

## The Genus *Galerina*:

### An Outline of its Classification.

Alexander H. Smith and Rolf Singer\*).

For a number of years we have been working toward a world monograph of this genus, but the amount of new material which comes in each year has delayed the completion of the project. Consequently, rather than withhold all our ideas on the classification of the genus, it seemed best to us to publish a survey of it at this time in order to help others collecting *Galerinas* to place their collections according to our system so that we may learn how workable our classification actually is in the hands of others.

It need not be stressed here that the number of recognizable species has exceeded our remotest expectations — almost to the point of our feeling apologetic for publishing any more new ones. Yet field experience has shown these entities do exist in nature and must be accounted for if the *Galerina* flora of the world is to be accurately inventoried on a realistic basis.

With this in mind, we propose the following outline:

***Galerina*** Earle, Bull. N. Y. Bot. Garden **5**: 423. 1909.

*Galera* (Fr.) Kummer, Führer in die Pilzkunde, p. 74. 1871 (non. *Galera* Blume. 1825).

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

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

Type species: *Agaricus villaeformis* Fr. Epic. designated by Earle, p. 207. 1838.

Subgenus I: ***Tubariopsis*** (Kühner) stat. nov.

Section *Tubariopsis*, Kühner, Encyc. Myc. **7**: 168. 1935. Clamp connections absent; spores with a roughened or ornamented plate area.

Type species: *Galerina graminea* (Vel.) Kühner.

Encyc. Myc. **7**: 168. 1935.

Discussion: At the present time we recognize seven species. A new combination is necessitated by the discovery that *Galerula heterocystis* Atkinson is the same as *Galerina clavata* (Vel.) Kühner.

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\*) Papers from the University of Michigan Herbarium and the Department of Botany, No. 1091, University of Michigan, Ann Arbor, Michigan.

**Galerina heterocystis** (Atk.) comb. nov. (Syn. =  
*Galerula heterocystis* Atk. Proc. Amer. Phil. Soc. **57**: 362. 1918.  
*Galera fragilis* var. *clavata*, Vel. Ceske Houby, p. 548. 1921;  
*Galera clavata* (Vel.) Kühner, in Kühner & Romagnesi, Flore Anal.  
 Champ. Sup. p. 318. 1953;  
*Galerina clavata* (Vel.) Kühner. Encyc. Myc. **7**: 171. 1935).

## Subgenus II: **Galerina**.

Clamp connections present on at least some of the hyphae of the fruiting body; spores with a smooth plage or entirely smooth and hence plage not evident.

Type species: *Galerina hypnorum* (Fr.) Kühner.

### Key to Sections.

1. Spores calyptrate; pleurocystidia typically absent (present in *G. filiformis*) Section **Calyptrospora**
1. Spores not calyptrate; pleurocystidia absent or present 2
2. Surface of pileus dry, or innately fibrillose when faded, or with fibrils from a distinctly colored veil (veil other than merely grayish pallid to yellowish) Section **Inoderma**
2. Surface of pileus typically viscid to moist and hygrophanous, not appearing innately fibrillose when faded; if with veil fibrils then these merely white, grayish or yellowish 3
3. Pleurocystidia typically absent 4
3. Pleurocystidia typically present 5
4. Spores with a distinct narrow apical pore (but apex not truncate), wall ornamentation absent to very faint hence plage boundary scarcely visible Section **Porospora**
4. Spores lacking an apical pore, wall ornamented to smooth Section **Mycenopsis**
5. Spores smooth, no plage boundary visible Section **Pseudotubaria**
5. Spores usually with a well-developed ornamentation and hence plage boundary distinct 6
6. Pleurocystidia thick-walled in the neck and ventricose part Section **Inocyboides**
6. Pleurocystidia typically thin-walled, not muricate (some with slightly thickened walls in pedicels) 7
7. Pleurocystidia with broadly rounded apices Section **Physocystis**
7. Pleurocystidia with obtuse to acute apices 8
8. Margin of pileus incurved when young Section **Naucoriopsis**
8. Margin of pileus straight at first Section **Galerina**

## Section *Calyptrospora* sect. nov.

Hyphis fibulatis; sporis calyptratis.

Type species: *Galerina sahleri* (Quél.) Favre sensu Favre.

Mat. Flor. Crypt. Suisse 10: 136. 1948.

In this section are grouped species in which the outermost layer of the spore wall fits tightly over the spore except at the apiculate end where it loosens to form blisters often visible as „ears“, one on each side of the plage as the spore is seen in frontal view. Pleurocystidia, typically, are absent, and the surface of the pileus is not fibrillose except sometimes from loose remains of a white to yellowish veil.

Certain species of this section are so similar in appearance to some of the smaller Cortinariii that anyone would be confused by their field characters. It appears to us that the members of this section are unquestionably derived from *Cortinarius*. A number of species of *Cortinarius* are now known which possess an indistinctly delimited nearly smooth or smooth plage. We regard the calyptrate spore as a characteristic of *Galerina*. We recognize 16 species in the section at present, some of which, as in *G. cerina* are actually complexes of many varieties and forms.

## Section *Mycenopsis* sect. nov.

Sporis haud porigeris, verrucosis vel subtiliter subasperulatis vel levibus, haud calyptratis; pleurocystidiis nullis; cheilocystidiis praesentibus; hyphis fibuligeris.

Type species: *Galerina mycenopsis* (Fr.) Kühner, Encyc. Myc. 7: 190. 1935.

This is the largest section of the genus and we have divided it into three subsections on the characters indicated in the key.

### Key to Subsections.

1. Cheilocystidia vesiculose Subsection *Bulluliferinae*
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 less than 3  $\mu$  thick in the thinnest part, or, if not capitate then the apex acute to subacute and the neck typically less than 3  $\mu$  thick near the tip Subsec. *Tibiicystidiae*
2. Cheilocystidia not as above, if capitate the narrow part of the neck more than 3  $\mu$  thick Subsec. *Mycenopsidae*

### Subsection *Tibiicystidiae* subsect. nov.

Cheilocystidiis tibiiformibus vel sub apice — 3  $\mu$  crassis.

Type species: *Galerina tibiicystis* (Atk.) Kühner, Encyc. Myc. 7: 176. 1935.

This subsection is characterized by the cheilocystidia which are either tibiiform and — 3  $\mu$  thick in the narrow part of the neck, of



narrowly ampullaceous with necks up to 3  $\mu$  thick a short distance back from the apex. It is divided into stirps as indicated in the following key:

# Key to Stirps.

1. Typically on sphagnum; 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 Stirps *Sideroides*

## Stirps *Tibiicystis*.

At the present time we have information on four species which belong here.

## Stirps *Triscopa*.

We have eighteen tentative species in this stirps, which makes it rather large, but the species are very intimately related. Hence we have kept the group intact. Among the various species we have noted a tendency of the cheilocystidia to have thicker necks than in the stirps *Tibiicystis*, so that to some extent this section is a bridge between stirps *Hypnorum* and *Tibiicystis*.

An examination of the type of *Pholiota bryophila* Murrill, Mycologia **5**: 33. 1913, reveals that it is a *Galerina* of this section. Hence, we propose the following combination: ***Galerina bryophila*** (Murrill) comb. nov. The same situation also prevails for two other species and combinations are proposed for them as follows: ***Galerina pellucida*** (Murrill) comb. nov. (*Naucoria pellucida* Murrill, Mycologia **4**: 78. 1912. ***Galerina pistillcystis*** (Atk.) comb. nov. (*Galerula pistillcystis* Atk., Proc. Amer. Phil. Soc. **57**: 364. 1918.

K ü h n e r (1935) apparently did not find clamp connections when he studied the type because he thought *G. pistillcystis* might be a synonym of *G. graminea*.

## Stirps *Sideroides*.

Most of the species in this stirps have the aspect of a *Naucoria*, i. e., the pileus margin is curved in somewhat and they are not as fragile generally as the members of most of the other subsections. At present we recognize 12 species in the group. The following combinations are necessitated:

***Galerina mammillata*** (Murrill) comb. nov. (*Naucoria mammillata* Murrill, North Amer. Flora **10**: 180. 1917). ***Galerina stylifera*** (Atk.) comb. nov. (*Galerula stylifera* Atk. Proc. Amer. Phil. Soc. **57**: 365. 1918.)

## Subsection **Mycenopsidae** subsect. nov.

Cheilocystidiis variabilibus sed non vesiculososis vel non ut in subsec. Tibiicystidiis.

Type species: *Galerina mycenopsis* (Fr.) Kühner, Encyc. Myc. 7: 190. 1935.

As indicated above, 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.

Key to Stirps.

- |  |                          |
|--|--------------------------|
| 1. Regularly associated with Sphagnum  | Stirps <i>Sphagnorum</i> |
| 1. Not as above  | 2                        |
| 2. Spores distinctly roughened under oil and plage distinctly delimited        | Stirps <i>Hypnorum</i>   |
| 2. Spores smooth to very faintly marbled; plage boundary very faint if present | Stirps <i>Mycenopsis</i> |

Stirps *Sphagnorum*.

The spores are smooth or only very faintly ornamented, and the cheilocystidia have relatively thick necks. A veil is present and may be quite well developed. The exceptionally long stipes are apparently an adaptation to the habitat. Pleurocystidia are absent. We have six species referred here at present, among them the common *G. paludosa*.

Stirps *Hypnorum*.

The spores of this stirps are distinctly verrucose to warty-rugulose under a good oil-immersion lens. The outer layer of wall material loosens slightly in some species but the spores never are actually calyptrate. At present we recognize eleven species in the group. The most variable species is *G. hypnorum* itself, and we recognize a number of varieties for it. A study of Karsten's types reveals that *Galera hypnicola* is a valid species so the combination ***Galerina hypnicola*** (Karsten) comb. nov. is proposed.

*Galera hypnicola* Karsten, Symb. Myc. Fenn. 32: 7. 1889.

Stirps *Mycenopsis*.

We recognize 14 species in this stirps. The species generally are more *Mycena*-like in aspect than in the preceding subsection.

Subsection ***Bulluliferinae*** subsect. nov.

Cheilocystidiis vesiculosis et pedicellatis.

Although the subsection is monotypic, the vesiculose-pedicellate cheilocystidia appear sufficiently distinct in this section to justify establishing a subsection.

*G. bullulifera* Singer it the one species known to date.

Section ***Porospora*** sect. nov.

Sporis levibus vel sublevibus, poro germinativo instructis sed haud truncatis; pleurocystidiis nullis; cheilocystidiis praesentibus; hyphis fibuligeris.

Type species: *Galerina stagnina* (Fr.) Kühner, Encyc. Myc. 7: 187. 1935.

The spores are practically smooth, with a narrow germ pore at the apex but the latter not truncate. Pleurocystidia absent. We are recognizing 5 species at present.

#### Section **Inoderma** sect. nov.

Sporis levibus vel sublevibus, haud calyptratis; pleurocystidiis sparsis praesentibus vel absentibus; pilei fibrillosa ex strato cuticulari laxa trichodermali eo Phaeomarasmiorum comparabili vel ex velo tenui alutaceo vel ochraceo consistente.

Type species: *Galerina fibrillosa* Smith, Mycologia 45: 901. 1953.

Pileus dry and innately fibrillose, or if moist and hygrophanous appearing distinctly innately fibrillose when faded. Some have colored fibrils at least over the marginal zone of the pileus and basal portion of stipe. The spores are almost smooth and the plage is delimited by only a faint line. It is remarkable that all except the most atypical species came from the Pacific Coast area. Four species are recognized in the section, all from the United States.

#### Section **Physocystis** sect. nov.

Sporis verrucosis vel asperulatis, haud levissimis nec calyptratis; pleurocystidiis praesentibus, late fusoido-ventricosis, apice late rotundatis; cheilocystidiis pleurocystidiis saepe simillimis; superficie pilei haud vel vix fibrillosa; fibulis praesentibus.

The roughened, non-calyptrate spores and broadly rounded pleurocystidia are diagnostic for the section. It is curious that all the species belonging here are known from western United States and South America. Seven species are known.

Type species: *Galerina pruinatipes* Smith, Mycologia 45: 912. 1953.

#### Section **Naucorlopsis** Kühner, Encyc. 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 not broadly rounded.

Type species: *Galerina marginata* (Fr.) Kühner, Enc. Myc. 7: 225. 1935.

#### Key to Stirps.

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; usually with a distinct annulus Stirps *Marginata*



2. Fruiting body *Naucoria*-like; annulus if present merely a zone of fibrils  
Stirps *Cedretorum*

*Stirps Autumnalis.*

This stirps differs from stirps *Marginata* in the single character of there being a gelatinous pellicle forming the surface layer of the pileus. There are seven species known and both lignicolous and terrestrial species occur. The fruiting bodies of some are among the largest in the genus.

*Stirps Marginata.*

The eleven species placed here are very closely related. They can be recognized as a group by the thin membranous inner veil, the warty-rugulose spores with a distinct plage, the presence of pleurocystidia, and lack of a gelatinous pellicle. In the spores of some species the outer layer loosens appreciably, but the spores are never characteristically calyprate.

*Stirps Cedretorum.*

The species placed here are *Naucorioid* in aspect and lack a membranous inner veil. If a ring is present it is merely a zone of fibrils. The incurved margin of the young pileus aids in distinguishing species of this stirps from those of the following section. Eight species are known.

**Section *Galerina*.**

The species placed here are typically *Mycena*-like in aspect, and as far as is known the margin is straight in the young cap. This is the classical distinction between „*Naucoria*“ and „*Galera*“ of the old Friesian system. Pleurocystidia are acute and show a tendency in some toward colored walls. The spores are never calyprate.

The section is divided into two stirpes as follows:

*Stirps Minima.*

Either a veil is present or the stipe has caulocystidia only over the apex or not at all. Thirteen species are known, many of which are typically bryophilous.

*Stirps Villaeformis.*

In this group a veil is never present and the caulocystidia are typically abundant over the midportion of the stipe or lower. Only about five species are known.

**Section *Inocyboides* Singer, Act. Inst. Bot. Kom. II Pl.**

Cript. 6: 47. 1950.

Pleurocystidia thick-walled and incrustated as in *Inocybe*; spores well ornamented, with a plage; veil present; clamp connections present.

Only one species, *G. nana* is known.

Section **Pseudotubarla** sect. nov.

Sporis levissimis; pleurocystidiis et cheilocystidiis praesentibus; superficie pilei cellulis terminalibus cystidioideis gaudentibus vel carentibus; ad terram.

Spores smooth and hence plage lacking; pleurocystidia and cheilocystidia differentiated; clamp connections present; not lignicolous. Only two species are known.

Type species: *Galerina fuegiana* Singer, Sydowia **7**: 242. 1953.



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