singer and Digilio, for Argentina, is, as pointed out then (Lilloa 25: 379. 1952) somewhat doubtful, and in the light of our present classification of the stirps *Marginata*, perhaps not referable to the northern type. Say T-572, comm. Singer, (LIL), is now cited for *G. helvoliceps* as it was in Lilloa 25: 510. 1952. The other specimen, Singer T-1342, cannot be correctly disposed of since in it the cystidia collapsed and remain unrecognizable. Since the odor was farinaceous, it cannot be *G. patagonica*. It might be *G. physospora*.

In a collection by Ruth Oswald from near Portland, Oregon, the pleurocystidia and cheilocystidia measure up to 90 μ long and have flexuous necks 2–3 μ thick ending in acute apices. The spores are almost as roughened as in *G. helvoliceps*. In this character and in the lack of a gelatinous epicutis on the pileus the collection differs from *G. autumnalis* var. *angusticystis*. Smith 58000 from Michigan may also belong with the Oswald collection. These collections may represent an undescribed species but we lack sufficient data to describe it.

In Smith 51800 from Colorado, and collections from Wyoming by Kauffman & Kanouse, the spores measure 9–13 \times 5.5–6.5(7) μ , but in all other characters these appear to be *G. marginata*. The cheilocystidia are

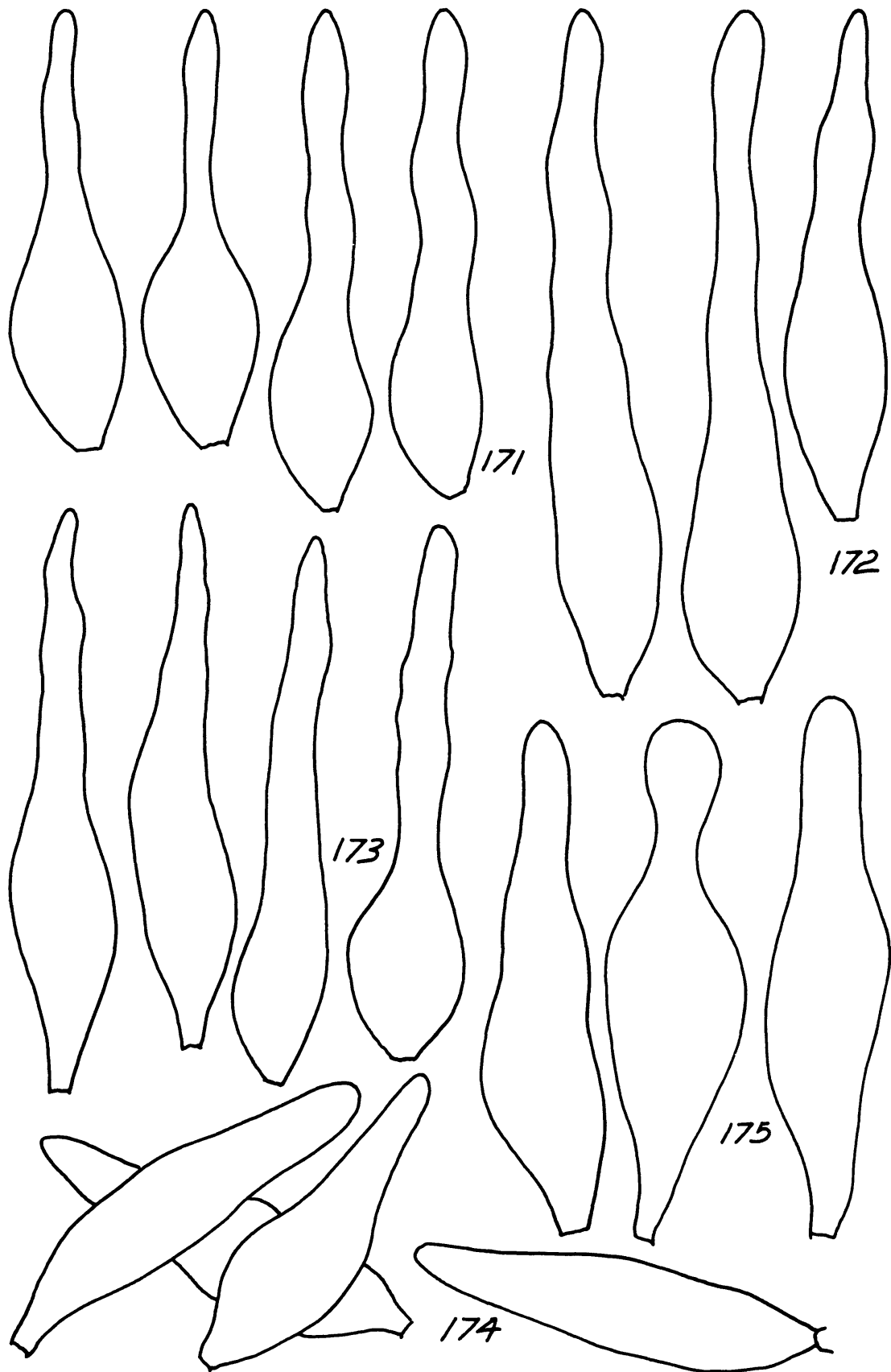


Fig. XXIII

Cystidia: Fig. 171 and 172, cheilocystidia and pleurocystidia of *G. unicolor*; 173, pleurocystidia and cheilocystidia of *G. marginata*; of *G. rudericola*, 174, cheilocystidia and 175, pleurocystidia.

hyaline and only a thin annulus is present on the stipe. We regard these as a collection showing intergradation with *G. platyphylla*.

MATERIAL EXAMINED: Bigelow 6046. Burke, Ft. Toulouse, Alabama, 12-20-42 & 1-3-43 (MICH). Deegan H-156; H-162 (MICH). Gruber P-41. Haglund 574 (MICH). Hesler 3872. Kauffman, Medicine Bow Mts., Wyoming, 9-7-23 & 9-11-23; Lake Quinault, Washington, 10-16-25 (MICH). Jaap, Fungi Sel. Escic 930, Germany (MICH). Kanouse 11-3-29; 579. Kelly 1043. Oswald, near Portland, Oregon, Oct. 1955; 5; 8; 16 (MICH). Smith 1186; 15003; 17952; 20399; 27399; 31604; 32091; 35816; 35820; 40203; 40250 (typical); 40665; 40683; 40712; 41068; 41136; 42681; 46297; 46381; 46715; 47087; 47149; 47224; 48166; 48224; 48483; 48728; 49262; 49487 (typical); 49501; 50606; 51368; 51369; 51382; 51388; 51392; 51393; 51400; 51735; 51883; 52097; 52256; 52280; 52584; 52701; 52705; 52721; 52992; 53022; 53074; 53100; 53355; 53495; 53608; 53993; 53998; 58362; 58614; 62328. Thiers 2661 (MICH). Tuomikoski, Finland, 19/9/54 (H).

151. *Galerina rudericola* Smith, Mycologia 45: 914. 1953.

Illustrations: Figs. 174 (cheilocystidia), 175 (pleurocystidia).

Pileus 10–25 mm broad, obtuse with an incurved margin young, expanding to plane with a conic umbo or the margin remaining decurved, surface glabrous, moist, “buckthorn brown” fading to near “pinkish buff” or pale pinkish buff, faintly striate moist; odor and taste not recorded.

Lamellae subdistant to distant, arcuate to short-decurrent, narrow, dingy ochraceous tawny, edges white fimbriate.

Stipe 30–50 mm long, 1.5–2 mm thick, equal, fragile, with a submembranous to fibrillose superior annulus, punctate-fibrillose and dull honey color below, darkening from the base up in age.

Spores 7–9 × 4–5 μ , obscurely inequilateral in profile, in face view elliptic to narrowly ovate, minutely roughened and with a ragged zone around the smooth depression but no blisters, dark ochraceous tawny in KOH. Basidia 4-spored. Pleurocystidia scattered, 40–50(60) × 10–15(18) μ , fusoid-ventricose, hyaline or with yellowish walls in KOH, with obtuse apices but occasionally apex with a nipple-like protrusion either apical or to one side, or apex subcapitate. Cheilocystidia similar to pleurocystidia or necks more flexuous and elongated; gill trama subparallel, subhymenium not distinctive; pileus trama homogeneous (no pellicle found). Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On debris at the base of an old avalanche now well grown over with herbaceous plants and shrubs; Green Lake, Mt. Rainier National Park, Washington, October.

OBSERVATIONS: The fruiting bodies look like those of a very slender form of *G. marginata*, but the fibrillose annulus and minutely asperulate spores with their smooth plage readily distinguish it. The colors of the pileus are dingy ocher brown, quite different from the typical ochraceous tawny to

tawny of the *G. hypnorum* series. It differs sharply from *G. subochracea* in lacking a gelatinous pellicle (it is not even lubricous) and in the stipe remaining darker brown below when specimens are dried. The situation here parallels that existing for *G. marginata* and *G. autumnalis*.

MATERIAL EXAMINED: Smith 41070-*type*; 41087 (MICH).

152. *Galerina patagonica* Singer, Sydowia 8: 140. 1954.

Pileus 8–63 mm broad, obtusely conic in the primordia, soon convex, then appanate, most frequently with a small but distinct umbo, later sometimes exumbonate, rarely obtuse from the beginning, chestnut brown in the primordia, soon more ochraceous brown to fulvous ocher brown (a mixture between *sorel* and *Alamo* or *pl. 14 E 12*) on margin with richer deeper color on disc, later *pl. 12 I 7–8* between striae, striae and center with a shade of *burnt umber*, somewhat dull, shining in the primordia and sometimes fatty-opimous in mature material (but absolutely not viscid), hygrophanous, light yellowish buff or pale buff when dry, usually with contrasting deeper colored brown umbo where the latter is present, usually glabrous and smooth, but once observed with a coarsely fibrillose tomentose and slightly uneven surface, when wet transparently striate for a distance of 10 mm in from the margin, drying from a median zone in and outward; flesh subconcolorous with surface or paler, with mild but not farinaceous taste, and without any odor.

Lamellae *raw sienna* or near *Sudan brown*, subclose to subdistant mostly moderately close, moderately broad to broad (up to 5.5 mm), adnate to subdecurrent, finally seceding, horizontal below.

Stipe 22–95 mm long, 1.5–8 mm thick, equal or subequal, hollow, *oak* to *Sudan brown* and usually deeper brown in lower half eventually, sometimes entirely deep dull brown, with pruinose apex, appressedly innately longitudinally fibrillose-sulcate in some, in others smooth, naked except for the veil, veil annuliform, below the annulus sometimes showing superficial inconspicuous longitudinal pallid fibrils; annulus well developed, membranous, not cortinoid, color *pl. 14 E 12*, then *12 I 7–8*, apical, usually applicate but sometimes narrowly distant, constant and persistent.

Spores $7.5\text{--}9.7 \times 4.5\text{--}5.8 \mu$, finely rusty punctate with small and low verruculose particles of the exosporium which are distinctly deeper colored than the episorium (rusty), exceptionally some spores showing a distinct perisporial sack with the exosporial ornamentation slightly adhering, (much less often than in *G. helvoliceps*), subfusoid-ellipsoid, with distinctly marked plage. Basidia $26.5\text{--}28 \times 6.8\text{--}7 \mu$, usually all 4-spored, in some carpophores a very few 2- or 3-spored intermixed. Pleurocystidia thin-walled, ventricose below, narrowed above, pedicellate, with the apex either entire or with nodes to finger-like outgrowths at the tip (1–4 fingers—as in *Agrocybe tuberosa*) as in some other *Galerinas* where they are very rare, strongly projecting and very numerous, $40\text{--}70 \times 11\text{--}15 \mu$, some with rusty incrustation at the apex, otherwise hyaline. Cheilocystidia sometimes differentiated and

then versiform, usually clavate to ventricose-subvesiculose, $27-35 \times 8-12.5 \mu$. Gill trama regular in larger mature specimens, hyphal cells often very short and voluminous, brownish, with clamp connections, at first brownish hyaline and of normal size, not incrustated; hyphae of the epicuticular layer of the pileus rather thin, repent, subhyaline to hyaline, not distinctly gelatinized. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Cespitose-gregarious and common all over northwestern Patagonia on dead logs, fallen trunks and hollow trees of *Myrceugenia exsucca* (Myrtaceae), *Nothofagus dombeyi* (Fagaceae) and *Austrocedrus chilensis* (a conifer); late fall.

OBSERVATIONS: The outgrowths on the pleurocystidia are almost unique for the genus, and the stature very robust.

MATERIAL EXAMINED: Singer M-518; M-599; M-677-type; M-679; M-702 (LIL).

153. *Galerina physospora* Singer, Lilloa 25: 381. 1951 (1952).

Illustrations: Figs. 237-238 (spores); 188 (cheilocystidia).

Pileus 17-41 mm broad, convex, with or without an umbo, color *antique gold* to *burnt umber* when wet, hygrophanous, *sunlight* with an occasional hue of *chinese y*, especially on the umbo if present, transparently striate but smooth, glabrous; flesh pale yellow, with a very slight odor of radish (not farinaceous), taste mild.

Lamellae lighter colored than *gold brown*, eventually colored like the spores (rusty), adnate to adnate-subdecurrent, subclose to moderately close, rather broad (to 5 mm).

Stipe 22-55 \times 2-8 mm (1.5-5 mm at apex) subequal above an enlarged base, *sunlight* or near that color above and somewhat deeper below, becoming *burnt umber* below when mature and old, the thick, cortinoid veil which remains as an annulus being somewhat paler than *putty* but later becoming rusty from the spores and less conspicuous, aside from the veil the surface slightly innately silky and slightly longitudinally sulcate in some specimens, stuffed, eventually hollow inside and almost concolorous; annulus narrowly funnel-shaped, i.e., ascendant and narrowly distant, apical, smooth.

Spores 8-8.5(12.3) \times 4.5-5(5.8) μ , finely warty, with smooth plage, well pigmented. Basidia 23-27 \times 5.8-6.5 μ , clavate, hyaline, 4-spored, a few 1-, 2-, 3-spored. Pleurocystidia, 36-58 \times 10.8-14.5 μ , rather thin-walled, either hyaline or pale brownish, ventricose below, with a thick and broadly rounded apex but not capitate, the neck short or long, often with a resinous incrustation forming a ring around the neck which is 4.3-5.8 μ in diam. Cheilocystidia at places rather crowded but many basidia and cystidia of the same type as the pleurocystidia interspersed among them. Some cheilocystidia vesiculose-pedicellate but not as abruptly globiferous as in *G. bullulifera*, more like the corresponding type of *Kuehneromyces vernalis*, hya-

line, smooth, $17.5\text{--}30 \times 10\text{--}17 \mu$; hyphae of the hymenophoral trama light brownish, with clamp connections. Epicutis of pileus not studied.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on the trunk of a deciduous tree in subtropical forest in fall and winter, March to July, Tucumán, Argentina.

OBSERVATIONS: A very similar collection from higher altitude (approximately 1600 m) collected in the fall (Singer T-1342) was macroscopically almost identical but with farinaceous odor, the spores were somewhat more strongly warted, but the hymenophore around the edge was so damaged by decay that no definite data on the cystidia and cheilocystidia could be obtained. This might be typical *G. marginata* (habitat: *Podocarpus* wood or *Alnus*) which has not otherwise been observed in South America, but more likely belongs in *G. physospora*.

This, and many collections of *G. patagonica*, have the same type of cheilocystidia as found in *G. viscida* but differ from the latter in better developed annular veil and absence of a viscid pellicle on the pileus. *G. physospora* has some characters in common with *G. subbullulifera* but is on the other hand too close to *G. patagonica* to be removed from *Naucoriopsis*.

MATERIAL EXAMINED: Singer T-597-type (MICH), (LIL); T-1342 (LIL).

154. *Galerina vialis* Smith, Mycologia 45: 924. 1953.

Illustrations: Pl. 16, fig. A. Fig. 176 (pleurocystidia and cheilocystidia).

Pileus 10–40 mm broad, convex when young, becoming plane or the disc shallowly depressed and margin arched in age, surface moist and hygrophanous, color evenly “cinnamon brown” moist, gradually dingy ochraceous tawny before fading, fading on disc first to ochraceous buff but finally about pale pinkish buff, translucent striate nearly to disc when moist, glabrous but in age when faded somewhat squamulose from breaking of cuticle; flesh thin, soft, fragile, odor and taste not distinctive.

Lamellae broadly adnate to slightly decurrent, seceding, close to subdistant, broad, dull ochraceous tawny, edges minutely fimbriate.

Stipe 30–50 mm long, 2–4 mm thick at apex, narrowly clavate to nearly equal, concolorous with young gills above but base soon bister and discoloration progressing upward, annulus superior, gray-fibrillose below annulus or fibrils breaking into squamules, coarsely pruinose-fibrillose above annulus.

Spores $8.5\text{--}11 \times 5\text{--}6.5 \mu$, in face view ovate and many with an almost snout-like apex, inequilateral in profile, rugulose-roughened and with blisters around the depression, russet in KOH. Basidia $26\text{--}30 \times 7.5\text{--}8 \mu$, 4-spored. Pleurocystidia scattered, $48\text{--}60 \times 12\text{--}18 \mu$, fusoid-ventricose with subacute apices and the wall of the neck flexuous, thin-walled, or walls slightly thickened, dingy yellowish to nearly hyaline in KOH, smooth. Cheilocystidia abundant and fully as large as or larger than the pleurocystidia, ventricose portion pale dingy yellowish in KOH. Gill trama

subparallel, the cells \pm ellipsoid, nearly hyaline in H₂O when fresh, ochraceous to cinnamon buff as revived in KOH. Pileus trama homogeneous, the cuticular layer of nongelatinous hyphae, when revived in KOH the surface layer yellowish, a cinnamon colored layer beneath this and the remainder nearly hyaline. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious-subcespitate along a road on soil, Carbon River, Mt. Rainier National Park, Washington, elevation 3300 ft. Rare.

OBSERVATIONS: This species is in the *G. marginata* stirps but is readily distinct when fresh by the dark brown pileus, more fragile consistency, and more conspicuous striae. Under the microscope the pale smoky yellow cystidia are distinctive in revived material. Their walls are slightly thickened in the midportion, and the yellow pigment is in the wall. As compared with *G. marginata*, the fibrillose sheath over the lower portion of the stipe is much looser in organization, thicker, and in age leaves the lower part of the stipe with squamules or zones. Not much emphasis should be placed on the habitat being terrestrial because it is entirely possible that considerable wood has been used as a fill in making the road.

MATERIAL EXAMINED: Smith 40709-*type*; 40710; 40779; 40788; 52255.

155. *Galerina platyphylla* (Kauff.) Smith & Singer, comb. nov.

Pholiota platyphylla Kauffman, Pap. Mich. Acad. 1: 145. 1923.

Illustrations: Fig. 177 (pleurocystidia and cheilocystidia).

Pileus 10–30(40) mm broad, convex, obtuse or obsoletely subumbonate, hygrophanous, “tawny” with a “mars brown” disc, fading to “antimony yellow” or “warm buff” (pale yellow), glabrous, obscurely striatulate on margin when moist; flesh thin, odor and taste not recorded.

Lamellae broadly adnate, decurrent by a tooth, very broad, ventricose, close to subdistant, thin, at first pallid, soon “clay color” to “buckthorn brown” (dingy pale fulvous).

Stipe 30–50(60) mm long, 2–4.5 mm thick, equal or slightly tapering upward, subflexuous in age, stuffed, *concentrically white zoned from the delicate veil*, zones terminating above middle of stipe in a flaring membranous whitish annulus, white scurfy above annulus, at length becoming silky or glabrous below, brownish within and without under the veil remnants, *fuscuscent*.

Spores 10–13 \times 5–6.5 μ , inequilateral in profile, ovate in face view, tawny in KOH, warty-rugulose and with a smooth plage, no loosening of exosporial material to form blisters noted. Basidia 4-spored, \pm 30 \times 9 μ . Pleurocystidia rare to scattered, 50–70 \times 9–11 μ , narrowly fusoid-ventricose with subacute apices, smooth, hyaline revived in KOH. Cheilocystidia similar to pleurocystidia or shorter and fatter (38–56 \times 9–12 μ). Gill trama \pm parallel, ochraceous in KOH, hymenopodium and subhymenium not distinctive. Pileus trama homogeneous, no pellicle differentiated, hyphae of epicutis radially arranged to interwoven, 4–8 μ in diam. and with incrusting pigment. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On wet moss under pine and spruce along a stream, Tolland, Colorado, Sept.

OBSERVATIONS: Kauffman's type is clearly a *Galerina* as Harding (1952) pointed out, and it is very close to *G. marginata* by virtue of lacking a gelatinous pellicle on the pileus. The large spores, habitat, and zones of fibrils on the stipe below the annulus, prevent it from being considered a synonym of *G. marginata* at the level species are being circumscribed in this group at present. It is close to *G. vialis* but differs in the color of the cystidia in KOH and their being thinner-walled. The adherence of the exosporium as well as the characters of the cystidia and the habitat differentiate it from *G. helvoliceps*.

MATERIAL EXAMINED: Kauffman, Sept. 5, 1920, Colorado, type (MICH).

156. *Galerina riparia* Singer, Sydowia 7: 249. 1953.

Pileus 8–29 mm broad, convex to subhemispheric, disc finally flattened or at times retaining a slight umbo, pale to dark fulvous, hygrophanous, much paler faded, glabrous and naked, slightly lubricous when young and translucent striate fresh; flesh inodorous, almost concolorous with surface.

Lamellae adnate to decurrent, typically subdistant, broad (especially near the stipe), horizontal, paler than the pileus, brownish avellaneous at maturity, finally colored from the spores.

Stipe 18–60 mm long, 1–3 mm thick, tubular, equal or slightly enlarged (to 4 mm) downward, honey colored to concolorous with pileus, sometimes pallid, in some specimens the lower half with a fuscous ground color, usually evenly colored, entirely appressed white-silky fibrillose, annulate; annulus flaring to infundibuliform, membranous, apical to median, smooth on underside, sometimes sulcate on upper (inner) surface, whitish or white, persistent.

Spores $9.5\text{--}13.8 \times 6.2\text{--}8.2 \mu$ ($16.5 \times 8.2 \mu$ from 2-spored basidia), with fine, low but distinct, verrucose exosporial ornamentation, amygdaliform-ellipsoid, with a well-marked plage and an apical callus, wall thick and double, rather well colored (in NH_4OH).

Basidia $31\text{--}37 \times 8\text{--}16.2 \mu$, 4-spored or sometimes a few 2-spored intermingled, clavate to narrowly clavate. Pleurocystidia scattered, $40\text{--}67 \times 8.2\text{--}19 \mu$, ventricose near base, with an ampullaceous neck $4.8\text{--}7 \mu$ thick, enlarged to subcapitate at apex and up to 10μ broad, often with a long basal pedicel. Cheilocystidia variable, resembling pleurocystidia or shorter and broadly fusoid to vesiculose, hyaline, $12.3\text{--}15.5 \mu$ diameter; trama regular, pale melleous; epicuticular layer of filaments. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Solitary to gregarious in subantarctic *Sphagnum* bogs ("turberas"), and in the drier succession but with peat moss underneath, on a new cover layer of living mosses other than *Sphagnum*,

and among grasses forming cushions all over the bogs; Tierra del Fuego, Argentina, February.

OBSERVATIONS: The collection M-409b is from a mossy pasture, but on an old peat base, frequented by cattle and sheep. This collection differs from the others in having a shorter stipe with a deeper brown ground color in the lower half, and likewise in its slightly less distinctly punctate spores. It is also the one specimen which is slightly lubricous. It is possible that this is a combination of hereditary characters, but with just this one collection at hand we do not wish to formally designate it as a taxon at present. Spegazzini (1922) indicated *Tubaria stagnina* for this region. This is obviously *G. riparia*.

MATERIAL EXAMINED: Singer M-214; M-240-*type*; M-314; M-315; M-352; M-409b (LIL).

157. *Galerina infernalis* Singer, sp. nov.

Pileo usque ad 47 mm lato, brunneo, haud sulcato, subopimo sed haud viscido, partim hygrophano, campanulato-convexo, saepe umbonato. Lamellis flavo-ochraceis vel ferrugineo-brunneis, ventricosis, adnexis vel adnatis, subconfertis. Stipite 30–110 × 2–11 mm, albido-pallido vel brunneo, ad basin haud brunnescente; velo membranaceo, albido, in maturis annuliformi persistente. Sporis 9.5–12.5 × 5.5–7.2 μ, verrucosis. Pleurocystidii tenuicatis, hyphis fibuligeris. Ad terram et gramina in alpinis. Infiernillo, Tucuman, Argentinae (LIL).

Pileus up to 47 mm broad, campanulate, then convex and umbonate or obtuse becoming convex, rarely conic to conic-campanulate at first, frequently with a low obtuse umbo when mature or rarely slightly umbilicate, somewhat lubricous and shining when fresh, subhygrophanous and frequently marbled when fading, when moist between *pencil wood* and *Titian gold* (pale brick color to bright cinnamon), finally becoming *mast color* to *gold pheasant* (more or less bright ochraceous brown), fading to *9 F 4* (pale yellowish), in age often more watery and deeper colored (near *Arabian*), smooth and not (or scarcely and faintly) translucent-striate at extreme margin, rarely appendiculate from the veil and then only slightly so; context fleshy, at maturity buffy white faded but tawny when moist, odor weak and not distinctive, taste mild.

Lamellae sinuate to adnexed, decurrent in some by lines, rarely adnate, rarely forked, broad (up to 7 mm), ventricose, close, tridymous, pale buff (*11 F 6*), becoming near ochraceous tawny (*nugget*, *bronze Y* or *Yucatan*), with a narrow pallid edge.

Stipe 30–110 mm long, 2–11 mm thick, more or less equal with the base variously tapered to a point or enlarged depending on the substratum, solid becoming stuffed, finally hollow, typically faintly longitudinally appressed silky up to the annulus, extreme apex whitish pubescent, glabrescent, when young at times pallid but soon ochraceous to golden ochraceous, later often brownish or concolorous with context; veil white to pallid, leav-

ing a persistent membranous superior annulus with silky fibrillose outer (under) side and funnel-shaped or becoming pendulous.

Spores $9.5\text{--}12.5 \times 5.5\text{--}7.2 \mu$, ellipsoid to oblong-fusiform, mostly ellipsoid, suprahilar depression distinct, with a well-delimited smooth plage, verruculose-punctate, the exosporial ornamentation tending to separate along with the perisporium but not easily peeling off together, with a distinct apical callus, episporium and endosporium distinct, the exosporial ornamentation deeper colored than episporium.

Hymenium. Basidia 4-spored, a few 2-spored, $31\text{--}41 \times 8\text{--}8.5 \mu$, clavate, hyaline. Cheilocystidia and pleurocystidia similar or the former slightly smaller, hyaline to rarely slightly brownish, thin-walled, typically broadly ventricose below, then with a long narrow neck ($20\text{--}30 \times 4\text{--}11 \mu$), the apex obtuse to subacute, rarely some broadly fusoid-ventricose cells with short thick neck and broadly rounded apex also present.

Hymenophoral trama of hyaline to pale golden yellow, smooth hyphae some of which are very broad, arrangement regular. Epicutis of pileus of thin, filamentous smooth hyaline hyphae ascending at tips at first, but in age somewhat appressed, not distinctly gelatinized; this layer grading into the hypodermium where some pigment-incrusted hyphae occur. The latter broader than the non-incrusted hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: In the alpine zone of the Pre-Andes, between 3000 and 3300 m alt., more frequently on the base of, or in fascicles of, *Stipa* culms, more rarely in wet places among herbaceous vegetation on wet earth ("vegas"). Gregarious or solitary, in summer, Argentina.

OBSERVATIONS: This species is close to *G. helvoliceps* but differs in its habitat, in the stipe not darkening conspicuously at the base, and apparently in lacking a farinaceous taste although there appears to be some variation in this character for *G. helvoliceps*. It is also very close to *G. moelleri*.

MATERIAL EXAMINED: Singer B-3046-type; T-3548 (LIL).

158. *Galerina helvoliceps* (Berk. & Curt.) Singer, Lilloa 22: 572. 1949.

Agaricus helvoliceps Berkeley & Curtis, Jour. Linn. Soc. 10: 290. 1868.

Flammula helvoliceps (Berk. & Curt.) Sacc. Syll. Fung. 5: 813. 1887.

Pholiota pseudoblattaria Spegazzini, Anal. Mus. Nac. Buenos Aires 6: 121. 1899.

Gymnopilus helvoliceps (Berk. & Curt.) Murrill, Mycologia 5: 20. 1913.

Illustrations: Figs. 235–236 (Spores).

Pileus 10–32 mm broad, hemispheric then convex-applanate or eventually slightly depressed with or without a recurved margin, at times slightly subumbonate with a broad obtuse elevation, slightly opimous-subviscid and slightly shining when moist but not truly viscid, with a tendency to become rimose-lacerate-fibrous in some old caps, usually (especially when young) glabrous and naked, the center sometimes slightly flocculose in mature material, hygrophanous, melleous-yellowish to ochre brown, *Alamo* to *Arab* in

center, 13-7-10 on margin (or darker in very young caps), more light yellowish (10-I-5 to 11-H-6) when faded, in old material most of the surface remaining brown (helvulous-castaneous) when faded, the margin of the thinner caps transparently short-striate when moist and often strongly sulcate when dry, typically smooth when moist; flesh thin, thicker only in the center of the pileus, and usually characteristically dry, soft, at first sordid yellowish white, then pale yellow, taste mild to farinaceous, odor varying from slightly farinaceous to none.

Lamellae narrow to rather broad (2-8 mm), adnate, or adnate with a decurrent tooth, sometimes decurrent, sometimes slightly sinuate-adnate, separating from the apex of the stipe, sometimes forked but mostly simple, close to distant, but mostly subdistant, brownish sordid or brownish ochraceous (*India spice*), eventually the color of the spores (*kis kilim*, *tawny* or *cocoa*).

Stipe 15-85 mm long \times 2-5 mm thick, slightly tapering upward, or equal, straight curved, with white mycelial tomentum at the base, hollow, with spongy-stuffed base, slightly innately longitudinally sulcate to sometimes deeply furrowed in continuation with the lamellae, concolorous with the pileus, sometimes with distinctly more pallid apex, always becoming (or being from the first) more brownish to dark reddish brown below and finally often entirely brown; veil forming a median to apical annulus and appressed whitish to yellowish fibrils below the annulus; annulus white to yellowish, sometimes fragmentary and soon lacerate, membranous and thin, smooth, rarely distant, often oblique and at times somewhat fugacious; flesh of stipe colored like that of pileus but becoming concolorous with the surface in the lower portion.

Spores 8.7-11.5 \times 5-7 μ (4-spored), 10.8-16 \times 5.8-8 μ (2 spored) the latter often conspicuously narrow and boat-shaped, at times abnormally shaped, otherwise ellipsoid-subamygdaliform in face view, somewhat inequilateral in profile, light melleous in NH_4OH , deep intensely rusty-tawny in KOH, rather strongly verrucose, with distinct suprahilar smooth spot and an apical callus, the exosporial ornamentation characteristically (but not always completely) clinging to the frequently very strongly developed perisporium and the two tending to peel off together leaving the naked episporium.

Basidia 4-spored but in our experience mostly with at least a few 2-spored intermixed, purely 2-spored forms also observed, and then with two very long sterigmata, occasionally also 1- or 3-spored basidia present, all basidia hyaline in KOH, clavate or constricted in the middle, 21-33 \times 6-8.5 μ . Pleurocystidia 35-67 \times 10-15 μ rather numerous, very versiform, almost all with ventricose central third or basal half, ampullaceous, or once to repeatedly swelling above, constrictions often subcapitate (capitellum about 10 μ in diam.), the tips often forked as in *G. marginata* and *G. patagonica*, or else sometimes with lateral irregular outgrowths, the capitellum where present sometimes with a mucronate tip, with rather thin to thin hyaline to stramineous wall (diameter 0.7 μ or less), sometimes slightly resinously incrustated, pedicellate and originating deeper in the gill trama than the basidia. Cheilocystidia resembling pleurocystidia or with longer

necks. Trama regular, often with slightly yellow background from a soluble pigment, but most hyphae also incrustated by an insoluble rusty tawny or ochraceous pigment, especially in the hypodermium and in the lower portion of the stipe. Epicutis in young caps hyaline or pale yellow, of appressed non-gelatinized hyphae, epicutis in mature material not very well differentiated and not gelatinized, often fragmentary and showing ascending hyphal ends of the hypodermium reaching the surface among narrower hyphae of the original epicutis, such terminal members of hypodermial hyphae forming the flocons of the center of old pilei and measuring $42 \times 13.2 \mu$, epicuticular hyphae proper radially arranged, thinner and yellowish, repent and filamentous. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION. On wood, moss-covered rocks or humus in frondose woods, or (more frequently) on dead frondose wood, usually not cespitose but rather subsolitary to gregarious, or with two or three carpophores attached to each other at the base, also in greenhouses on wooden frames and on roots of *Arundinaria khassica*, fruiting throughout the year. Cuba to Argentina, Japan, also found (in greenhouses) in Europe.

OBSERVATIONS: This species is very closely related to *G. marginata* but differs in having a somewhat less persistent and narrower annulus, and slightly larger spores in which there is a definite tendency for the exosporium to loosen around the episporium; even in those specimens where the loosening is less conspicuous than in the type, the spores are broader than in *G. marginata*. A specimen of *G. praticola* (Möller) Bas, (see *G. unicolor*) from Bas, has the spores of *G. helvoliceps* and it should be mentioned that the outer layer is much better developed and looser about the spore than shown in Bas's figure. There is not much in Möller's original description of the macroscopic features which contradicts placing this material in *G. helvoliceps*. However, the germ pore of the spore is still a questionable point. It may be that the type of *G. praticola* is a mixture of *G. mælleri* and *G. helvoliceps*.

Walters collected one specimen on hardwood near Cleveland, Ohio, which has spores typical of *G. helvoliceps* but in stature resembles a large *G. autumnalis*. It is thus at the other extreme from *G. unicolor*.

MATERIAL EXAMINED: Hongo 1143 (MICH) (Japan); Nyberg (H) (Finland); Singer 4-362 (and Jan. 1939, no number) (LE) (greenhouses, Botanical Garden, Leningrad); T572, T3385 (Tucumán); Spegazzini Mus. 18266 type of *Pholiota pseudoblattaria* (LPS) (Buenos Aires); Wright 90-type and 93-paratype (FH) (Cuba).

159. *Galerina venenata* Smith, Mycologia 45: 922. 1953.

Illustrations: Figs. 251-252 (spores); 178 (cheilocystidia), 179 (pleurocystidia).

Pileus 10-35 mm broad, broadly convex young, expanding to plane or with a slightly uplifted, arched margin and depressed disc, surface glabrous and moist, near cinnamon brown, hygrophorous, fading to a very dingy

yellowish white to pinkish buff (often browner because of deposited spores), margin crenate to lacerated; flesh moderately thick, odor farinaceous, taste farinaceous but slowly becoming bitter and disagreeable—leaving a burning sensation in the throat.

Lamellae broad, subdistant, broadly adnate, golden tawny becoming dull cinnamon, edges even.

Stipe 30–40 mm long, 3–5 mm thick at apex, enlarged somewhat toward the base, terete or compressed, brownish with a very thin apical annulus appressed against the stipe, in about half the specimens glabrous except for the white-mycelioid base.

Spores 8–11 × 6–6.5 μ , subinequilateral in profile, ovate in face view, russet in KOH, with a conspicuously rugulose-warty outer wall tending to loosen to form blisters near hilar end, but not calyptrate, plage smooth. Basidia 4-spored, content oily-globular, 20–25 × 7–8 μ . Pleurocystidia present, 45–70 × 9–15 μ , hyaline in KOH, smooth, fusoid-ventricose with acute to subacute apices. Cheilocystidia similar to pleurocystidia, no clavate to mucronate cells seen. Gill trama somewhat interwoven, ochraceous in KOH, hyphal cells up to 30 μ broad, hymenopodium not distinctive. Pileus trama homogeneous the hyphae at the surface 6–12(15) μ in diam. and interwoven, tramal body ochraceous in KOH. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious in a lawn, Portland, Oregon, Nov.–Jan. Known only from the type locality.

OBSERVATIONS: This fungus was positively identified by two people as the fungus they ate a short time before being stricken with a severe case of fungus poisoning. The clinical history of this case was published by Dr. Grossman of Portland, Oregon (1954).

There has been discussion in the literature (Harding, 1952) of the edible and poisonous properties of the *Galerina marginata* complex. *Pholiota autumnalis* was blamed for a case of poisoning in Minnesota (reported by Dr. Whetstone) and Harding showed clearly that in this instance a number of fungi (at least 2) had served to confuse the issue. As a result of his study he was inclined to name a species of *Gymnopilus* as the poisoning agent and cited work he had done on *Galerina marginata* which supported the conclusions of European authors that it is an edible species. He regarded *G. autumnalis* as a synonym of *G. marginata*.

The discovery of this poisonous fungus in Portland reopens the matter for consideration. First, the possibility still exists that *Galerina autumnalis*, as recognized by us, may be a poisonous species. We do not dispute the claim that *G. marginata* is edible. That seems to be well established. However, from the data now at hand we are forced to the conclusion that at least one species in the group is poisonous—namely *G. venenata*. Since the latter has a very different cap cuticle from *G. autumnalis*, we cannot consider it as a variety or form of Peck's species. In addition there is the difference in the shape of the apex of the cystidia and in the habitat. The dried fruiting bodies are not alike.

Because of the situation in regard to edibility in this group we believe it is desirable to search for all characters which might be of use taxonomic-

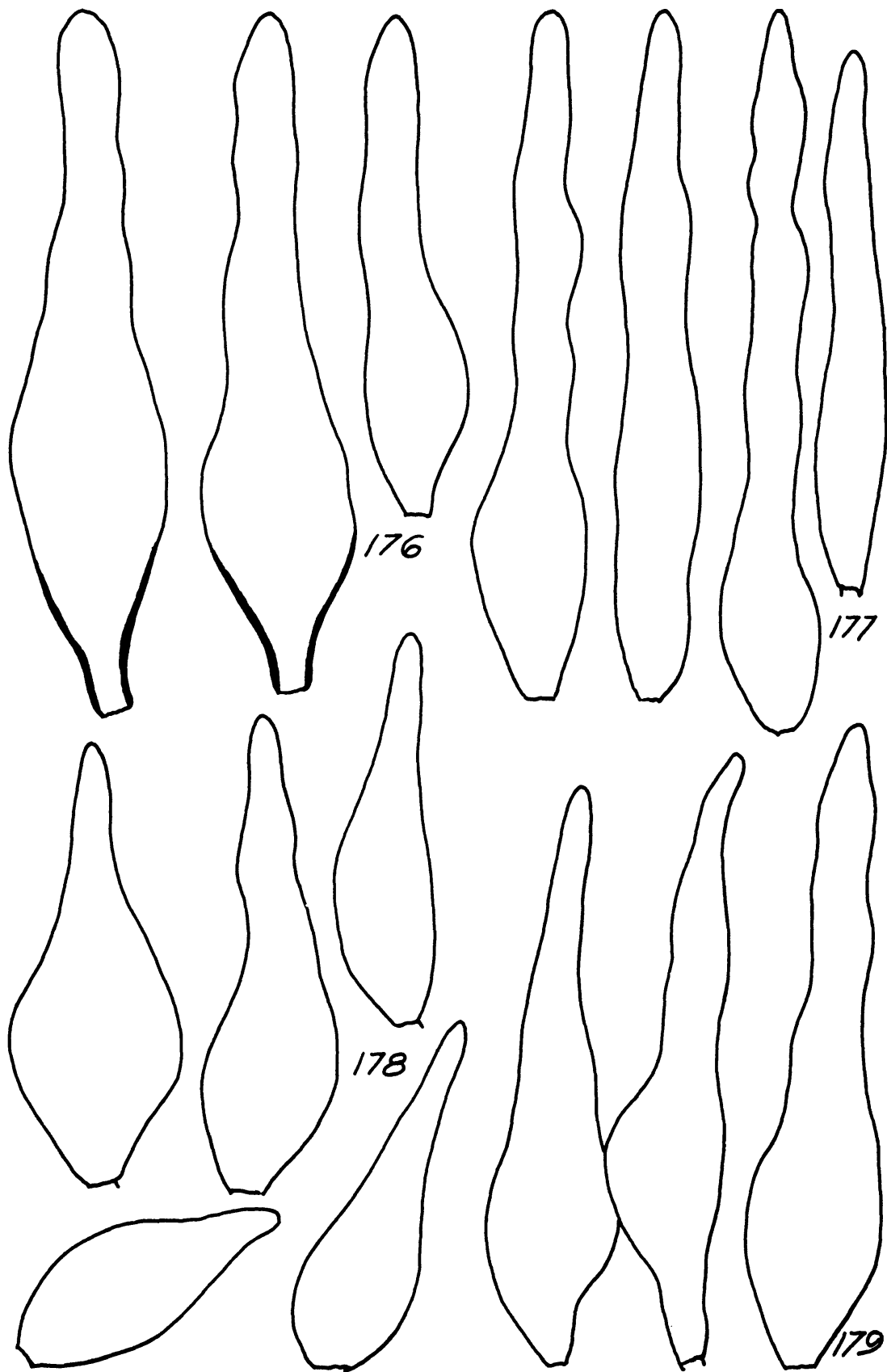


Fig. XXIV

Cystidia: Fig. 176, pleurocystidia and cheilocystidia of *G. vialis*; 177, pleurocystidia and cheilocystidia of *G. platyphylla*; 178, cheilocystidia of *G. venenata*, 179, pleurocystidia.

ally, in the hope of eventually being able to distinguish the poisonous from the edible members on correlated characters even though these may seem trivial in themselves. For this reason we have re-examined all the species placed in synonymy with *G. marginata* by Harding, and we have recognized them if there seemed to be any justification for doing so. We have examined the collection of the *Galerina* sent to Kauffman by Dr. Whetstone, which was thought to have been involved in the Minnesota case of poisoning, and though it is poorly dried, the remains of a gelatinous pellicle were found on the pileus; hence, we classify this collection in *G. autumnalis*.

In the material of *G. venenata* collected by Mr. Gruber in November, 1953, and sent to Smith, airmail, in the fresh condition, the odor resembled that of *Macrocystidia cucumis*, the stipe was streaked below the annulus with buff fibrils, and the colors were about as in *G. marginata*. The taste was very powerful. The cuticle in this material gelatinizes slightly in KOH, but the cells were the same diameter as those of the flesh and had the same incrustations. This slight gelatinization of an undifferentiated layer might have been due to the fact that the specimens were wrapped in aluminum foil and thus held at high humidity while they were in transit.

MATERIAL EXAMINED: Gruber et al., Portland, Oregon, Jan. 1953-type. Additional collections. Gruber, Portland, Oregon, Nov. 25, 1953.

Stirps *Cedretorum*

These species are naucorioid in aspect and lack both a gelatinous pellicle over the pileus and a membranous partial veil, if a veil is present it merely leaves a thin fibrillose zone. The incurved margin of the pileus aids in distinguishing species of this stirps from those of the following section.

Key to Species

1. Stipe conspicuously velutinous over lower part; spores 8–11 × 5–6 μ; pileus strongly sulcate 163. *G. velutipes*
1. Stipe not velutinous 2
2. Spores 9–13 μ long 3
2. Spores 7–10 μ long 7
3. Cheilocystidia mostly vesiculose to vesiculose-mucronate; on soil among *Empetrum*; from Tierra del Fuego see *G. subannulata* (170)
3. Cheilocystidia fusoid-ventricose 4
4. Veil typically leaving a zone of fibrils on stipe 5
4. Veil reduced and any zone very soon evanescent
..... 162a. *G. cedretorum* var. *bispora*
5. On wood of hardwoods; stipe dark brown; spores 9–11 μ long, wall merely faintly marbled 160 *G. mesites*
5. Generally on coniferous wood and debris; stipe bister below; spores 11–13 μ long, ornamentation more distinct 6
6. Lamellae close; pileus trama rusty ochraceous; cystidia entirely hyaline 161 *G. badipes*

6. Lamellae distant; pileus trama yellow; cystidia often with ochraceous base ----- 162b. *G. cedretorum* var. *austroandina*
7. Aspect of carpophore Marasmius-like (pileus deeply sulcate); veil none; pleurocystidia $86-142 \times 8-11 \times 5-8 \mu$; tropical -----
----- 164 *G. sulciceps*
7. Not as above ----- 8
8. Spores rather distinctly ornamented ----- 9
8. Spores weakly ornamented ----- 13
9. Pileus chestnut brown ----- see *G. victoriae* (137)
9. Pileus fulvous to pale tawny ----- 10
10. Lignicolous; gills narrow; pileus "deeply striate" -----
----- 165. *G. subpectinata*
10. Not as above ----- 11
11. Stipe with a distinct annulus ----- see *G. physospora* (153)
11. Not as above ----- 12
12. Stipe bister below; basidia
2-spored ----- 162d. *G. cedretorum* var. *microspora*
12. Stipe not as above; basidia
4-spored ----- 166. *G. hepaticicola*
13. Lamellae "cinnamon"; on sand dunes ----- 167. *G. arenicola*
13. Not as above ----- 14
14. On wood of hardwood; South America ----- see *G. physospora* (153)
14. Not as above ----- 15
15. Spores very pale yellow; carpophores gregarious; on conifer needles
----- 168. *G. pinetorum*
15. Not with above combination of characters ----- 16
16. Spores $8-10 \times 5-6 \mu$, weakly ornamented -----
----- 162. *G. cedretorum* var. *cedretorum*
16. Spores $7-9 \times 4-5 \mu$, practically smooth ----- 169. *G. subglabripes*

160. *Galerina mesites* Smith & Singer, Mycologia 47: 587. 1955.

Illustrations: Pl. 121, fig. C. Fig. 180 (pleurocystidia and cheilocystidia).

Pileus 10–20 mm broad, conic to plano-umbonate, surface glabrous, moist, hygrophanous (lubricous to subviscid on young fresh caps), evenly tawny and translucent striate part way to disc when moist, fading to cinnamon buff; flesh thin, pliant, odor faintly acidulous, taste mild.

Lamellae broad, short-decurrent, \pm subdistant, tawny (both young and old), edges even to slightly fimbriate under a lens.

Stipe 10–30 mm long, 1–2 thick, equal, dark red brown over all, with merely a faint fibrillous zone from broken veil, glabrous and naked in age.

Spores $9-11 \times 5-6.5 \mu$, somewhat inequilateral in profile, narrowly ovate in face view, ochraceous tawny in KOH, deep red-brown in Melzer's reagent, wall faintly marbled (under oil) and with a smooth faintly delimited plage. Basidia $28-34 \times 6-7 \mu$, 4-spored. Pleurocystidia scattered,

40–60 \times 9–15 μ , fusoid-ventricose with subacute apices, hyaline, thin-walled. Cheilocystidia similar to pleurocystidia, scattered. Gill trama \pm parallel but cells \pm ellipsoid. Epicutis of pileus subgelatinous in KOH, but indistinct, consisting of a layer of hyaline hyphae 2–4 hyphae thick. Pileus trama consisting of hyphae with yellow to rusty incrusting pigment. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Closely gregarious on a hardwood log, Mackinaw City Hardwoods, Emmet County, Michigan, Oct.

OBSERVATIONS: This species is clearly close to *G. unicolor*. The subgelatinous cuticular hyphae are not appreciably narrower than the colored ones making up the context, and the pleurocystidia are similar. The spores are nearly smooth, however, and the veil is slight.

Since the pellicle does not show the narrower hyphae usually accompanying a truly viscid condition, we place the species in this stirps where it finds a logical place beside *G. badipes*. It differs from the latter in growing on hardwood, having smoother spores which become dark red-brown in Melzer's solution, and in the stipe becoming bay instead of bister.

MATERIAL EXAMINED: Smith 34148; 40216; 44054-*type*.

161. *Galerina badipes* (Fr.) Kühner, Ency. Myc. 7: 222. 1935. sensu Fr. non Kühn.

Agaricus badipes Fr., Epicr. Myc., p. 196. 1838.

Naucoria badipes (Fr.) Kummer, Führer in Pilzk. p. 77. 1871. (as *N. badipus*)

Galera badipes (Fr.) Ricken, Blätterp. 1: 228. 1915.

Illustrations: Pl. 9, figs. C & D; pl. 13, figs. C, E; pl. 15, fig. E. Fig. 181 (pleurocystidia).

Pileus 10–25 mm broad, obtuse when young, expanding to broadly convex or plano-umbonate, surface moist and hygrophanous, with scattered remnants of veil along the margin at first, color dull ochraceous tawny, fading to pinkish buff; odor and taste not recorded.

Lamellae close, moderately broad, adnate with a decurrent tooth, ochraceous tawny, margins fimbriate from cheilocystidia.

Stipe 30–40 mm long, 1–2.5 mm thick, equal, pliant-cartilaginous, tubular, pale honey color above, darker below (base bister within and without and this shade retained in drying), rather copiously fibrillose with grayish-pallid veil remnants and usually with a superior fibrillose annulus; lower portion sheathed at first but the sheath separating into patches in age.

Spores 10–13 \times 5–7 μ , inequilateral in profile, ovate in face view, tawny-ochraceous in KOH, wall slightly rugulose and the smooth supra-hilar depression usually rather indistinctly delimited. Basidia 2-spored. Pleurocystidia abundant, 60–90 \times 9–15 μ , fusoid-ventricose with flexuous necks and acute to subacute apices, thin-walled, hyaline in KOH. Cheilocystidia abundant 40–60(70) \times 8–12 μ , fusoid-ventricose with flexuous necks and obtuse apices. Gill trama regular, ochraceous in KOH. Pileus

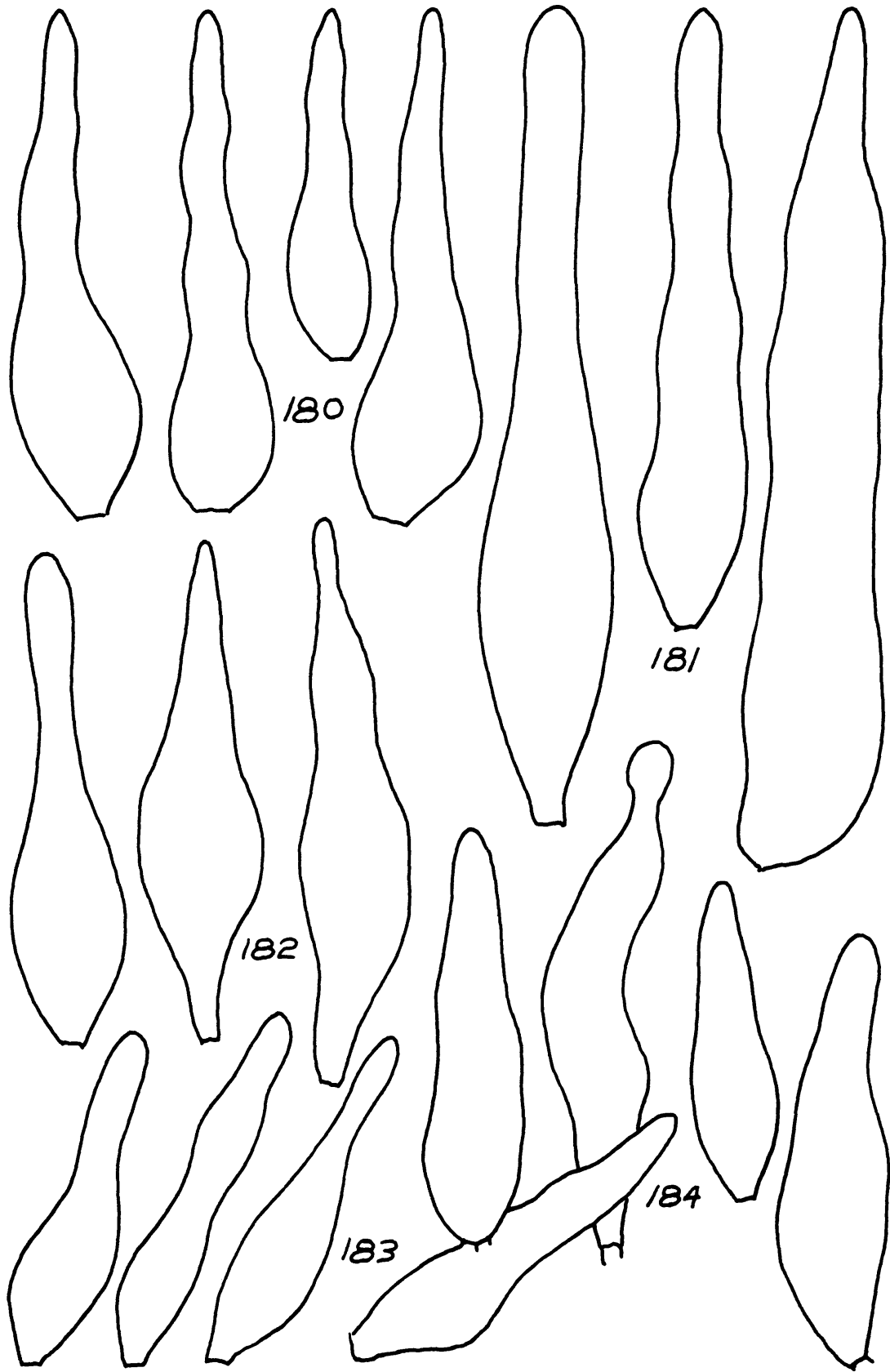


Fig. XXV

Cystidia: Fig. 180, pleurocystidia and cheilocystidia of *G. mesites*; 181, pleurocystidia of *G. badipes*; 182, pleurocystidia and 183, cheilocystidia, of *G. cedretorum* var. *bispora*; 184, pleurocystidia of *G. subpectinata*.

trama rusty ochraceous in KOH, homogeneous beneath a thin cuticle of non-gelatinous hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on conifer debris in wet areas, especially around chips, Pacific Northwest and the Great Lakes region in North America, and in Europe where it is apparently very rare or restricted to the north and the Alps.

OBSERVATIONS: We have encountered some difficulty in arriving at a name for this species. The fungus is superficially like *Agaricus badipes* Fries, but Kühner used this name for *G. cedretorum*, an unjustified interpretation in our estimation since the true *A. badipes* should have a much better developed veil. We were tempted to apply a new name to our American collections in an attempt to avoid further confusion in regard to the epithet *badipes*. Many fungi which resemble each other superficially but occur in different continents, are quite different in their microscopic characters. The collections from Italy (Alps) and Finland, however, have convinced us of the correctness of the above interpretation of Fries' species.

Smith 52818 from Trout Lake, Colorado, apparently belongs here but was found on an aspen log. The caps were 10–20 mm broad, ochraceous-tawny moist, faded to cinnamon buff, and were slightly lubricous. The stipe was grayish fibrillose-pruinose over all and a distinct zone was left by the veil. Beneath the veil the stipe was bister below and honey-colored above. There was neither a distinctive odor nor a taste. Both 2- and 4-spored basidia were present. The pleurocystidia were typical and the hyphae of the cuticle were 3–5 μ in diam., slightly incrustated and not at all gelatinous.

Some of Karsten's collections of *Naucoria camerina* appear to belong here and Wm. Bridge Cooke 22646 and 21383 are 4-spored collections.

MATERIAL EXAMINED: W. B. & V. G. Cooke 21383 (4-spored form); 22646 (4-spored form) (MICH). Höhnel, Italy ("Vahrn b. Brixen") (FH). Karsten, Finland, Sept. 22, 1878 (H). Smith 40125 (typical); 40211; 40217; 40219; 40221; 40539; 40636; 41139; 42037; 43575; 43628; 43696; 43697; 43851; 45487; 47043; 48724; 49212; 52128; 52818.

Key to the Varieties of *Galerina cedretorum*

1. Spores 8–10 μ long; basidia 2-spored var. *microspora*
1. Spores larger, or basidia 4-spored 2
 2. Basidia (all or many) 4-spored; stipe generally deep red brown at base when bruised or in age 3
 2. Basidia (1) 2 (3)-spored 4
3. Stipe 1–1.5 mm broad at apex; spores rugulose-verrucose ... var. *filiformis*
3. Stipe generally broader; spores with a low to faint warty-rugulose ornamentation var. *cedretorum*
 4. Cystidia 30–55 \times 8–12(15) μ , scattered to rare var. *variabilis*
 4. Cystidia larger, more numerous 5
5. Stipe 1–1.5 mm broad at apex, on bruising or in age becoming reddish brown at base; cystidia hyaline; spores distinctly warty-rugulose 3
5. Not combining these characters 6

6. Stipe 1–1.5 mm broad at apex, broadening towards base, veil well developed; lamellae distinct, broad; stipe short; most spores finely punctate ----- var. *austroandina*
6. Stipe 1.5–3.5 mm broad at apex; veil poorly developed; lamellae close to subdistant, mostly moderately broad; most spores rugulose-roughened (warty) ----- var. *bispora*

162. *Galerina cedretorum* (Maire) Singer, Trudy Bot. Inst. Akad. Nauk. S.S.S.R. 6: 47. 1950.

Galerula cedretorum Maire, Bull. Soc. Myc. Fr. 44: 49. 1928.
var. *cedretorum*

Pileus 10–20 mm broad, convex, obtusely umbonate to broadly convex in age, glabrous, moist, hygrophanous, “ochraceous tawny” fading to “pale ochraceous buff,” striatulate on the margin when moist, edge glabrous and even; flesh thick on the disc, tapering evenly to margin, watery ochraceous tawny moist, odor and taste not recorded.

Lamellae close (± 20 reach the stipe), moderately broad (3–5 mm), broadly adnate-decurrent, ochraceous-tawny, edges somewhat eroded.

Stipe 30–40 mm long, 2–3.5 mm thick, pale ochraceous at first, basal region dark chestnut brown in age, surface with a thin coating of appressed silky fibrils over lower half, upper portion pruinose.

Spores 8–10 \times 5–6 μ , in profile view subinequilateral, ovate in face view, faintly warty-rugulose and occasionally the wall loosening slightly around the smooth plage, with an apical callus, ochraceous tawny to darker in KOH. Basidia 4-spored, 18–20 \times 7–8 μ , hyaline in KOH. Pleurocystidia abundant, narrowly fusoid-ventricose, 50–70 \times 8–12 μ , thin-walled, hyaline in KOH, smooth, the necks somewhat flexuous and apices subacute to obtuse, a few subcapitate. Cheilocystidia similar to but usually smaller than pleurocystidia. Gill trama parallel, pale yellow in KOH. Pileus trama homogeneous, yellow in KOH, hyphae with clamp connections, surface layer more compact but otherwise not differentiated from the remainder of the trama.

HABIT, HABITAT AND DISTRIBUTION: Cespitose-gregarious along highways on debris, and gregarious under conifers, late summer and fall in northern and western United States, also in North Africa, the Caucasus and Europe. Collections of the 4-spored form were all from Washington and Oregon.

OBSERVATIONS: This species, as is true of most common species, is a variable fungus even as we have restricted the concept of the type variety. The lack of a fibrillose annulus is the field character by which it can be distinguished from *G. badipes*. The two-spored variety, var. *bispora*, is more common than the type variety here in North America and, apparently, also in Northern and Eastern Europe.

In Mexico (Singer M 1567, Paso de Cortes, 3600 m. alt. 21 Jul. 1957) there exists a form which does not become darkened in the lower stipe region (merely ochraceous brown), and has spore ornamentation intermedi-

ate between that of var. *cedretorum* and var. *filiformis*. Stipe diameter at apex 1.7 mm. Spore size $9.2\text{--}10.5 \times 6.3\text{--}7.7 \mu$. Among grass on earth in scattered pine woods. The material is too scanty to be described as a taxon intermediate between the two published varieties, but is worth mentioning since it tends to demonstrate their conspecificity.

MATERIAL EXAMINED: Four-spored form: Smith 3519; 28177; 28188; 41088; 41140; 41162; 44519.

162a. *Galerina cedretorum* var. *bispora*, Smith & Singer, var. nov.
Illustrations: Pl. 16 fig. B. Fig. 182 (pleurocystidia), 183 (cheilocystidia).

A varietate *cedretorum* differt sporis minus verrucosis, basidiis haud tetrasporis; stipite ad basin fuscescente. Specimen typicum leg. Smith 56162 (MICH).

Pileus 15–35 mm broad, obtusely conic with an incurved margin, becoming expanded and umbonate or remaining obtusely conic, surface moist and hygrophanous, pale fulvous (“ochraceous tawny” to “buckthorn brown”) moist and then striate, when faded opaque and pale yellow (“light buff”), glabrous; context pliant, thick in the disc, watery brown fading to pale buff, odor and taste not distinctive.

Lamellae moderately broad, close to subdistant, broadest near stipe, bluntly adnate with a decurrent tooth, dingy brownish young, near ochraceous tawny when mature, edges even or somewhat eroded.

Stipe 40–60(70) mm long, 2–3.5 mm thick, equal, rather tough, hollow or soon becoming so, at first whitish from a thin canescent covering of fibrils to near the pruinose apex, glabrescent, brownish above, soon fuscescent from below upward, finally bister overall.

Spores $10\text{--}13 \times 5.5\text{--}7(8) \mu$, in profile inequilateral, ovate in face view, plage delimited by an irregular line, surface rugulose, roughened overall but outer layer not separating, no apical pore present but callus often distinct. Basidia 2-spored; pleurocystidia scattered $40\text{--}60 \times 1\text{--}15 \mu$, fusoid-ventricose with necks tapering to acute to subacute apices, thin-walled, smooth. Cheilocystidia similar to pleurocystidia but smaller. Epicutis of appressed non-gelatinous hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on woody debris (conifers) along roads, etc., fall, often late; Michigan, Washington, Oregon and California in USA, USSR in Asia; apparently not uncommon in Europe.

OBSERVATIONS: Kühner’s concept of *G. badipes* is a two-spored *Galerina* of this group which is different from *G. badipes* var. *badipes* in our sense, but apparently very close to our var. *bispora*. There is, however, a discrepancy between our data on the epicutis of var. *bispora* and the description given by Kühner (op. cit., p. 224) where it is stated that the hyphae of the covering of the pileus are “± gélifiées.” This is not the case in our own material, nor is it found in any of the varieties of *G. cedretorum* admitted here, and it is not indicated in Maire’s original description of *G. cedretorum* (4-spored form). If there were a *Galerina* with the general characters of *G. cedretorum* and truly

gelatinized epicutis, it would key out in the *Autumnalis* group of our classification, with *G. moelleri* from which it differs in the absence of an annulus, not fatty-shiny pileus, smaller spores in the 4-spored forms, and habitat.

Among Karsten's collections we found one with smaller spores on 2-spored basidia and with relatively few pleurocystidia. It was collected by Karsten, Nov. 28, 1877.

MATERIAL EXAMINED: Bailey 33. Bigelow 4661. Cooke, W. B., 18969. Smith 3429; 8394; 17850; 19506; 19824; 35730; 35732; 40567; 40600; 41214; 44481; 44494; 44530; 46601; 46728; 46808; 46817; 47038; 47091; 47131; 47225; 48484; 49205; 52171; 53990; 53991; 54083; 54120; 54166; 54242; 55395; 55609; 55699; 56162-*type*.

162b. *Galerina cedretorum* var. *austroandina* Singer, var. nov.

A *Galerina cedretorum* var. *bispora* differt stipite tenuiore (1–1.5 mm diam.), ad basin fusciscente; cystidiis ad basin ad ochraceum tendentibus; sporis subtiliter verruculose-punctatis, velo bene evoluto, lamellis distantibus. In Patagonia leg. Singer M 1849 (LIL).

Pileus 9–13 mm broad convex with a distinct but obtuse umbo, not viscid, transparently striate on the outer half of the radius when wet, glabrous, brown (*hazel*, later *14-A-11* to "*burnt umber*") on striae and in center, between striae sometimes paler (11-I-7 to 12-J-7), hygrophanous, fading to much paler (near *maple*, *Inca gold*, *10-G-6*); taste banal, mild; odor not farinaceous, almost nil.

Lamellae broad, ventricose, distant, adnate, or sinuate-adnate and occasionally subdecurrent, yellow brown (between *Yucatan* and *raw sienna*).

Stipe 26–31 × 1–1.5 mm, but gradually broader below reaching 2–2.5 mm at base, strongly silky-fibrillose from a white veil over all except the apex which is light brown and pallid-pruinose, ground color deep fuscous brown without a reddish tint (*bracken*), becoming visible where surface is scratched and in lower portion of stipe in age and on drying; annulus none, but in faded condition velar fibrils at their upper end often somewhat ascendant forming a vague and fugacious demarcation line.

Spores 9.5–13 × 6–7 μ (some giant spores reaching 16–17 × 6.2–8.3 μ), varying from subsmooth to distinctly punctate-verruculose, mostly finely punctate, well pigmented and often remarkably thick-walled (and then no callus or pore present), usually with an apical discontinuity which may vary from a slight callus to a narrow inconspicuous pore, ellipsoid, with distinct suprahilar depression and plage area well delimited. Basidia 2-spored, few 1-spored or 3-spored, hyaline, 19–27 × 6.3–8.3 μ; pleurocystidia and cheilocystidia similar, the latter often slightly larger and crowded, the former scattered to very numerous, hyaline, more rarely with a slightly ochraceous base, 54–65 × 8–15 μ, with swollen ventricose base and a long tapering, cylindrical or subfilamentous neck which is often wavy or with an irregular oblique appendage, apex generally simple and rounded to more rarely subacute, neck 3.5 μ broad at its narrowest, 4–5 μ at its widest

point; trama of lamellae and pileus yellow, not distinctly incrustated, regular; epicutis of pileus of hyaline filamentous hyphae which are not gelatinized. Hyphae with clamp connections.

HABIT, HABITAT, AND DISTRIBUTION: Gregarious on dark sand of river-side near the glacier, attached to small twigs of *Fitzroya cupressoides*, March 16, 1959, Rio Frías, path to Paso de los Nubes, Rio Negro (Patagonia), Argentina, Singer M 1849-*typus* (LIL).

This variety is intermediate between *G. badipes* and *G. cedretorum* var. *bispora* as far as veil development is concerned, it differs from the latter in narrower shorter stipe, more copious veil, and more distant lamellae. It differs from var. *filiformis* in the color of the base of the stipe and the definitely weaker exosporial ornamentation; and from *variabilis* in the more numerous and considerably larger cystidia. *G. badipes* differs from var. *austroandina* in veil characters, close and moderately broad lamellae, hyaline cystidia, and rusty ochraceous pileus trama.

162c. *Galerina cedretorum* var. *filiformis* Smith & Singer, var. nov.
Illustrations: Pl. 5, fig. B; pl. 14, fig. E.; pl. 17, fig. A.

A varietate typica carne aquosa fragili, stipite filiformi deorsum fibrilloso, glabrescente differet. Ad quisquilia lignea coniferarum. Specimen typicum in Herb. Univ. Mich. conservatum; legit prope Green Lake, Mt. Rainier National Park, Washington, Oct. 17, 1952. Smith 41032.

Pileus (8)10–15 mm broad, obtusely conic, in age broadly conic to convex, surface glabrous, moist and translucent striate, hygrophanous, pale ochraceous fading to pale pinkish buff or more yellowish; flesh *very soft* and *fragile*, concolorous with surface, odor and taste not distinctive.

Lamellae broad, broadly adnate, seceding, subdistant, pale ochraceous tawny, edges slightly fimbriate.

Stipe 20–35 mm long, 1–1.5 mm thick at apex, equal or nearly so, more or less concolorous with moist pileus and thinly pallid-fibrillose over lower half, base darkening, either where bruised or in age, to reddish brown.

Spores (9)10–12 × 5–6.5 μ, obscurely inequilateral in profile view, ovate in face view, rugulose warted, suprahilar depression smooth and distinctly delimited, occasional spores with blisters around the depression. Basidia 2- and 4-spored. Pleurocystidia scattered, 40–60 × 10–15 μ, fusoid-ventricose with obtuse apices, hyaline, thin-walled. Cheilocystidia abundant, 40–55 × 8–10(12) μ, some scarcely ventricose, hyaline, thin-walled. Gill trama regular, ochraceous in KOH. Pileus trama homogeneous, ochraceous in KOH. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on very rotten conifer and herbaceous debris, Green Lake, Mt. Rainier National Park, Washington. Known only from the type locality.

OBSERVATIONS: The spores of this variety are more like those of *G. marginata* in their markings than like those of *G. consobrina* or *G. cedretorum* var. *cedretorum*. The soft consistency is a character at variance with the other taxa

of this stirps. Both the consistency and the reduced veil prevent assignment to *G. marginata*. This variety was not uncommon at Green Lake under herbaceous plants which had grown up over old conifer logs brought down the mountain by snow slides.

A collection (Paso de Cortés, 3600 m. alt., Mexico, D.F.) by Singer (M 1567) agrees fairly well with this variety; it grew on earth, apparently on rotten herbaceous material and mosses under *Pinus*, and differs in somewhat smaller but broader spores ($9.2\text{--}10.5 \times 6.3\text{--}7.7 \mu$) and consistently 4-spored basidia; also, perhaps more important, in somewhat larger (up to 54μ) cystidia and in the base of the stipe not darkening. This is probably another variety of this species but since the material was not abundant we merely mention it here (MICH).

MATERIAL EXAMINED: Smith 41032-*type*; 41062; 41085; 41151; 41218; 48160; 48163.

162d. *Galerina cedretorum* var. *microspora* Smith, Sydowia, Beih. I: 52. 1957.

Pileus 10–20 mm broad, obtusely conic to convex sometimes campanulate, surface glabrous, moist, translucent-striate, hygrophanous, ochraceous tawny fading to pale “cinnamon-buff”; flesh thin, odor and taste not recorded.

Lamellae narrow, close, adnate, ascending to nearly horizontal, pale buff becoming pale ochraceous tawny, edges fimbriate.

Stipe 25–40 mm long, ± 1.5 mm thick, equal, cartilaginous, dark brown to bister at base progressing upward in age, usually pallid honey-color above, glabrous or with a few silky fibrils, apex pruinose; veil not evident, if present rudimentary.

Spores $8\text{--}10 \times 5\text{--}6 \mu$, ovate in face view, inequilateral in profile, distinctly roughened (as seen under a 4 mm dry objective), with a well-defined smooth plage, dark ochraceous tawny to rusty brown in KOH. Basidia 2-spored, hyaline in KOH. Pleurocystidia scattered, $45\text{--}60 \times 10\text{--}15 \mu$, fusoid-ventricose, apices obtuse to subacute, hyaline, smooth, thin-walled. Gill trama parallel, hyaline to yellowish in KOH. Pileus trama with a hyaline layer of non-gelatinous hyphae $4\text{--}6 \mu$ in diam. over the surface, beneath this hyphae with ochraceous incrusting pigment (hyaline incrusting material may be present on the hyphae of the cuticle). Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: In a clearing through a mixed forest of aspen, birch, balsam, pine and black spruce, on debris in a grassy spot, Wilderness Park, Emmet County, Michigan, Oct. 7, 1955. Smith 50911.

OBSERVATIONS: This is the 2-spored form of the variety. When the 4-spored form is found it is expected that it will have even smaller spores. We would venture to predict, if the usual ratio between 2- and 4-spored forms holds, that the spores will measure $6.5\text{--}8 \times \pm 5 \mu$. If such a fungus is found the taxonomic status of both forms should be re-evaluated.

MATERIAL EXAMINED: Smith 50911-*type*; 50918; 51055.

162e. *Galerina cedretorum* var. *variabilis* Smith & Singer, var. nov.

Ab aliis varietatibus huius speciei cystidiis minoribus et sparsis differt.

Pileus 10–20 mm broad, convex, becoming broadly convex, surface glabrous moist and hygrophanous, bright “ochraceous tawny” moist, cinnamon buff faded.

Lamellae close, broad, adnate, ochraceous-tawny, edges fimbriate under a lens.

Stipe 20–30 mm long, 1–2.5 mm at apex, equal, fragile, pruinose above, glabrous or with a few appressed fibrils below, upper half pale yellow, lower portion discoloring to bister.

Spores 10–14(17) \times 6–7.5 μ , narrowly inequilateral in profile view, narrowly ovate in face view, pale “tawny” in KOH, dark red-brown in Melzer’s sol., very minutely roughened and plage margin distinct under oil. Basidia 1–2 spored. Pleurocystidia scattered to rare, 30–55 \times 8–12(15) μ , fusoid-ventricose with subacute apices, hyaline in KOH or walls faintly yellowish especially over lower one-third. Cheilocystidia 30–55 \times 8–14 μ , fusoid-ventricose and more highly colored than the pleurocystidia. Gill trama subparallel, ochraceous in KOH. Pileus trama ochraceous in KOH, cuticle of radial narrow, incrustated hyphae. Clamps present.

HABIT, HABITAT AND DISTRIBUTION: On moist conifer debris, Upper Trout Lake Valley, San Juan Mountains, Colorado, Aug. 13, 1956. Smith 52126-*type* (MICH).

OBSERVATIONS: This variety is distinguished from the type variety by the smaller, more scattered to rare pleurocystidia and by the distinct tendency for the cheilocystidia to have colored walls in their basal third. The spores vary according to the usual pattern in 1- and 2-spored forms. Many extremely elongated, narrow spores are found and in these the snout-like apical region is often smooth walled. One-spored basidia with the single large sterigma are likely to be mistaken for small pleurocystidia. The most interesting variation is in the form of the sterigmata. These are often up to 12 μ long and 3 μ thick with an abrupt constriction leading to the pointed tip. Thus they resemble the epibasidia as these structures are often interpreted in the Dacrymycetales. Actually this type of sterigma is not rare among bi-spored forms in the agarics generally.

Smith 51984 from a conifer log, Ophir, Colorado, appears to be the same but in it the sterigmata are only 6–8 μ long, and 3–3.5 μ at the base. The cheilocystidia, spores and pleurocystidia are typical.

163. *Galerina velutipes* Singer, sp. nov.

Illustrations: Figs. 152 (cheilocystidia), 153 (pileocystidia), 154 (pleurocystidia).

A *G. sulcicipite* pleurocystidiorum forma, perisporio adhaerente, superficie velutina stipitis differt. Ceterum, praesertim sulcatione pilei speciei asiaticae simillima affinisque.

Pileus up to 35 mm broad, varying from irregularly to regularly con-

vex to convex-umbilicate, color pale dingy ochraceous brown (*pl. 11, 1-7* and *pl. 12, 7-8*), hygrophanous, fading to near pinkish buff (*pl. 10, D-2*), strongly sulcate over one half to two-thirds or three-fourths of the radius; veil on margin slightly tomentose; odor none, taste farinaceous, very slightly bitter in addition at times.

Lamellae dingy yellow brown (*pl. 13, K-10*), close to subdistant, moderately broad to rather broad (± 4 mm), adnate.

Stipe 20–36 mm long, 5 mm thick, slightly tapering upward, surface strongly velutinous over lower part and progressively less so toward the apex, cortex about concolorous with the pileus but showing more above because of the less dense covering there; veil very thin and only occasionally leaving a slight superior evanescent furfuraceous zone.

Spores $8-11 \times 5-6 \mu$, inequilateral in profile view, ovate in face view, ochraceous tawny in KOH, dark rusty red in Melzer's sol., distinctly verruculose under oil-immersion, verruculose material somewhat deciduous (but spores never calyptrate). Basidia (16)20–25 \times 6–7.5 μ , hyaline to yellowish (in KOH), mostly 4-spored. Pleurocystidia ventricose with elongated neck, (40)60–90 \times 12–16 \times 6–8 \times 7–12 μ , hyaline or nearly so, thin-walled, wall often flexuous in the neck, apices obtuse to rounded or subcapitate. Cheilocystidia similar to pleurocystidia but usually smaller, rare to scattered; subhymenium compactly interwoven, somewhat "glassy" in KOH. Pilocystidia present, 10–18(50) \times 2.5–4.5 μ , elongate-subcapitate to subfusoid or some filamentous and often rather crooked. Gill trama regular, interwoven-parallel, yellowish-pallid, the hyphal walls 0.5–0.75 μ thick, lacking incrustations; trama of pileus homogeneous beneath a poorly defined non-gelatinous epicutis, hyphal walls "glassy" in KOH and $\pm 1 \mu$ thick. Clamp connections present. Covering of the stipe formed by hyaline thin-walled, often branched hyphae growing out from the cortex and forming a rather dense mat, no differentiation into cystidioid elements observed.

HABIT, HABITAT AND DISTRIBUTION: On trunk of dicotyledonous tree rotting in subtropical forest in dry weather conditions, gregarious to subcespitose, late fall, R. Singer M 932-type Puerto Iguazú (Puerto Aguirre) prov. Misiones, Argentina, April 12, 1957 (LIL) and (MICH).

OBSERVATIONS: This species is related to *G. sulciceps* but differs in the shape of the pleurocystidia, the adherant perisporium, and the characters of the surface of the stipe. The cystidia are indeed somewhat intermediate between the type found in *G. sulciceps* and the *Physocystis* type, but the deeply sulcate pileus and other characters link *G. velutipes* with *G. sulciceps* and *G. subpectinata*, species which undoubtedly belong in the *Cedretorum* group.

164. *Galerina sulciceps* (Berk.) Boedijn, Sydowia 5: 224. 1951.

Marasmius sulciceps Berkeley, Hook. Lond. Jour. Bot. 6: 490. 1847.

Phaeomarasmius sulciceps ["sulcipes"] (Berk.) Scherffel, Hedwigia 36: 289. 1897.

Pileus 15–40 mm in diam., smooth, membranous, tough, subgelatinous in consistency, convex becoming more or less depressed in the center,

margin thin, acute, spreading and somewhat wavy, often split, center with a small almost globose umbo, deeply sulcate almost to the umbo, color (of dried material) dark rusty to dark vinaceous brown ("Mikado brown" "Verona brown" or "snuff brown").

Lamellae distant, broadly adnate to slightly decurrent, lamellulae present, broad (up to 4 mm) and thick at the base (1 mm), in age distinctly intervenose.

Stipe 4–25 mm long, 1.5–3 mm thick, central to more or less excentric, solid, terete to compressed, faintly pruinose.

Spores $7.2\text{--}9.7 \times 4.5\text{--}5.8 \mu$, ellipsoid to almond-shaped, yellowish brown (well pigmented), with a distinct callus, with well delimited plage, exosporial ornamentation finely punctate to finely verrucose, loosening together with the saccate perisporium (in herbarium specimen) and often peeling off the episporium, leaving the spore smooth. Basidia 4-spored. Pleurocystidia $40 \times 10.5 \mu$ and larger (up to $142 \times 18 \times 8 \mu$, according to Boedijn), ventricose at base, neck long and subcylindric with obtuse tip, thin-walled, hyaline to more rarely pale brownish ochraceous, sometimes with a crystalline cap (artifact?), moderately numerous. Cheilocystidia similar to pleurocystidia. Gill trama regular, pale melleous to hyaline, without incrustations of pigment. Epicutis little differentiated from trama. Hyphae with clamp connections.

HABIT, HABITAT, AND DISTRIBUTION: Java, Sumatra, Ceylon, apparently abundant in some localities, on dead wood.

OBSERVATIONS: Our macroscopical description is taken from Boedijn's excellent account (1938); the microscopical description is given according to the notes taken by Singer on the type.

This species obviously has more than its share of distinguishing characteristics and in addition is deadly poisonous. Even the symptoms of poisoning are unusual to some extent, involving local anesthesia, "pins and needles" sensation and nausea without vomiting. Death occurs in 7–51 hours unless the patient survives, which seems to depend on the quantity eaten and the vigor of the individual.

MATERIAL STUDIED: Gardner, from Hautane Range, No. 38 (K).

165. *Galerina subpectinata* (Murrill) Smith & Singer, comb. nov.

Agaricus pectinatus Berkeley & Curtis, Jour. Linn. Soc. 10: 291. 1868.
(not *A. pectinatus* Schw. 1822)

Naucoria pectinata (Berk. & Curt.) Sacc. Syll. Fung. 5: 856. 1887.

Naucoria subpectinata Murrill, N. Am. Fl. 10: 184. 1917.

Illustration: Fig. 184 (pleurocystidia).

Pileus 25–40 mm broad, convex becoming plane or depressed, surface glabrous, hygrophanous, fulvous, margin deeply striate; flesh thin.

Lamellae adnexed or adnate, narrow, subdistant, concolorous.

Stipe 25–60 mm long, 2–5 mm thick, solid, glabrous, brown or reddish brown.

Spores $6.5-8 \times 4-5 \mu$ (including inflated exosporium) $6-7.5 \times 3.5-4 \mu$ (when exosporium is removed), dark rusty in KOH, warty-wrinkled from loose exosporium, plage smooth. Basidia 4-spored, hyaline in KOH, $16-20 \times 6-7 \mu$. Pleurocystidia abundant, mostly remaining collapsed in revived mounts, $50-65 \times 9-13 \mu$, subcylindric to subventricose (at base), hyaline, thin-walled, apices obtuse. Cheilocystidia not reviving (a yellow amorphous gill edge was all that was evident). Gill trama interwoven of hyaline, broad, \pm thick-walled hyphae which appear "glassy" (as in some tropical *Marsmii*) when revived in KOH. Pileus trama homogeneous, hyphae of same type as in gill trama. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Cespitose on logs in Cuba.

OBSERVATIONS: Our microscopic data check with the illustrations by Dennis (1953) who considered *G. subpectinata* and *G. hepaticicola* to be synonymous. There appears to be a valid anatomical difference in the nature of the tramal hyphae, and, of course, the habit and habitat of the two are quite different. The misleading point seems to be that in southern regions there is a much more pronounced tendency generally for *Galerinae* to have a loosely enveloping exosporium. Actually, if one compares the descriptions carefully, a number of differences between these two species are evident. The question is whether or not they mean anything. This will have to be settled by careful study of further collections.

MATERIAL EXAMINED: Murrill's authentic material (N.Y.), and Berkeley's type (K).

166. *Galerina hepaticicola* (Murrill) Smith & Singer, comb. nov.

Naucoria hepaticicola Murrill, Mycologia 4: 78. 1912.

Illustration: Fig. 186 (pleurocystidia).

Pileus about 10 mm broad, hemispheric to convex, surface dry, glabrous, smooth, not striate, fulvous.

Lamellae adnate, plane or slightly arcuate, broad, distant, inserted, melleous to fulvous.

Stipe about 15 mm long, 2 mm thick, tapering upward, glabrous, smooth, cartilaginous, veil very slight, fibrillose-evanescent.

Spores $7-9 \times 5-6 \mu$, dark rusty in KOH, subovate to elliptic in face view, somewhat inequilateral in profile, outer wall coarsely rugulose-warty and loosely enveloping the endosporium, plage smooth and distinct. Basidia 4-spored. Cheilocystidia abundant, $40-70 \times 10-16 \mu$, fusoid-ventricose with elongated necks and obtuse apices, hyaline, readily collapsing, smooth, thin-walled. Pleurocystidia *rare*, readily collapsing, apparently similar to the cheilocystidia. Gill trama regular, of thin-walled hyphae not glassy in KOH. Pileus trama homogeneous, of thin-walled pigment-incrusted hyphae. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious among liverworts on a clay bank, Jalapa, Mexico, 5,000 ft. elev. Dec. 12-20, 1909.

OBSERVATIONS: See *G. subpectinata* for comments.

MATERIAL EXAMINED: W. A. & E. L. Murrill 131-*type* (N.Y.)

167. *Galerina arenicola* Smith, sp. nov.

Illustrations: Figs. 185, 187 (pleurocystidia).

Pileus 10–15 mm latus, late convexus, demum subplanus, glaber, udus, hygrophanus, fulvus, deinde pallide fulvus; lamellae angustae, late adnatae vel subdecurrentes, confertae, cinnamomeae; stipes 10–20 mm longus, 2–2.5 mm crassus, griseo-fibrillosus, deorsum demum subfuscus; sporae 7–9(10) \times 4–4.5(5) μ , anguste ovatae; pleurocystidia 30–40 \times 7–10 μ vel 55–77 \times 15–25 μ . Specimen typicum legit Smith (56815) 18 Dec. 1956, Little River Dunes, Humboldt County, California, U.S.A. (MICH).

Pileus 10–15 mm broad, broadly convex with an incurved margin; expanding to plane or margin uplifted, surface glabrous, moist, hygrophanous, tawny fresh, fading to paler tawny; odor and taste not recorded.

Lamellae narrow, broadly adnate to subdecurrent, seceding, close, near “cinnamon” both fresh and dried, edges crenulate.

Stipe 10–20 mm long, 2–2.5 mm at apex, equal, surface fibrillose over lower part from grayish fibrils representing remains of the veil but no distinct zone or annulus present, darkening to bister over the basal area, apex pruinose.

Spores 7–9(10) \times 4–4.5(5) μ , narrowly ovate in face view, in profile narrowly inequilateral, dark dull tawny in KOH, surface faintly marbled (under oil) and with a faint line marking the plage, apical callus present. Basidia 2- and 4-spored, yellow in KOH. Pleurocystidia abundant 30–40 \times 7–10 μ and up to 55–77 \times 15–25 μ (the smallest ones narrowly fusoid), with thin walls, smooth, content hyaline to pale yellowish in KOH, the apices acute, tapered to apex and thin-walled in neck. Cheilocystidia similar to the smaller pleurocystidia. Gill trama parallel, yellow in KOH. Pileus trama homogeneous, ochraceous in KOH; no pilocysts present and no true pellicle. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered on sand dunes, Little River Dunes, Humboldt County, California, Dec. 18, 1956. Smith 56815.

OBSERVATIONS: This species is close to *G. subglabripes*, but, in the field, has more of a veil though no annulus is present. The pleurocystidia are much larger (most of them) and the spores darker. There is also a distinct difference in the habitat. The carpophores do not remind one of *G. sideroides* when they are fresh. *G. arenicola* is also close to *Agaricus pumilus* Fr. sensu Lundell as reported by Bas (1960), which is also a *Galerina*, but lacks a distinct fibrillose or membranous annulus, the basal tomentum is gray, the lower part of the stipe becomes bister, and the spore surface is only faintly marbled. The spore characters also prevent it from being classified as *G. uncialis*.

MATERIAL EXAMINED: Smith 56815-*type* (MICH).

168. *Galerina pinetorum* Métrod, Bull. Soc. Myc. Fr. 56: 52. 1940.
Illustrations: Métrod (l.c.) fig. 4.

Pileus 20–25 mm broad, hemispheric then convex, slightly fleshy, dry, dull, deep ochraceous-argillaceous and slightly translucent striate when wet, quickly fading (on disc) and becoming opaque in fading, ornamented on the margin with white fibrils representing the remains of a general (universal) veil; flesh concolorous, lax, soft and fragile in the cap, fibrous in the stipe, taste mild and faintly earthy.

Lamellae unequal, broad, moderately crowded, thin, emarginate and uncinata, very fragile, concolorous with the cap, and darker finally, edges acute, white and finely fimbriate.

Stipe 25–40 mm long, 1.5–2.5 mm thick, confluent, subcartilaginous, wavy, concolorous with cap, paler above, darker toward the base when young with a white superior floccose-fibrillose annulus, base with abundant white mycelium fixing it to substratum, hollow from a canal filled with soft floccose pith, pruinose above the annulus, fibrillose below.

Spores $7-9 \times 4-5 \mu$, ellipsoid in face view, in profile subelliptic to slightly depressed along the dorsal line or that line nearly straight, very thin-walled, pale yellow in KOH, many collapsed, faintly punctate to marbled and the smooth plage faintly delimited. Basidia 4-spored. Pleurocystidia, $40-65 \times 7-14 \times 4-5 \mu$, scattered, hyaline, thin-walled and readily collapsing, subcapitate and only slightly ventricose, projecting up to 40μ beyond the hymenium. Cheilocystidia similar to pleurocystidia (reviving very poorly). Pileus with a filamentose cuticle. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on needles under conifers (*Pinus silvestris*), December, France.

OBSERVATIONS: We are indebted to M. Métrod for allowing us to examine his specimens, from which the microscopic data given in the above description are taken. Métrod described the basidia $25-28 \times 6-7 \mu$, 4-spored and the cheilocystidia as abundant, subcylindric with obtuse apices, subventricose or elongate-subcapitate, $40-65 \times 4-5 \mu$ at base and $10-14 \mu$ in broadest part. This is a most peculiar *Galerina*. The hyphae all collapse and are difficult to revive even in well-dried material. Even the spores are so thin-walled and the walls so weak that they collapse readily. However, they have the markings of a typical *Galerina*. The convex pileus and pleurocystidia lead us to place the species here but it does not appear closely related to others in the subsection.

169. *Galerina subglabripes* Smith & Singer, Mycologia 47: 589.
1955.
Illustrations: Fig. 189 (cheilocystidia), 190 (pleurocystidia).

Pileus 10–15 mm broad, convex expanding to nearly plane, some with a slight umbo, surface glabrous moist, hygrophanous, more or less dull

tawny moist and slightly striate, fading to pinkish buff, darker when dried; odor and taste not recorded.

Lamellae close, moderately broad, adnate and with a slight tooth, dull cinnamon to dark ochraceous tawny, edges crenulate.

Stipe \pm 15 mm long, \pm 1 mm thick, equal, pale honey color and pruinose above, soon dark reddish brown to bister below and lower portion covered thinly with pallid to grayish fibrils, \pm matted-fibrillose with pallid fibrils around the base.

Spores $7-9 \times 4-4.5 \mu$, ovate in face view, in profile very obscurely inequilateral, appearing smooth but under oil surface minutely areolate-roughened, plage delimited by a faint line, ochraceous-tawny to buckthorn brown in KOH. Basidia 4-spored. Pleurocystidia scattered, fusoid-ventricose to fusoid, $40-58 \times 9-12(16) \mu$, apices subacute. Cheilocystidia (34)38-55 \times 8-11 μ , narrowly ventricose to nearly fusoid, hyaline or some with ochraceous walls in basal part, thin-walled. Gill trama subparallel, pallid in KOH, subhymenium thin and not distinctive. Pileus trama homogeneous, pallid to ochraceous in KOH. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on debris, Carbon River, Mt. Rainier National Park. Known only from the Park.

OBSERVATIONS: This species was mistaken for *G. sideroides* in the field. It is very close to *G. rudericola* from which the lack of a fibrillose zone on the stipe distinguishes it. The appressed fibrils over the lower part of the stipe in *G. subglabripes* have not been demonstrated to be veil remnants.

MATERIAL EXAMINED: Smith 40459-type.

SECTION GALERINA

Pileus typically conic to conic campanulate, sometimes obtuse to convex, margin straight when young; pleurocystidia present and typically with acute to subacute apex; spores typically ornamented and with a smooth plage but never calyptrate.

Type species: *G. vittaeformis* (Fr.) Singer, op. cit.

The species placed here are typically *Mycena*-like in aspect. This is the classical distinction between "Naucoria" and "Galera" of the old Friesian system, and in the main it is also a practical grouping with a relatively small degree of intergradation.

Key to Stirpes

1. Stipe with remains of a veil present or if veil is lacking caulocystidia present only over the apical portion..... Stirps *Minima*
1. Veil lacking; stipe characteristically covered to below the middle with caulocystidia Stirps *Vittaeformis*

Stirps *Minima*

Pileus conic to convex, margin typically straight when young; spores ornamented but not calyptrate, either a veil present originally or if none then caulocystidia typically only over the upper third of stipe.

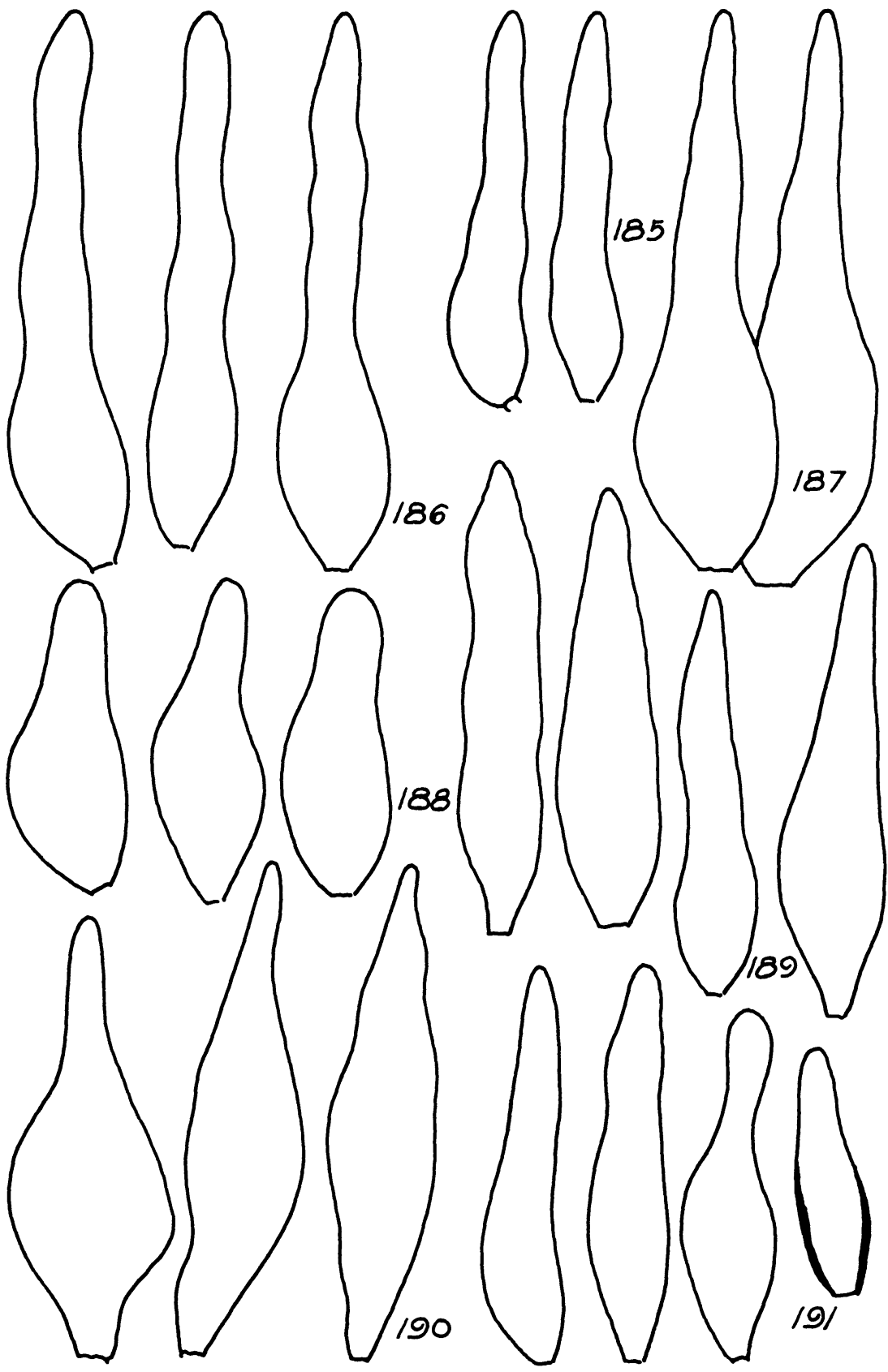


Fig. XXVI

Cystidia: Fig. 186, pleurocystidia of *G. hepaticicola*; 185 and 187, pleurocystidia of *G. arenicola*; 188, cheilocystidia of *G. physophora*; 189, cheilocystidia, 190, pleurocystidia of *G. subglabripes*; 191, cheilocystidia of *G. minima*.

Key to Species

1. Veil usually well-developed and leaving an inconspicuous to distinct fibrillose annular zone on stipe..... 2
1. Veil absent or so thin as not to leave a persistent zone, often showing merely as scattered fibrils on lower part of stipe..... 7
 2. Spores 9–13 μ long..... 3
 2. Spores 7–9 μ long..... 5
3. Spores 7.5–8.5(9) μ broad..... 170. *G. subannulata*
3. Spores 5.5–7 μ broad..... 4
 4. Lignicolous (on *Nothofagus*, South America)..... 171. *G. gamundiae*
 4. Terrestrial (cold springy areas, mountains of Pacific Northwest, U.S.A.)..... 172. *G. rainierensis*
5. On pine needles; spores very thin-walled and many collapsing..... see *G. pinetorum* (168)
5. Not as above..... 6
 6. Pleurocystidia 9–12 μ broad; on mosses and soil..... 173. *G. minima*
 6. Pleurocystidia 10–18 μ broad; on herbaceous stems..... 174. *G. mollis* var. *mollis* and *G. mollis* var. *latifolia*
7. Pileus slightly viscid; stipe reddish brown below..... 8
7. Not as above..... 9
 8. Spores 8–10 \times 5–6 μ ; basidia 4-spored..... 175. *G. reflexa*
 8. Spores 10–13 \times 6.8–7.8 μ ; basidia 2-spored..... 176. *G. longinqua*
9. Spores 7–9 μ long (4-spored basidia)..... 10
9. Spores 9–11 μ long or more (2- or 4-spored basidia)..... 14
 10. Pleurocystidia often branched; spores slightly compressed..... 177. *G. thujina*
 10. Not as above..... 11
11. Ventricose part of pleurocystidia with ochraceous to pale tawny slightly thickened walls..... 178. *G. diabolissima*
11. Not as above..... 12
 12. Stipe distinctly darker below; spores 4.5–5 μ broad and warty-rugulose, a smooth plage present in only about 10%; veil lacking..... (see *G. funariae* (186) also) 179. *G. nancyae*
 12. Stipe not or only rarely darker below; spores 5.5–6.5 μ broad, smooth plage present; veil present though remains often evanescent..... 13
13. Cheilocystidia obtuse to subcapitate, thin-walled, and hyaline throughout..... 180. *G. saltensis*
13. Cheilocystidia acute to subacute, many with slightly thickened ochraceous wall in ventricose part..... 187. *G. oreina*
14. Lamellae distant and decurrent (carpophore with aspect of *Omphalina*)..... 182. *G. fontinalis*
14. Lamellae not as above..... 15
15. Some pleurocystidia or cheilocystidia showing colored, somewhat thickened walls in ventricose part..... 16

15. Cystidia practically all hyaline..... 17
 16. Pileus orange-brown to rich tawny; veil none.... 183. *G. mainsii*
 16. Pileus pale fulvous to yellowish; veil present... 184. *G. inconspicua*
 17. Spores from 4-spored basidia 6.5–7.5 μ broad..... 185. *G. latispora*
 17. Spores narrower; basidia 2- or 4-spored..... 18
 18. Spores only minutely roughened,
 pleurocystidia 35–50 \times 8–12 μ 186. *G. funariae*
 18. Spores conspicuously ornamented,
 pleurocystidia 50–70 \times 9–14 μ 187. *G. nordmaniana*

170. *Galerina subannulata* (Singer) Smith & Singer, comb. nov.

Galerina vittaeformis var. *subannulata* Singer, Sydowia 7: 246. 1953.

Galera rubiginosa var. *annulata* Favre, Ergeb. Wiss. Unters. Schweiz. Nat. Park 5(nf) 33: 204. 1955.

Pileus 4–11 mm broad, obtusely campanulate, always naked and glabrous, strongly hygrophanous, transparently striate when wet, between *burnt umber* and *Alamo*, fading to much paler (*pl. 10 F 5*); flesh very thin, inodorous.

Lamellae *Peruvian brown*, moderately close to subdistant, broad, horizontally adnate to sinuate-adnate.

Stipe 18–25 mm long, 1–2 mm thick, equal or tapered upward, lacking a bulb, with the tone quality of *burnt umber* but darker (about as dark as *pl. 8 J 12*), the central part paler (*Alamo*), still lighter colored at apex, finely appressedly fibrillose up to the somewhat fugacious annular belt, minutely pubescent-pruinose above it.

Spores 9.6–13.7(14.5) \times 7.5–8.3(9) μ , finely to moderately verruculose, with a distinct smooth plage, mucronate, (as sometimes observed in the Fuegian specimens of *G. vittaeformis*, but with finer ornamentation), ovate-subamygdaliform in face view or some almost ellipsoid, with double wall and rather well-pigmented to deeply colored. Basidia 1-, 2-, 3-spored, 24–32 \times 8.2–11 μ . Pleurocystidia like the cheilocystidia, but more rarely with cylindrical neck. Cheilocystidia 38–57 \times 10.2–20 μ , mostly of a vesiculose type, some mucronate, with all transitions to ampullaceous type as found in *G. vittaeformis*, and then with a long cylindrical or subulate neck; the vesiculose type shorter. Caulocystidia like the ampullaceous type of pleurocystidia, very numerous at the apex of the stipe, but some found over almost all the stipe. Gill trama regular, the hyphae regularly with clamp connections at the cross walls.

HABIT, HABITAT AND DISTRIBUTION: Scattered on dry, open, windswept ground among low *Empetrum* plants, February 22, 1950, Nueva Argentina, Tierra del Fuego, apparently also in Europe (Alps).

OBSERVATIONS: This species is difficult to place; its cystidia indicate an intermediate position between section *Physocystis* and the subsection *Minima*, while the caulocystidia, found so far toward the base of the stipe, indicate a rather close relationship with *G. vittaeformis*, from which it differs in the abundance of the veil. We have not seen material of Favres' *G. rubi-*

ginosa var. *annulata*, but it checks so well in all essential characters as described by Favre that we doubt if it is distinct from *G. subannulata*.

MATERIAL EXAMINED: Singer M 429.

171. *Galerina gamundiae* Singer, sp. nov.

Pileo margine haud incurvato in juvenilibus; basidiis bisporis; ceterum *G. patagonicae* persimilis sed minor est. Ad ligna dicotyledonum emortua, Villa Angostura, Patagoniae, Argentinensis. Typus in herbario Lilloiano conservatus est.

Pileus 4–8 mm broad, campanulate, then campanulate-convex, umbonate, opaque, dried pale buff with rusty-tawny sulcate margin, margin straight; context thin, odor and taste not recorded.

Lamellae deep ochraceous brown with pallid edges, very broad and broadly adnate, close or subclose.

Stipe 12–15 × 0.7–1.5 mm, subequal or tapered downward, apex about concolor with pileus, darker below to bister at base; veil strongly developed but not leaving a distinct annulus on stipe, or if a ring is present at first it is evanescent, white to pallid floccose particles or fragmentary zones of veil material variously scattered below the point at which the veil breaks (somewhat as in *G. paludosa*).

Spores (9.5)11–13.7(15) × 5.5–7 μ, subellipsoid, with suprahilar applanation or depression, strongly and deeply pigmented (deep rusty brown in KOH, not as dark in ammonia), not or indistinctly pseudoamyloid, with a distinct apical callus or narrow nontruncate apical pore, with a very low and fine verruculose punctation all over except on the distinctly defined plage, the ornamentation hardly deeper in color than the epispodium and therefore not conspicuous.

Hymenium. Basidia 22–28 × 6.8–8.3 μ, 1-, 2-, and 3-spored, (mostly 2-spored) clavate. Pleurocystidia scattered, 50–70 × 8.3–13.2 μ, ventricose near base, with a long fairly thin neck, 2–4 μ broad at apex, thin-walled but eventually slightly thick-walled in lower part (wall 0.1–0.8 μ thick) hyaline to stramineous, smooth. Cheilocystidia very crowded, slightly more variable than the pleurocystidia, rarely vesiculose; caulocystidia above line at which veil breaks numerous and similar to cheilocystidia. Gill edge heteromorphic. Hymenophoral trama deep lemon yellow. Epicutis of pileus of hyaline, not or scarcely gelatinized hyphae, some ascending hyphal tips at times slightly cystidioid in shape. Hypodermium and most of the trama of the pileus not distinctly incrustated by pigment deposits, deep lemon yellow or chrome yellow.

HABIT, HABITAT AND DISTRIBUTION: On wood of dicotyledonous tree in *Nothofagus* woods, gregarious but not cespitose; fall, Argentina, Neuquén.

OBSERVATIONS: This species is evidently close to *G. patagonica* from which it differs in its 2-spored basidia, the straight margin of its young pilei, its spore size and ornamentation, and its veil characters.

MATERIAL EXAMINED: Pujals & Gamundí 366, Argentina, Neuquén, Villa Angostura (LIL-*typus*; duplicate material BAFC).

172. *Galerina rainierensis* Smith, sp. nov.

Pileus 10–20 mm latus, obtuse conicus, udus, glaber, hygrophanus, pallide fulvus demum subargillaceus; lamellae latae, subdistantes, adnatae, fulvae; stipes 10–20 mm longus, circa 1 mm latus, aequalis, deorsum subfulvus, sursum ochroleucus, deorsum albo-fibrillosus, fibrilloso-annulatus, sursum pruinosis. Sporae 11–14 × 6–7 μ , verrucosae; pleurocystidia 44–62 × 10–15(18) μ , ad apicem subacuta; cheilocystidia pleurocystidibus similia.

Specimen typicum legit Smith 40204 (MICH), prope St. Andrews Creek, Mt. Rainier National Park, Washington, 24 Sep. 1924.

Pileus 10–20 mm broad, obtusely conic, moist, glabrous, hygrophanous, ochraceous tawny moist fading to pinkish buff.

Lamellae broad, subdistant, adnate, fulvous.

Stipe 10–20 mm long, about 1 mm thick, lower part subfulvous and white fibrillose from a copious veil which leaves a median white-fibrillose annulus, pale honey color above the annulus and coarsely pruinose from bunches of caulocystidia.

Spores 11–14 × 6–7 μ , ovate in face view, distinctly inequilateral in profile, near ochraceous tawny in KOH, at least some spores dark red-brown in Melzer's sol., surface distinctly warty-roughened and plage marked off distinctly by a ragged line. Basidia 2-spored (rarely 1-spored), 22–28 × 6–8 μ . Pleurocystidia scattered, 44–62 × 10–15(18) μ , fusoid-ventricose, tapered to a subacute apex, thin-walled, hyaline, smooth. Cheilocystidia similar to pleurocystidia. Gill trama of greatly inflated cells with slightly thickened smooth yellowish walls. Epicutis of pileus of appressed hyphae 4–12 μ in diam. with smooth hyaline to yellowish walls, these hyphae intergrading imperceptibly with the context, no incrusting pigment present on either the hyphae of the pileus cutis or context; clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On wet soil at edge of a springy area, St. Andrews Creek, Mt. Rainier National Park, Washington, 24 Sept. 1952. Smith 40204-*type*; 40221.

OBSERVATIONS: This is a strikingly mycenoid species apparently closely related to *G. gamundiae*. The latter grows on wood of *Nothofagus* in Argentina. The ecological requirements of *G. rainierensis* are very different—it grows on cold wet soil and debris in springy areas in dense forests of *Tsuga* and *Abies*. There are other differences also, as one would expect; for instance, the spores of *G. rainierensis* are dark red-brown in Melzer's sol. and only pale tawny in KOH. In *G. gamundiae*, Singer describes them as deep rusty brown in KOH and not or only indistinctly pseudomyloid. A comparison of the descriptions indicates further differences in shape of pleurocystidia and cheilocystidia and in the color of the revived context. The two

species are obviously closely related, however, in type of hyphal pigmentation, spore size, aspect of fruiting body, veil development and fruit-body anatomy.

An interesting feature of *G. rainierensis* is the number of abnormally elongated spores present and their irregular shape. Some are so reduced as to resemble thick-walled elongated sterigmata with undulating walls.

G. badipes resembles *G. rainierensis* in microscopic characters but has an incurved cap margin and the pileus is convex to broadly expanded.

173. *Galerina minima* (Peck) Smith & Singer, comb. nov.

Pholiota minima Peck, Ann. Rept. N. Y. State Mus. 41: 65. 1888.

Illustrations: Pl. 15, fig. C; pl. 16, fig. D. Figs. 191 (cheilocystidia), 192 (pleurocystidia).

Pileus (3)5–10(12) mm broad, convex with a straight margin, more rarely obtusely conic, expanding to broadly convex, rarely slightly umbonate, surface glabrous, moist, hygrophorous, dark “tawny” and translucent striate, fading to dingy tan and then appearing hoary to furfuraceous or glistening (fibrillose-furfuraceous under a lens); flesh very delicate and fragile, concolorous with pileus surface, odor and taste mild.

Lamellae broad, broadly adnate, subdistant, edges even, concolorous with moist pileus.

Stipe 20–30 mm long, \pm 1 mm thick, equal, glabrous except for an evanescent delicate zone of fibrils near mid-portion, veil elements pallid to yellowish, surface concolorous with the pileus, apex scarcely paler.

Spores 7–8.5 \times 4.5–5.5 μ , pale ochraceous tawny revived in KOH, roughened with warts or remains of exosporial layer except for plage, inequilateral in profile, ovate in face view. Basidia 4-spored, hymenium yellowish in KOH. Pleurocystidia rare to scattered, similar to cheilocystidia or more rounded to subcapitate. Cheilocystidia 30–40 \times 8–12 μ , fusoid-ventricose with subacute to obtuse apices. Gill trama tawny revived in KOH, interwoven to subregular. Pileus trama homogeneous, tawny in KOH, surface layer giving rise to hyphae with enlarged—ovoid to ventricose—cystidium-like end cells, hyphae heavily incrustated. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on moss over very sterile soil, New York, Alabama, Idaho, Washington and Oregon. In Mt. Rainier National Park it was abundant along the Carbon River.

OBSERVATIONS: A distinctive species by reason of the dark colors, unpolished to furfuraceous pileus when just faded, small spores, and fusoid-ventricose cheilocystidia. About half the specimens show the annular zone of veil remnants. Caps which have faded, been remoistened, and then faded again, are not furfuraceous because the cystidioid elements become matted down. The stipe may or may not be darker below. The pleurocystidia can nearly always be readily demonstrated. In some collections they show a tendency toward being subcapitate, but this is by no means a distinctive

character. In dried material, or in old but still fresh caps, the clavate cells on the pileus are difficult to demonstrate. The habitat appears to be naked soil freshly invaded by a cover of mosses. Smith 23722, from an elevation of 4,000 ft. in the Cascade Mts. (Clackamas Ranger Station, Mt. Hood National Forest, Oregon), was found in a burned area on a thin moss cover.

Smith 53102 has the following characters:

Pileus convex and 7 mm broad, glabrous, moist, hygrophanous, ochraceous tawny moist, striate, fading to cinnamon buff.

Lamellae broad, adnate, close, ochraceous tawny, edges fimbriate.

Stipe 15 mm long, less than 1 mm thick, cinnamon buff over all, apex pruinose, below this more or less loosely covered with pallid fibrils from the well-developed veil.

Spores 8–10(11) \times 4.5–5.5 μ , ovate in face view, somewhat inequilateral in profile, minutely roughened except for the smooth plage, no separation of exosporium around plage, dull “buckthorn brown” in KOH, callus distinct and rather broad (but apex not truncate). Basidia 2- and 4-spored. Pleurocystidia scattered, 50–65 \times 9–15 μ , fusoid-ventricose with subacute apices, hyaline in KOH, thin-walled, smooth. Cheilocystidia abundant and similar to pleurocystidia or smaller; gill trama regular, ochraceous in KOH. Pileus cuticle of narrow hyphae radially arranged and only 1–2(3) hyphae deep, hypodermal zone tawny in KOH. Clamp connections present. On moss, Trout Lake, San Juan Mountains, Colorado, July 21, 1956, Smith 53102.

This collection appears closest to *G. minima* but has larger spores and a more copious veil; the pleurocystidia are larger and more acute at the apex, as well as more numerous. No cystidium-like end cells were found on the cap. We include the data on the specimen here because there is insufficient material to justify describing a distinct taxon.

MATERIAL EXAMINED: R. Oswald, near Willamette, Portland, Oregon, Oct. 1956 (MICH). Peck, *type* (NYS). Smith, Carbon River, Mt. Rainier National Park, Washington, 10–8–54; 16013; 19507; 23722; 27894; 40214; 40617; 40618; 40620; 40621; 40633; 40635; 40644; 40645; 40746; 40747; 40751; 40752; 40754; 40758; 40762; 44858; 47380; 48369; 53102 (aberrant).

174. *Galerina mollis* Smith & Singer, Mycologia 47: 590. 1955.
var. *mollis*

Illustrations: Pl. 15, fig. D. Fig. 193 (cheilocystidia), 194 (pleurocystidia).

Pileus 10–15 mm broad, conic becoming conic-umbonate, the margin often spreading, glabrous moist, hygrophanous, ochraceous tawny and striate to umbo, buff when faded; flesh very soft, odor and taste mild.

Lamellae close, narrow, adnate, edges even, about concolorous with pileus.

Stipe 30–35 mm long, \pm 1.5 mm thick, equal, uneven, fragile, concolorous with gills, at base pallid-silky, with a very inconspicuous superior fibrillose annulus, base darkening to watery brown where bruised.

Spores $7-9 \times 4.5-5.5 \mu$, inequilateral in profile, in face view ovate to oval, tawny in KOH, outer wall loosening around the depression which is smooth, remainder of surface minutely warted. Basidia 4-spored. Pleurocystidia scattered, $34-56 \times 12-18 \mu$, ventricose with short necks and obtuse to rounded apices. Cheilocystidia $40-58 \times 10-15 \mu$, fusoid-ventricose with obtuse apices. Gill trama subparallel, hyaline or nearly so in KOH. Pileus trama homogeneous, hyaline to pale ochraceous in KOH. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered on remains of herbaceous stems (of *Capnoides*), Green Lake, Mt. Rainier National Park, Washington, Oct. 17, 1952.

OBSERVATIONS: The very soft context, broadly ventricose pleurocystidia, and the change in color of the base of the stipe when bruised, are distinctive. The veil remnants, though forming a thin zone at first, soon vanish. In many respects this species connects the *Stirps Vittaeformis* with *Stirps Cedretorum*. The habitat is most unusual for a *Galerina*. The carpophores occur singly along the old stems, in the manner of many species of *Psilocybe* which have a similar type of habitat.

OBSERVATIONS: The pleurocystidia might lead one to look for this species in *Physocystis* but the variation is toward the subacute apex as often shown in var. *latifolia*, so we place the species here.

MATERIAL EXAMINED: Smith 41074-*type*; 41077; 41082; 41083; 41100; 48167; 48168.

174a. *Galerina mollis* var. *latifolia* Smith, var. nov.

Illustrations: Figs. 195 (pleurocystidia), 196 (cheilocystidia).

Pileus 10–20 mm latus, obtusus, demum planus et umbonatus, pallide fulvus; lamellae subdistantes, latae, late-adnatae, stipes 20–30 mm longus, 1–2 mm crassus, fragilis, sursum subfulvus, deorsum castaneus; sporae $8-10.5 \times 4.5-5.2 \mu$; pleurocystidia $48-65 \times 10-16 \mu$; cheilocystidia pleurocystidiis similia. Specimen typicum legit Smith 41066 (MICH), prope Green Lake, Mt. Rainier National Park, Washington, 17 Oct. 1952.

Pileus 10–20 mm broad, obtuse, expanding to plane or with a slight obtuse umbo, surface glabrous, moist, hygrophorous, "ochraceous tawny," margin striate, fading to pinkish buff; flesh exceedingly soft and fragile, concolorous with surface, odor and taste none.

Lamellae subdistant, broad, broadly adnate, readily seceding, with decurrent lines down apex of stipe, edges even.

Stipe 20–30 mm long, 1–2 mm thick, equal, hollow, exceedingly fragile, concolorous with gills above, dull chestnut brown below, fibrils over lower part grayish.

Spores $8-10(10.5) \times 4.5-5.2 \mu$, inequilateral in profile, ovate in face view, wall minutely roughened and with a ragged line around the depression, ochraceous tawny in KOH. Basidia 4-spored (one pileus 2-spored and spores $9-11 \times 5.5-7 \mu$). Pleurocystidia abundant, fusoid-ventricose, 48–

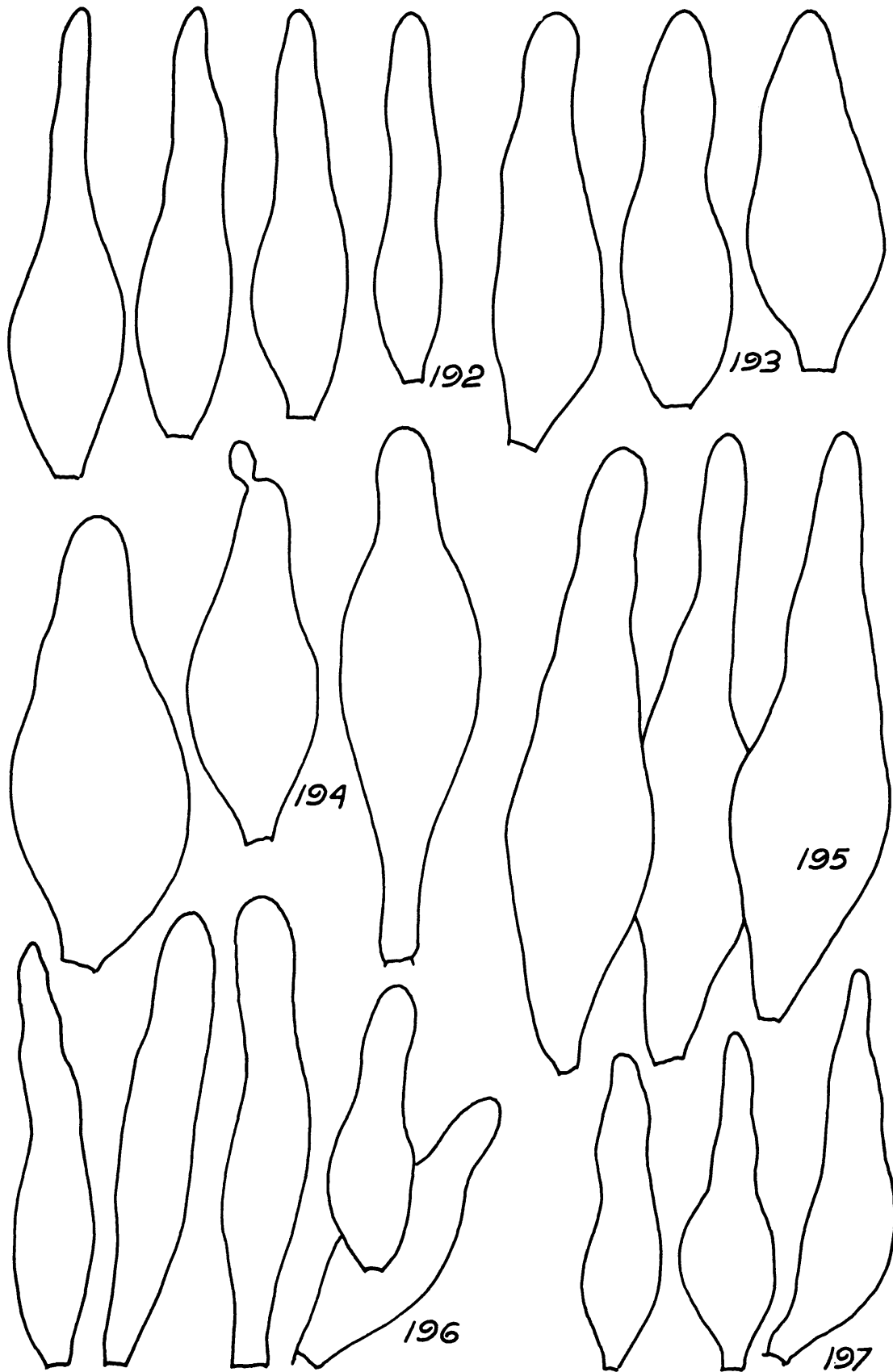


Fig. XXVII

Cystidia: Fig. 192, pleurocystidia of *G. minima*; 193, cheilocystidia of *G. mollis* var. *mollis*, 194, pleurocystidia; 195, pleurocystidia of *G. mollis* var. *latifolia*, 196, cheilocystidia; 197, cheilocystidia of *G. nancyae*.

65 × 10–16 μ, apices subacute to gradually enlarged, mostly merely obtuse, many with a hyaline colloidal content. Cheilocystidia similar to pleurocystidia, occasionally one found with ochraceous content, many with ± ochraceous pedicels as revived in KOH. Gill trama somewhat interwoven, pallid ochraceous in KOH. Pileus trama homogeneous, pale ochraceous in KOH. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered on debris of herbaceous material, Green Lake, Mt. Rainier National Park, Washington, Oct. 17, 1952, Smith 41066, and 41067.

OBSERVATIONS: The broad, subdistant gills, very soft consistency and dark chestnut brown stipe-base are distinctive. The pleurocystidia are generally longer, narrower, and more frequently have a hyaline colloidal content, than in var. *mollis*, and in the material examined no tendency is seen for the outer spore layer to loosen around the depression.

175. *Galerina reflexa* (Murrill) Smith & Singer, comb. nov.

Galerula reflexa Murrill, N. Am. Fl. 10: 169. 1917.

Pileus 15 mm broad, becoming depressed at maturity, with the margin reflexed, surface smooth, glabrous, slightly viscid, cream-color, margin concolorous, not striate, becoming undulate or slightly lacerate with age; flesh thin.

Lamellae adnate, ventricose, fulvous at maturity of the spores, entire and concolorous on the edges.

Stipe 30 mm long, 1.5 mm thick, slender, subequal, smooth, glabrous, pale yellow above, slightly reddish brown below.

Spores 8–10 × 5–6 μ, ovate in face view, somewhat inequilateral in profile, dull ochraceous tawny in KOH, warty-rugulose but with a smooth suprahilar depression. Basidia 4-spored, hyaline in KOH. Pleurocystidia 50–70 × 8–12 μ, abundant, fusoid-ventricose with elongated narrow necks and obtuse apices, thin-walled, smooth. Cheilocystidia similar to pleurocystidia. Pileus trama homogeneous beneath a thin somewhat gelatinous pellicle. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Solitary on the ground, in humus, Tepeite Valley, near Cuernavaca, Mexico, Dec. 28, 1909.

OBSERVATIONS: This is a species of doubtful affinity. The viscid pellicle, as well as the features of the spores, and cystidia indicate a close relationship to *G. autumnalis* but apparently a veil is lacking. Since Murrill placed it in *Galerula*, we may assume the cap margin was straight, but the description of the pileus does not confirm the assumption. It is also possible that this apparently mature to over-mature specimen is all that Murrill collected. We can not be sure whether a veil is present or absent, to say nothing of its characters if present. Dennis (1953) considered that this species was probably the same as *G. hypnorum*. On the basis of our study it cannot be either *G. hypnorum* or *G. vittaeformis*.

MATERIAL EXAMINED: Murrill 448-type (NY).

176. *Galerina longinqua* Smith & Singer, Mycologia 50: 477. 1958. Illustrations: Singer & Corte, Contr. Inst. Anart. Arg. fig. 10 and pl. I, 1-10.

Pileus 5-15 mm broad, thin, convex to conic when young, later flattened to slightly concave, at times with a slight papilla or umbo, smooth, orange brown (*cocoa*), hygrophanous, glabrous, opaque to slightly translucent striate; evelate.

Lamellae moderately broad to broad, adnate, especially when young, becoming adnate-subdecurrent, later often slightly sinuate to adnexed, medium close to distant, mostly subdistant, ventricose to horizontal.

Stipe 10-50 mm long, 1-3 mm thick, cartilaginous, smooth and glabrous, fistulose, subequal, terete or compressed, at first nearly pallid above, brownish below (*cookie* or *tortoise*) later concolorous with pileus at apex and deeper reddish brown below, smooth and glabrous.

Spores $9.5-13.5 \times 6.2-7.8 \mu$, ellipsoid to broadly almond-shaped with often protruding (even snout-like) apex, rather well pigmented, typically with a thick complex wall, apex merely with a callus, the plage distinctly limited, suprahilar area not depressed; ornamentation rugulose-verruculose, not prominently projecting, concolorous with episporium to darker colored.

Basidia 2-spored (rarely 1- or 3-spored), $21.5-28.8 \times 7.3-9.7 \mu$. Pleurocystidia few, scattered, similar in shape to the cheilocystidia and in addition a few cystidioid cells present having slightly thickened walls (1μ). Cheilocystidia $38-55 \times 5.5-11 \times 4-4.5 \times 4-4.8 \mu$, numerous, ventricose at base (ampullaceous), and with a neck 25-30 μ long, or ventricose near the mid-portion and pedicellate, the apex subcapitate to obtuse. Hymenophoral trama regular (parallel), of very short and broad cells; epicutis of pileus well developed, hyaline, consisting of narrow hyaline hyphae separated somewhat from each other and often wavy, indicating a gelatinous layer when fresh; pilocystidia none; caulocystidia present on upper half of stipe, similar to cheilocystidia; clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On and among mosses, single or in small clusters, fruiting from January through March in subantarctic regions.

OBSERVATIONS: The pleurocystidia are constant even though they are scattered, and serve to place the species in this section. (We have also keyed it out in section *Mycenopsis*.) *G. longinqua* has caused us many difficulties as far as its relation to *G. inconspicua* is concerned. The geographic distance which separates them is of minor importance since it is well known that "pan-subantarctic species" exist. The most striking differences, such as size of fruit body, are perhaps of minor diagnostic value. The Australian material was kept in formalin for a while, which may have caused the slight gelatinization of the pileus epicutis as described, but we do not believe formalin would have such an effect. Evidence of a slight veil may have been overlooked by the collector, but there is no basis for believing this since he clearly indicated that no traces of a veil were present.

MATERIAL EXAMINED: Macquarie Island; Green Gorge, G. Bunt (LIL, *type*). Antarctic Peninsula, Costa Danco, A. Corte 029 (Collection of the Instituto Antártico, Buenos Aires and LIL).

177. *Galerina thujina* Smith & Singer, *Mycologia* 47: 595. 1955.
Illustrations: Fig. 198 (pleurocystidia), 199 (cheilocystidia).

Pileus 8–10 mm broad, plano-umbonate, margin bent in somewhat at first, surface glabrous, moist, hygrophanous, pale “cinnamon brown” and slightly translucent striate moist, dingy tan when faded; flesh thin, fragile, odor none, taste not recorded.

Lamellae distant to subdistant, broad, depressed-adnate, pale ochraceous becoming \pm tawny or nearly concolorous with the pileus.

Stipe \pm 10 mm long, \pm 1 mm thick, equal, faintly fibrillose over lower part from remains of a thin pallid veil, very dark cinnamon brown at base, paler upward, apex pruinose.

Spores $6.5\text{--}8 \times 4\text{--}4.5 \times 5\text{--}5.5 \mu$, compressed slightly, subelliptic in profile, ovate in face view, very minutely wrinkled and with a ragged line marking the plage, occasionally the outer layer of the spore wall separating to form small blisters—usually around the plage area, color in KOH pale cinnamon-brown to dingy tawny. Basidia 4-spored, $20\text{--}23 \times 6\text{--}7.5 \mu$. Pleurocystidia scattered, $50\text{--}70 \times 9\text{--}13 \mu$, fusoid-ventricose with subacute apices or the neck branched and at times primary branches giving rise to secondaries—branching mostly dichotomous, at times the apices \pm spear-head-like in shape, content of cystidia granular in water mounts of fresh material, hyaline and homogeneous in KOH, walls thin and hyaline. Cheilocystidia similar to pleurocystidia, with more tendency to branch. Hyphae of pileus trama heavily incrustated with pigment. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered on an old cedar (*Thuja occidentalis*) log, Tahquamenon Falls State Park Michigan, Sept. 11, 1953.

OBSERVATIONS: The small spores have an outer layer which is about as separable as that of *G. decipiens* f. *separans*, or less so. The unusual characters of this species are the forked cystidia and slightly compressed spores. The darkening stipe and cinnamon brown pileus along with the habitat on *Thuja* appear to be the distinguishing field characters.

MATERIAL EXAMINED: Smith 42589-*type*.

178. *Galerina diabolissima* Smith, *Sydowia* Beiheft I: 49. 1957.

Pileus 3–5 mm broad, conic becoming convex, glabrous, moist, hygrophanous, near “tawny” moist and cinnamon buff faded, somewhat striate moist; flesh thin, fragile, tawny.

Lamellae broad and ventricose, ascending adnate, subdistant, reddish tawny, edges even.

Stipe 20–25 mm long, less than 1 mm thick, terete, equal, delicate, evenly colored and slightly paler than the pileus, no evidence of a veil present even on young specimens.

Spores $7\text{--}8 \times 4.2\text{--}4.7 \mu$, ovate in face view, inequilateral in profile,

with a tendency toward a snout-like apex, callus present at apex but not a true pore, surface finely verrucose and plage area as a rule not differentiated (a smooth plage seen in a few spores), dingy clay color to dark cinnamon-buff in KOH. Basidia 4-spored, $22-27 \times 7-8 \mu$, hyaline in KOH. Pleurocystidia scattered, $26-38 \times 7-11 \mu$, fusoid-ventricose, apices subacute, ventricose lower part usually with ochraceous tawny very slightly thickened walls, wall of neck and upper ventricose part hyaline smooth and thin. Cheilocystidia similar to pleurocystidia. Gill trama of interwoven hyphae with walls ochraceous in KOH. Pileus trama of greatly enlarged hyphae beneath a thin non-gelatinous pellicle of appressed hyphae, the large cells with tawny to ochraceous incrusting pigment, generally heavily incrustated. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on a thin moss cover over exposed soil, summer, Idaho and Michigan.

OBSERVATIONS: The pleurocystidia and the cheilocystidia having walls of the lower part tawny to ochraceous in KOH, the failure of a smooth plage to develop on most spores, the lack of a veil, and the narrow spores, separate it from all members of the Stirps *Minima*. The presence of clamps in conjunction with the failure of the plage area to become smooth is one of the few instances of intergradation to the Subgenus *Tubariopsis* which have been encountered. Since a plage is occasionally present, and clamps are abundant, we place it in Subgenus *Galerina*. In the characters of the cystidia it is close to *G. oreina*, but the spores of the two readily separate them.

MATERIAL EXAMINED: Smith, U. of M. Biol. Station, Cheboygan Co., Michigan, June 1955. Seven Devils Mts., Idaho, July 26, 1954. Smith 45382-type.

179. *Galerina nancyae* Smith, sp. nov.

Illustrations: Figs. 197 (cheilocystidia), 200 (pleurocystidia).

Pileus 8–20 mm latus, obtuse conicus, obscure cinnamomeo-brunneus; lamellae confertae, latae; stipes 20–30 mm longus, 1–1.5 mm crassus, deorsum castaneus; sporae $7-8.5 \times 4.5-5 \mu$; pleurocystidia et cheilocystidia $32-47 \times 8-12 \mu$, fusoido-ventricosa. Specimen typicum leg Smith (51310, MICH) prope Lupton, Michigan 13 May 1956.

Pileus 8–20 mm broad, obtusely conic with a straight margin when young, expanding to broadly conic or nearly plane, pale russet to dark tawny over all, striate when moist, hygrophorous and fading to cinnamon buff, changing color on disc first, naked at all stages; flesh thin, odor and taste not distinctive.

Lamellae close, broad, adnate, almost concolorous with cap in age, near pinkish buff when young, edges even.

Stipe 20–30 mm long, about 1.5 mm thick, equal, often undulating somewhat, honey color above, soon becoming dark reddish brown from base upward, naked at all times, when very young the apex faintly pruinose.

Spores $7-8.5 \times 4.5-5 \mu$, in face view ovate and with a tendency for the apex to be slightly beaked, somewhat inequilateral in profile, distinctly

warty-rugulose revived in KOH, the plage smooth and well defined in only $\pm 10\%$ of the spores, plage area not entirely smooth in remainder, dull ochraceous tawny in KOH. Basidia 4-spored. Pleurocystidia scattered to infrequent, $32\text{--}47 \times 8\text{--}12 \mu$, narrowly ventricose, neck wide ($5\text{--}6 \mu$) and apices obtuse, *thin-walled* throughout, hyaline throughout, smooth. Cheilocystidia similar to pleurocystidia in size, shape, color, and lack of markings. Caulocystidia about like the cheilocystidia but many broader in ventricose part and with the wall there and in pedicel pale tawny. Pileus trama homogeneous, hyphae $8\text{--}15 \mu$ broad, radially arranged and with walls dull tawny in KOH and roughened from incrusting pigment. Gill trama subparallel, the hyphae with walls pale tawny in KOH. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on moss (*Bryum*) in a grassy area, Rifle River Area, Lupton, Michigan. May 13, 1956, Nancy Jane Smith (Sm 51310).

OBSERVATIONS: This species differs from *G. minima* in its larger size, darkening stipe, lack of a veil, and in that the faded pileus does not appear furfuraceous. *G. saltensis* has a slight veil when young, the stipe does not darken appreciably and it has broader spores. *G. diabolissima* is closest but in it the stipe does not darken, the pleurocystidia and cheilocystidia are somewhat colored, and a thin pellicle is differentiated on the cap. The lack of a clearly defined smooth plage on the spores is a character of both species. *G. nancyae* differs from *G. oreina* in having narrower spores most of which do not have a smooth plage, in the stipe becoming dark reddish brown below, and in the close gills.

180. *Galerina saltensis* Singer, Lilloa 25: 382. 1951 (1952).
Illustrations: Figs. 201 (pleurocystidia), 203 (cheilocystidia).

Pileus about 12 mm broad, convex, papillate, glabrous, transparently striate when wet (but not strongly so), hygrophanous, ochraceous brown, somewhat faded when drying out, without veil remnants on mature pileus; flesh thin, fragile, subconcolorous with the surface, inodorous.

Lamellae ochraceous brownish, horizontal, subclose, rather broad (2.5 mm), adnate.

Stipe 23 mm long, 1.5 mm thick, equal, curved, tubular, subconcolorous with the pileus and not or only slightly paler at the apex, appressedly finely fibrillose but without a persistent veil.

Spores $7.5\text{--}8.9 \times 5.5\text{--}6 \mu$, ellipsoid and rather broad, lowly but distinctly verruculose-punctate, with well marked plage, well colored. Basidia comparatively small, 2-, 3-, 4-spored, the majority 4-spored. Pleurocystidia ventricose in the middle, with a thinner cylindrical neck, or attenuate toward an almost subcapitate (indistinctly so) tip, rather scattered, $45\text{--}59 \times 12\text{--}14 \mu$. Cheilocystidia of the same type as the pleurocystidia, somewhat more numerous, $45\text{--}52 \times 10.2\text{--}13.7 \mu$. Hymenophoral trama regular, pale melleous; hyphae with clamp connections.

HABIT, HABITAT AND DISTRIBUTION: Solitary on rather wet moss over a

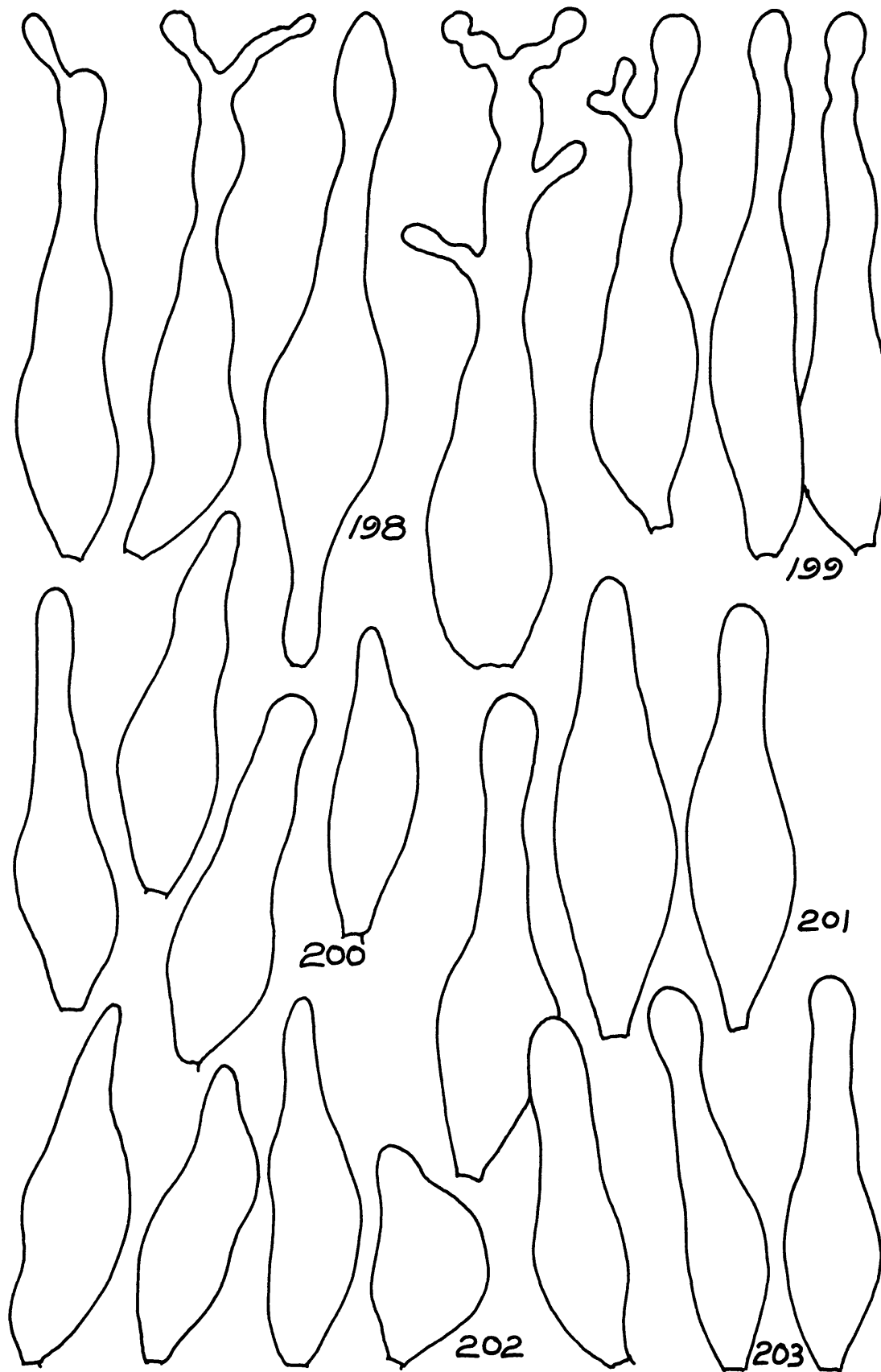


Fig. XXVIII

Cystidia: Fig. 198, pleurocystidia of *G. thujina*, 199, cheilocystidia; 200, pleurocystidia of *G. nancyae*; 201, pleurocystidia of *G. saltensis*, 203, cheilocystidia; 202, cheilocystidia of *G. oreina*.

spring, mostly on *Polytrichaceae*, far away from the wooded areas above a rock in the montane zone, Corralitos, Prov. Salta, east slope of Andes in Northwest Argentina, March 24, 1951.

OBSERVATIONS: The montane species of *Galerina* are many and varied, but among them *G. saltensis* may be distinguished by its thin veil, short broad spores, stipe more or less concolorous throughout, and obtuse to subcapitate pleurocystidia. *G. oreina* is rather similar in a number of respects but can be distinguished by the acute to subacute pleurocystidia, cheilocystidia with yellowish often somewhat thickened walls in the ventricose part, and distant gills.

MATERIAL EXAMINED: Singer T-1418-type (LIL).

181. *Galerina oreina* Smith & Singer, Mycologia 47: 593. 1955.

Illustrations: Pl. 5, fig. C. Figs. 240–241 (spores); 202 (cheilocystidia), 204 (pleurocystidia).

Pileus 3–8 mm broad, obtuse to convex with a straight margin, remaining unexpanded, tawny to dark ochraceous tawny and with broad translucent striations, fading to buffy tan or paler; flesh soft and fragile, odor and taste not distinctive.

Lamellae distant, broad, bluntly adnate but soon seceding, concolorous with pileus.

Stipe 20–40 mm long, 0.5–0.75 mm thick, equal, flexuous, paler ochraceous tawny than pileus, base not appreciably darker (often paler where buried in moss), veil rudimentary and all traces soon gone.

Spores 7–9 × 5.5–6.3 μ , in face view broadly ovate, in profile inequilateral, dark rusty in KOH, wall roughened and depression marked by a ragged line. Basidia 4-spored. Pleurocystidia scattered, fusoid-ventricose, 40–60 × 10–15 μ , with long narrow (4–6 μ) necks and subacute apices. Cheilocystidia similar to pleurocystidia, but many with the basal part having ochraceous slightly thickened walls in KOH. Gill trama of enlarged subregular hyphal cells, pale tawny in KOH. Pileus trama homogeneous, tawny to rusty in KOH, pigment incrustated. Clamp connections present. None or very few caulocystidia present on the stipes examined.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on moss in areas made moist by run-off from nearby glaciers and snow-fields, Snow Lake, Mt. Rainier National Park, Washington.

OBSERVATIONS: The distinctive characters are the distant gills, non-darkening stipe, pleurocystidia, broad short spores and rich tawny pileus. The colored, slightly thickened walls of the lower portion of the cheilocystidia is a rather noteworthy character in revived material. In Smith 40258 the cheilocystidia are longer on the average than in the other collections and have a more colloidal content. The broad spores place the collection here. In Smith 40102 the shape of the cheilocystidia is highly variable. No veil was noted in this collection, and a few caulocystidia were found. *G. oreina* is closely related to *G. minima*, but the broad dark spores

distinguish it along with the more abundant larger pleurocystidia. For a comparison with *G. mainsii* see that species. In some collections, Smith 40300 for example, the stipe darkened somewhat, becoming bay brown below, and the pleurocystidia were narrower (8–12 μ). It is possible that a distinct variety exists, based on these characters, but more data are needed. Ruth Oswald sent a specimen from Oregon made in Oct. 1955, which obviously had a stipe which darkened markedly in the basal region and had the narrow subacute pleurocystidia. She noted that the flesh was red in KOH and this change was present in the revived material, though it soon faded. We have not noted this reaction in any of Smith's collections.

MATERIAL EXAMINED: W. B. & V. G. Cooke 21376 (MICH). R. Oswald (6) Willamette, Oregon, Oct. 1955 (var. nov.?); (11) Portland, Oregon, Jan. 1956 (MICH). Smith 39809; 39810; 40102; 40134; 40258; 40300; 40301; 40306; 40309; 40344-type; 40354; 40355; 40356; 40358; 40359; 40360; 40369; 40370; 40371; 40819; 40820; 40824; 40828; 40830; 40832; 40864; 48059; 48073; 48915; 48917; 48921; 51989; 52186 (2-spored).

182. *Galerina fontinalis* Smith, sp. nov.

Pileus 5–10 mm latus, udus ochroleucus, lamellae distantes, decurrentes, latae; stipes 20–25 mm longus, 2–2.5 mm crassus, concolor, deorsum sparsim fibrillosus; sporae 9–12 \times 5–6 μ ; pleurocystidia 45–60 \times 10–15 μ , fusoid-ventricosa; cheilocystidia similis. Specimen typicum legit prope Payette Lakes, Idaho, 25 Jun 1954. Smith 44163 (MICH).

Pileus 5–10 mm broad, pale butterscotch color when moist, striate and shining, hygrophanous and fading to whitish.

Lamellae distant, decurrent, broad, concolorous with moist pileus (not pale).

Stipe 20–25 mm long, 2–2.5 mm thick, concolorous with the pileus but finally darker at the base, pruinose above, with a white fibrillose veil leaving scattered fibrils below.

Spores (8)9–11(12) \times 5–6 μ , somewhat inequilateral in profile, ovate in face view, wall minutely roughened and smooth plage bounded by a faint line, dull rusty brown in KOH, apical pore not evident, basidia 2- and 4-spored, 20–24 \times 7–8 μ , hyaline in KOH. Pleurocystidia scattered, fusoid-ventricose 45–60 \times 10–15 μ , necks often flexuous and apices obtuse, hyaline, thin-walled, occasionally with a secondary septum in the neck. Cheilocystidia similar to pleurocystidia but with more tendency for apex to be slightly enlarged. Gill trama interwoven. Pileus trama hyaline in KOH and with a subgelatinous pellicle of narrow appressed hyaline hyphae as revived in KOH (not viscid fresh). Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On wet soil in a springy area along a road, Payette Lake, Idaho, June 25, 1954. Smith 44163.

OBSERVATIONS: The broad, distant, truly decurrent lamellae cause the small carpophore to resemble an *Omphalina* in appearance. The very pale

pileus with its shiny lubricous surface, the slight veil and the darkening stipe appear distinctive.

MATERIAL EXAMINED: Smith 44163-*type*.

183. *Galerina mainsii* Smith & Singer, *Mycologia* 50: 479. 1958.
Illustrations: Fig. 205 (pleurocystidia), 206 (cheilocystidia).

Pileus 6–12 mm broad, obtuse to convex becoming broadly convex, glabrous, moist and hygrophanous, “Burnt Sienna” (orange-brown) moist, fading to yellowish on the disc first, striate when moist.

Lamellae broad, broadly adnate, distant, edges minutely fimbriate, color not known but judging from the dried specimens yellowish when young and tawny at maturity.

Stipe 20–30 mm long, 1–1.5 mm thick, equal, evenly pale reddish tawny throughout as dried, pruinose near apex from caulocystidia, naked over the lower two thirds.

Spores 9–11 × 6.5–7.5 μ broadly ovate in face view, broadly inequilateral in profile, distinctly roughened under oil and with a smooth plage, pale tawny in KOH, rubiginous in Melzer’s (pseudo-amyloid), with a very slight callus. Basidia 2-spored, 23–26 × 7–8 μ, in KOH hyaline but many basidioles with dull cinnamon content. Pleurocystidia 50–65 × 10–14 μ, fusoid ventricose part down to and including the pedicel pale cinnamon in KOH; smooth, thin-walled or wall only very slightly thickened in the pedicel. Cheilocystidia abundant, similar to pleurocystidia in size and shape, and with slightly thickened walls in the pedicel. Gill trama of tawny incrustated hyphae. Pellicle of pileus of appressed narrow non-gelatinous yellowish hyphae, tramal body of enlarged hyphae deep reddish tawny in KOH from pigment incrustations. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on moss, Logan Pass, Glacier National Park, Montana, Aug. 20, 1941. Mains 6116.

OBSERVATIONS: This is not the 2-spored form of *G. diabolissima* for a number of reasons: the plage is well formed, the colors are too vivid, the cystidia are too large, and the spores are too large (9–11 × 6.5–7.5 μ as compared to 7–8 × 4.2–4.7 μ) even allowing for the two-spored condition. The lack of pilocystidia and any appreciable number of caulocystidia over the lower two-thirds of the stipe rules out both *G. vittaeformis* and *G. atkinsoniana*.

Smith 50797 apparently belongs here also. Data are as follows: pileus 5–9 mm broad, obtuse, dull tawny, striate; gills ochraceous tawny, distant, thickish, intervenose; stipe 10 mm × 1.5 mm, evenly colored, concolorous with cap, veil none; spores 9–12 × 5.5–6.5 μ, ovate in face view, inequilateral in profile view, roughened, plage smooth, no separation around it. Basidia 2- and 4-spored, many with pale ochraceous to tawny content. Pleurocystidia 50–70 × 10–15 μ, fusoid-ventricose with flexuous necks and subacute apices, yellow in KOH fresh, wall in pedicel and ventricose part ochraceous as revived in KOH. Gill trama and pileus trama heavily in-

crusted with cinnamon-ochraceous pigment. Clamps present, no pilocystidia found. It was collected at Tahquamenon Falls State Park, Luce Co., Michigan, Oct. 5, 1955.

Smith 51995 from Lizard Head Pass, San Juan Mts., Colorado, has the following microscopic features: Spores $9-11.5 \times 6-7.5 \mu$, inequilateral in profile view, obscurely angular-ovate in face view, well-ornamented, plage distinct, wall tawny in KOH. Basidia 4-spored. Pleurocystidia scattered $40-55 \times 7-12 \mu$, fusoid-ventricose with acute to subacute apices, mostly hyaline and thin-walled but some with yellowish to cinnamon walls in pedicel and lower part of ventricose portion. Cheilocystidia abundant, similar to pleurocystidia but colored and thickened walls much better developed (nearly entire cell with cinnamon walls in some). Pilocystidia none; clamps present. The pilei are "tawny", striate, and naked; the gills distant, broad and tawny; the stipe honey color overall and no veil is present; caulocystidia are present over the apical area but very rare otherwise.

Smith 52068 from Alta Lakes, near Ophir, Colorado, had a slight veil and there was less tendency for the cystidia to be colored. The spores, however, were distinctly obscurely angular. The basidia are 2-spored, the spores $9-12 \times 6-7 \mu$ and distinctly roughened.

Smith 51994 from Lizard Head Pass is a good collection and the following data were taken from it: Pileus dark "tawny", striate; stipe evenly colored tawny overall, not pubescent, no veil present. The spores are $8-10 \times 6-7$ ($9-12 \times 6.5-8$) μ , distinctly roughened, with a smooth plage, rich tawny in KOH, distinctly inequilateral in profile and broadly ovate in face view. Basidia are 2- and 4-spored and many are fulvous in KOH. The pleurocystidia are $50-70 \times 10-15 \mu$, apices subacute and necks often very crooked, walls thickened slightly and \pm colored in basal part. The cheilocystidia are similar but the cinnamon wall-pigment is more pronounced. The pileus trama has heavily incrustated hyphae and clamps are present on the hyphae.

Although some possibly significant differences appear to be present in the above collections they all show broad spores, cheilocystidia with a tendency to become colored, lack of appreciable caulocystidia over the lower half of the stipe, and generally dark brown to russet colors due to the heavy pigment incrustations on the hyphae.

MATERIAL EXAMINED: Mains 6116-type (MICH). Smith 44147; 51364; 51898; 51981; 51983; 51994; 51995; 51998; 52066; 52067; 52068; 52069; 52070; 52071; 52703; 52773; 52775; 52777; 52778; 53598.

184. *Galerina inconspicua* Smith & Singer, Mycologia 47: 592. 1955.

Pileus 6 mm broad, 5 mm high, convex and umbonate, glabrous, hygrophanous, buff to light ochraceous brown (between *buff* and *gold leaf*), striatulate when wet, fading when dry; flesh thin, without distinct odor, taste not recorded.

Lamellae concolorous with pileus, ventricose and broad, adnexed to adnate, distant.

Stipe 10 mm long, 2 mm thick, equal or very slightly tapering downward, concolorous with the pileus but the base brown, pallid pruinose at the apex, below the apex not pruinose but pallid fibrillose from the distinct but never annulate veil, no veil remnants on margin of pileus.

Spores $11-12 \times 6-6.3(7.5) \mu$, a few up to 15μ long, very finely punctulate or marbled, almost smooth in a minority, with well-marked plage, moderately deep rusty-brown in KOH subfusoid in front view, slightly inequilateral in profile with a strong callus. Basidia 2-spored, with a few 1-spored intermixed, $24-27 \times 8-8.5 \mu$, more rarely up to 9.7μ broad. Pleurocystidia hyaline to pale brownish in KOH and NH_4OH , ventricose below, ampullaceous with medium thin and long-cylindrical neck, usually not thickened at the apex, thin-walled, $48-62 \times 7-15 \mu$. Cheilocystidia like the pleurocystidia or just vesiculose to clavate without a neck. Caulocystidia, $42-83 \times 8-12.5 \mu$; in dense bunches, hyaline to melleous, ventricose at the base, filamentous in the upper portion, much like the pleurocystidia. Gill trama regular, melleous to light brownish but without distinct pigment incrustations. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered among *Polytrichum* in an opening of the *Nothofagus dombeyi* woods, May 16, 1952, Quetrihué, Nahuel Huapi National Park, Terr. Neuquén, Patagonia, Argentina; apparently also in North America.

OBSERVATIONS: This species differs from *G. subannulata* in a number of characters. The veil and the spore ornamentation are not as well developed; the spores are non-mucronate, paler in NH_4OH and definitely narrower; the pleurocystidia are usually ampullaceous with a long cylindrical neck; and the pileus is umbonate rather than obtuse, with a paler color. The spores are too large for the bispored *G. oreina*. The latter has a darker pileus, different cheilocystidia, and a much more elongated stipe. Smith 63320 apparently belongs here but the pilei measure up to 10 mm broad. It was found on *Polytrichum*. Since Singer's original collections were not sufficient to establish a size range for the species, the discrepancy noted here is not considered important.

MATERIAL EXAMINED: Smith 63320. Singer M-622-*type* (LIL).

185. *Galerina latispora* Smith & Singer, Mycologia 47: 591. 1955.
Illustration: Fig. 207 (cheilocystidia), 208 (pleurocystidia).

var. latispora

Pileus 10–15 mm broad, convex, expanding to broadly convex, surface glabrous, moist, hygrophanous, striatulate moist, “tawny” and fading to dingy tan.

Lamellae near tawny at maturity, subdistant, narrow to moderately broad, nearly horizontal and bluntly adnate.

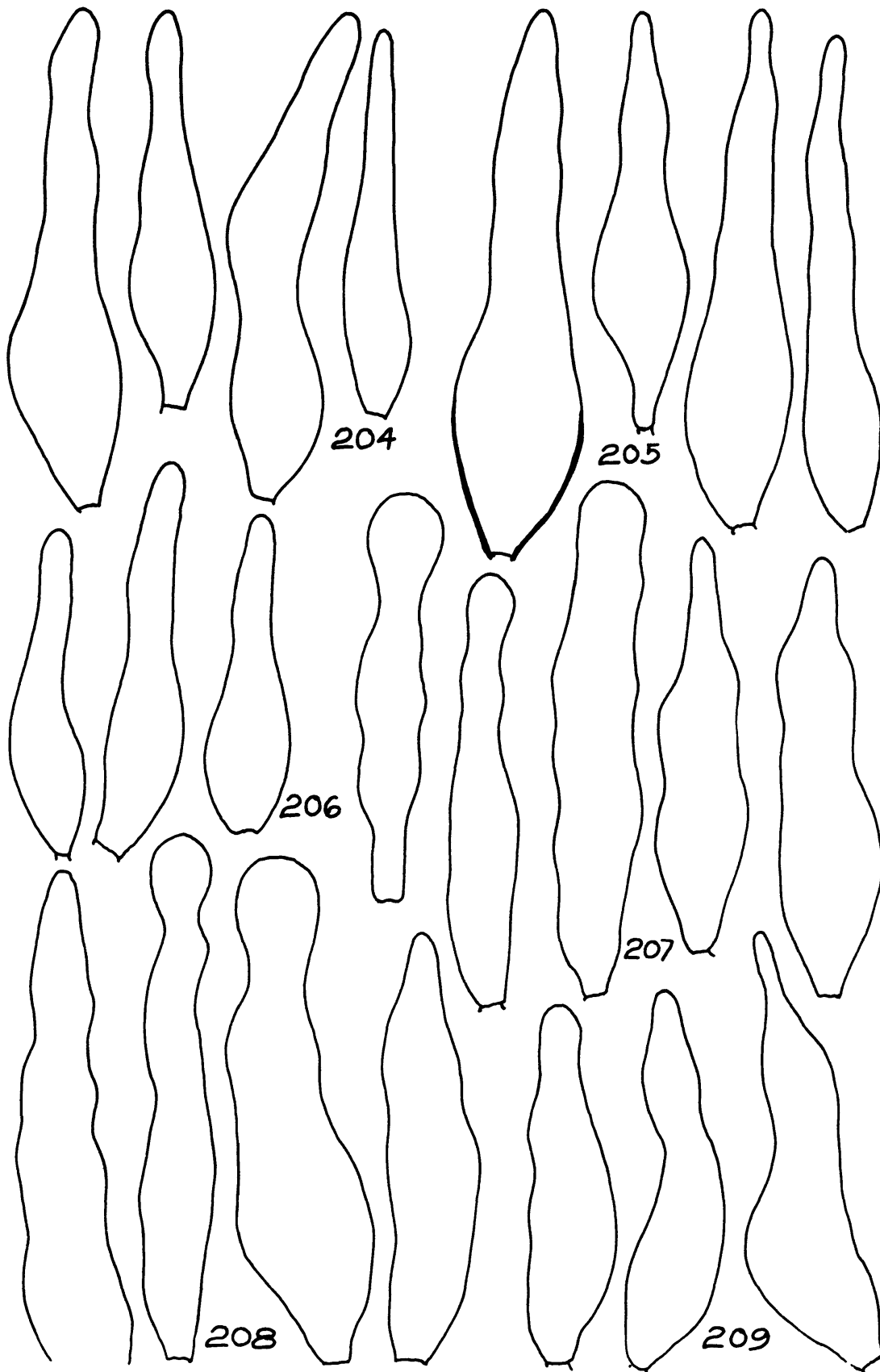


Fig. XXIX

Cystidia: Fig. 204, pleurocystidia of *G. oreina*; 205, pleurocystidia of *G. mainsii*, 206, cheilocystidia; 207, cheilocystidia of *G. latispora*, 208, pleurocystidia; 209, cheilocystidia of *G. funariae*.

Stipe 15–25 mm long, 1–2 mm thick, sometimes narrowed downward, apex faintly pruinose, lower portion naked, tawny overall.

Spores $9\text{--}11 \times 6.5\text{--}7.5 \mu$ ($12\text{--}13 \times 8\text{--}8.5 \mu$), broadly ovate or in many the apex snoutlike, broadly inequilateral in profile, tawny or darker in KOH, very minutely rugulose roughened, and with a smooth suprahilar depression marked by only a faint ragged line of granules. Basidia 2- and 4-spored. Pleurocystidia scattered to rare, similar to the cheilocystidia. Cheilocystidia abundant, $42\text{--}60 \times 7\text{--}12 \mu$, subfusoid with flexuous walls in the neck and subacute to subcapitate apices, hyaline, thin-walled. Gill trama tawny in KOH, somewhat interwoven. Pileus trama tawny in KOH, homogeneous; pigment incrustated on hyphae of carpophore. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered on moss in wet areas along a stream, known only from the type locality, Mt. Rainier National Park, Washington.

OBSERVATIONS: The very broad, almost smooth spores, rare to scattered pleurocystidia, evenly colored carpophores and convex pileus are distinctive. This species differs from *G. oreina* mainly in its nearly smooth spores with indistinctly marked smooth plage. The spores are also larger and have somewhat thicker walls. The absence of a veil may be an additional character, but more material in younger stages of development is needed to verify this. In the revived material studied to date the cheilocystidia have been found to be hyaline, but in the hymenium many of the old basidia have tawny walls in the lower portion, and some tawny brown basidioles are also present.

MATERIAL EXAMINED: Smith 40099-*type*.

185a. *Galerina latispora* var. *mexicana* Singer, var. nov.

Pileo 12 mm lato, obtuse conico, brunneo, hygrophano, glabro, striatulo; lamellis ferrugineo brunneis, ascendentibus, adnexis, dein subhorizontalibus, latis, subdistantibus vel sat confertis; stipite 42 mm longo, 2 mm crasso, omnino, ochraceo-brunneo, haud fortiter mutabili in adultis vel exsiccatione, glabro; velo vix manifesto; sporis $9.2\text{--}10.5 \times 7.3\text{--}10.5 \mu$ bene pigmentatis, verruculoso-punctatis, disco levi suprahilari instructis, ellipsoideo-amygdaliformibus, sursum semper rotundato-obtusis; basidiis tetrasporis; cheilocystidiis pleurocystidiisque ampullaceis, $43\text{--}54 \times 4.2\text{--}9 \times 8.5\text{--}16 \mu$, apice $10\text{--}26 \mu$ longo, obtusis, numerosis, ubique cum basidiis immixtis, ad latera lamellarum magis voluminosis quam ad aciem; hypodermio fortiter incrustato; epicute haud gelatinascente, caulocystidiis in duabus tertiis inferioribus stipitis absentibus; hyphis fibuligeris.

Pileus 12 mm broad, 9 mm high, brown, obtusely conic, hygrophanous, fading to paler, two-thirds of radius transparently striate when wet; odor none.

Lamellae ferruginous-brown, ascendant-adnexed, then subascendant, broad, subdistant to moderately close.

Stipe 42 mm long, 2 mm thick, ochraceous brown over all, not strongly darkening in age or on drying, glabrous; veil not distinct.

Spores $9.2\text{--}10.5 \times 6.3\text{--}7.7 \mu$, well-colored in KOH, with a low but distinctly projecting exosporial ornamentation which is verruculose-punctate, with a distinct suprahilar plage, in face view ovoid and narrowed near apex; basidia $23\text{--}34 \times 7.4\text{--}10.5 \mu$, hyaline, clavate to ventricose, 4-spored; cheilocystidia and pleurocystidia similar or the latter more voluminous, $43\text{--}54 \times 4\text{--}9.3 \times 8.5\text{--}15.5 \mu$, ampullaceous, with a short pedicel and ventricose above it, neck cylindrical and apex subcapitate to subacute, hyaline to pale brownish, numerous, mixed with basidia on the edge; subhymenium densely ochraceous brown from both wall and incrusting pigment, small irregular elements forming a relatively thin layer; hymenophoral trama regular, pale brownish to almost hyaline in places, some elements inflated and almost like sphaerocysts and others filamentous, the diameters varying from $2\text{--}20 \mu$; epicutis only very slightly less incrusting by pigment than hypodermium but its hyphae narrower ($2\text{--}11 \mu$), not gelatinous; hypodermium dark ochraceous from heavily incrusting hyphae $5\text{--}20 \mu$ in diam.; trama of pileus not different from gill trama; caulocystidia absent from mid-portion of stipe; clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: In pine forests (*P. hartwegii*) on moist earth, among tufts of grass and very small mosses (no *Sphagnaceae* or *Polytrichaceae*), solitary, Singer M 1567 type, just below (at 3600 m. alt.) Paso de Cortés, Distrito Federal, Mexico, July 21, 1957 (MICH).

OBSERVATIONS: The type variety has finer spore ornamentation. At first we were inclined to regard var. *mexicana* as a distinct species, but decided finally that it was too close to *G. latispora*.

186. *Galerina funariae* Smith & Singer, Mycologia 47: 594. 1955.
Illustrations: Fig. 209 (cheilocystidia), 210 (pleurocystidia).

Pileus 10–30 mm broad, obtuse at first, becoming convex to nearly plane, surface glabrous, moist, hygrophanous, with broad translucent striations extending to the disc, “tawny” to “ochraceous tawny” and fading to sordid ochraceous buff, margin usually paler than disc, smooth; flesh concolorous with surface, watery and fragile, odor and taste not distinctive.

Lamellae subdistant, (10–15 reach the stipe) very broad (8–10 mm), adnate, oval in outline, 1–2 tiers of lamellulae, pale tawny when very young, concolorous with cap in age.

Stipe 20–35 mm long, 1–1.5 mm thick, pruinose above from caulocystidia, fragile, equal, concolorous with cap or paler, becoming bister from the base upward, very scantily mycelioid at base, lower half glabrous.

Spores $8\text{--}10 \times 5\text{--}6 \mu$, subinequilateral in profile, in face view broadly ovate, ochraceous tawny to slightly darker in KOH, exosporium minutely roughened to rugulose, with a smooth plage, apical callus present. Basidia 4-spored, $24\text{--}26 \times 8\text{--}9 \mu$, hyaline in KOH. Pleurocystidia scattered, $35\text{--}50(56) \times 8\text{--}12 \mu$, fusoid-ventricose, thin-walled, hyaline in KOH, apices

obtuse to subacute. Cheilocystidia similar to pleurocystidia or slightly more elongated. Gill trama subparallel, pale ochraceous from incrusting pigment. Pileus trama homogeneous, darker than gill trama; caulocystidia fusoid. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered near *Funaria* and on it, in a burned area (muck soil as base), Kalaloch, Washington, April. One collection was from a fresh grass seeding over the burn in which some moss was also present.

OBSERVATIONS: This is a large *Galerina* distinguished by pale, minutely roughened spores, the stipe which becomes distinctly darker below in age, the lack of a veil, and the habitat. It is distinguished from *G. minima* by its lack of a veil, paler pileus, distinctly darkening stipe, and much larger size.

MATERIAL EXAMINED: Smith 12063-*type*; 13001; 51062.

187. *Galerina nordmaniana* Smith & Singer, Mycologia 50: 480. 1958.

Illustrations: Pl. 5, fig. E.

Pileus 8–15 mm broad, convex, margin straight, expanding to broadly convex, surface moist and hygrophanous, pale cinnamon brown moist, fading to pinkish buff or warm buff (pale yellow), glabrous; flesh very soft, concolorous with the surface, odor none, taste mild.

Lamellae broadly adnate to subdecurrent, broad, distant or nearly so, “cinnamon”, edges uneven and pallid.

Stipe 20–25 mm long, 1–5 mm thick, equal, fragile, near cinnamon brown below and honey color above, naked to the pruinose apex in age, all traces of rudimentary veil soon gone.

Spores $8.5\text{--}11 \times 5\text{--}6 \mu$, almost russet in KOH (dark dull rusty brown) surface rather coarsely warty-wrinkled over all except the well-defined smooth plage, rarely the outer wall separating slightly around the plage, callus present but inconspicuous. Basidia 4-spored. Pleurocystidia scattered, $50\text{--}70 \times 9\text{--}14 \mu$, fusoid-ventricose, the apices acute to subacute, often with a slight enlargement just back of the apex, walls thin and hyaline as revived in KOH, smooth, walls flexuous in some. Cheilocystidia usually narrower than pleurocystidia but otherwise similar (no color seen in the walls). Gill trama subregular, hyaline to ochraceous in KOH. Pileus trama with a tawny yellow hypodermal zone, the cuticle of non-gelatinous narrower hyphae, color mostly located in the wall, pigment incrustations slight. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: On moss along a road bank, Granite Creek, near Nordman, Idaho, Oct. 9, 1956. Smith 54260-*type*.

OBSERVATIONS: This seems to be intermediate between *G. saltensis* and *G. oreina*. The latter differs in having pleurocystidia and cheilocystidia with more rigid walls often slightly colored over the lower part, in spores broader in relation to their length, and in a less conspicuously darkening stipe. There is very likely a significant difference in the color of the gills

also—"cinnamon" as compared with "ochraceous-tawny", but more collections of *G. nordmaniana* are needed for comparison on this point, and spore deposits of the two should be compared.

MATERIAL EXAMINED: Smith 54260-*type*.

Stirps *Vittaeformis*

Pileus typically conic, the margin appressed against the stipe when young (straight); pleurocystidia present; spores ornamented and with a smooth plage but never calyptrate; caulocystidia present over most of stipe; veil absent.

This group presents a complex pattern of variants difficult to classify because of the large number of intermediates. After one has studied hundreds of collections in the group one can actually sort out at sight in the field most of the taxa involved. It is in this group more than any other that one finds collections, as present in many herbaria, containing mixtures of species. Hence, a fresh start was badly needed and we have approached the problem from that point of view. We have, however, encountered certain limitations in the variants around *G. atkinsoniana*. We have not tried to classify separately every variation from the type that we have found. The reason is simple; we found ourselves describing collections, not populations. We believe that there is much to be done in this complex in evaluating such characters as deal with the features of the pilocystidia, pleuro- and cheilocystidia, spore ornamentation, and the extent of the development of the cystidia over the stipe. Our data at present are not detailed enough to give a clear picture of the situation. We go so far as to recognize two species, *G. perplexa* and *G. atkinsoniana*. We base *G. perplexa* on the characters of small spores ($7-11 \times 5-6.5 \mu$) on 4-spored basidia, and pilocystidia mostly of the hyaline seta-like type (not markedly inflated at the base). Around this concept one finds a spattering of variants with 2-spored basidia, spores $10-12 \times 6-7 \mu$ and in some of these the pilocystidia are more seta-like than ventricose and vice versa. Additional characters which come into the picture are thickened and colored walls in the cheilocystidia and/or pleurocystidia. *G. atkinsoniana* itself is centered on material with 4-spored basidia and spores $11-13 \times 5.5-7 \mu$, and inflated pilocystidia. But the 2-spored form is the one found most frequently and is perhaps the most constant variant in the whole group. Further studies on this complex, to be most effective, should include culture characteristics and mating behavior as well as critical cytological studies.

Key to Species

1. Stipe pale umber over all; pleurocystidia dimorphic... 188. *G. umbrinipes*
1. Not with both the above characters..... 2
 2. Pileus 10-20 mm broad; lamellae narrow and close; stipe tawny above and paler below..... 189. *G. angustifolia*
 2. Not with above combination of characters..... 3

3. Spore ornamentation very faint under oil immersion..... 4
 3. Spore ornamentation readily visible under oil..... 5
 4. Spores $7-9.5 \times 6-7 \mu$ 190. *G. karstenii*
 4. Spores $9-12 \times 4-5 \mu$ 191. *G. pubescentipes*
 5. Context vinaceous red; spores $12.2-13.8 \times 7.3 \mu$ 192. *G. vinolenta*
 5. Not with above combination of characters..... 6
 6. Pilocystidia absent to very rare and then mostly near the pileus margin..... 195. *G. vittaeformis*
 6. Pilocystidia readily demonstrated..... 7
 7. Many pleurocystidia with flexuous to corkscrew-like necks.....
 194a. *G. atkinsoniana* var. *sphagnorum*
 7. Pleurocystidia with straight to slightly flexuous necks..... 8
 8. Spores $11-13 \times 6-7 \mu$; basidia 4-spored; pilocystidia present and often bulbous at base..... 194. *G. atkinsoniana*
 8. Spores $(7)8-11 \times 5-6.5 \mu$; basidia 4-spored; pilocystidia almost seta-like ($\pm 8 \mu$ at basal inflated part)..... 193. *G. perplexa*
 8. Spores from 2-spored basidia and of various sizes..... 9
 9. Pilocystidia seta-like..... variants of 193. *G. perplexa*
 9. Pilocystidia more bulbous at base..... variants of 194. *G. atkinsoniana*

188. *Galerina umbrinipes* Smith, Mycologia 45: 920. 1953.

Illustrations: Fig. 211, 212 (pleurocystidia), 213 (cheilocystidia).

Pileus 6–10 mm broad, obtusely conic, remaining conic or becoming campanulate, glabrous, moist, hygrophorous, “ochraceous tawny” moist, pale buff faded, when moist translucent-striate to the watery disc, somewhat sulcate faded; flesh very thin and fragile, no appreciable odor.

Lamellae ascending-adnate, narrow to moderately broad, 1 tier of lamellulae, subdistant, ochraceous tawny.

Stipe 30–40 mm long, 1–1.5 mm thick, equal or base slightly enlarged, pale umber over all when young, in age fading out more or less concolorous with the pileus in upper part, umber cast remaining at base, surface finely pubescent over all from projecting caulocystidia.

Spores $10-12.5(13) \times 5.5-7 \mu$, tawny to pale tawny in KOH, inequilateral in profile, ovate in face view, outer wall wrinkled, suprahilar area slightly roughened and not noticeably depressed, apical callus present. Basidia 4-spored, $23-26 \times 6-7 \mu$, hyaline in KOH, not projecting when sporulating. Pleurocystidia of two types—the first rare, $23-30 \times 5-6 \mu$, fusoid and imbedded in hymenium, hyaline and homogeneous in KOH, the second abundant, greatly elongated, $46-80 \times 9-14 \mu$, ventricose at base, apex subcapitate to subacute, hyaline, thin-walled in KOH or walls slightly thickened. Cheilocystidia similar to pleurocystidia, very abundant. Caulocystidia fusoid-ventricose, hyaline, thin-walled in KOH $(40)50-100 \times 12-18 \mu$, ventricose at base, tapered to a subcapitate to subacute apex. Gill trama subparallel, the cells short and broad, with ochraceous incrusting pigment on the walls when revived in KOH, hyphae yellow in water

mounts of fresh material. Pileus trama homogeneous; pellicle undifferentiated, the hyphae merely more compactly interwoven near surface, the walls yellow in KOH from incrusting pigment.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on moss under conifers, Still Creek Forest Camp, 3800 ft. elevation, Mt. Hood National Forest, Oregon, Oct. 3, 1946.

OBSERVATIONS: The umber stipe is an unusual character in this genus, particularly in young specimens. It is likely that cap primordia have a similar cast. The young stipe may appear almost fibrillose at times but examination under the microscope shows the fibrils to be elongated caulocystidia. The spores are essentially as in *G. vittaeformis*, but the color of the stipe when young, and the presence of two types of pleurocystidia, are a pair of characters which readily distinguish it. The small pleurocystidia are indeed curious; when forked, they resemble 2-spored basidia with thick obtuse sterigmata.

MATERIAL EXAMINED: Smith 24051-*type*; 46415.

189. *Galerina angustifolia* Smith & Singer, sp. nov.

Illustrations: Pl. 16, fig. C.

Pileo fulvo-brunneo, centro obscure fulvo-brunneo, 10–20 mm lato; lamellis angustis, confertis; stipite 20–30 × 1.5 mm, pallidiore in parte inferiore quam in parte superiore; velo nullo; pleurocystidiis, ampullaceis, apice obtusis vel subacutis integrisque; basidiis bi- et tetrasporis; ceterum *G. vittaeformi* simillima peraffinisque species. Inter muscos. Specimen typicum leg. Smith 52000, Colorado (MICH).

Pileus 10–20 mm broad, conic becoming broadly campanulate, surface glabrous, moist, hygrophanous, dark tawny on the disc and paler toward the margin; flesh thin, concolorous, no odor, taste not recorded.

Lamellae narrow, close, adnate, pinkish buff becoming tawny, edges fimbriate under a lens.

Stipe 20–30 mm long, 1.5 mm thick, equal, dark dull tawny above, paler below, finely pubescent from caulocystidia; veil absent.

Spores 8–11 × 5–6.5 μ, broadly inequilateral in profile view, distinctly ovate in face view, dull tawny in KOH, surface roughened but not conspicuously so (appearing nearly smooth under high dry magnification), plage distinct and no separation of wall around it. Basidia 2- and 4-spored. Pleurocystidia 50–68 × 9–15 μ, fusoid-ventricose with subacute to obtuse apices, hyaline, thin-walled, walls often flexuous. Cheilocystidia similar to pleurocystidia but with a tendency to have cinnamon-tinted walls in the ventricose portion and pedicel. Gill trama subparallel, hyphae with smooth pale tawny to ochraceous walls as revived in KOH, pileus trama fulvous from pigment-incrusted hyphae, cuticle of radial narrower non-gelatinous faintly incrusted hyphae, no pilocystidia present. Clamp connections present.

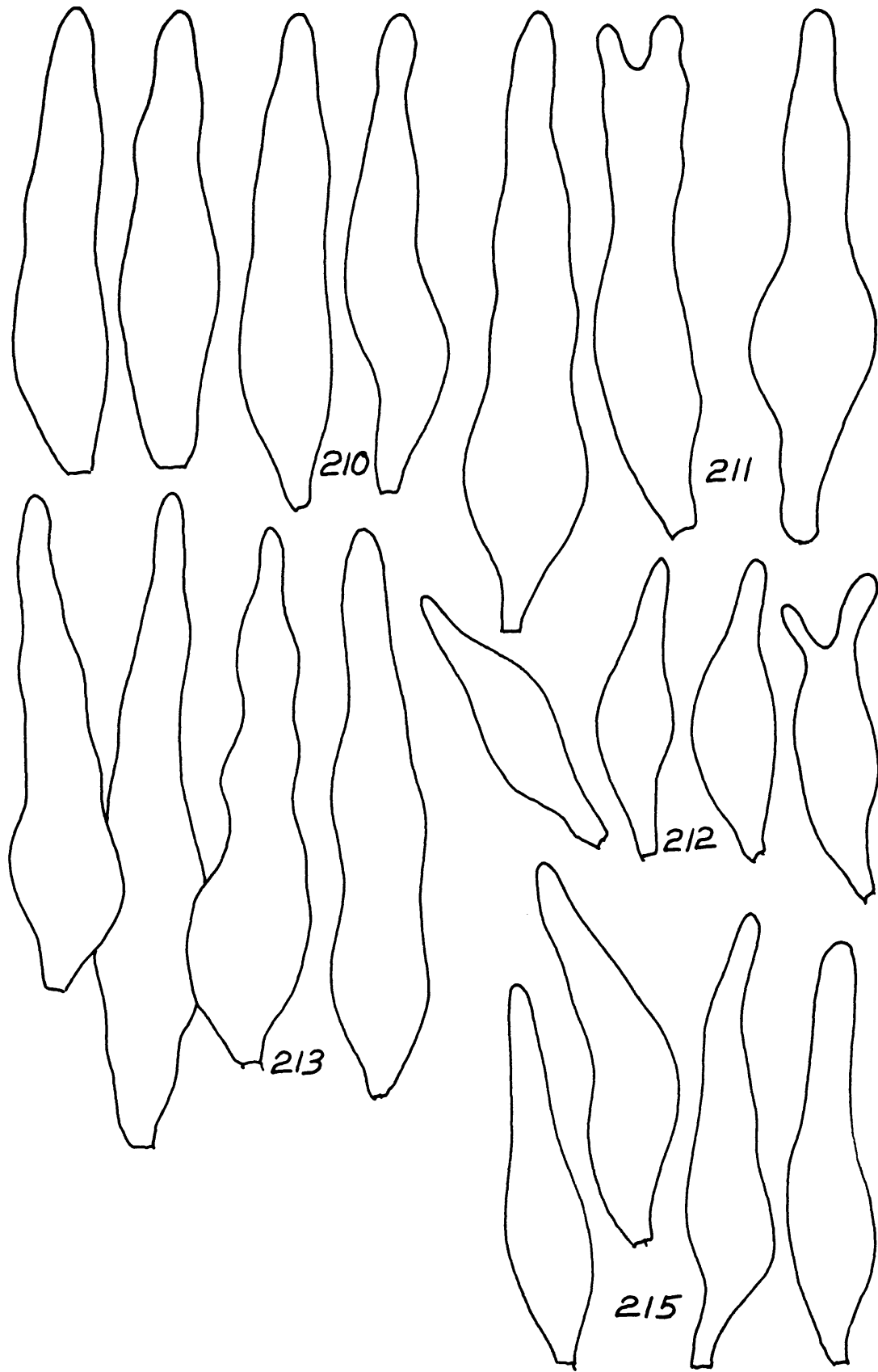


Fig. XXX

Cystidia; Fig. 210, pleurocystidia of *G. funariae*; 211, pleurocystidia of *G. umbrinipes*, 212, small pleurocystidia, 213, cheilocystidia; 215, cheilocystidia of *G. karstenii*.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on moss, Lizard Head Pass, Colorado, Aug. 10, 1956. Smith 52000.

OBSERVATIONS: This species is close to *G. vittaeformis* but can be distinguished in the field by its more robust stature and close narrow gills, as well as by the fact that the stipe is darker above in young specimens. The cheilocystidia show a tendency toward cinnamon colored walls which is more characteristic of *G. atkinsoniana* than *G. vittaeformis*. *G. karstenii* has smoother spores and is broader in relation to its length than *G. angustifolia*, and has hyaline cheilocystidia.

MATERIAL EXAMINED: Smith 52000-*type*.

190. *Galerina karstenii* Smith & Singer, sp. nov.

Illustrations: Fig. 215 (cheilocystidia).

Pileo 10–15 mm lato; lamellis latis, confertis vel subdistantibus fere; stipite 30–50 × 1–2 mm; rufobrunneo in siccis, e caulocystidiis pruinoso, velo nullo; sporis 7.5–9.5 × 6–7 μ levibus vel sublevibus; pleurocystidiis raris; basidiis tetrasporis, paucis bisporis, pilocystidiis nullis; fibulis praesentibus. Ad muscos, leg. P. A. Karsten, 9 Sept., 1865, in Fennia (H), specimen typicum.

Pileus 10–15 mm, obtusely campanulate to convex, color of dried specimens indicating the usually tawny to ochraceous tawny color when fresh of most of the genus, very likely striate when moist, fading to buff or pale tan.

Lamellae broad, close to nearly subdistant, ascending adnate, edges fimbriate, rusty brown as dried.

Stipe 30–50 mm long, 1–2 mm thick, equal, fragile, dark reddish brown as dried, hence very likely darkening from base upward, pruinose from caulocystidia, no veil remnants seen.

Spores 7.5–9.5 × 6–7 μ , broadly ovate in face view, broadly and obscurely inequilateral in profile view, as seen under oil smooth to very obscurely mottled and with a very faintly delimited plage, no apical pore visible, “tawny” or duller KOH (color fairly dark). Basidia 20–24 × 6–8 μ , broadest when young, 4-spored (a few 2-spored), hyaline in KOH. Pleurocystidia rare and like the cheilocystidia. Cheilocystidia 30–45 × 8–12 × 4–5 μ , fusoid-ventricose, hyaline, smooth. Caulocystidia similar to cheilocystidia or longer. Gill trama pale ochraceous in KOH, hyphae \pm interwoven. Pileus trama with a thin hyaline subgelatinous pellicle over an ochraceous hypoderm, no pilocystidia present. Clamps present.

HABIT, HABITAT AND DISTRIBUTION: On moss in Finland, collected by P. A. Karsten, Sept. 9, 1865. (H).

OBSERVATIONS: This species is close to *G. emmetensis* in the stirps *Hypnorum* but has much broader spores. In the stirps *Minima* it is closest to *G. oreina*, because of the broad spores, but has fewer pleurocystidia and no color was seen in the walls of the cheilocystidia. In our classification, the species belongs in the stirps *Vittaeformis*, because of the caulocystidia. Here it is

closest to *G. vittaeformis* f. *tetraspora* but differs in having nearly smooth spores and very few pleurocystidia.

191. *Galerina pubescentipes* Smith & Singer, sp. nov.

Illustrations: Fig. 216 (pleurocystidia).

A *Galerina karstenii* affini differt sporis 9–12 × 4–5 μ; pileo stipiteque ochraceobrunneis, stipite ex integro pubescente ex caulocystidiis; basidiis bisporis; cellulis terminalibus epicuticularibus dermatocystidioideis, sparsis in superficie pilei. Gregatim ad lignum coniferarum, leg. A. H. Smith, 53374 (MICH) in Idaho.

Pileus 4–7 mm broad, obtuse to convex, becoming broadly convex, surface glabrous, moist, hygrophanous, ochraceous tawny and striate moist, cinnamon buff faded.

Lamellae close to subdistant, moderately broad, ascending-adnate, ochraceous tawny, edges fimbriate.

Stipe 15–25 mm long, 1 mm thick, equal, nearly concolorous with cap varying to darker (but often as dark at apex as at base), pubescent overall from caulocystidia, veil absent.

Spores 9–12 × 4–5 μ, narrow and slightly inequilateral in profile, narrowly ovate to nearly oblong in face view, many obscurely angular in face view, pale ochraceous tawny in KOH, pale reddish tawny in Melzer's, very minutely roughened but plage smooth and distinct as seen under oil. Basidia 2-spored. Pleurocystidia abundant, 50–80 × 9–14 μ, thin-walled, hyaline, smooth, apices acute to subacute, gill trama subregular, yellowish in KOH. Pileus trama yellowish in KOH, pilocystidium-like hyphal end-cells scattered over surface of cap. Epicutis of pileus of radial nongelatinous hyphae. Clamps present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on a conifer log, Papoose Creek, Seven Devils' Mountains, Idaho, Sept. 12, 1956. Smith 53374-*type*.

OBSERVATIONS: The nearly smooth spores distinguish this species from *G. vittaeformis*, but there is also a difference in width which in turn is expressed in the shape.

MATERIAL EXAMINED: Smith 53374-*type*.

192. *Galerina vinolenta* (Berk.) Smith & Singer, comb. nov.

Agaricus vinolentus Berkeley, Hook. Journ. Bot. & Kew Gard. Misc. 4: 131. 1852.

Galera vinolenta (Berk.) Sacc. Syll. Fung. 5: 861. 1887.

Pileus 8–13 mm broad × 8–11 mm high, conic-campanulate, with obtuse apex, over one-third to one-half of the radius sulcate or striate, vinaceous cinnamon to ochraceous brown.

Lamellae rather distant and broad, ascendant-adnate, said to be vinaceous (?).

Stipe 5.5 cm \times 1.2 mm, base thickened to 2 mm, gradually enlarged downwards, said to be vinaceous but painted in original drawing cinnamon to cinnamon brown with cinnamon pallid to almost pallid apex. Context said to be deep vinaceous red.

Spores 12.2–13.8 \times 7.3 μ , well pigmented, very distinctly and visibly but lowly (periphery scarcely roughened) verrucose, with strongly marked plage. Basidia 4-spored, mostly collapsed in type. Pleurocystidia and cheilocystidia similar, not distinctly thick-walled, ventricose below, with subcylindrical “neck”, much as in *G. vittaeformis*. Caulocystidia numerous at least to middle of stipe, like pleurocystidia or more subulate. Pilocystidia doubtful, in type collection only in one section doubtfully recorded as present. Hyphae with clamp connections.

HABIT, HABITAT AND DISTRIBUTION: Among mosses and on rotten wood in pine forest, 3300 m. alt. Sikkim (Himalaya).

MATERIAL EXAMINED: Type (K), coll. Hooker, accompanied by a painting.

OBSERVATIONS: We feel obliged here to place emphasis on the colors as described. These do not check exactly with the painting at Kew, but during the years these may have changed significantly. The colors of the fresh fruit body, and the species epithet applied by Berkeley, emphasize the distinctive color. The spore size is close to that of *G. atkinsoniana*, but the large pilocystidia of the latter could not be found on the material of Berkeley's species available for study. Hence we recognize *G. vinolenta* as distinct from *G. atkinsoniana* and *G. vittaeformis*.

193. *Galerina perplexa* Smith, sp. nov.

Illustrations: Fig. 217 (pleurocystidia), 218 (pilocystidia), 219 (caulocystidia), 220 (cheilocystidia).

Pileus 7–15(20) mm latus, 6–8 mm altus, conicus, demum convexus vel obtuse-campanulatus, udus, pruinosis, hygrophanus, fulvus demum subochraceus, striatus; lamellae confertae vel subdistantes, angustae demum latae, anguste adnatae; stipes 30–60 mm longus, 0.5–2 mm crassus pruinosis, sursum purpureo-brunneus, sursum pallide fulvus; sporae (7)8–11 \times 5–6.5 μ , verruculosae; pleurocystidia (45)50–75 \times (8)9–12 \times 4–5 \times 3–4 μ , subacuta; pilocystidia circa 80 \times 8 \times 4 \times 2.5 μ , setulosa. Specimen typicum legit. A. H. Smith (62446), 17 Jun 1960, Dexter, Michigan, USA.

Pileus 7–15(20) mm broad, 6–8 mm high, conic, convex to obtusely campanulate, margin straight at first, surface pruinose at first, soon naked, moist, hygrophanous, ochraceous tawny or paler (pale butter-scotch color), translucent striate moist, fading on disc first to “cartridge buff” or pinkish buff; context very thin and watery (after heavy rains), odor of crushed content pungent-subnauseous, taste resembling that of raw *Morchella esculenta*.

Lamellae close to subdistant, narrow to broad, narrowly adnate, pale pinkish buff becoming clay color or nearly so, edges even but fimbriate under a lens.

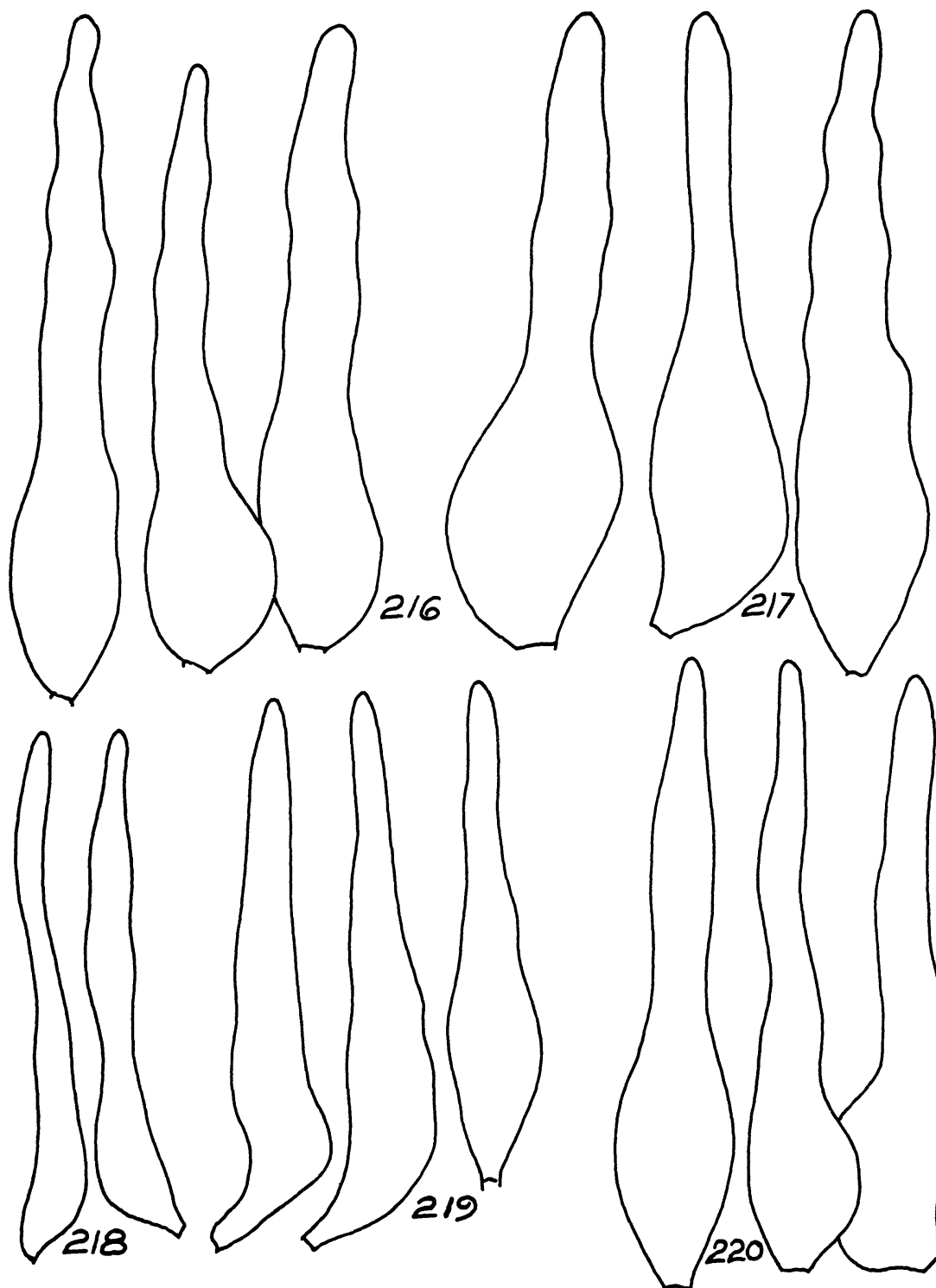


Fig. XXXI

Cystidia: Fig. 216, pleurocystidia of *G. pubescentipes*; 217, pleurocystidia of *G. perplexa*, 218, pilocystidia, 219, caulocystidia, 220, cheilocystidia.

Stipe 30–60 mm long, 0.5–2 mm thick, equal, upper half pruinose from caulocystidia, pruinose to nearly naked in the lower half, base slightly mycelioid, basal third gradually dark reddish brown to purplish-umber brown, or finally blackish brown, upper half about concolorous with the gills (paler than cap). No veil present.

Spores (7)8–11 \times 5–6.5 μ broadly inequilateral in profile view, ovate in face view, pale ochraceous tawny to ochraceous tawny in KOH, deep red-brown in Melzer's reagent, distinctly warty-rugulose except for a smooth plage. Basidia 4-spored. Pleurocystidia scattered, (45)50–75 \times (8)9–12 \times 4–5 \times 3–4 μ , apices subacute, thin-walled, hyaline in KOH; cheilocystidia similar to pleurocystidia in shape but usually smaller. Pilocystidia about 80 \times 8 \times 4 \times 2.5 μ , (almost seta-like), flexuous and tapered to an acute apex from a narrowly inflated base, colorless. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on moss under pine, on sandy soil. Michigan, Colorado, California, Idaho; summer and fall.

OBSERVATIONS: The number of pilocystidia varies greatly with collections, in fact a few caps were found which were densely pubescent under a lens. The characters of real significance, as they appear to us at present, are the almost seta-like pilocystidia without greatly inflated basal part, the pale fulvous pileus, medium-sized spores on 4-spored basidia, and conspicuously darkening stipe. The variable characters appear to be the number of pilocystidia and caulocystidia present, the spacing of the gills and the stature; the stipe may be short and thick or long and slender.

If any species related to *G. vittaeformis* deserves to bear the name *G. rubiginosa* it is this one, as it fits the Friesian descriptions almost perfectly.

G. karstenii is closest to it but the spores are smoother and pilocystidia are absent. Singer N-611, with spores 10–11 \times 6 μ on 2-spored basidia, is apparently a 2-spored form of this species. Smith 48795 has spores in the upper size range of *G. perplexa* and a mixture of the seta-like and bulbous pilocystidia, so it seems that one may expect to encounter some intermediates with *G. atkinsoniana*.

MATERIAL EXAMINED: Singer N-611 (2-spored). Smith 3062; 4059 (2- & 4-spored); 36546; 41737; 41977; 42340; 42344; 42347; 42973; 43006; 43012; 43014; 43015; 43022; 43027; 43641; 43642; 43643; 47774; 47783; 48759; 50717; 50910; 56721; 56814; 56817; 57316; 58594; 61659b; 62446-type; 62449; 62461; 62794; 63320; 63414; 63415; 63416.

194. *Galerina atkinsoniana* Smith, Mycologia 45: 894. 1953.

var. *atkinsoniana*

Galera cerina Bres. in Sacc. Fl. Ital. Crypt., Hym. p. 779, 1916 (non *Galerina cerina* Smith & Sing.).

Illustrations: Pl. 5, fig. D. Figs. 221 (pleurocystidia), 222 (cheilocystidia).

Pileus 3–12 mm broad, 3–6 mm high, obtusely conic, becoming campanulate to convex, moist, hygrophanous, "russet" to "tawny" *Martinique*,

Antique bronze, Sudan brown, chipmunk or oak briar (russet to fulvous), much paler (*Inca gold*) between the striations, fading to "warm buff" (pale yellow), striate to the disc when moist, densely pruinose from projecting pilocystidia at first; flesh very thin, watery and fragile, tawny to ochraceous, odor and taste not distinctive.

Lamellae broadly adnate, broad (15 mm), distant, subventricose, tawny (*raw sienna*) at maturity, pale ochraceous when young, with white fimbriate edges which are often slightly eroded.

Stipe 20–45 mm long, 1–2 mm thick, equal or slightly tapering upward, fragile, at first pale fulvous throughout (*pl. 11 G 6; 12 FSM & P*), but gradually darkening over lower portion to dark fulvous (\pm concolorous with pileus or darker), densely pruinose from projecting caulocystidia until past maturity; no veil present in buttons.

Spores (10.5)11–15(16.5) \times 6–9 μ , ovate-apiculate in face view and slightly inequilateral in profile, rugulose to minutely warty when revived in KOH, some showing from 1–3 oil droplets, with apical callus. Basidia 2-spored, 27–34 \times 7–8 μ , projecting slightly when sporulating. Pleurocystidia scattered, fusoid-ventricose, 38–70 \times 10–15(16) μ , thin-walled and hyaline to sometimes somewhat brown in KOH. Cheilocystidia 28–40(60) \times (8)9–18 μ , abundant to scattered, narrowly to broadly fusoid-ventricose, thin-walled, hyaline or sometimes brownish in KOH. Pilocystidia present, similar to pleurocystidia, often larger, 50–90 \times 7.5–15(20) μ ; caulocystidia abundant, hyaline or with pale ochraceous pedicels, thin-walled, (40)60–120 \times 8.2–18(20) μ , fusoid-ventricose. Gill trama with subparallel to slightly interwoven hyphae, regular, with short and relatively broad cells which are pale ochraceous from incrusting pigment. Pileus trama homogeneous, pale ochraceous to tawny in KOH, with incrusting pigment and conspicuously darker in the hypodermium. Epicutis poorly differentiated. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered to gregarious on the moss carpets under conifers and on mossy logs, etc., boreal in distribution and common during warm relatively dry seasons. It has been collected in the Pacific Northwest and Northern Michigan in quantity and we would expect it to be one of the common species in Canada. It fruits throughout the season, but is most abundant in the fall. Bigelow found it in northern Maine. Also common in the Alps.

OBSERVATIONS: In *Smith 42002* abnormal spores up to 18 μ long, which were nearly smooth, were present in fair abundance. This is also true of *Smith 47090* from Idaho. This species is the most easily distinguished member of the *G. vittaeformis* group by virtue of the conspicuous rather persistent pilocystidia and the very broad spores. The coloration of the stipe tends to be somewhat confusing, however, because it varies from unicolorous to quite a bit darker at the base than at the apex. The collecting season of 1953 showed this species to be the most abundant *Galerina* under the balsam and spruce stands bordering the shore line from Trail's End Bay to the tip of Waugaschance Point in Wilderness State Park, on the Lake Michigan shore. Consequently, we are now inclined to regard such mossy areas dom-

inated by balsam and spruce as its typical habitat, and expect its area of distribution to coincide with this formation in a general way. We feel fairly certain that this species is common in Europe, from comments made by Kühner in regard to dermatocystidia on the pileus of 2-spored forms of his *G. rubiginosa*. However, since this whole group in Europe needs critical revision in the light of our study, we refrain from further comments on the *Galerinae* likely to turn up there.

What appears to be the type of *Galera cerina* Bres. has spores and pilocystidia of *G. atkinsoniana* and we do not hesitate in reducing it to synonymy of this latter species inasmuch as Singer has found *G. atkinsoniana* to be common in the Alps. However, the upper figures (with veil) of Icon. Mycol. 17, pl. 815 are obviously another species which was confused by Bresadola when describing *G. cerina*, l.c. p. 815.

Smith 43374 has 2-spored basidia, spores $10-12 \times 7-8 \mu$, and rather short cystidia on cap, gills and gill edges. *Smith 61510* fades to whitish, as in *G. vittaeformis* var. *albescens*, but is referable to *G. atkinsoniana* because of the pilocystidia. *Smith 61659b* has 4-spored basidia, spores $9-11 \times 5-6 \mu$ and the ventricose pilocystidia of typical *G. atkinsoniana*. In other words it is intermediate between *G. atkinsoniana* and *G. perplexa*. *Smith 49400* and *43012* have spores $11-13 \times 6-7 \mu$. This we regard as the 4-spored *G. atkinsoniana* var. *atkinsoniana*.

MATERIAL EXAMINED: Bigelow 3000; 3360; 3645; 3731; 3766; 3776; 3827; 3925; 3977; 3981; 3983; 4046; 4205; 4206; 4269; 4270; 4277; 4377; 4647; 4651; 4652; 4655; 5807; 6639; 7280; 8056; 8724. Bresadola (Mendolei, Trentino, Aug. 1901, type of *G. cerina*) (S). Oswald, Oregon, 1954. Singer N 269, N 531 (F) from Michigan; C 3015, C3047 (LIL) from Tirol. Smith 33-872; 26563; 36746; 36771; 36780; 36898; 36902; 36914; 37015; 37017; 37032; 38067; 38143; 40886; 40887; 40888; 40890; 41084; 41464; 41734; 42002; 42158; 42161; 42163; 42175; 42181; 42182; 42186; 42224; 42337; 42343; 42345; 42348; 42449; 42965; 42966; 42968; 42969; 42970; 42971; 42976; 42977; 42979; 42986; 43009; 43010; 43011; 43012; 43016; 43018; 43019; 43021; 43023; 43025; 43028; 43032; 43276; 43277; 43328; 43371; 43373; 43374; 43376; 43470; 43476; 43576; 43633; 43638; 43642; 43692; 43720; 43845; 43846; 43965; 44478; 44479; 44504; 44641; 44642; 44643; 44644; 44647; 44959; 46004; 46337; 46399; 46533; 46805; 46818; 47034; 47039; 47041; 47088; 47090; 47122; 47123; 47220; 47285; 47287; 47480; 48038; 48079; 48530; 49391; 49400; 53199; 57729; 58274; 58425; 61504; 61506; 61510; 61513; 61517; 61581; 61663; 61677; 61679. Thiers 3904.

194a. *Galerina atkinsoniana* var. *sphagnorum* Smith, var. nov.
Illustrations: Fig. 223 (pleurocystidia and cheilocystidia).

Pileus 8-10 mm latus, conicus, glaber, pallide fulvus; lamellae subdistantes, angustae, pallide ochraceae vel pallide fulvae; stipes 30-35 mm longus, 0.75 mm crassus, ochraceous deorsum demum fulvus; pubescens;

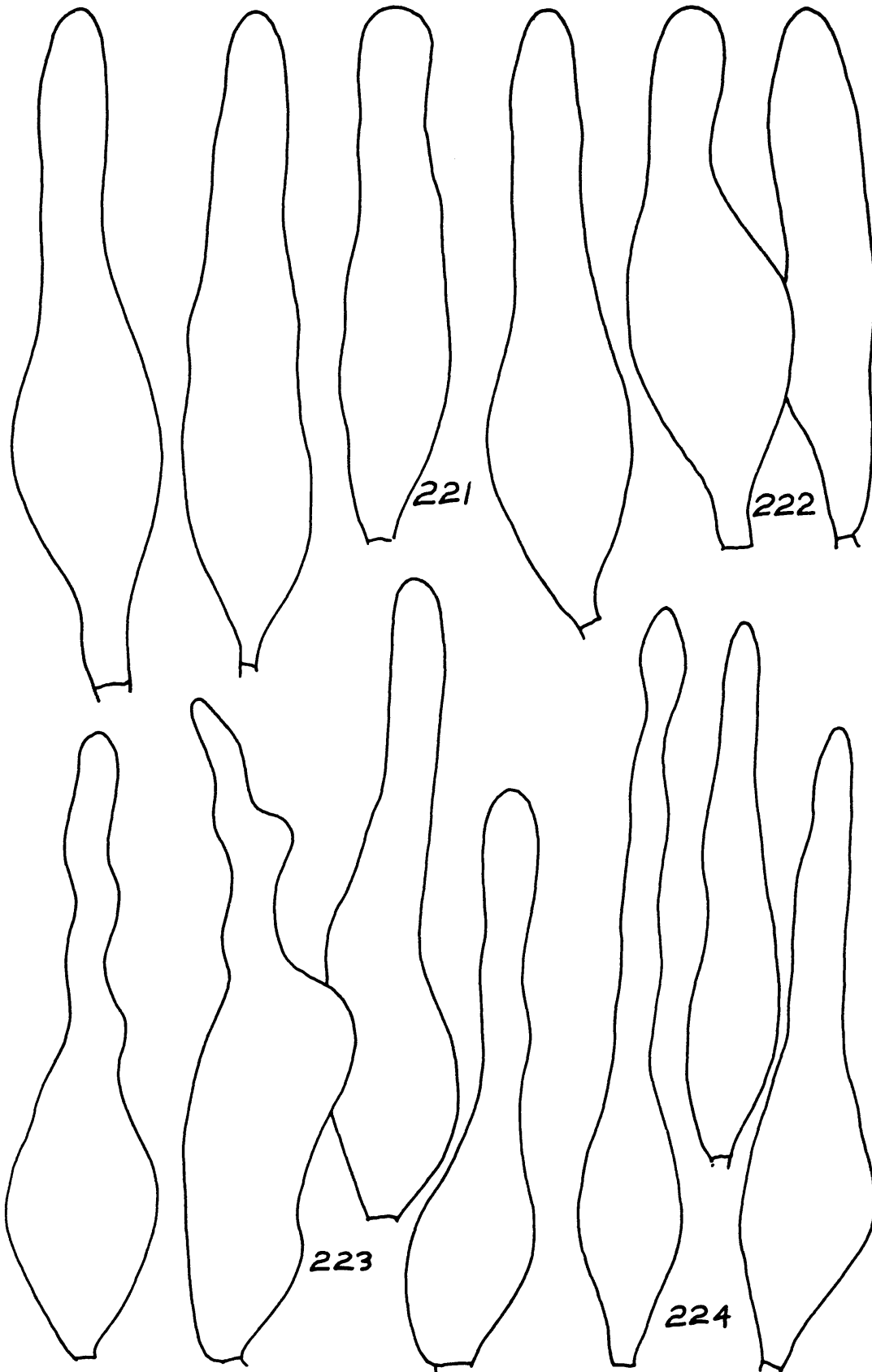


Fig. XXXII

Cystidia: Fig. 221, pleurocystidia of *G. atkinsoniana* var. *atkinsoniana*, 222, cheilocystidia; 223, pleurocystidia and cheilocystidia of *G. atkinsoniana* var. *sphagnorum*; 224, pleurocystidia of *G. vittaeformis* var. *albescens* f. *bispora*.

spores $10-12.5 \times 6-7 \mu$, basidia bispora; pleurocystidia $46-70 \times 10-16 \mu$, fusoido-ventricosa, subacute flexuosa vel subcontorta. Specimen typicum in Herb. Univ. Mich. conservatum. Smith 43721.

Pileus 8–10 mm broad, obtusely conic, glabrous, moist, hygrophanus, \pm dark ochraceous tawny over the striations and paler between, fading to pinkish buff.

Lamellae subdistant, narrow, ascending, hooked, pale ochraceous tawny.

Stipe 30–35 mm long, 0.75 mm thick, equal, yellowish at first but becoming dark ochraceous tawny from the base up, finely pubescent from caulocystidia; veil absent.

Spores $10-12.5 \times 6-7 \mu$, ovate in face view, inequilateral in profile, rugulose-roughened except for the smooth plage, pale ochraceous in KOH but thick-walled. Basidia 2-spored. Pleurocystidia abundant, $46-70 \times 10-16 \mu$, apices subacute, fusoid-ventricose with the walls of the neck flexuous to almost cork-screw like, hyaline, smooth, thin-walled or wall faintly thickened in the ventricose part. Cheilocystidia similar to pleurocystidia but with necks not as crooked. Pilocystidia scattered, $40-90 \times 10-20 \mu$, fusoid-ventricose, often with crooked necks, thin-walled, hyaline. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered on living *Sphagnum*, Pt. Aux Chenes, west of St. Ignace, Michigan, on U.S. Highway 2, Oct. 4, 1953.

OBSERVATIONS: We have only two carpophores in this collection but in view of the habitat, the nature of the pleurocystidia and the large pilocystidia, it cannot be disregarded. We are inclined to place some emphasis on the spore size, which is smaller than in var. *atkinsoniana*. The curiously crooked cystidia need more study before being given much recognition taxonomically. We have an additional collection, Smith 43965, also on *Sphagnum*, which is long-stiped and has spores and cystidia more like those of var. *atkinsoniana*, but the pleurocystidia are rare and show only a slight tendency to be crooked. This indicates to us that intermediates between the two are to be expected.

MATERIAL EXAMINED: Smith 43721-*type*. Bigelow 6128, Lac Cascopedia, Gaspé, Quebec, Aug. 21, 1957, cespitose on moss between conifer logs of old cabin.

Key to Variants of

Galerina vittaeformis

- | | |
|--|---|
| 1. Basidia mostly 4-spored | 2 |
| 1. Basidia mostly 2-spored | 3 |
| 2. Stipe darker below than at apex; pileus pale tan faded—195.
..... <i>G. vittaeformis</i> var. <i>vittaeformis</i> f. <i>tetraspora</i> | |
| 2. Stipe evenly colored to apex; pileus whitish faded—195c.
..... <i>G. vittaeformis</i> var. <i>albescens</i> f. <i>tetraspora</i> | |

3. Spores $11-12 \times 7.5-8.2 \mu$; slightly compressed --- 195b. *G. vittaeformis*
 ----- var. *pachyspora*
3. Spores narrower and not compressed ----- 4
4. Stipe darker below than at apex; pileus tan when faded—195a.
 ----- *G. vittaeformis* var. *vittaeformis* f. *vittaeformis*
4. Stipe evenly colored; pileus whitish faded—195d. *G. vittaeformis*
 ----- var. *albescens* f. *bispora*

195. *Galerina vittaeformis* (Fr.) Singer, Trudy Bot. Inst. Akad. Nauk, S.S.S.R. 6: 472. 1950.

Agaricus vittaeformis Fries, Epicr. Syst. Myc. p. 207. 1838.

Galera vittaeformis (Fr.) Kummer, Führer in die Pilzk. p. 75. 1871.

Galerula muricellospora Atkinson, Proc. Am. Philos. Soc. 57: 360. 1918.

Galera martipes Kauffman, Pap. Mich. Acad. 5: 129. 1926.

Illustrations: Figs. 231 (pleurocystidia), 232 (cheilocystidia).

var. *vittaeformis* f. *tetraspora*

Pileus 5–10(22) mm broad, obtusely conic or campanulate when young, expanding to plano-umbonate or nearly so, glabrous, moist and hygrophanous, evenly “tawny” fading to near “cinnamon buff” or paler, translucent striate moist; flesh thin, odor and taste not distinctive.

Lamellae distant, horizontal, moderately broad, broadly adnate and decurrent with a tooth, tawny at maturity, with crenulate edges.

Stipe 20–30 mm long, ± 1 mm thick, equal and flexuous, pruinose at first but soon naked over the lower half, dark honey color to dull tawny overall when young, finally dull tawny above, darker below.

Spores (8)8.2–9.8(10.5) \times 5.2–6.5 μ , inequilateral in profile, ovate in face view, finely punctate-rough, with a plage and suprahilar depression, the plage well-marked by a ragged line, tawny in KOH. Basidia 4-spored, hyaline in KOH but many brown basidioles present. Pleurocystidia scattered, 38–70 \times 12–18 μ , fusoid-ventricose with narrow necks and subacute tips, the apex sometimes forked and outline of apex often undulate, hyaline in KOH. Cheilocystidia fusoid-ventricose, 36–60 \times 10–14 μ , some forked at apex, apex 3.5–6.7 μ in diam., mostly obtuse or slightly enlarged, hyaline in KOH, smooth. Pilocystidia none or rare. Caulocystidia like the cheilocystidia or nearly subulate. Gill trama interwoven-subregular, ochraceous tawny in KOH. Pileus trama colored like the gill trama, homogeneous. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered on moss or more rarely on moss-covered rotten wood. It is known from North America (New York, Michigan, Wyoming, Washington, Oregon), Europe (France, Germany, Scandinavia, Italy, etc.) and Asia (Altai Mts.).

OBSERVATIONS: In *Smith 36546*, the pleurocystidia measure 40–60 \times 7–10 μ ; ordinarily they are much broader. The caulocystidia of the 4-spored form collapse readily leaving the lower part of the stipe naked and the darkening of the stipe is not pronounced. For the 4-spored form we have cited only collections which appear to be entirely 4-spored. It is very likely

that among the collections cited for the 2-spored form some caps with 4-spored basidia can be found as the two often grow together and cannot always be distinguished in the field. In *Smith 49403* the spores were $10-12 \times 5-6 \mu$ on 4-spored basidia. In *Stordal 5215* the stipe had very few caulocysts below the middle and *no* pilocystidia were found. The spores were $8-9 \times 5.5-6 \mu$. In *Smith 55136*, from under redwood in California, the basidia are 4-spored, the spores $8-9.5 \times 5-6 \mu$, with moderate ornamentation and relatively pale color in KOH for the species, the pleurocystidia were abundant and large ($55-80 \times 10-18 \mu$) and the wall of the ventricose part was slightly thickened but hyaline to yellowish in KOH. The cheilocystidia were similar but with more ochre in the wall of the ventricose part. No pilocystidia were found. The stipes darkened to the same extent as in the 2-spored form, and the caulocystidia were abundant and large with some color in the wall toward the base.

On the basis of this collection and some others it appears that there is a tendency in *G. vittaeformis* for the development of pigment in the cystidial walls and also for the walls to become thickened. In view of the great variability which we find in this species we have used spore ornamentation, which seems the least variable character, to segregate the new taxa. However, in *Gruber P-36* from Idaho we have a collection in which the pleurocystidia are small and rare ($30-48 \times 7-12 \mu$) and the spores exceptionally well ornamented.

MATERIAL EXAMINED: *Smith 35810* is a typical 4-spored specimen. Additional collections: *Smith 19223; 36544; 37583; 40447; 40756; 40764; 41464; 41734; 41736; 41737; 41738; 41977; 42004; 42127; 42186; 42224; 42337; 42342; 42343; 42344; 42345; 42347; 42348; 42349; 42353; 42429; 42443; 42962; 42965; 42966; 42968; 42969; 42970; 42971; 42973; 42976; 42977; 42979; 42980; 42981; 42986; 43006; 43009; 43011; 43014; 43015; 43016; 43018; 43020; 43021; 43022; 43023; 43025; 43027; 43028; 43031; 43240; 43288; 43371; 43470; 43576; 43638; 43641; 43642; 43643. Singer A-169 (LE); N-908 (CF). Stordal 5215.*

Cooke 21587. Smith 46811; 47046; 47092; 47128; 47283; 47290; 47937; 48423; 48729; 49226; 49384; 50988; 51056; 51060; 51982; 51999; 52111; 52594; 52788; 53503; 54000; 54507; 54723; 55133; 55136; 55145; 55391; 55507; 56678. Thiers 3550, 3551.

Mixed 2- and 4-spored forms. *Smith 51108; 51109; 52064.*

195a. *Galerina vittaeformis* (Fr.) Singer, Trudy Bot. Inst. Akad. Nauk S.S.S.R. 6: 472. 1950.

Illustration: Pl. 14, fig. F. Figs. 228 (pleurocystidia and cheilocystidia), 229 (aborted caulocystidium). 230 (caulocystidia).

var. *vittaeformis* f. *vittaeformis*

Pileus 4–25(30) mm broad, obtusely conic to convex, becoming broadly campanulate to expanded-umbonate or nearly plane, often with a broad prominent umbo and recurved margin, surface moist and hygrophanous, with broad ($\frac{1}{3}$ to $\frac{3}{4}$ the radius) translucent striations, opaque when faded

and then occasionally somewhat sulcate, when moist pale to dark melleous over disc and striations ("ochraceous tawny," *Alamo*), paler along the margin and between striae *spice*, fading to paler yellowish ("warm buff"); flesh thin and fragile, pale tawny to yellowish, odor none, taste mild.

Lamellae close or in fully expanded caps appearing subdistant (10–15 reach the stipe), 1–2 tiers of lamellulae, broad (5 mm), broadly adnate, at times somewhat ventricose, pallid tawny to cream color when young, then between *pl. 11 I 7* and *12 J 8*, concolorous with pileus in age.

Stipe 30–60(120) × 0.7–2 mm, equal, straight or flexuous, fragile, tubular, between pale yellowish and tawny (desert) at first and minutely pubescent from projecting caulocystidia at least down to the middle of the stipe, darkening to chestnut brown (*raw sienna* or *amber brown*) at least throughout the lower portion in age, dull reddish brown to tawny brown with a yellowish apex when dried.

Spores 10–12.3 × 5–6.5 μ, inequilateral in profile, ovate in face view, pale ochraceous in NH₄OH, pale ochraceous tawny when revived in KOH (usually paler colored than in *f. tetraspora*), with apical callus, with broad distant verrucose markings of exosporium, plage sharply delimited (South American), otherwise with distinct but small and very low asperulations and smooth plage. Basidia (1-) 2-spored, 20–24 × 7–8 μ, hyaline in KOH. Pleurocystidia and cheilocystidia similar and abundant to scattered, 56–74 × 10–16 μ, fusoid-ventricose, pedicellate, with acute, subacute or rounded tip, the walls of the neck often flexuous, always thin, and hyaline in KOH. Gill trama somewhat interwoven in mature specimens, the wall yellowish with incrusting pigment. Pileus trama homogeneous, the epicutis hardly differentiated and no pilocystidia observed. Stipe with numerous caulocystidia similar to the cheilocystidia or more subulate, extending down to the lower portion of the stipe. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Scattered to gregarious on mossy logs in coniferous forests and perhaps also in frondose forests, and among mosses along the margins of woods throughout the United States and Canada, also in Europe and Japan, and probably also in Northern Asia.

OBSERVATIONS: This is the fungus which, following Kühner, in recent years has been known under the name *Galerina rubiginosa*. The two-spored form is more variable as to size and color than *f. tetraspora* and usually more commonly encountered. Its caulocystidia apparently have slightly thicker walls, since they do not seem to collapse as readily as in *f. tetraspora*.

Material from Favre, collected in Switzerland, is this 2-spored form but in it the pileus and gill trama are exceptionally dark rusty brown in KOH and the wall in the ventricose part of the cheilocystidium is also yellow to pale fulvous. No pilocystidia were found.

Material from the Altai Mts. (Singer A-928 LE) seems to vary in having somewhat thickened cystidial walls, moderately broad lamellae and especially in that the cystidia are limited to the upper portion of the stipe. We originally determined it as *G. vittaeformis* *f. bispora* but it may well belong in an unknown variety or species (spores 11.5–16.5 × 7.5–9 μ with low asperulation, 2-spored basidia, cystidia as above, and occurring on very

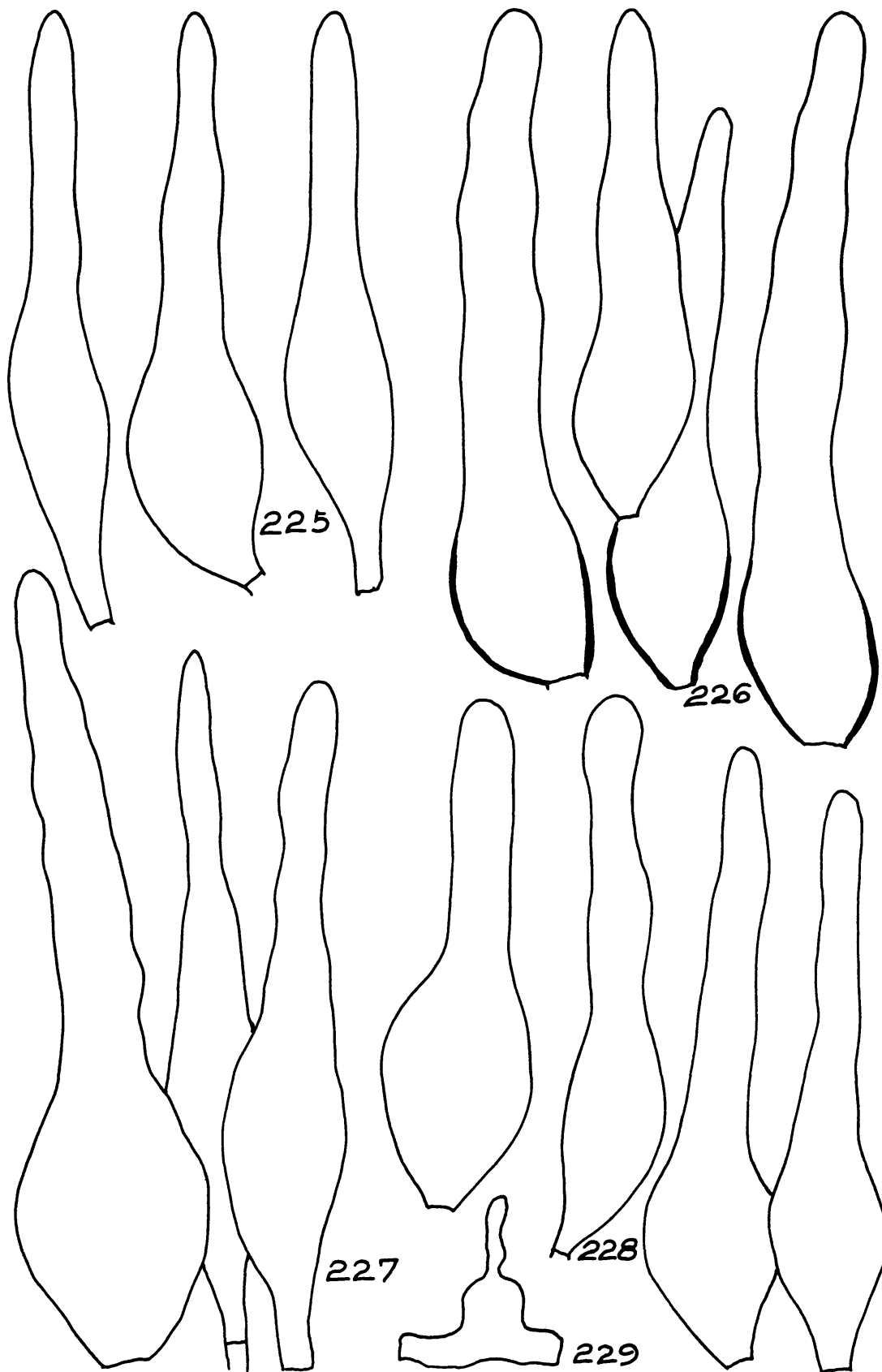


Fig. XXXIII

Cystidia: Fig. 225, cheilocystidia of *G. vittaeformis* var. *albescens* f. *bispora*; 226, cheilocystidia of *G. vittaeformis* var. *albescens* f. *tetraspora*, 227, pleurocystidia; 228, pleurocystidia and cheilocystidia of *G. vittaeformis* var. *vittaeformis* f. *vittaeformis*, 229, aborted caulocystidium.

rotten branchlets of *Abies sibirica*). We are not describing it here because we have no data on the pilocystidia. It might very easily be a form of *G. atkinsoniana*.

Smith 55615 has only scattered pleurocystidia, spores $8-11 \times 5-6 \mu$ (the largest well ornamented, the small ones often \pm smooth and obscurely angular), no pilocystidia and very few caulocystidia over the lower half. *Thiers 3276*, from near Mackinaw City, Michigan, has pleurocystidia with obtuse to subcapitate apices and hyaline walls. The spores measure $9-11.5 \times 5-6.5 \mu$.

MATERIAL EXAMINED: (Not every pileus in the following collections was examined, but those examined were 2-spored.) Bigelow 3363; 3478; 5461 (Quebec); 6134 (variant); 6136; 7437; 7865; 7867; 7915; 8568. Gruber 570, *typical*. Hoare (Quebec); (Nova Scotia) (MICH). Hongo 1170. Karsten 41079 (Finland, 1883). Kauffman, 5 collections under the names *G. hypnorum*, *G. muricellospora* and *G. martipes* (including type of the latter). Smith 33-699; 33-877; 439; 2755; 3490; 22336; 30603; 35811; 35815; 35817; 36656; 36777; 37481; 37547; 39823; 39930; 40008; 40220; 40370; 40445; 40599; 40749; 40750; 40761; 41009; 41010; 41069; 41081; 41134; 41137; 41142; 41150; 42161; 43278; 47047; 48920; 50203; 51107; 51996; 52593; 53565; 54228; 54714; 54773; 54848; 54850; 55007; 55533; 55615; 61545 (Quebec); 63207 (England). Thiers 3275; 3276; 4221; 4222. Tuomikoski 19 24/8 54 (Finland) (pilocysts were very rare).

195b. *Galerina vittaeformis* var. *pachyspora* Smith & Singer, Mycologia 50: 488. 1958.

Pileus 4-13 mm broad, 4-8 mm high, conic campanulate, mostly obtuse (not papillate), very rarely subumbonate, ochraceous brown (*spice to alamo*), strongly hygrophanous, very pale buff to buffish pallid faded, when fresh transparently striate over one half to three fourths of the radius, with the margin eventually often slightly uplifted; odor none.

Lamellae horizontal or ascendant, or arcuate towards stipe, adnate to adnexed or sinuate-subdecurrent, at first ochraceous (concolorous with the apex of the stipe, *desert, 11-I-7 to 12-J-8*, later near *Peruvian brown*), subclose to subdistant.

Stipe 15-40 mm long, 0.7-2 mm thick, equal or tapering upwards or down, cartilaginous, fistulose, at first pruinose over all, later glabrescent from base upwards, apex concolorous with young lamellae, downwards much deeper color (*raw sienna to amber brown*) or concolorous with pileus; veil very rudimentary, apical in primordia and pallid.

Spores $(7.5)11-13 \times (6.2)7.2-8.5(8.8) \mu$, inequilateral in profile view, ovate to almond-shaped in face view, slightly compressed, typically about 0.7μ broader in face than in profile view, when mature well-colored and with distinct verrucose exosporial ornamentation, rough, often many pale immature spores remaining along hymenium; apex with a callus, sometimes extended to a slight beak; wall double, sometimes very thick.

Basidia $24-34 \times 8-10 \mu$, mostly 2-spored but in some collections 1- or 3-spored, hyaline. Pleurocystidia $34-59 \times 7-14 \mu$ (neck $4-6.3 \mu$), scattered,

hyaline, not incrustated, ampullaceous with middle or lower third ventricose, pedicellate, neck cylindrical, apex blunt or more rarely conic. Cheilocystidia numerous, similar to pleurocystidia. Caulocystidia present, similar to pleurocystidia. Pilocystidia absent. Hymenophoral trama of rather broad, parallel hyphae. Epicutis of pileus of narrow (1.5μ) smooth hyphae rather loosely arranged but not visibly gelatinized and forming a thin layer; hypodermium somewhat pigmented, of broader and more compactly arranged parallel to subparallel hyphae. Clamp connections regularly present.

HABIT, HABITAT AND DISTRIBUTION: On a moss bed of various species but lacking *Sphagnum* (possibly covering an old layer of peat), or among *Juncus*, in wet places and swamps of the subantarctic belt.

OBSERVATIONS: The broad spores remind one of *G. atkinsoniana* but the lack of pilocystidia excludes that species. The presence of a slight veil in very young carpophores suggests relationship with *G. subannulata*. It is barely possible that this species is also represented in the subarctic and arctic zone (an area disjunction often observed in Basidiomycetes). We have broad-spored material from *Polytrichum* cultures obtained from Novaya Zemlya but have no data on the presence or absence of pilocystidia.

A collection (Stordal 81) from Norway has the same broad spores and lacks pilocystidia as far as we could ascertain. In it the cheilocystidia have ochraceous walls in their basal part. In Stordal 83, with spores $12-16 \times 7-9 \mu$ and no pilocystidia, the cheilocystidia were hyaline. We are not certain that these collections actually belong in var. *pachyspora* as certain data are lacking.

MATERIAL EXAMINED: Bunt, Jan. 31 and March 31, 1951, West Point and Half Moon Bay, Macquarie Island. The West Point collection is the type (LIL), and a paratype is at Michigan. Singer M 795, Quetrihué, Neuquén, Patagonia, Argentina, May 20, 1952 (LIL); M 3505, Villa Angustura March 12, 1963 (BAFC); M 243, M 432, Est. Nueva Argentina Tierra del Fuego, Argentina, Feb. 12 and 22, 1950 (LIL).

**195c. *Galerina vittaeformis* var. *albescens* Smith & Singer, var. nov.
f. *tetraspora*.**

Illustrations: Figs. 226 (cheilocystidia), 227 (pleurocystidia).

A varietate *vittaeformis* (typica) differt pileo in siccis albido; stipite unicolori; spores $7-9(10) \times 4.5-5.5 \mu$ in forma tetraspora. Ad Bryophyta; specimen typicum in Herb. Univ. Mich. conservatum; Smith 40128.

Pileus (3)5–10 mm broad, obtusely conic, becoming campanulate, surface glabrous, moist, hygrophorous, pale honey color to ochraceous tawny moist, whitish faded, fading on disc first, translucent striate moist.

Lamellae subdistant, narrow to moderately broad, broadly adnate, edges fimbriate, faces pale ochraceous.

Stipe 30–50 mm long, ± 1 mm thick, pruinose from cystidia but soon glabrous below, "Sayal brown" over all (darker than pileus), fragile.

Spores $7-9(10) \times 4.5-5.5 \mu$, inequilateral in profile, ovate in face view, very pale ochraceous in KOH, very minutely roughened, smooth plage faintly delimited. Basidia 4-spored; hyaline, $26-30 \times 7-8 \mu$. Pleurocystidia

abundant, $46-69 \times 9-12(18) \mu$, fusoid-ventricose with subacute to acute apices, hyaline and thin-walled in KOH. Cheilocystidia similar to pleurocystidia but many with thickened yellowish walls in ventricose part in KOH. Gill trama \pm interwoven, hyaline in KOH. Pileus trama homogeneous, hyaline or nearly so in KOH (some incrusting pigment on hyphae on surface). Clamp connections present. Caulocystidia present; pilocystidia none.

HABIT, HABITAT AND DISTRIBUTION: Scattered on moss over soil and logs.

MATERIAL EXAMINED: Smith 40128-*type*; additional collections: Smith 16684; 29988; 40196; 40197; 40458; 40533; 40534; 40597; 42443; 47282; 56338; 56367.

195d. *Galerina vittaeformis* var. *albescens* f. *bispora* Smith & Singer, f. nov.

Illustrations: Figs. 224 (pleurocystidia), 225 (cheilocystidia).

Pileus 4–10(15) mm latus, obtuse conicus, glaber, hygrophanus, pallide fulvus demum subalbidus; stipes pallide fulvus, pubescens; sporae 9–12(14) \times 6–7(8.3) μ ; pleurocystidia 40–60(70) \times (8)10–15(23) μ . Specimen typicum legit Smith (40340), 30 Sept. 1952, Mt. Rainier National Park, Washington, U. S. A.

Pileus 4–10(15) mm broad, obtusely conic with a straight margin, expanding to broadly conic, glabrous, moist hygrophanus, pale dingy ochraceous tawny when moist, fading to whitish or very pale pinkish buff in age, broadly (to half the radius) transparently striate when moist; flesh thin, delicate, odor none, taste mild.

Lamellae pale ochroleucous becoming bright ochraceous tawny, moderately close to mostly distant, broad, in European and Asiatic specimens often narrow (1–2.5 mm), edges even.

Stipe 30–40 mm long, about 1 mm thick, ochraceous tawny over all (concolorous with the lamellae), evenly pubescent to the base, veil none.

Spores 9–12(14) \times 6–7(8.3) μ , inequilateral in profile, ovate in face view, with slightly wrinkled-verruculose exosporial ornamentation and well marked plage, pale tawny in KOH. Basidia 20–33 \times 6–9 μ , 2-spored. Pleurocystidia 40–60(70) \times (8)10–15(23) μ , fusoid-ventricose with subacute apex (3–7 μ). Cheilocystidia similar to pleurocystidia, 40–75 \times 7–15 μ , apex 1.5–7 μ in diameter. Gill trama pale dingy ochraceous in KOH, its hyphae somewhat interwoven. Pileus trama homogeneous, pallid ochraceous in KOH. Pilocystidia none; caulocystidia covering the stipe, numerous. Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Gregarious on moss, Washington, Tierra del Fuego, and Northern Europe.

OBSERVATIONS: The evenly colored stipe and the paler color in fading distinguish this 2-spored form from the 2-spored form of the type variety. The spore characters are approximately the same in the two. This is the most boreal form in the entire complex. In Smith 42321 pleurocystidia and clamp connections are rare. No pilocystidia were seen.

MATERIAL EXAMINED: Smith 40340-*type*; additional collections: Cooke 22736. Smith 40201; 40759; 40760; 40763; 42321; 47289; 48173. Singer 4-104 (Leningrad region, LE). Bigelow 5806, Lake Munroe, Quebec, on mossy conifer log, July 26, 1957.

GENERAL CONSIDERATIONS REGARDING *G. VITTAEFORMIS*

Kühner applied the name *G. rubiginosa* to this species. The preferable species epithet, however, is *vittaeformis*, which we have adopted here after considerable hesitation. Our reluctance to abandon the name *G. rubiginosa* is not based on any doubts we have as regards the correct nomenclatural solution as such, but rather because Kühner's nomenclatural decision has been unchallenged in Western Europe until recently, and a usage based on *G. rubiginosa* has developed. However, we could not neglect the facts which make Fries' description of *Agaricus vittaeformis* clearly applicable to species we recognize under that epithet. It is also the name adopted in the sense of Ricken, Singer, Moser, Dennis and Orton, and Ibara. Even the illustrations cited by Fries (Schaeffer pl. 63, figs. 4-6) correspond well with our concept, inasmuch as the stipe in Schaeffer's plate is not "yellowish" as indicated by Fries. Consequently, we have here a good Friesian "classical" epithet which is based on a positive character mentioned by Fries. It should not be abandoned in favor of *G. rubiginosa* (*A. rubiginosus*) of Persoon, Fries and Secretan, the descriptions of which may be quoted for almost any species of "*Galera*" and which do not show in the diagnoses, any indication that the stipe is pruinose-pubescent. Fries in his own words described *A. rubiginosus* as "nondum rite delimitata."

Specimens of the *G. vittaeformis* complex were also named *G. hypnorum* by Patouillard and later by Atkinson, v. Höhnel, and others. *G. martipes* Kauff. is clearly representative of the type variety of *G. vittaeformis*. *G. muricellospora* Atk. has the large spores and bispored-basidia as indicated by Atkinson. Pleurocystidia, as well as caulocystidia on most of the stipe, were found in the type material from the Herbarium of Cornell University. However, some few basidia were found to be 3-spored and measured $18-22 \times 5.8-7.2 \mu$. The cheilocystidia measured $36-50 \times 7.8-12 \mu$, pleurocystidia were about $44 \times 12 \mu$ and scattered. The caulocystidia measured $57-68 \times 8-15 \mu$. Clamp connections were present; pilocystidia were absent. The spores were rather pale colored (melleous-ochraceous) with more rusty yellow (but brighter rusty) and therefore rather conspicuous exosporial ornamentation, sometimes in the form of round dots, other times confluent with neighboring flecks to form short rows or ridges or lines, with a distinctly delimited smooth plage. They measure $10.5-11.8 \times 6-7.2 \mu$, thus coinciding in this regard with the rest of the North American measurements of f. *bispora*, with which it is identical.

The various bispored forms as described here do not always occur independently of the 4-spored forms. In handling material we have found it necessary to examine every pileus in a collection to be sure there are no mixtures, and of course one finds some pilei in which the number of spores born on a given basidium is 1, 2, 3, or 4 and basidia showing two or more

combinations of these may occur on a single gill. Consequently we wish to emphasize the point that in the collections cited we have found the form indicated, but this does not mean that every cap was sectioned; consequently there may be some collections with some caps showing a condition different from the one we have indicated. In our estimation this is further evidence, added to that already shown by Smith (1947) for *Mycena*, that the number of spores on a basidium is not necessarily a taxonomic character of any particular value, but one which, for convenience sake, can be used at the form level. Here, as in *Mycena*, there appears to be a difference in spore size correlated with the number of spores on a basidium; in placing emphasis on spore size in this genus we have been careful to make due allowance for this situation. This *vittaeformis* complex, now that it can be recognized as such, would be an interesting one for a general biological study.

We have not attempted to classify all the variant collections we have made beyond those given in our key. The situation exactly parallels that discussed for *G. atkinsoniana* and the possibility is not to be excluded that these two intergrade. We do feel certain that another valid species parallel to *G. perplexa* can eventually be recognized in this group, but at present we have only meagre microscopic data on it.

Section *Pseudotubaria* Smith & Singer, *Sydowia* 11: 453. 1957.

Spores smooth, plage lacking; cheilocystidia present, pleurocystidia present. Clamp connections present.

Type species. *Galerina fuegiana* Singer, *Sydowia* 7: 242. 1953.

Key to Species

1. Pileus 3–5 mm broad; spores 4–5 μ wide 196. *G. clavus*
 1. Pileus 10–30 mm wide; spores 5–7(8) μ wide 197. *G. fuegiana*

196. *Galerina clavus* Romagnesi, *Bull. Soc. Myc. Fr.* 58: 144. 1942.
Naucoria clavus (Rom.) Kühner & Romagnesi, *Flore Anal. Champ. Super.*
 p. 239. 1953.

Illustrations: Romagnesi (l.c.) fig. 14.

Pileus minute, 3–5 mm broad, regular, conic-convex or convex-obtuse, sometimes with a small mammillate umbo, finally convex-plane, often regularly wavy or a little lobed-crenulate on margin, when moist rather bright rusty-tawny and broadly striate but exceptionally bright when faded and then becoming reddish and with a submicaceous aspect, as if covered by a hoar frost, silky white obscuring the ground color (especially on the disc), in general resembling closely *Tubaria minutalis* Romagnesi; flesh concolorous, very thin.

Lamellae very distant, lamellulae almost lacking, some forked, thickish,

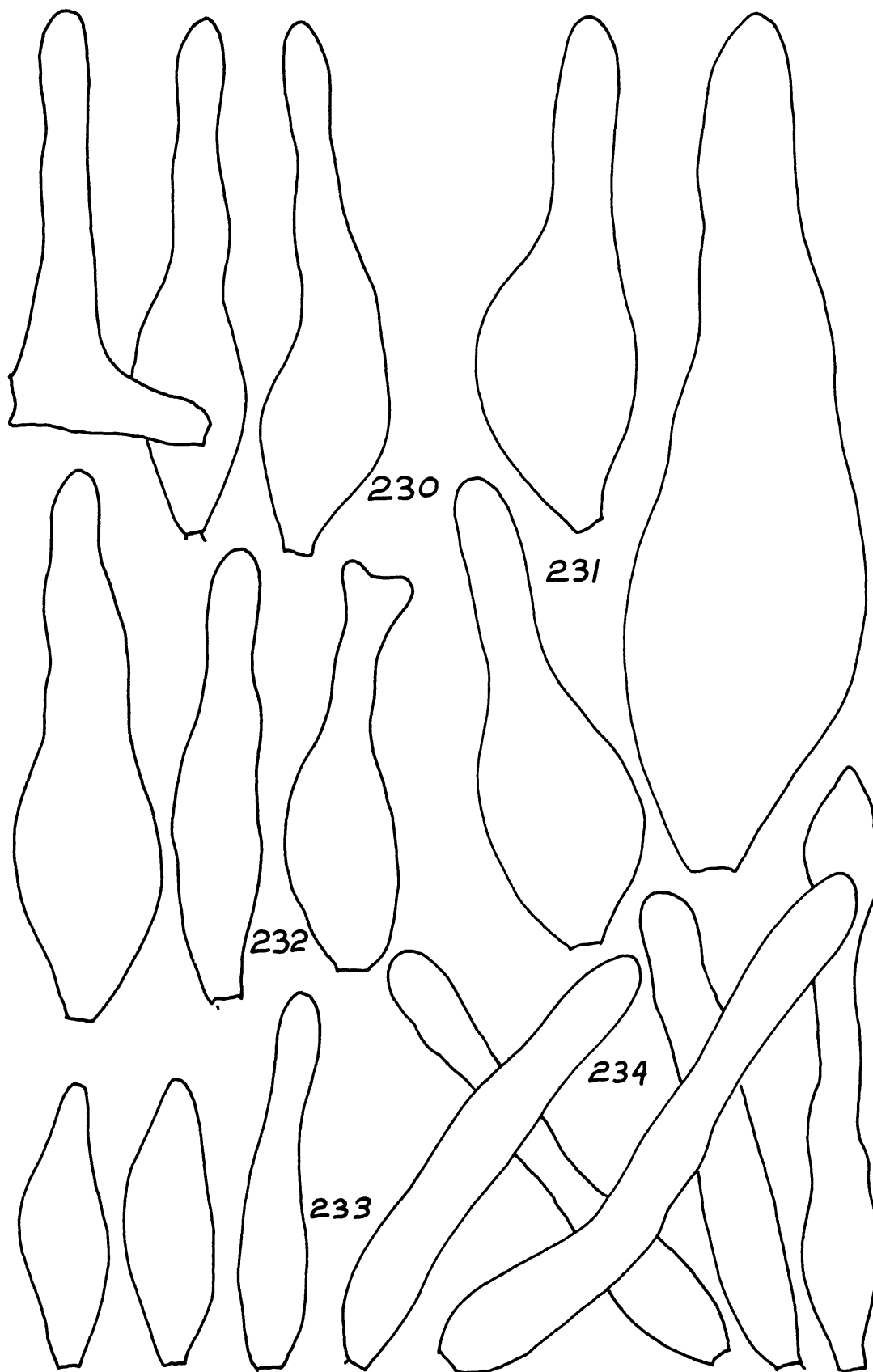


Fig. XXXIV

Cystidia: Fig. 230, caulocystidia of *G. vittaeformis* var. *vittaeformis* f. *vittaeformis*; 231, pleurocystidia of *G. vittaeformis* var. *vittaeformis* f. *tetraspora*, 232, cheilocystidia; 233, cheilocystidia of *G. fuegiana*, 234, pleurocystidia.

remarkably triangular (not arcuate), very broadly adnate to somewhat decurrent, tawny reddish (different from pileus in tint), with the edge pruinose and white.

Stipe 9–15 mm long, 0.3–0.5 mm thick, in general flexuous, somewhat thickened at base, where it is weakly tomentose, fairly tenacious, color bay-brown with a distinct purplish tone, dark, continuous with cap, strongly striate from fine white fibrils, often somewhat crooked.

Spores $7.5\text{--}10 \times 4\text{--}5 \mu$, smooth, elliptic or cylindric-elliptic, obtuse at apex, strongly colored, thick-walled, quite different from those typical of *Galerina*. Basidia $25\text{--}35 \times 8\text{--}10 \mu$, 4-spored. Pleurocystidia rare, $40\text{--}65 \times 8\text{--}9 \mu$, fusoid-ventricose. Cheilocystidia $40\text{--}60 \times 8\text{--}16 \mu$, fusoid-ventricose with obtuse to subacute apices; cuticle of cap giving rise to elliptic or clavate cells $35\text{--}75 \times 25\text{--}50 \mu$ (not a palisade).

HABIT, HABITAT AND DISTRIBUTION: On moist earth in an old grassy car track, Yerres, France, 1939 and June 18, 1942.

OBSERVATIONS: The species is unknown to us, and we have merely reproduced the original description which seems to place the species in this subsection.

197. *Galerina fuegiana* Singer, Sydowia 7: 242. 1953.
Illustrations: Figs. 233 (cheilocystidia), 234 (pleurocystidia).

Pileus 10–30 mm broad, obtuse to convex, with white fibrillose veil remnants on the margin, disc glabrous and naked, hygrophane, fading rapidly, when moist translucent striate on the margin, cinnamon brownish to melleous ocher-brown (evenly *copper brown* in primordia), later cocoa brown on disc, at maturity duller than *cocoa* or *chipmunk* on the margin; flesh fragile, paler to whitish, inodorous.

Lamellae adnate, subdistant, rather broad to broad, brownish yellow to cinnamon (pl. 13 K 9).

Stipe 35–50 mm long, 3–5 mm thick, equal or with thickened base, or gradually tapering upward, hollow, lower portion fibrillose to squamulose from the veil, subglabrescent, apical region pruinose, color pale brownish to whitish, (paler than pileus); veil white, pallid or pale brownish, forming a narrow zone near stipe apex, the zone often evanescent.

Spores $8.2\text{--}11(11.8) \times 4.8\text{--}7(8) \mu$, with distinctly double but comparatively thin wall which does not collapse (as revived in KOH) and is moderately well colored (or at times remaining rather pale), some spores with a slight apical callus, without any trace of a plage; ellipsoid, a few very slightly almond-shaped, apex usually broadly rounded, rarely slightly mucronate; smooth, lacking any traces of exosporial ornamentation; (spores generally shaped like those of *Tubaria gregoriana*).

Basidia $22\text{--}37 \times 7.2\text{--}11 \mu$, 4-spored (at times some 2- and 3-spored individuals among the 4-spored ones), clavate, hyaline. Pleurocystidia $30\text{--}90 \times 4.7\text{--}13.8 \times 4\text{--}4.3 \mu$, scattered to numerous, ventricose (often abruptly so in lower third), ampullaceous, with a cylindric neck, rarely cylindric throughout or with one or two local swellings and subcapitate; hyaline or

lower part at times brownish (in ammonia), smooth, thin-walled. Cheilocystidia similar to pleurocystidia or merely basidioid and "empty."

Gill trama regular, consisting of hyphae which are constricted at the septa, the cells up to 18 μ broad, pale to distinctly brownish from incrusting pigment, arrangement subparallel in the central strand, more nearly parallel in the narrower hymenopodium, (and in this region the cells mostly uninflated and with heavier pigmentation); subhymenium appearing subcellular because of numerous cross walls, the cells mostly irregular in shape as revived and brownish. Epicutis of pileus hyaline, of narrow smooth repent filaments; hypodermium differing mainly in the pale rusty to deep fulvous incrusting pigmentation. Pilocystidia none. Erect fibrils of the stipe apex (caulocystidia) consisting of non-incrusted hyphal fascicles, their elements mostly cystidioid but rather variable in shape, typically ventricose in lower half (about 8 μ) and attenuated to the apex (2.7–5.5 μ). Clamp connections present.

HABIT, HABITAT AND DISTRIBUTION: Solitary or gregarious in the *Nothofagus* area of South America, either outside the forested region, on sandy soil near lake shores, on dead peat overgrown with other mosses, or else on earth among *Polytrichum* or in grassy places in the woods, fruiting in February until May.

OBSERVATIONS: This species, according to the spores, is closely related to *G. clavus* which has spores with thicker walls, elliptic to clavate cells in the epicutis of the pileus, and smaller carpophores. *G. pinetorum* Metrod is very similar but its spores have a plage and slight ornamentation.

MATERIAL EXAMINED: Singer M-327; M-449 (MICH); M-387; M-640 (LIL).

Section *Inocyboides* Singer,
Trudy Bot. Inst. Akad. Nauk, S.S.S.R.
6: 47. 1950.
(see also *Sydowia* 11: 452. 1957)

Pleurocystidia thick-walled above the ventricose portion and often incrusting, reminding one of the cystidia of *Inocybe*; spores well-ornamented, with a plage. Veil present, and clamps present.

The wall in the neck of the pleurocystidia of *G. victoriae* is somewhat thickened, see p. 234.

G. nana (Petri) Kühner (type).

Key to Species

1. Veil pallid; pleurocystidia often with crystalline incrusting material at apex and apex merely obtuse ----- 198. *G. nana*
1. Veil yellowish; pleurocystidia often with mucilage caps and apex broadly rounded ----- 199. *G. heimansii*

198. *Galerina nana* (Petri) Kühner, Ency. Myc. 7: 219. 1935.
Naucoria nana Petri Ann. Myc. 2: 10. 1904.

Naucoria montana Murrill, *Mycologia* 4: 78. 1912.

Inocybe whitei Velenovský, *České Houby* p. 371. 1920.

Galerula velenovskyi Kühner, *Bull. Soc. Myc. Fr.* 50: 74. 1934.

Galera nana (Petri) Kühner in Kühner & Romagnesi, *Flore. Anal. Champ. Supér.* p. 321. 1953.

Illustrations: Petri, figs. 1 and 2.

Pileus 6–23 mm broad and about 6 mm high, campanulate to hemispheric or convex, typically with a papilla, or sometimes obtusely umbonate, eventually convex-plane with a slight umbo or papilla, margin not incurved at first, transparently striate in an area up to 6 mm in from margin, smooth or becoming rugose-sulcate (independently of transparent striations), subviscid, yellowish brown to light brown with darker center, in young caps with rather dark ochraceous brown disc and striations, somewhat paler between striae (*Bombey* to near *burnt sienna*), with a dull appearance when wet, strongly hygrophanous, fading to alutaceous or stramineous brownish (pl. 9 G 5 to 10 F 4), but the umbo, if present, often retaining more brown in dry specimens; context thin to moderately thick, with a rather slight indistinct odor, or with a slight farinaceous odor, taste mild.

Lamellae pale cinnamon brownish (pl. 13 H 10), eventually more rusty ocher brown, often comparatively thick and often of unequal breadth, the lamellulae the same breadth as the lamellae or narrower, the broadest lamellae about 3 mm broad, subdistant (in medium-sized carpophores about 14–15 reach the stipe), horizontal or slightly ventricose, adnate, rarely some sinuate, eventually adnate-decurrent, often seceding.

Stipe 12–39 mm long, 1–4 mm thick, subequal or tapering upward, tubular, often curved or flexuous, often with white basal tomentum, sometimes deeply inserted in the soil but never with a distinct pseudorhiza, subconcolorous with the pileus, varying from slightly to distinctly darker brown at the base than at the apex, finally usually deep brown or deep chestnut brown in the lower portion, white fibrillose below with fine often almost silky appressed fibrils of the veil but without an annulus, or rarely with a very delicate and fugacious annular belt, finely furfuraceous to pruinose at the apex, eventually completely glabrescent.

Spores 6.5–10.8 × 4.8–6.2 μ from 4-spored basidia, 9.5–16.2 × 5–6.7 μ (usually 11–13 × 5–6.5 μ) from 2-spored basidia, with distinct but low exosporial verrucose ornamentation which is not very strongly distinct from the episorium in color and therefore inconspicuous (unless studied in chloral hydrate under oil) plage well-marked in mature spores, with apical callus, rusty melleous, broadest in the hilar third, somewhat inequilateral in profile, ovate-amygdaliform in face view. Basidia 21.5–24 × 7.5–8.2 μ and 4-spored or rarely 2-spored intermixed, in other collections somewhat longer (up to 27 μ) and 6–7.5 μ broad and 2-spored. Pleurocystidia numerous reminding one of the metuloids of *Inocybe* and certainly of metuloid character, with thick wall (0.8–1.6 μ), in a minority thinner-walled (mostly 0.4–0.8 μ), hyaline, citrinous or clay yellowish (melleous) in NH₄OH, the very apex with a crown of needle-like to granular crystalline (CaC₂O₄) incrustations which are hyaline to brownish yellow, shape of cystidium

fusoid-ventricose with the thickest portion in the middle, pedicellate, with an attenuate but obtuse apex, metrachromatic in cresyl blue, $40\text{--}75 \times 11\text{--}22 \mu$. Cheilocystidia present but similar to the pleurocystidia. Near the cap margin occur scattered vesiculose pedicellate ($6.8\text{--}9.7 \mu$) bodies. Caulocystidia $68\text{--}80 \times 13.7\text{--}19.3 \mu$, thick-walled and muricate like the pleurocystidia, single or in bunches. Epicutis of the pileus of filamentous repent smooth hyphae which in the uppermost layer are more or less gelatinized but gelatinized zone not always demonstrable in older caps or poorly dried material; hypodermium with pigment incrustated hyphae, poorly differentiated from both epicutis and trama of the pileus. Pilocystidia none. Hymenophoral trama regular, consisting of comparatively narrow brownish hyphae, clamp connections present in both 2- and 4-spored fruiting bodies.

HABIT, HABITAT AND DISTRIBUTION: Scattered or more rarely in small densely gregarious groups on buried particles of wood, on wooden boards and wooden flower pots, on earth, on living *Cyathea*, on fence poles, on dead trunks in *Alnus* woods, in temperate climates of the northern hemisphere, usually in gardens and in greenhouses, cellars, etc., in the tropical and subtropical latitudes in the montane zone in and near the forest, widely distributed in Europe and North America, but not common; in truly native habitats only in Central and South America (Cinchona, Jamaica, West Indies, Selva Boliviano-Tucumana, Argentina and Yungas, Bolivia).

OBSERVATIONS: On the basis of the Leningrad collections, Singer (1950) described the 2- and 4-spored forms separately, and also distinguished some forms according to habit characters, etc. The South American form was also separately described (Singer & Digilio 1952). It was therefore, felt justifiable to give a composite description here.

Our study of the type of *Naucoria montana* Murrill, gave the following microscopic data:

Spores $8\text{--}12 \times 5\text{--}6 \mu$, inequilateral in profile, ovate to ovate-mucronate (with a snout-like apex) in face view, dark rusty brown in KOH, with warty-rugulose exosporium and smooth plage; basidia apparently 4-spored; pleurocystidia abundant $40\text{--}60 \times 10\text{--}15 \mu$, *Inocybe*-like (thick-walled and incrustated); cheilocystidia similar to the pleurocystidia; gill trama somewhat interwoven, ochraceous in KOH; pileus trama with a thin pellicle of narrow hyaline hyphae (gelatinous?), homogeneous beneath it and rusty-ochraceous in KOH; clamp connections present.

Dennis (1953) has published very different data as a result of his study of the type. Not only this, but his data on *Naucoria spinulifera* Murrill, which he considers close to *G. nana*, correspond fairly closely with our data on *N. montana*. What has been the source of confusion? At this time we cannot say. Smith, who made the type studies on Murrill's species of *Naucoria*, made it a policy of handling only one species at a time, and is certain that he studied the designated type in each instance. As pointed out under *Naucoria pellucida* Murrill, Smith's observations on the type check with those given by Murrill for the macroscopic features of the species, and such is not true for the observations of Dennis, hence we are relying on our own observations where we disagree with Dennis.

MATERIAL EXAMINED: H. Lanphere 69 (MICH). Murrill's type of *G.*

montana (NY). Singer, no number, Arlington, Mass. (FH); Singer (Northern Argentina) T-832, T-2234 (LIL); and (Bolivia) B-658, B-1538 and various collections by Singer in the greenhouses in the Botanical Garden in Lenin-grad (LE).

199. *Galerina heimansii* W. Reijnd., *Persoonia* 1: 165. 1959.

Pileus 4–8(–10) mm broad, conic, with a conspicuous small umbo, expanding and quickly becoming broadly convex, finally flat and often irregularly depressed around the umbo, hygrophanous, strongly translucently striate to sulcate up to the umbo, surface glabrous, somewhat lubricous, ochraceous tawny, center tending to reddish brown, near edge honey color, edge in youth showing veil remnants; context thin, watery-fragile, concolorous or slightly darker than the surface when moist, odor and taste distinctly raphanoid.

Lamellae distant, (11–)13–16 reaching the stipe, 1–2 ranks of lamellulae, not regularly alternating, fulvous ochraceous, adnate to rotundato-adnate, convex, broad, edges fimbriate, faces pruinose; subcollariate, i.e., becoming detached from the stipe on expanding of the pileus, but remaining adherent to each other, leaving a star-like space between gills and stem.

Stipe (10–)15–20 mm long \times 0.6–0.8(–1) mm thick, straight to sometimes strongly curved, gradually enlarged towards the subbulbous base (up to 1.7 mm), honey color with a reddish brown tinge, especially near the darker base, apex pruinose, surface covered with sparse yellowish fibrils from the veil, glabrescent with age; fibrils sometimes forming a ring-like zone more densely coating the base.

Spores 8.2–10.5 \times 4.8–6 μ , ellipsoid to subamygdaliform, strongly warty, smooth plage absent (oil immersion) or else very indistinct, but suprahilar depression conspicuous, apical pore distinct, reddish brown in KOH solution, the same color as spores of *G. marginata*. Basidia 2-spored, 20–33 \times 5–7 μ , cylindrical but very often constricted near the apex, hyaline. Pleurocystidia very numerous, utriform, ventricose in lower part, apices broadly rounded, frequently constricted in the middle portion, 40–60 (–70) \times 12–18(21) \times 10–13 μ , (at the constriction, if one is present, 6–8 μ wide), walls thickened, conspicuous in KOH solution (up to 1 μ), refractive, with age often covered with mucilage caps. Cheilocystidia similar to pleurocystidia, 35–55(–65) \times 13–18 \times (8–)10–13 μ . Caulocystidia of variable shape, rarely utriform, mostly about cylindrical and often curved, up to 80 μ long. Pilocystidia not observed. Gill trama parallel or nearly so, incrustated with ochraceous brown pigment. Pileus lacking a differentiated epicutis, hyaline to ochraceous with pigment incrustations; elements often narrowed in the middle part. Clamp connections present but not frequent. Pellicle not differentiated.

HABIT, HABITAT AND DISTRIBUTION: Scattered to gregarious in marshy copses with *Alnus* and *Betula*, often mixed with *Salix*, in hollows of the litter,

adhering to decaying leaves and fragments of stems of *Phragmites* and *Rubus*, on dead *Sphagnum*; in the Netherlands.

OBSERVATIONS: We have examined a fragment of this species which seems amply distinguished by the key characters. However, in the material seen an apical pore was not found (rather a callus) and a smoother plage area was often quite well discernible. The cystidia remind one of the metuloid type known in *G. nana* but have a somewhat different shape and incrustation. Basidia were collapsed. *G. heimansii* differs from *G. nana* in the cystidial characters mentioned, and has smaller spores than the 2-spored forms of the latter. It is not clear whether a gelatinized pellicle is persistently absent in *G. heimansii*.

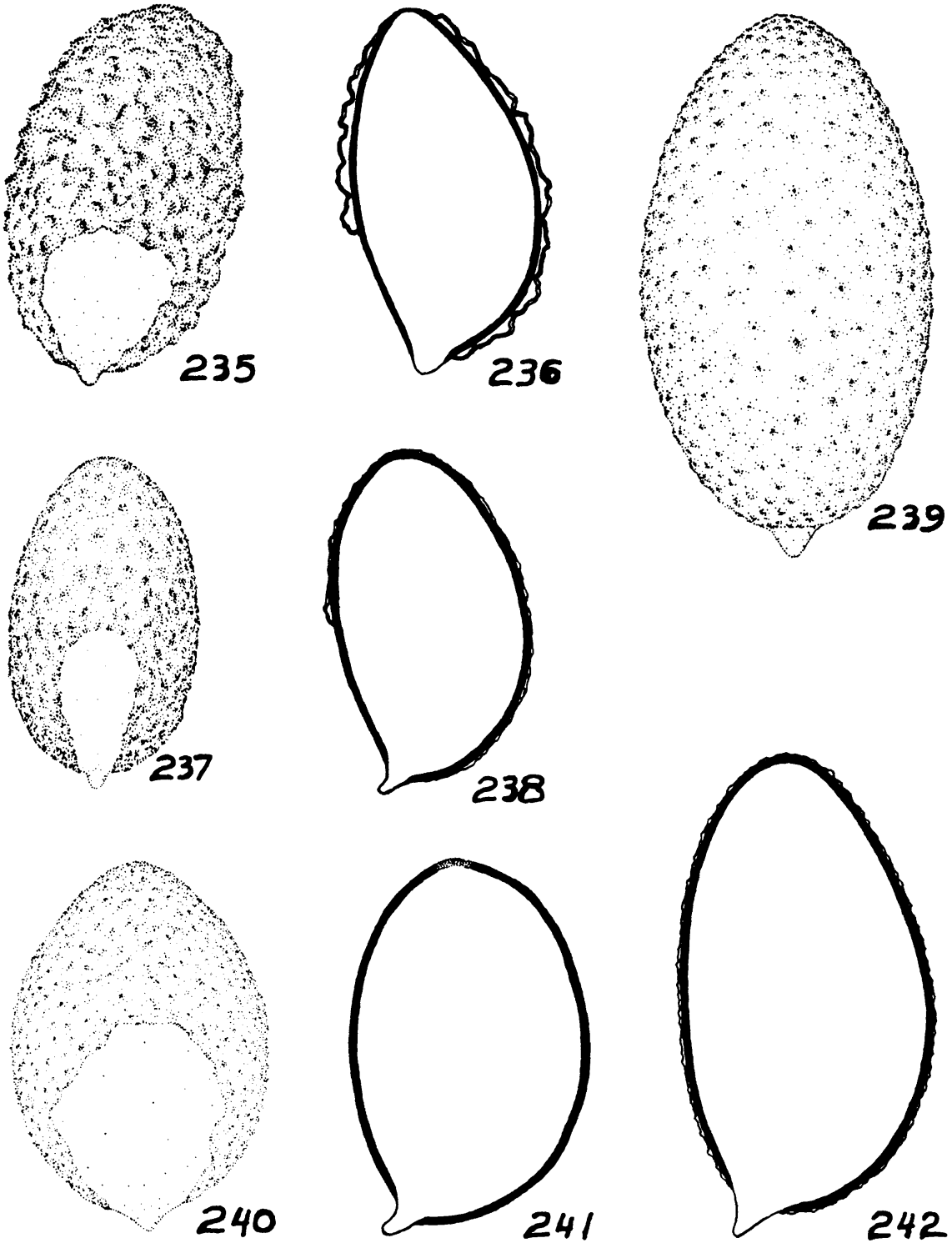


Fig. XXXV

Spores of *Galerina*: Figs. 235–236, *G. helvoliceps*; 237–238, *G. physospora*; 240–241, *G. oreina*; 239 & 242, *G. heterocystis*.

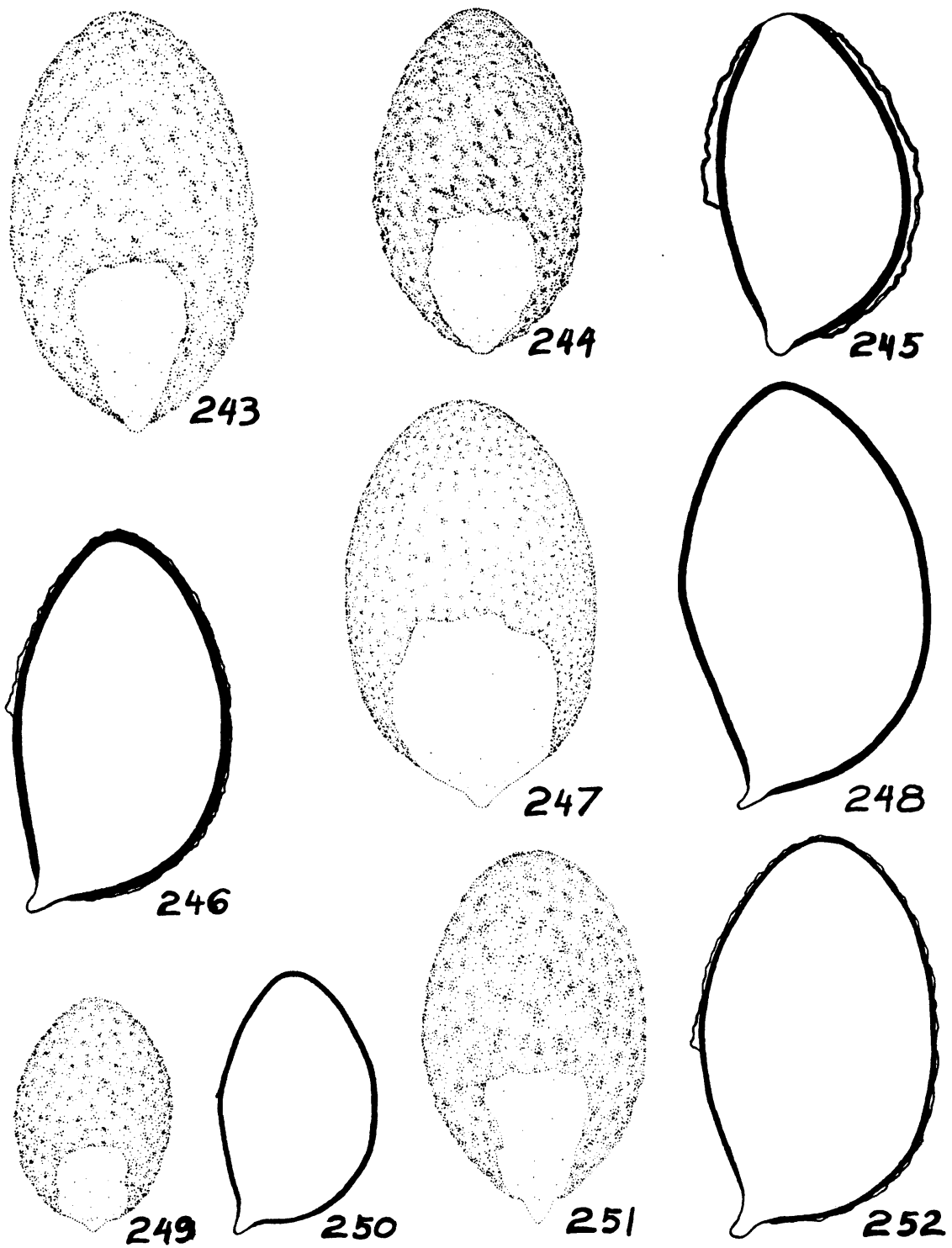


Fig. XXXVI

Spores of *Galerina*: Figs. 243 & 246, *G. wellsiae*; 244–245, *G. autumnalis* var. *autumnalis* f. *autumnalis*; 247–248, *G. farinosipes*; 249–250, *G. triscopa* var. *tetrascopa*; 251–252, *G. venenata*.

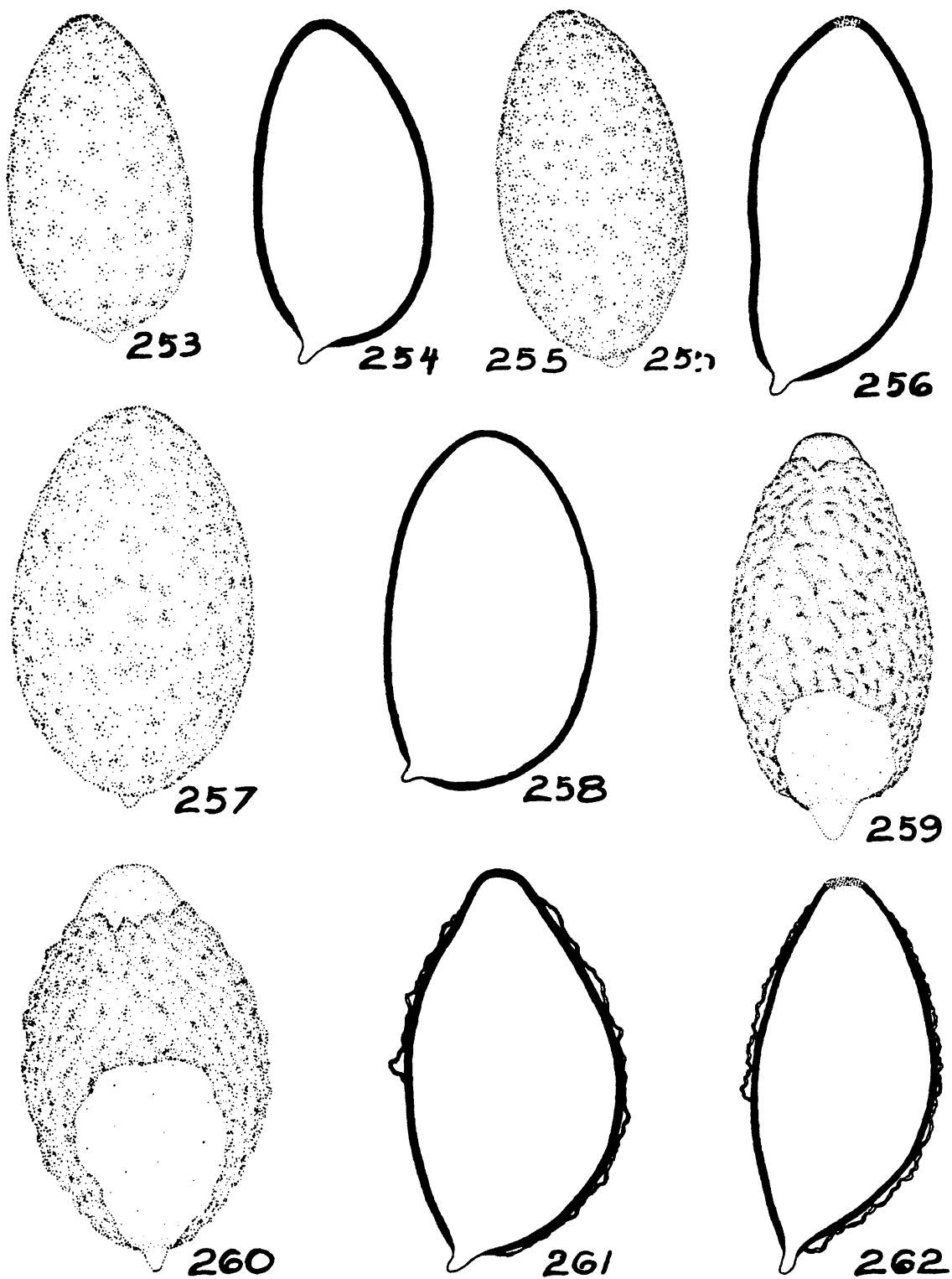


Fig. XXXVII

Spores of *Galerina*: Figs. 253–254, *G. brunneimarginata*; 255–256, *G. dimorphocystis* var. *dimorphocystis*; 257–258, *G. semilanceata*; 260–261, *G. rugisperma*; 259–262, *G. carbonicola*.

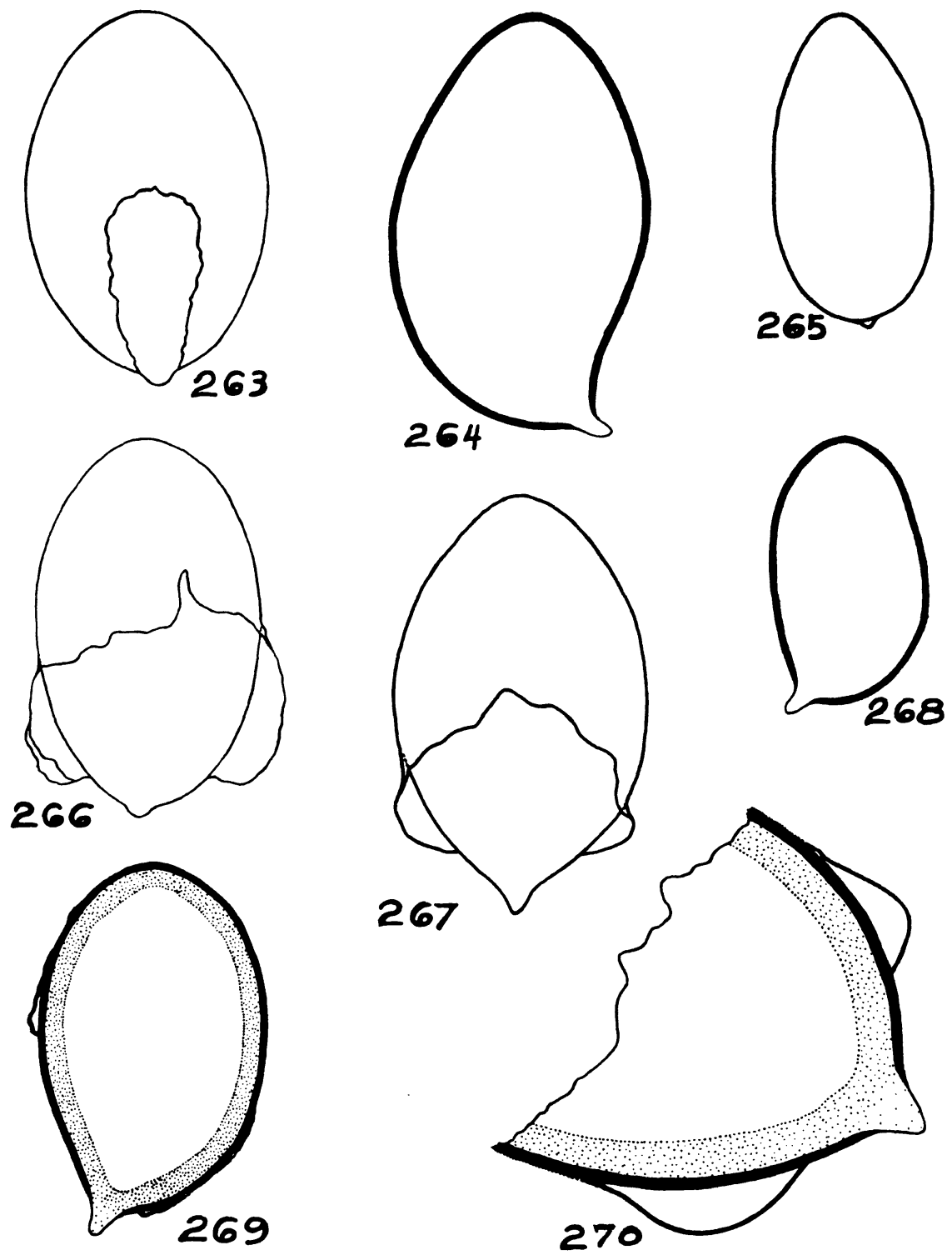


Fig. XXXVIII
 Spores of *Galerina*: Figs. 263–264 & 266, *G. turfosa*; 265–268, *G. mammilata*; 267, 269, & 270, *G. cortinarioides*.

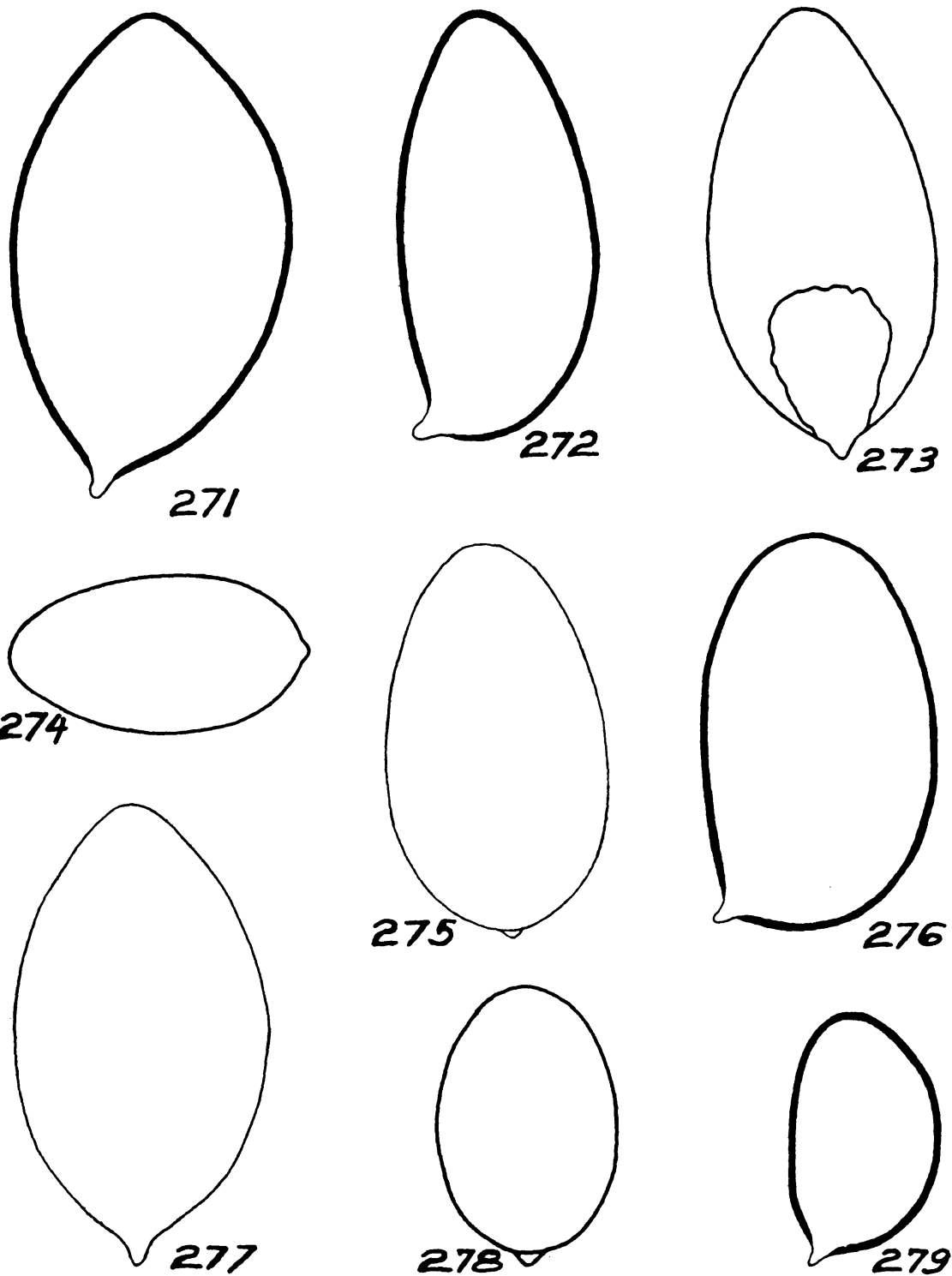


Fig. XXXIX

Spores of *Galerina*: Figs. 271 - 277, *G. vaccinii*; 272-273, *G. tsugae*; 275-276, *G. nigripes*; 278-279, *G. vinaceobrunnea*; 274, *G. emmetensis* var. *intermedia*.

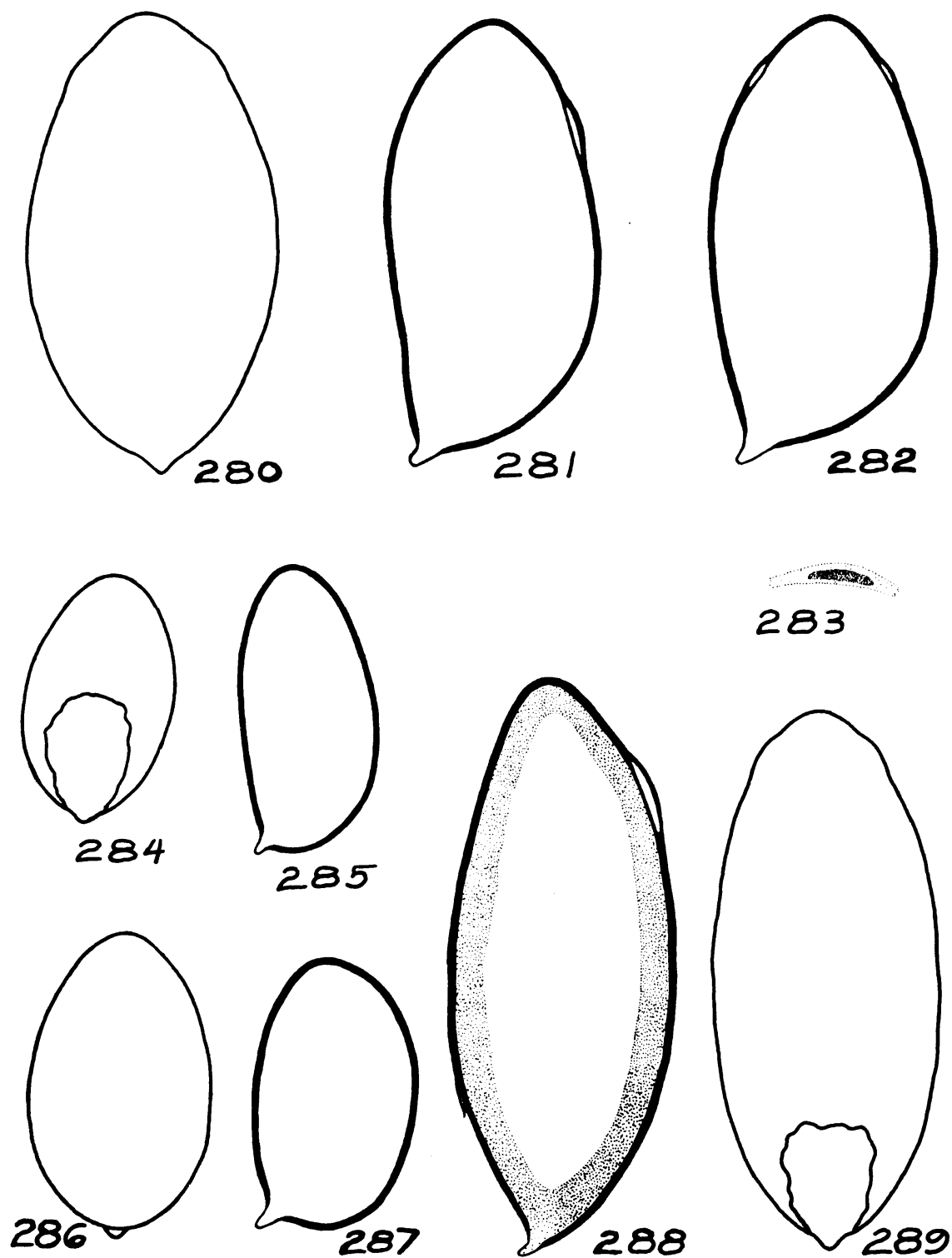


Fig. XL

Spores of *Galerina*: Figs. 280–283, *G. allospora* var. *allospora*; 284–285, *G. aberrans*; 286–287, *G. stylifera* var. *caespitosa*; 288–289, *G. insignis*.

APPENDIX

The species described here were discovered too late to be included in the body of the text.

Galerina antarctica Singer, Cont. del Inst. Antartico Argent. No. 71, p. 13, 1963

Pileus 5–13 mm broad, 3–8 mm high, obtusely conic to campanulate, becoming subumbonate to broadly convex, fulvous, color persistent, smooth, striatulate on margin, margin straight, not sulcate, scarcely viscid. Lamellae ochraceous brown, moderately broad, close to subdistant, adnate to adnexed. Stipe 25–42 mm long, 1–2 mm thick, veil lacking but base mycelioid, straight or curved, naked or slightly silky shining, ochraceous becoming ochraceous-badious, faintly longitudinally striate, tubulose, very slender. Context fragile, taste unknown.

Spores (7) $8.3\text{--}16 \times 4.8\text{--}8.3 \mu$, calyptrate, with an apical callus, ellipsoid to amygdaliform, apex at times mucronate, well pigmented. Basidia 4-spored or up to 50% bispored, $24.5\text{--}29 \times 6\text{--}8.5 \mu$. Pleurocystidia none. Cheilocystidia $30\text{--}55 \times 4\text{--}11 \mu$, neck long, apex not or only subcapitate, hyaline, but in basal part brownish, thin-walled, brown elements equally distributed. Tramal hyphae with clamps, when mature encrusted with pigment. Epicutis of pileus of appressed hyaline scarcely gelatinous hyphae with little pigment. Hypodermium of more inflated hyphae.

On clumps of grass (*Deschampsiae*) and *Poa*, gregarious, Antarctic Peninsula. Type preserved at Inst. Antartico Argent. CE-50. 134.

This species somewhat resembles *G. austrocalyptratus* but the habitat on grass should distinguish it at once. This habitat is very unusual for species in this section.

Galerina perrara Singer, Cont. del Inst. Antartico Argent. No. 71, p. 15, 1963

Pileus 4–5 mm broad, 3–3.5 mm high, ochraceous brown, weakly striate over the margin, not viscid, smooth, campanulate. Lamellae ochraceous, ascending at first, then more or less adnexed and horizontal, moderately distant. Stipe 15–30 mm long, 1–1.5 mm thick, nearly filiform, narrowly tubular, weakly ochraceous brown. Odor and taste not distinctive.

Spores $8.2\text{--}10.7 \times 5.5\text{--}7.5 \mu$ ($14.5 \times 8.8 \mu$), ellipsoid to subpyriform, very weakly ornamented, with a faint plage. Basidia $30\text{--}32 \times 6\text{--}8.5 \mu$, mostly 4-spored. Cheilocystidia $45\text{--}55 \times 6\text{--}11 \mu$, ampullaceous to ampullaceous-capitate, narrowest part of the neck $2.7\text{--}4 \mu$, capitellum 4–7

μ , hyaline. Pleurocystidia none. Tramal hyphae with clamp connections. Epicutis of pileus not gelatinous, hyphae tubular, 2.7–3.5 μ , diam. Hypodermium heavily pigmented from incrusting pigment, broader than hyphae of the pileus epicutis.

On moss Antarctic Peninsula. Type conserved in Inst. Antartica Argentina

This species seems closest to *G. dicranorum* but that species has a system of laticiferous hyphae (resin-containing) and the hypodermium is not as darkly colored. The difference in distribution should also be regarded as important.

Galerina praetervisa Singer, sp. nov.

Pileo obtuso, ochraceo-brunneo, 6–19 mm lato; lamellis subangustis vel latis, confertis vel distantibus; stipite 10–60 mm longo, 0.7–2.5 mm lato, apicem versus vel basin versus attenuato, velo annulari manifesto sed interdum incompleto ornato; sporis 11–12 \times 6.3–8.2 μ , verrucosis, perisporio involutis; basidiis tetrasporis; cheilocystidiis ventricosis et longe ampullaceis vel tibiiformibus; dermatocystidiis paucis; hyphis defibulatis. Ad truncum nothofagineum putridum vel ad terram declivem nudam in silva, Argentina. Singer M-3064 (BAFC)-type.

Pileus 6–19 mm broad, 3–8 mm high, at first campanulate-convex, then with more or less recurved margin or simply convex, irregularly convex, convex-subumbonate, glabrous, smooth or (the larger caps) long sulcate, not viscid, hygrophanous, ochraceous brown, fading slightly; context almost concolorous; odor none. Lamellae variable in a single carpophore, some being moderately broad and not ventricose, others broad and ventricose, in other carpophores all rather broad and slightly ventricose, close to distant, adnexed to mostly adnate, ochraceous brown. Stipe 10–60 mm long, 0.7–2.5 mm broad, slightly tapering upwards, or on the contrary, tapering downwards, naked, except for remainders of the veil, hollow, brown below, paler above, rather deep brown in dried condition in the lower region; veil fibrillose, forming a complete or incomplete apical annulus which is relatively persistent.

Spores 11–12 \times 6.3–8.2 μ , with rather thick ochraceous episporium and rather deep ochraceous brown and heavy (projecting 0.4–0.7 μ) exosporial verrucose ornamentation, the warts often arranged in longitudinal rows or more rarely confluent to form short crests, in other spores all warts isolated, often lower towards the callus and callus region at times quite smooth; ellipsoid, generally with a strong perisporium which loosely envelops the exosporial layer, generally without trace of a plage but in some collections some spores showing a narrow smooth area in the suprahilar zone, exceptionally even with a distinct plage delimitation. Basidia 27–32 \times 9–10 μ , 4-spored. Pleurocystidia none. Cheilocystidia filamentous, with or more rarely without a basal ventricose swelling and with or more rarely without an apical capitellum, 24–50 \times 1.3–3 μ , basal swelling up to 9 μ across, capitellum 3–3.8 μ in diameter. Gill trama regular, hyaline, often with some short and swollen elements intermixed between the filamentous

ones, either entirely pigment-less or some elements with weak ochraceous pigment incrustations in KOH. Cuticular layer homogeneous, yellowish, some narrow hyphae often with ochraceous pigment incrustation at least in hypodermium, dermatocystidia very scattered on pileus and stipe. Clamp connections absent.

HABIT, HABITAT AND DISTRIBUTION. Scattered on rotten *Nothofagus* stumps and on earth in *Nothofagus* woods, especially on shady banks around 1000 m elevation, southern Argentina.

OBSERVATIONS. This is thus far the only species where even a trace of a plague has been observed on some individual spores of a clampless species of *Galerina*, but the opposite counterpart, a species with clamps but no plague is known, see section Mycenopsis. The strong veil and the relatively large spores are characteristic. This species differs from *G. semilanceata* in larger spores, more broadly obtuse pileus, annular veil, smaller capitellum on the cheilocystidia and in not being bryophilous.

MATERIAL EXAMINED: Singer, M-3064 (BAFC)-type, Patagonia, Neuquén, Rincón, 3-18-1963; M-3536 (BAFC).

***Galerina radicellicola* Singer sp. nov.**

Pileus 5-12 mm latus, obscure umbonatus, ochraceus, glaber, haud viscidus. Lamellae ochraceae, latae, confertae, adnatae. Stipes pallidus, 30-40 mm longus, 1.2-1.8 mm crassus, fibrillosus. Sporae 12.2-13.5 \times 7.3-8 μ , verrucosae, fulvae. Cheilocystidia ventricose ampullacea. (Typus M-3154, Singer)

Pileus 5-12 mm broad, sometimes low-convex and subumbonate, glabrous, not viscid, hygrophorous but scarcely changing color in fading, yellow ocher to burnished gold on disc, margin pond lily to pallid. Lamellae chamois to bure when fresh, more brownish when dried, horizontal, medium broad, adnexed to adnate, close, edges pallid and fringed. Stipe subequal, 30-40 mm long, 1.2-1.8 mm thick, finely pruinose from dermatocystidia above, below the ring glabrous and only innately silky-striate longitudinally as well as brownish (14-D-9); veil cortinoid, at first rather abundant and leaving an apical ring or zone which is soon evanescent, veil fibrils pallid. Context lacking a distinctive odor and taste.

Spores 12.2-13.5 \times 7.3-8 μ , stramineous with strongly contrasting deep ochraceous brown exosporial ornamentation which is composed of strong, almost heavy, rather broad and irregularly distributed warts; fusoid-ellipsoid, with suprahilar depression showing slightly, thick-walled, with a callus but lacking a germ pore, plague lacking or merely poorly defined. Basidia 24-34 \times 10.8-11.3 μ , 4-spored. Pleurocystidia none. Cheilocystidia abundant (gill edge heteromorphous), hyaline, ventricose near base and effilate-ampullaceous, the neck rather long to very long and 1.3-3.2 μ diam. with rarely a slight capitellum to 3.2-4.3 μ . Epicutis of pileus a thin layer of appressed hyphae with some vesiculate elements present as terminal cells from hypodermial hyphae. Hypodermium deep stramineous ochraceous but neither brown nor pigment incrustated, elements here also forming a cutis but consisting of rather broad and often subspherocystoid cells which reach

up to 30 μ diam. Apex of stipe with caulocystidia similar to cheilocystidia. Clamp connections not present.

On a high earth bank along a path, on the fine rootlets of *Nothofagus dombeyi*, gregarious. Los Cantaros, Brazo Blest, Neuquén, Argentina, March 23, 1963.

OBSERVATIONS. This is another of the large spored species in *Tubariopsis* and readily distinguished by the inflated cells in the pileus cutis.

EXCLUDED AND DOUBTFUL SPECIES ENCOUNTERED IN THIS STUDY

Of necessity this list is incomplete, as we do not believe it desirable to list all the species examined and which we find did not belong in *Galerina*. This would in itself amount almost to a monograph of the remaining slender-stiped brown spored agarics.

Agaricus discolor Peck, Bull. Buff. Soc. Nat. Hist. 1: 50. 1873

Pholiota discolor (Peck) Saccardo, Syll. Fung. 5: 744. 1887

Pileus 1–3 cm broad, convex becoming expanded or slightly depressed, smooth, viscid (?), hygrophanous, watery cinnamon and striatulate on the margin when moist, bright ochraceous yellow when dry. Lamellae close, narrow, pallid then pale ferruginous. Stipe equal, hollow, fibrillose striate, pallid; annulus distinct, persistent (from Peck, l. c.).

Spores 7–9 × 4–5 μ, smooth, ellipsoid, moderately thick-walled, pale yellow in KOH. Basidia 4-spored. Pleurocystidia none. Cheilocystidia abundant, 46–62 × 7–12 μ, fusoid-ventricose to subfilamentose, neck 4–6 μ thick, apex at times slightly thicker, walls often flexuous in age. Gill trama of narrow parallel yellowish hyphae in KOH; no gelatinization in subhymenial area present. Pileus trama dingy yellowish in KOH and of compactly interwoven hyphae 5–7 μ in diam., epicutis of loosely arranged nearly hyaline non-gelatinous hyphae 7–10 μ in diam. Clamp connections present.

On rotting logs, Greig, New York. Known only from type locality.

Because of the smooth spores this species cannot be considered closely related to *G. autumnalis* or *G. marginata*. We doubt that the pileus was ever viscid. However, it resembled *G. autumnalis* so closely that Peck himself was deceived. For this reason we give an account of it here based on a study of the type.

Agaricus glebarum Berk. in Hooker, Flora Antarctica 1: 447. 1844

Type studies carried out by Singer (*Sydowia* 5: 474. 1951; 7: 250. 1953) show that it is undoubtedly a *Galerina* but only a study of fresh material can indicate the position of this species in our classification. The hymenium is too much destroyed to provide data on the distribution and shape of the cystidia. The aspect of the dried carpophores is that of a small *Cortinarius* (*Telamonia*) but the spores (8–9.5 × 4.8 μ) are finely but distinctly warty, and with a distinct plage, hence more like those of a *Galerina*.

Galerina acuminata (Murr.) Smith, Mycologia 30: 37. 1938

Omphalina acuminata Murrill, N. A. F. 9: 349. 1916

Pileus scarcely reaching 1 cm broad, conic, with a very long, pointed

umbo, surface slightly viscid when moist, pruinose to glabrous, white, margin entire, concolorous, incurved when young; lamellae distant, broad, plane, short-decurrent white; stipe slender, whitish, pulverulent to glabrous, slightly enlarged at the base, 1 cm long, scarcely 1 mm thick.

Spores $7-9 \times 5-6 \mu$, ovate in face view, obscurely inequilateral in profile, with a warty-wrinkled exospore, dark rusty brown under the microscope; basidia 4-spored; pleurocystidia abundant, $40-60 \times 8-14 \mu$, fusoid-ventricose with obtuse to subacute apices; cheilocystidia similar to pleurocystidia; gill and pileus trama not distinctive as revived.

On decayed wood, 600 m elev. Union Hill, Moneague, Jamaica, Jan. 17, 18, 1909, Murrill 1178.

We believe it very likely that the designation of a type with rusty brown spores was a mistake due to labels becoming interchanged at some stage of the curating process. Murrill's original account obviously applies to a white *Omphalina*-like fungus. It appears best to us to regard the name as a permanent source of confusion and discard it.

Galerina aquatilis (Fr.) Lundell, *Fungi Exsic. Suec. Fasc. XLI-XLII*: 25. 1953

Lundell sought to substitute this name for *G. sphagnorum* because of "confusion" in regard to that name. However, we cannot accept the contention that the name *Galera aquatilis* applies equally well to *G. sphagnorum*. Fries in 1821 indicated the presence of a veil in what is now regarded as *G. sphagnorum* but failed to mention it in *aquatilis*. Even in the light of present day taxonomy of *Galerina* this still must be regarded as significant. Hence we here exclude *G. aquatilis* as a name to be dropped because of confusion of concepts.

Galera kerguelensis (Berk) Sacc. *Syll.* 5: 864. 1887

This species seems to belong to *Galerina*, but a search for the type has been fruitless.

Naucoria intertrunca Pilát, *Acta Mus. Nat. Prag.* 9B: no. 2, p. 55. 1953

Pileus 5–8 mm broad, from subglobose to expanding to plane, asymmetrical, visibly excentric, fragile, very slightly puberulent, ferruginous to argillaceous, dark colored. Lamellae adnate, distinctly thickish and remote; obviously fragile, concolorous with pileus or scarcely paler. Stipe 5–8 mm long, about 1 mm thick, short, bent at a right angle, concolorous with pileus, entire surface but particularly above finely pubescent, cylindrical, apex slightly thickened. Spores ferruginous, subelliptic in face view, somewhat inequilateral in profile, minutely verrucose (from drawing apparently with a smooth plage), apiculate, $5.5-6.5 (7) \times 3.5-4 \mu$.

On wood of *Abies*, near Detva, central Slovakia, August 25, 1951.

This is probably a distinct species but needs to be re-collected and a detailed study made of it.

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ILLUSTRATIONS



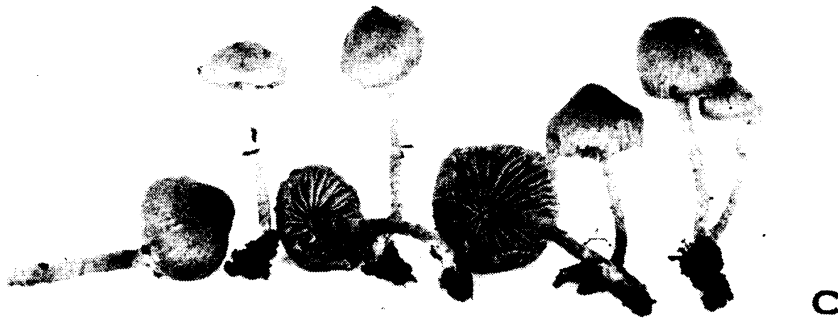
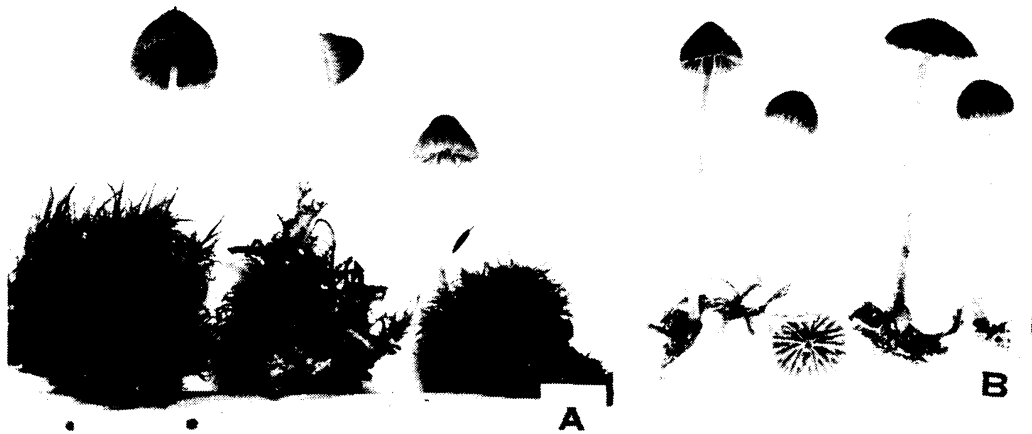
SM-18024

Galerina semilanceata (Pk) × 1.



A. *Galerina odora* Smith × 1.
 B. *Galerina fallax* Smith & Singer f. *fallax*
 C. *Galerina cortinarioides* Smith × 1.
 D. *Galerina turfosa* Smith & Singer.

SM 40210 (type).
 SM 33-626
 SM 40213
 SM 33-1101



A. *Galerina subcerina* Smith & Singer var. *subcerina* × 1.
 B. *Galerina fallax* Smith & Singer f. *fallax* × 1.
 C. *Galerina psathyrelloides* Smith × 1.
 D. *Galerina sphagnorum* (Fr.) Kühner × 1.

Bigelow 41
 SM 33-62
 SM 50935
 SM 33908



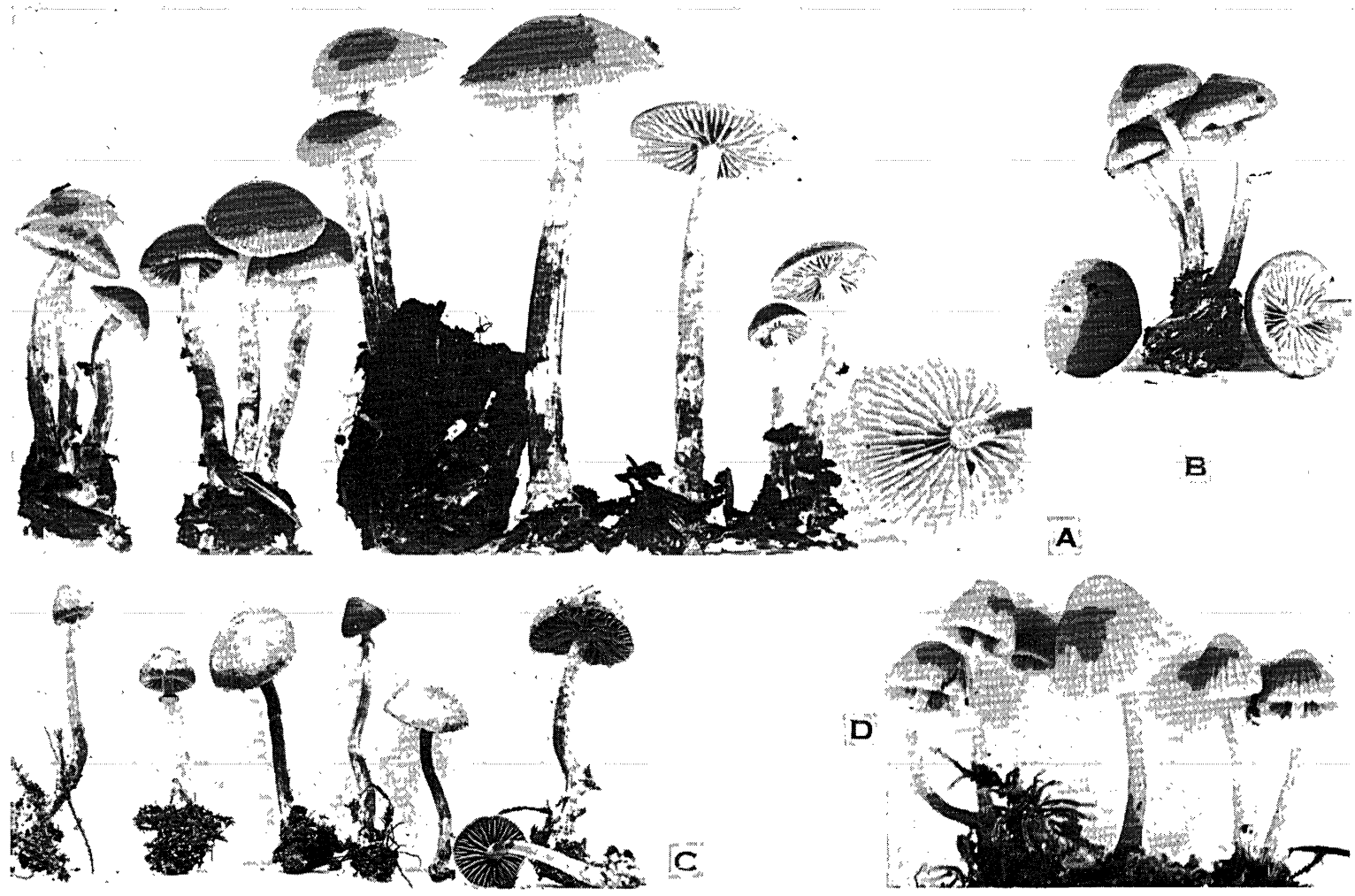
A. *Galerina tibicystis* (Fr.) Kühner $\times 1$.
 B. *Galerina pulchra* Smith & Singer $\times 1$.
 C. *Galerina triscopa* (Fr.) Kühner var. *triscopa* $\times 1$.

Big. 4540
 SM 41205
 SM 42701



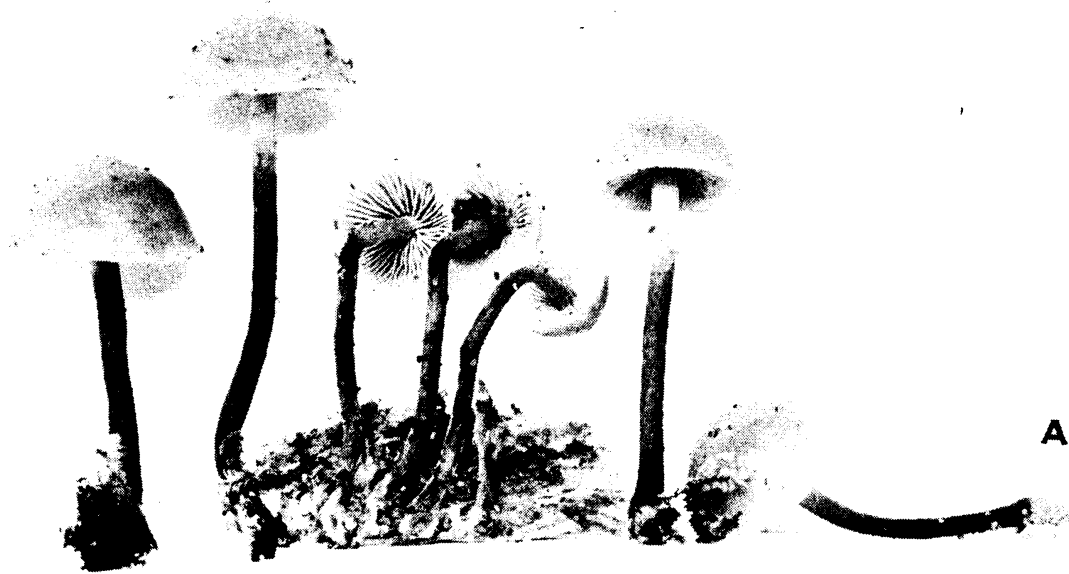
A. *Galerina cuspidata* Smith × 1.
 B. *Galerina cedretorum* var. *filiformis* Smith & Singer × 1.
 C. *Galerina oreina* Smith & Singer × 1.
 D. *Galerina atkinsoniana* Smith var. *atkinsoniana*
 E. *Galerina nordmaniana* Smith & Singer × 1.

SM 35716
 SM 41032
 SM 40344
 SM 43576
 SM 54260

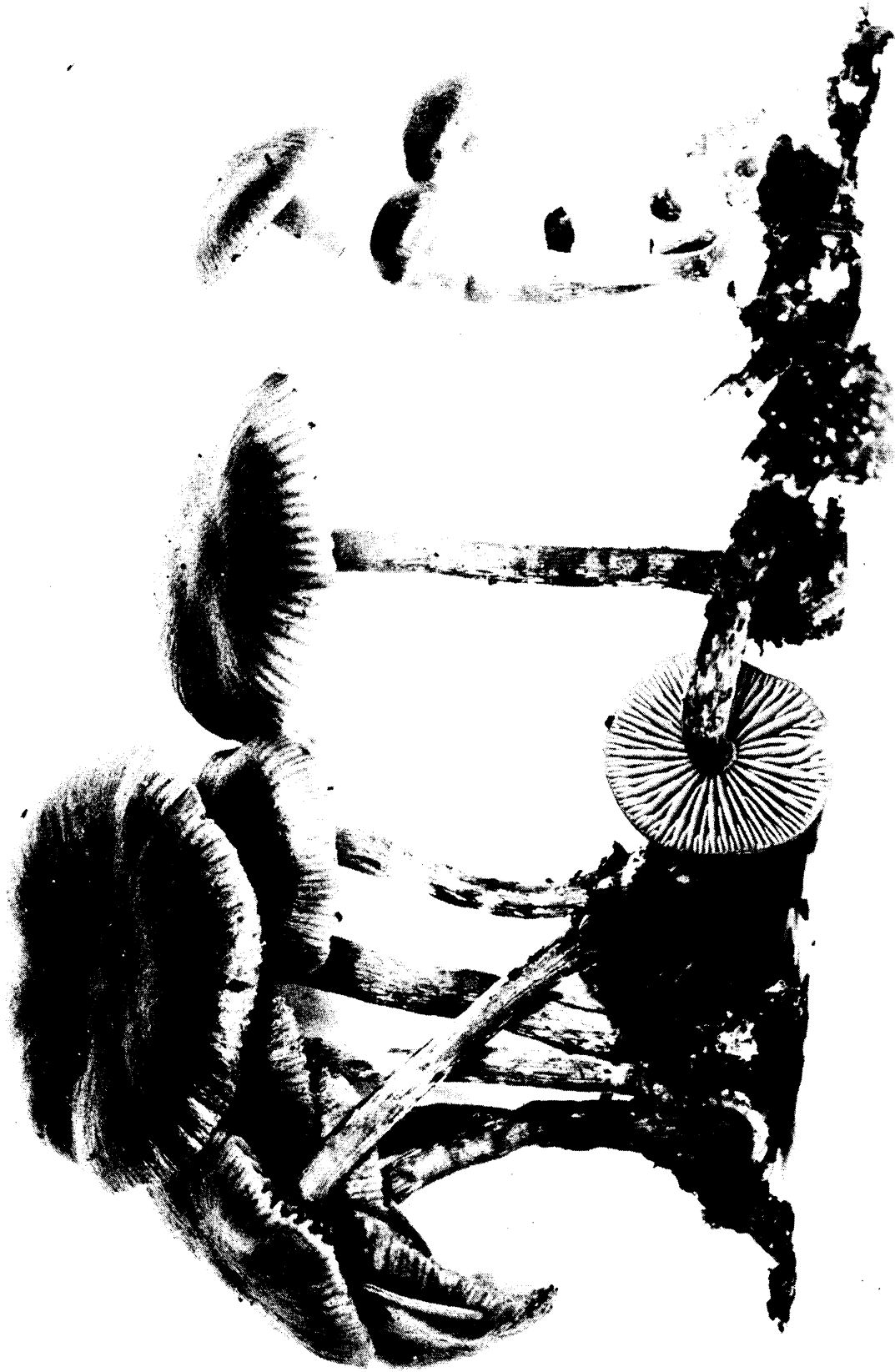


A. *Galerina stylifera* var. *stylifera* (large form) × 1.
B. & C. *Galerina unicolor* (Fr.) Singer × 1.
D. *Galerina pumila* var. *subalpina* Smith & Singer × 1.

SM 34148
SM 40641 & 43578
SM 48937



A. <i>Galerina mammillata</i> (Murr.) Smith & Singer	× 1.	SM 5647
B. <i>Galerina stylifera</i> var. <i>badia</i> Smith & Singer	× 1.	SM 5411
C. <i>Galerina stylifera</i> var. <i>stylifera</i> (Atk.) Smith & Singer	× 1.	SM 3076
D. <i>Galerina sideroides</i> (Fr.) Kühner	× 1.	SM 4098

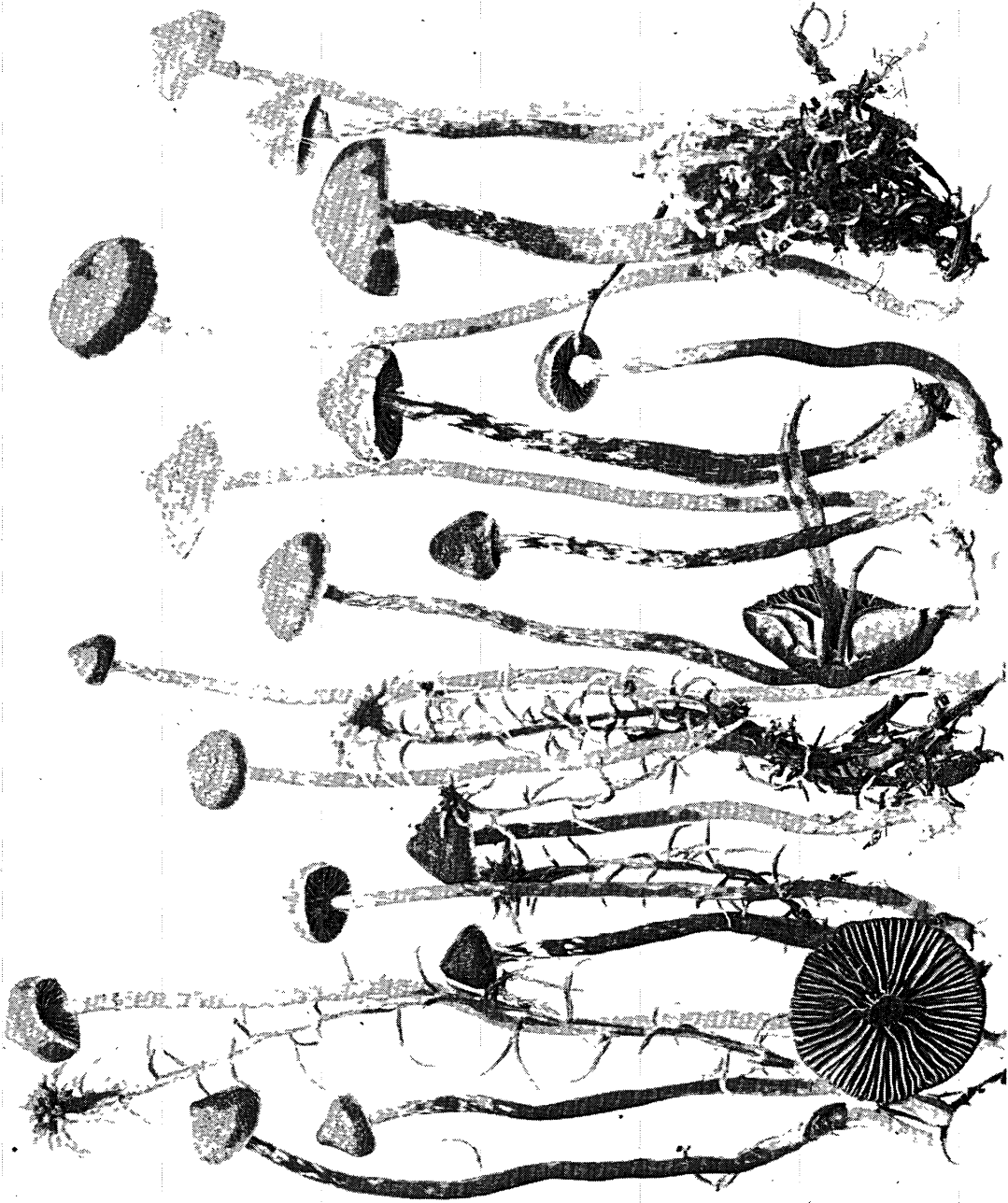


Galerina vinaceobrunnea Smith & Singer X 1.

SM 34149 (type).



A. B. & E. *Galerina stylifera* (Atk.) Smith & Singer var. *stylifera* × 1.
 C. & D. *Galerina badipes* Smith & Singer × 1. SM 4021

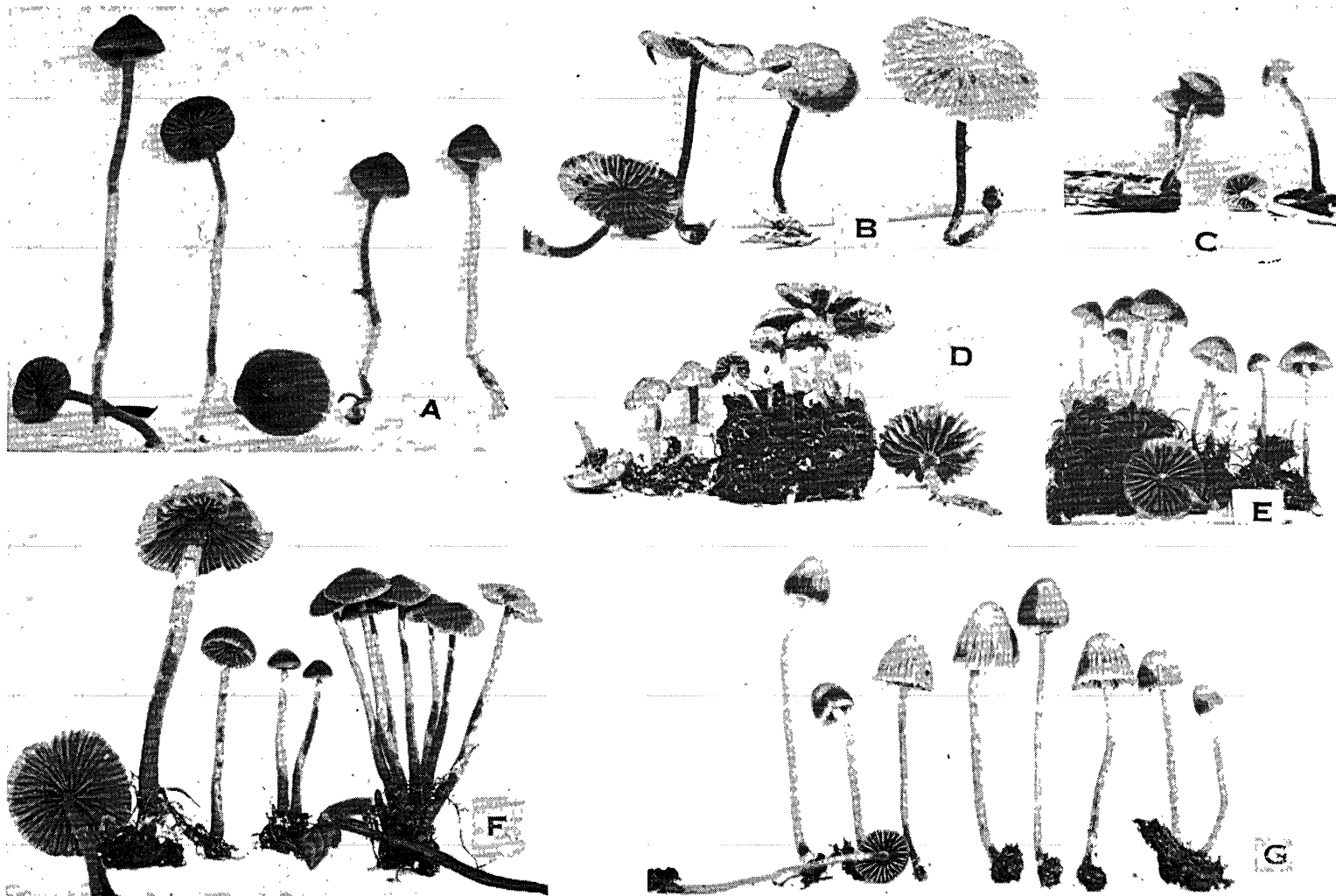


Galerina paludosa (Fr.) Kühner × 1.

SM 32-33.

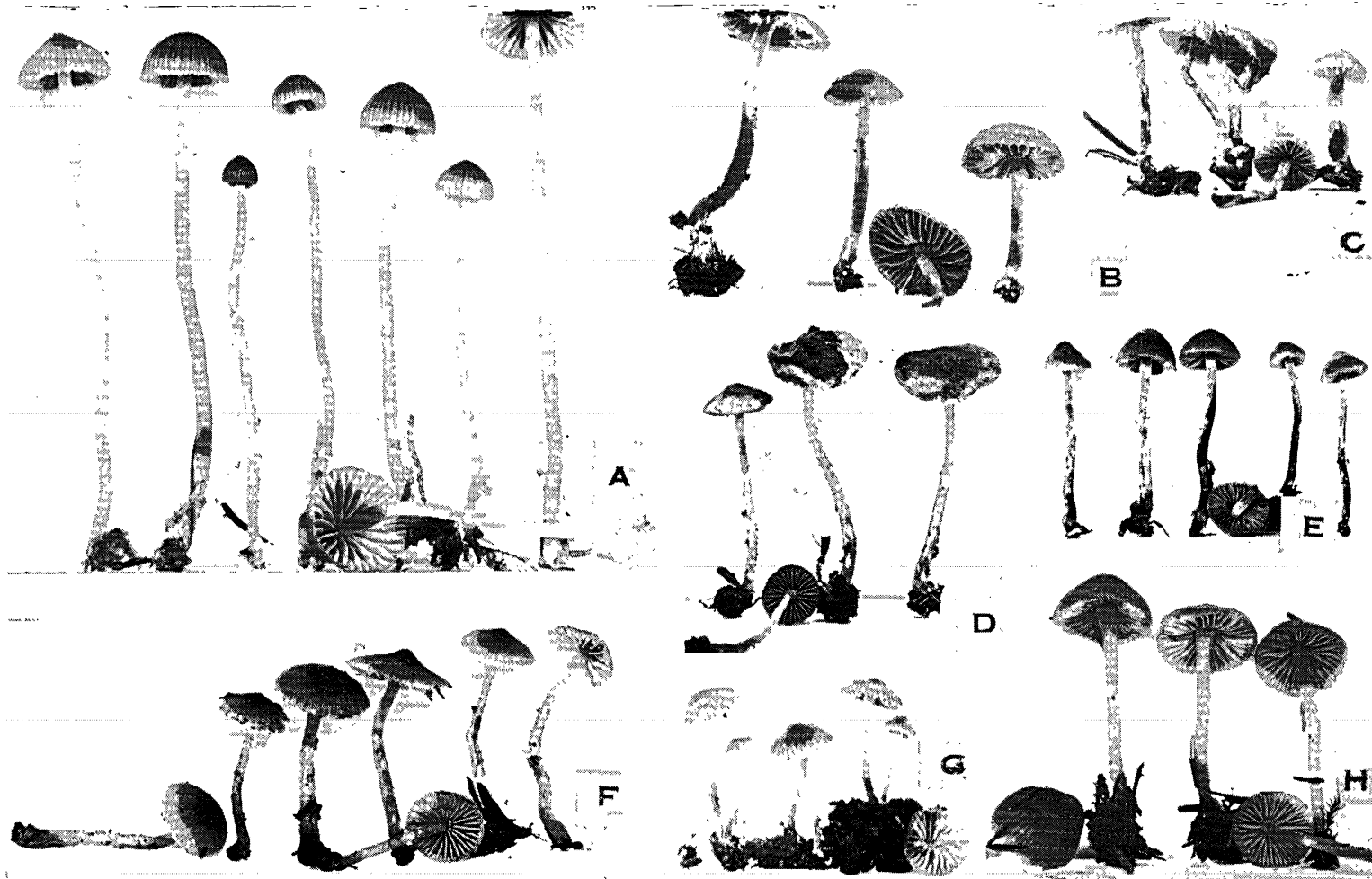


Galerina sphagnorum (Fr.) Kühner × 1.



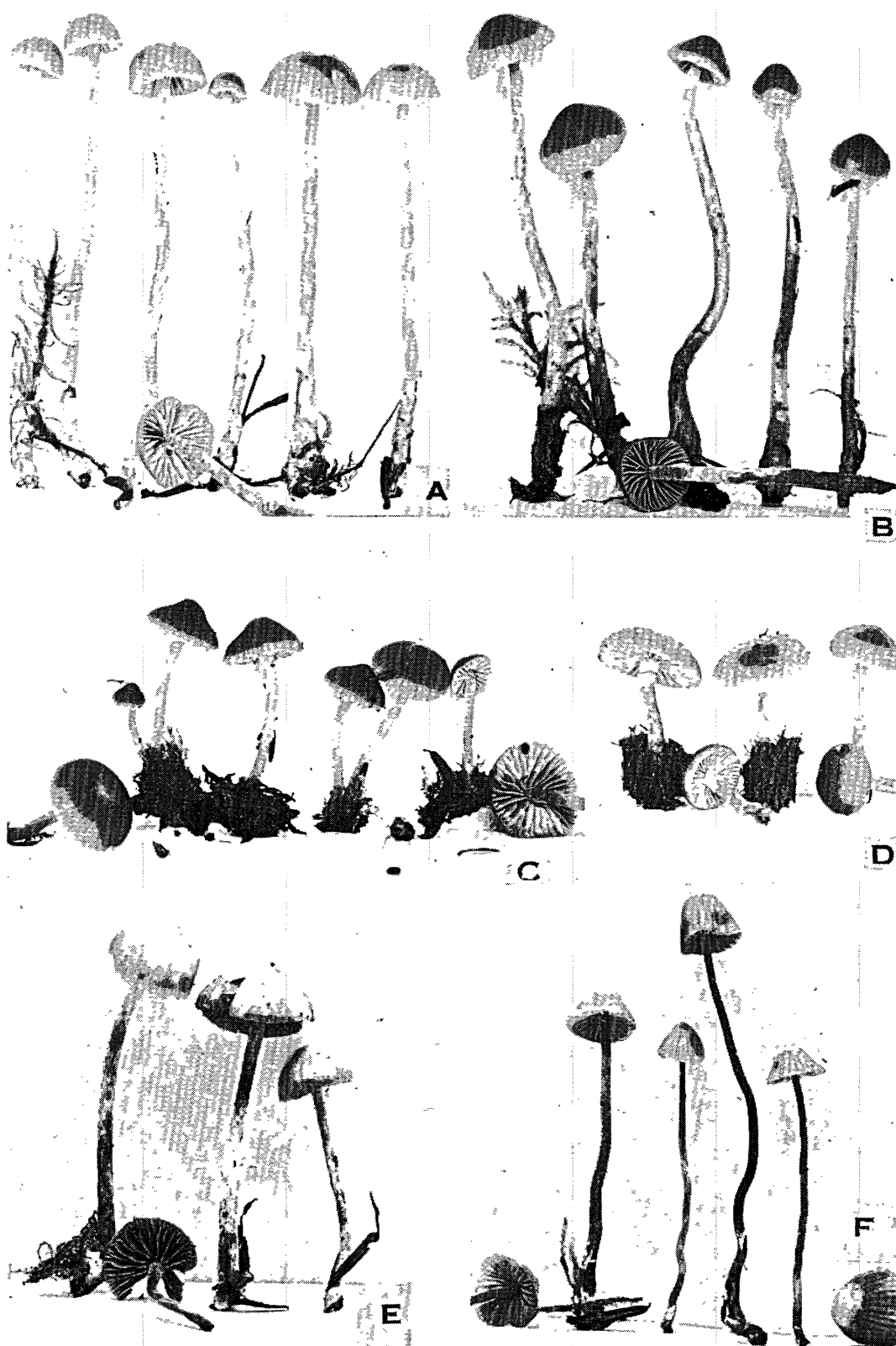
A. & F. *Galerina jaapii* Smith & Singer $\times 1$.
 B. *Galerina pruinatipes* Smith var. *pruinatipes* $\times 1$.
 C. *Galerina mesites* Smith & Singer $\times 1$.
 D. *Galerina vaccinii* Smith $\times 1$.
 E. *Galerina decipiens* Smith & Singer var. *decipiens*
 G. *Galerina perangusta* Smith & Singer $\times 1$.

SM 42568 & 4118.
 SM 41029 (type).
 SM 40216.
 SM 40798 (type).
 SM 43013.
 SM 56077 (type).

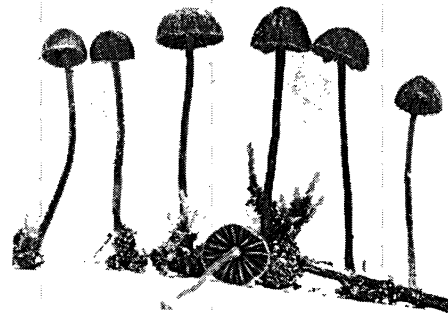
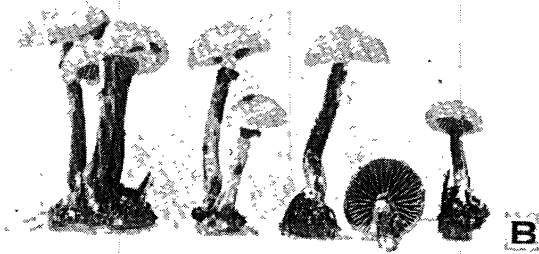


- A. *Galerina septentrionalis* Smith & Singer × 1.
 B. *Galerina tundrae* Smith × 1.
 C. *Galerina badipes* (Fr.) Kühner Smith & Singer × 1.
 D. *Galerina insignis* Smith × 1.
 E. *Galerina badipes* (Fr.) Kühner × 1.
 F. *Galerina rostrata* Smith & Singer × 1.
 G. *Galerina tsugae* Smith & Singer × 1.
 H. *Galerina allospora* Smith & Singer × 1.

SM 44016.
 SM 40351.
 SM 40221.
 SM 41096.
 SM 43575.
 SM 56364 (type).
 SM 44017.
 SM 44022.



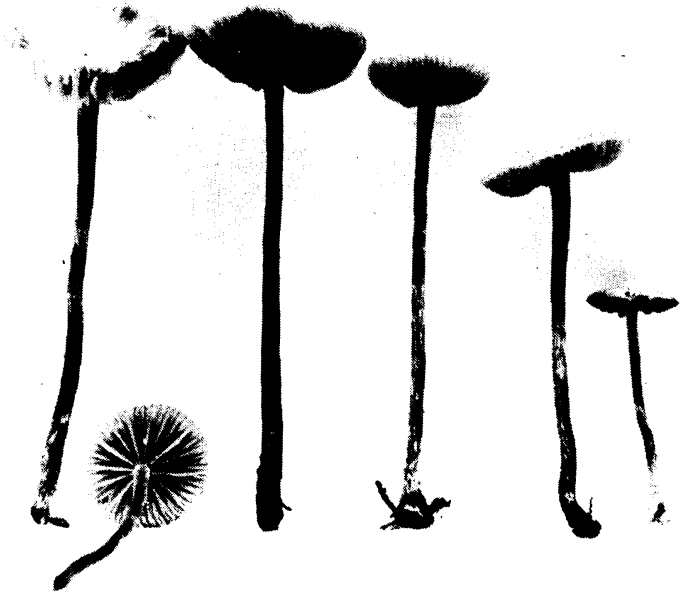
- A. & B. *Galerina vexans*, Smith & Singer $\times 1$. SM 43005; 42824 (type).
 C. *Galerina obscurata* Smith $\times 1$. SM 38231 (type).
 D. *Galerina unicolor* (Fr.) Singer $\times 1$. SM 43007.
 E. *Galerina cedretorum* (Maire) Singer, f. *filiformis* Smith & Singer
 F. *Galerina vittaeformis* (Fr.) Singer var. *vittaeformis* f. *vittaeformis* $\times 1$.
 SM 40220.



A. *Galerina dicranorum* Smith & Singer × 1. SM 28439.
 B. *Galerina unicolor* (Fr.) Singer × 1. SM 40779.
 C. *Galerina minima* (Pk) Smith & Singer × 1. SM 40644.
 D. *Galerina mollis* Smith & Singer var. *mollis* × 1. SM 41074.
 E. *Galerina badipes* (Fr.) Kühner × 1. SM 40539.



A



B



C



D

- A. *Galerina vialis* Smith $\times 1$.
 B. *Galerina cedretorum* (Maire) Singer var. *bispora*. $\times 1$.
 C. *Galerina angustifolia* Smith & Singer $\times 1$.
 D. *Galerina minima* (Pk.) Smith & Singer $\times 1$.

SM 40788.
 SM 41214.
 SM 5200 (type).
 SM 40645.



A



B

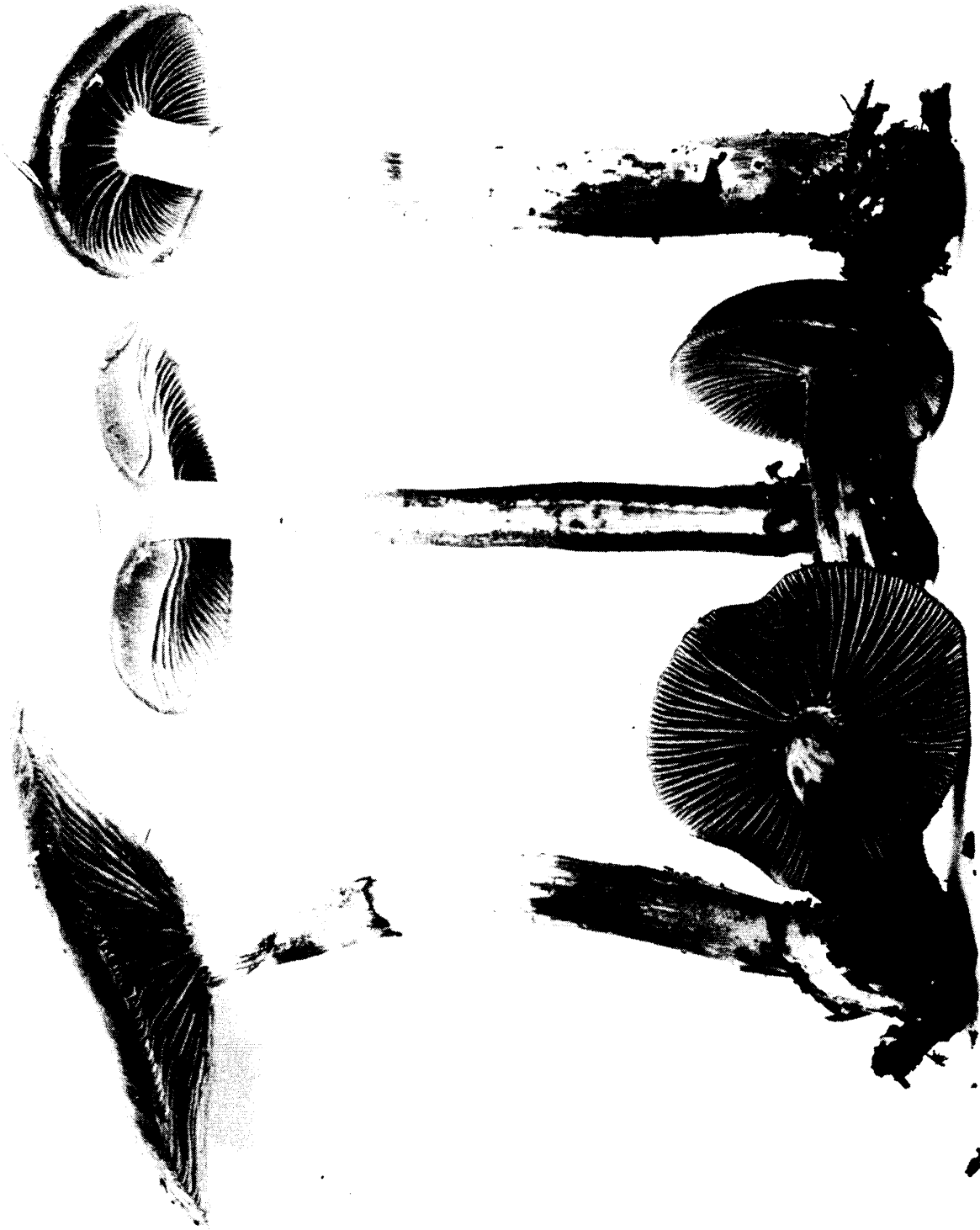
A. *Galerina cedretorum* (Maire) Singer, var. *filiformis* Smith & Singer × 1.
 SM 48163.

B. *Galerina marginata* (Fr.) Kühner × 1.
 SM 40665.



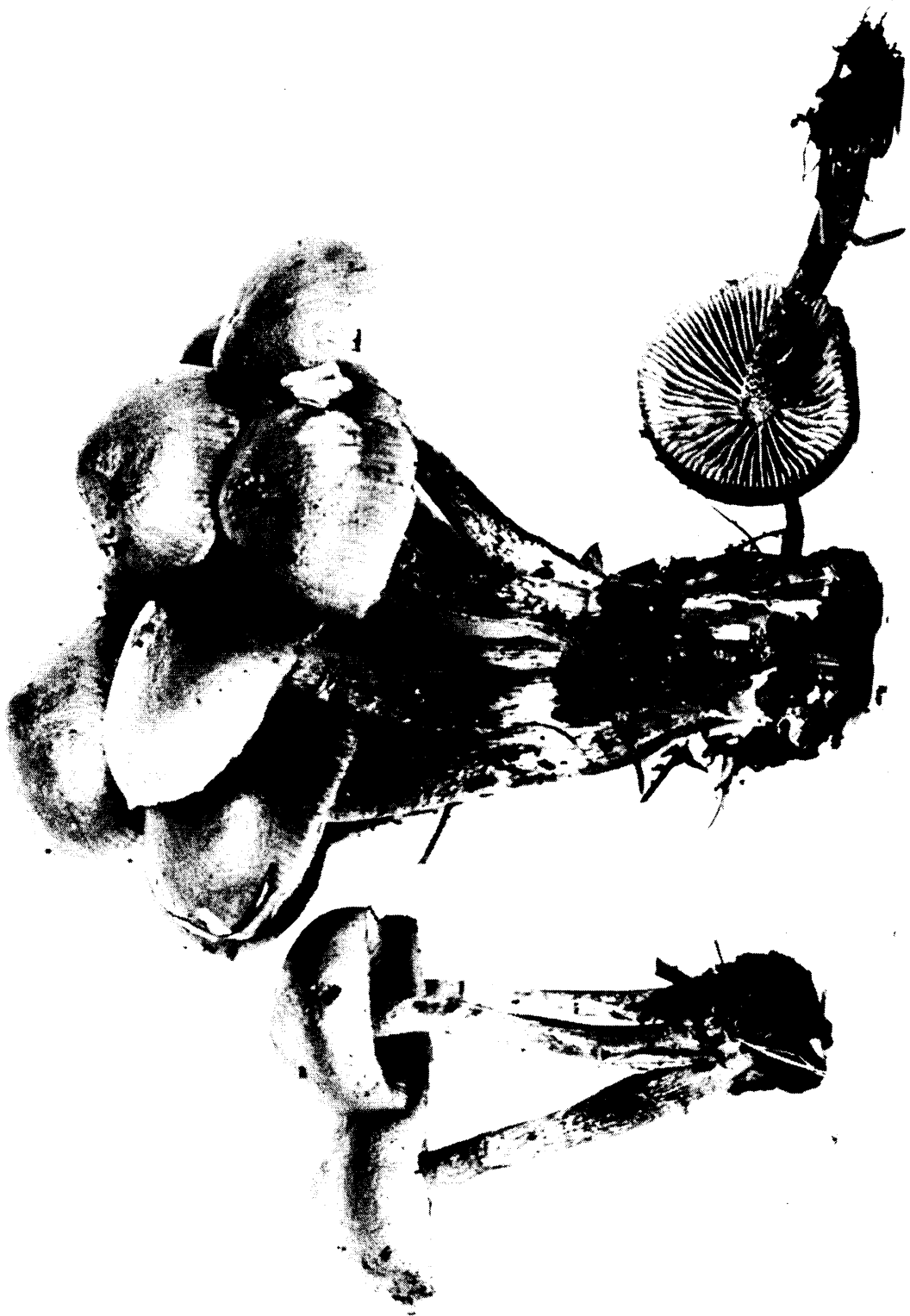
Galerina autumnalis (Pk) Smith & Singer X 1.

SM 33922.



Galerina megalocystis Smith & Singer X 1.

SM 3680 (type).



Galerina autumnalis (Pk) Smith & Singer × 1.

SM 28105.

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