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Galerina Notebook 1

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A KEY TO THE KNOWN SPECIES OF GALERINA WITH AN OUTLINE OF THE SUBGENERIC AND LOWER TAXA

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Key to Sections of Galerina

1. Clamp connections absent on all hyphae of the fruiting body; spores roughened over all including the plage area.---------- Section Tubariopsis p. 2

1. Clamp connections present on at least some of the hyphae of the fruiting body; spores typically with a smooth plage or spore entirely smooth.----- Section Galerina p. 4

Section Tubariopsis

In the species of this section clamp connections are absent from the hyphae of the fruiting body. The spores typically are without any trace of a plage and their surface may be warty or marbled all over including the plage area. In species with truly smooth spores an identification to section must be based entirely on the presence or absence of clamp connections. As far as we know, the species typically lack pleurocystidia. Kühner reported them in G. graminea but it is not clear whether or not those seen could have been over parts of the hymenium damaged by insects. A number of species in section Galerina, such as G. diabolissima, have ornamented spores most of which lack a smooth plage, or in which the plage is indistinct. In these clamp connections are abundant on the hyphae of the fruiting body.

Type species: Galerina graminea (Velen.) Kühner

Key to Species

1. Spores (9) 11-15 (16) x (5.5) 6.5-8 µ---1. G. heterocystis
1. Spores 7-11 µ long.---------- 2

2. Base of stipe blackening by maturity or soon after--
---------- 2. G. nigrescens
2. Base of stipe at the most darkening only slightly--- 3

3. Spores relatively thin-walled and a noticeable number collapsed as seen in mounts of revived material------- 4

3. Spores with appreciably thickened walls and not or very rarely (if immature) collapsing.---------- 5

4. Pilocystidia present and typically similar to the cheilocystidia.----------3. *G. graminea*

4. Pilocystidia absent---------4. *G. brunneimarginata*

5. Lamellae broad and thick; a thin white fibrillose veil present; pileus canescent----------5. *G. subceracea*

5. Not with the above characters---------- 6

6. Stipe with distinct white fibrils from a partial veil----------6. *G. semilanceata*

6. Veil absent (but elongated caulocystidia may produce a fibrillose-pruinose effect).----- 7. *G.dimorphocystis*

Section 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 indistinctly delimited in a few species, rarely absent. In the truly smooth spored species, because of the absence of exosporial ornamentation there is no plage, or only the faintest boundary line can be ascertained under the best oil immersion lens.

Type species: Galerina hypnorum (Schranck ex Fries) Kühner

Key to Subsections

1. Spores calyptrate; pleurocystidia typically absent (present in G. filiformis) --------Subsection Calyptrospora p. 6
1. Spores not calyptrate; pleurocystidia present or absent--2
   2. Surface of pileus innately fibrillose when faded, or with fibrils from a distinctly colored veil (veil not merely grayish pallid to yellowish)----------
   ----------Subsection Inoderma p. 29
   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---------- Subsection Porospora p. 27

4. Spores lacking a distinct apical pore (often merely with a callus); plage demonstrable if spores are ornamented---------- Subsection Mycenopsis p. 10

5. Spores smooth and with no plage because of the lack of any exosporial ornamentation---Subsection Pseudotubaria p.48

5. Spores usually with a 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--Subsection Inocyboides p.47

6. Pleurocystidia typically thin-walled, not muricate--- 7

7. Pleurocystidia with broadly rounded apices-------
----------Subsection Physocystis p. 30

7. Pleurocystidia with obtuse to acute apices------- 8

8. Margin of pileus incurved--Subsection Naucoriopsis p. 32

8. Margin of pileus straight--Subsection Galerina p.41

Subsection Calyptrospora Smith and Singer

In this subsection 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 through the formation of blisters near or over the basal area. In a 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 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 subsection are so similar in appearance to some of the smaller Cortinarii that anyone would be confused until a study of the spores is 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 Cortinarii, including C. violaceus, to develop a smooth though indistinctly bounded plage shows clearly that beginnings of this character are present in that genus.

Type species: Galerina sahleri (Quél.) Favre.

Key to Species

1. Pileus pale olive in color--------See G. tenerrima
1. Pileus not olivaceous---------- 2

2. With a distinct odor of freshly husked green corn when flesh is crushed (like odor of Lyophyllum infumatum) ---------- 8. G. odora

2. Not as above---------- 3

3. Stipe bister at base in age, copiously fibrillose; odor none; taste slightly rancid--- 9. G.cortinarioides

3. Not with above combination of characters--------- 4

4. Pileus ferruginous to bay when fresh; taste slightly farinaceous; gills cinnamon brown--10. G. turfosa

4. Not with above combination of characters------- 5

5. Habitat on naked needle beds or duff or muck on the forest floor---------- 6

5. Typically associated with mosses---------- 7

6. Veil thin and white; fruiting bodies with the aspect of a Galerina; on needle carpets---------- 11. G. acicola

6. Veil yellowish and copious; spores cinnamon brown in KOH-------12. G. psathyrelloides var. velosa

6. Veil yellowish; aspect of a Psathyrella; on wet muck in cedar swamps--12. G.psathyrelloides var. psathyrelloides

7. Spores 11 2 long or more, mostly over 11 μ---------- 8

7. Spores mostly under 11 2 long and basidia 4-spored--- 13

8. Veil present (check unexpanded pilei)---------- 9

8. Veil absent---------- 12

9. Stipe dark red-brown over lower part at maturity or when older--------13. G. sahleri

9. Stipe not conspicuously darker below---------- 10

10. Veil pale yellow---14a G. cerina var. luteovelata

10. Veil pallid to white---------- 11

11. Cheilocystidia 24-36 x 6-10 μ --------
------14b G. cerina var. bresadolae

11. Cheilocystidia 30-40 (50) x 7-12 μ ----
------- 14. G. cerina var. cerina

11. Cheilocystidia typically irregular in shape; pileus dark red-brown------14c G. cerina var. contorticystis

11. Cheilocystidia typically elongating up to 80 μ; spores not conspicuously calyptrate--
----------14d G. cerina var. longicystis

12. Spores pallid ochraceous in KOH fresh; many cheilocystidia capitate to subcapitate---15 G. pseudoevelata

12. Spores tawny in KOH; few cheilocystidia capitate; spores 7-8 μ broad ----------16. G. evelata

12. Spores tawny in KOH; many cheilocystidia capitate; spores (4-spored basidia) seldom 7 μ wide---------- ----------17. G. subcerina

13. Veil absent---------- 14

13. Veil present. (check immature pilei)---------- 17

14. Taste farinaceous; growing on sphagnum--18. G. farinacea

14. Not as above---------- 15

15. Pleurocystidia clavate to vesiculose, 26-34 x 12-20 μ----------19. G. filiformis

15. Pleurocystidia absent---------- 16

16. Spores 7-9 x 5-6 μ--------20. G. fallax

16. Spores 9-11 x 5.5-7 μ----------17. G. subcerina

17. Pileus conic as in G. triscopa, dull cinnamon---------- ----------21. G. payettensis

17. Not reminding one of G. triscopa ---------- 18

18. Habitat regularly on sphagnum------22. G. sphagnicola

18. On other mosses, rarely sphagnum------- G. cerina

a. Cheilocystidia 34-44 x 10-15 μ, with short necks and obtuse apices---14e. G. cerina var. brachycystis

b. Cheilocystidia with necks 2.5-4 μ thick back of apex----------14f. G. cerina var. ampullicystis

Subsection Mycenopsis Smith and Singer

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

This is the largest of the subsections of Section Galerina, and as far as the number of species, and probably the number of fruiting bodies produced, is concerned, it is the most important single group in the genus.

Key to Stirps

1. Cheilocystidia essentially capitate to subcapitate, or if not then the neck typically less than 3 μ thick near apex (hence apex acute to subacute)---------- 2
1. Cheilocystidia variously shaped but not as above---- 4

2. Typically on sphagnum; veil absent to rudimentary; spores usually distinctly roughened (but see G. luteolosperma also)---------- Stirps Tibiicystis p. 11

2. Typically not on sphagnum---------- 3

3. Spores distinctly roughened under oil immersion lens---------- Stirps Triscopa p. 13

3. Spores smooth to faintly marbled---Stirps Sideroides p.16

4. Cheilocystidia vesiculose----------Stirps Bullulifera p. 27

4. Cheilocystidia not as above---------- 5

5. Regularly found associated with Sphagnum---------- Stirps Sphagnorum p. 19

5. Not as above---------- 6

6. Spores distinctly roughened (under oil) and plage distinctly delimited-------Stirps Hypnorum p. 20

6. Spores smooth to faintly marbled (under oil); plage boundary very faint if present-Stirps Mycenopsis p.24

Stirps Tibiicystis

This stirps is characterized by capitate cheilocystidia, the sphagnicolous habitat and greatly elongated stipes, the veil being absent or only poorly developed, and a 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 (stipe may be pubescent from caulocystidia-- 2
1. Veil fibrillose but thin (check immature fruiting bodies)- ---------- 3

2. Spores distinctly ornamented (use oil immersion lens) ----------23. G. tibiicystis
2. Spores merely faintly marbled----24. G. stordalii

3. Cheilocystidia 8-11 μ broad at ventricose base; spores pale yellow when first mounted in KOH---25. G. luteolosperma
3. Cheilocystidia narrower and spores darker when first mounted in KOH---------- 4

4. Veil elements and all connective hyphae lacking clamps ---------- 26. G. subtibiicystis
4. Clamp connections regularly present on all hyphae at the cross walls---------- 27. G. biglowii

Stirps Triscopa

This stirps differs from stirps Tibiicystis in that the habitat is typically not deep moss and hence the stipes 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.

Key to Species

1. Spores 9-15 μ long; basidia 2- or 4-spored---------- 2
1. Spores on 4-spored basidia rarely over 10 μ long----- 10

2. Pileus dark rusty brown ("russet") at first; spores very pale ochraceous; veil rudimentary--28. G. pallidispora
2. Not with above combination of characters---------- 3

3. Cheilocystidia 40-70 μ long---------- 4
3. Cheilocystidia 20-36 (40) μ long---------- 6

4. Spores smooth except for a faint ragged line marking the limits of the plage; cheilocystidia 40-60 x 4-6 x 2.5-3.5 x 4-6 μ; taste farinaceous ---------- 29. G. angusticystis
4. Not with above combination of characters---- 5

5. Many cheilocystidia capitate; pileus 12-18 mm. broad (if smaller compare G. hypnorum) --- 30. G. cascadensis

5. All cheilocystidia with narrow neck and non-capitate apex ----------31. G. uncialis

6. Veil absent at maturity (very thin and seen only on buttons or immature caps); spores 9-11 x 5-6 μ ---- ---------- 32. G. camerinoides

6. As above but spores 11-14 (16) x 6.5-8 (10) μ ---- ---------- 33. G. pseudocerina

6. Veil typically leaving a zone or annulus on stipe-- 7

7. Taste somewhat rancid----------see G. occidentalis

7. Taste weakly farinaceous to mild---------- 8

8. Spore ornamentation very faint under oil immersion ---------- see G. larigna

8. Spore ornamentation readily seen under oil---- 9

9. Veil remnants buff to tawny--34. G. pseudocamerina var. A.

9. Veil pallid, copious, leaving zones on stipe much as in G. paludosa --34a. G. pseudocamerina var. B.

9. Veil whitish, less copious than in above choice; cap 5-9 mm. broad (see G. tahquamenonensis also)----------34c. G. pseudocamerina var. C.

10. Annulus white, conspicuous, persistent; spores 7-9.5 x 5-5.5 μ, outer layer loosening somewhat to form blisters; on mosses in Mexico------- 35. G. bryophila

10. Pilocystidia absent; veil leaving an annulus on stipe and stipe fibrillose below it; on hardwood logs ------ ----------36. G. tahquamenonensis

10. Not with either of the above combinations of characters-11

11. Pileus viscid, brick red on the umbo; occurring in Jamaica----------37. G. pellucida

11. Not with above combination of characters ------- 12

12. Pileus sharply conic; on humus; spores 5-6.5 μ long.----------38. G. humicola

12. Pileus sharply conic or with a prominent conic umbo; spores 6.5-8.5 μ long---------- 13

12. Pileus obtuse to convex ---------- 14

13. Pileus 3-10 (12) mm. broad; veil absent to very rudimentary; taste mild--- 39. G. triscopa var. triscopa

13. Pileus 4-10 mm. broad; stipe with a thin annular zone of fibrils; cheilocystidia 34-42 (63) x 4.5-10 μ------39a. G. triscopa var. tetrascopa

13. Pileus 10-20 mm. broad; stipe naked and shining; taste slightly disagreeable ---39b. G. triscopa var. pulchra

13. Cheilocystidia elomgating to 50-60 μ and then seldom enlarged at apex; veil slight --- 39c. G. triscopa var. longicystis

14. Exosporial ornamentation well developed, loosening when KOH mounts are crushed.---------- 40. G. laticeps

14. Spore ornamentation not as above---------- 15

15. Pileus ochraceous tawny; spores 7-10.8 μ long------ ---------- 41. G. pistillicystis

15. Pileus dark rusty brown to vinaceous brown; spores seldom over 8.5 μ long ---------- 16

16. Pilocystidia absent; stipe umber at apex when young and pallid below; honey color over all in age ----------42. G. mutabilis

16. Pilocystidia abundant; stipe concolorous with pileus over all-------43. G. subbadia

Stirps Sideroides

Spores smooth or faintly marbled only under highest magnification (1.3 NA oil immersion, in chloral hydrate mounts); pleurocystidia none; cheilocystidia mostly distinctly tibiiform or else numerous cheilocystidia very narrow or with narrow necks and acute apices.

Most of the species in this group have more the aspect of Naucoria, i.e., the cap margin is curved in somewhat and they are not as fragile generally as the members of most of the other stirps. In this latter character they resemble the species in the stirps marginata.

Key to Species

1. Spores 9-12 μ long (4-spored basidia)---------- 2
1. Spores 6-8 (10) μ long ---------- 4

2. Veil thin; stipe not darkening to fuscous at base in age---------- 44. G. borealis
2. Veil well developed and leaving a distinct annular zone---------- 3

3. Taste mild---------- 45. G. larigna
3. Taste bitter---------- 46. G. occidentalis

4. Spores 8-9 x 4.5-5 μ (11-12 x 5-5.5 μ on 2-spored basidia); pileus acutely conic to cuspidate ----47. G. cuspidata
4. Spores 6-8 μ long, 3-4.5 μ broad---------- 5

5. Pileus viscid as evidenced by a distinct gelatinous pellicle ---------- 6
5. Pileus lacking a gelatinous pellicle---------- 12

6. Pileus clay color and fading to whitish, usually with a papillate umbo ---------- 48. G. mammillata

6. Pileus darker in color than the above and not fading to whitish---------- 7

7. Veil absent; stipe shining-------49. G. sideroides

7. Veil present as indicated by fibrils on the stipe--- 8

8. Pileus dark vinaceous brown ("Roods" Brown") when moist---------- 50. G. vinaceobrunnea

8. Pileus differently colored---------- 9

9. Pileus bay-brown when fresh---51. G. stylifera var. badia

9. Pileus cinnamon brown to tawny or paler---- 10

10. Veil copious and stipe with a well formed annular zone; cap "buckthorn brown" ------ ---------- 51. G. stylifera var. velicopia

10. Veil thin; pileus darker (near "cinnamon brown") ---------- 11

11. Cespitose on rotting hardwood logs and stumps--51. G. stylifera var. caespitosa

11. Solitary to gregarious, mostly on conifer wood---51. G. stylifera var. stylifera

12. Spores 8-10 x 4.5-5.5 μ; pileus blackish brown when young-------. 52. G. fuscobrunnea

12. Spores smaller---------- 13

13. Pileus rusty brown to tawny and remaining dark when faded; stipe becoming dark red-brown over all in age----53. G. castanescens

13. Colors paler than in above choice or cap paler when faded ---------- 14

14. Cheilocystidia typically capitate (shape may vary extremely)---54. G. pseudobadipes

14. Cheilocystidia mostly with subacute apices, rarely capitate---55. G. agloeaa

Stirps Sphagnorum

Habitat on Sphagnum, veil present, cheilocystidia not regularly capitate (tibiiform) as in G. tibilcystis. The species grouped here have characteristically long stipes due, apparently, to the conditions imposed by the habitat. The spores are smooth or nearly so and pleurocystidia are absent.

Key to Species

1. Veil copious, leaving zones over lower part of stipe, stipe often annulate near apex-------- 56. G. paludosa

1. Veil thin to rudimentary or at times apparently lacking- 2

2. Cheilocystidia filamentose (50-70 x 5-8 μ)----------
---------- 57. G. norwegica

2. Cheilocystidia not as above---------- 3

3. Taste strongly farinaceous ------58. G. gibbosa

3. Taste mild or only slightly farinaceous---------- 4

4. Cheilocystidia 28-44 x 5.5-8.5 μ ---59. G.semiglobata

4. Cheilocystidia 30-65 x 8-14 μ ---------- 5

5. Pileus 10-35 mm. broad; cheilocystidia without a filamentose upper portion--60. G. sphagnorum

5. Pileus 3.5-5.5 mm. broad; cheilocystidia with an elengated filamentous portion above the ventricose part ----------61. G. taimbesinhoensis

Stirps Hypnorum

Spore ornamentation in the form of very fine to distinct warts or irregular ridges and occasionally loosening somewhat but never truly calyptrate; at times the spores are practically smooth. Cheilocystidia fusoid to ampullaceous and often with a subcapitate apex, but then rather broad just below the swollen apex (4 μ or more).

Key to Species

1. Stipe typically annulate with a membranous ring or fibrillose zone.---------- 2
1. Stipe evelate or with an evanescent zone left from the thin veil ---------- 3

2. Spores 7-9.5 x 5-5.5 μ on 4-spored basidia; pileus about 20 mm. broad----------see G. bryophila
2. Spores 10-13 x 6-7 μ; basidia 2-spored; pileus 6-18 mm. broad----------62. G. jaapii
2. Spores 8-11 x 4-5 μ, 4-spored basidia; pileus with an abrupt conic umbo-----62a. G. jaapii f. mamillata.

3. Spores up to 7.5 μ long (see G. humicola and G. triscopa)
3. Spores usually more than 7.5 μ long---------- 4

4. Pileus dull reddish ferruginous; plage of spores not perfectly smooth; on burned peat---63. G. ferruginea
4. Not combining the above characters---------- 5

5. Veil remnants buff colored; spores cinnamon in KOH; stipe bay-brown at base----64. G. californica
5. On burned ground; spored 8-10 x 4.5-5 μ, distinctly verruculose or rugulose----65. G. carbonicola
5. Not as above---------- 6

6. Some spores in a mount showing a band-like thickening of the wall near the apex------66. G. suballospora

6. Not as above---------- 7

7. Spores 7-8 (9) x 3.5-4 μ, weakly ornamented------- 8

7. Spores larger; ornamentation various---------- 9

8. Stipe darkening to hazel below in age; in dried out bog pools near moss or sedges---70. G. emmetensis var. intermedia

8. Stipe darkening to umber brown below; on burned Polytrichum----------67. G. aberrans

9. Spores comparatively well ornamented, ornamentation separating irregularly or not separating (see G. decipiens also) ---------- 10

9. Spores weakly ornamented or sometimes subsmooth, ornamentation not separating---------- 11

10. Spore ornamentation loosening variously; cheilocystidia large, 38-60 x 8-13 μ, stipe becoming reddish brown below------68. G. rugisperma

10. Spore ornamentation mostly loosening around the plage area; stipe merely ochraceous tawny below---
---------- 69a. G. decipiens var. separans

11. Pileus ochraceous tawny; spores well-ornamented-----
----------69. G. decipiens var. decipiens

11. Pileus cinnamon brown; spores smooth to faintly marbled, 8-10 μ long------ 70. G. emmetensis

11. Not with above combinations of characters-------- 12

12. Spores pale ochraceous in KOH; color of pileus and stipe also pale------71. G. mniophila

12. Spores well pigmented--ochraceous tawny to tawny or darker in KOH ---------- 13

13. Stipe 5-9 cm. long, hyaline-pallid to merely pallid.---------72. G. hypnicola

13. Stipe 1-4 cm. long, honey colored or darker-14

14. Pileus dark cinnamon brown to russet---15

14. Pileus ochraceous tawny to pale cinnamon brown---------- 16

15. Cheilocystidia narrow (6-9 μ) in ventricose part---73. G. hypnorum var.C

15. Cheilocystidia 8-12 μ broad in ventricose part ----- 73. G. hyphnorum var. B

16. Pileus surface with swollen subhyaline elements scattered over it--73. G. hypnorum var. D

16. Basidia regularly 2-spored; no veil present--------73. G. hypnorum f. bispora

16. Cheilocystidia acute to subacute, rarely obtuse at apex.---------73. G. hypnorum var. A

16. Cheilocystidia with obtuse to oval or rounded tips 7-11 μ broad--------73. G. hypnorum var. E

Stirps Mycenopsis

Spores smooth or with only a slight unevenness and this often confined to the boundary of the plage (mount spores in chloral hydrate and study under oil immersion lens), never calyptrate; otherwise as in the stirps Hypnorum.

Key to Species

1. Spores 7-9 x 4.5-5.5 μ (see G. aberrans also)---------- ---------- 74. G. leucobryicola

1. Spores larger---------- 2

2. Pileus lubricous to viscid and shining when fresh-- 3

2. Pileus merely moist and not shining---------- 6

3. Cheilocystidia often incrusted over the neck, apex usually enlarged-----75. G. lacustris

3. Cheilocystidia not as above---------- 4

4. Spores 11-15 x 6.5-8 μ; cheilocystidia 50-80 x 7-11 x 4-6 μ --------- 76. Galerina lubrica

4. Not as above ---------- 5

5. Stipe 4-6 cm. long; pileus pale yellow---77. G. vexans

5. Stipe 2-2.5 cm. long, pileus "tawny" (see G. translucens also) --------78. G. rostrata

6. Margin of pileus incurved at first; pileus russet, convex to plane; narrow brown clavate bodies imbedded in hymenium of fresh specimens ----------79. G. naucorioides

6. Not as above---------- 7

7. Spore wall frequently with a slightly thickened band near apex (in optical section appearing as two inconspicuous swellings in the wall)----80. G. allospora

7. Not as above---------- 8

8. Pileus ferruginous to rich rusty brown; on tundra-like slope above timberline---- 81. G. tundrae

8. Pileus ochraceous tawny, clay color or paler-- 9

9. Cheilocystidia filamentose to filamentose-capitate, 24-35 x 4-5 x 6-8 μ -82. G. arcoastookensis

9. Not as above ---------- 10

10. Cheilocystidia of two types; clavate, 24-30 x 10-15 μ and with ochraceous walls in KOH;

10. cont'd. - and clavate with an apical prolongation; no veil remnants on stipe -----83. G. campestris

10. Not as above---------- 11

11. Spores obscurely to distinctly angular in face view-12

11. Spores not as above---------- 13

12. Many spores with a caplike thickening of wall material over the apex; stipe darkening below---------- 84. G. finlandia

12. Not as above ----------see G. lubrica

13. Faint ornamentation visible over spore surface except for plage; pileus watery-translucent around the disc ----------85. G. translucens

13. Spores smooth (faint plage showing)---------- 14

14. Stipe 1-3 mm. thick; spores pale ochraceous in KOH ----------86. G. mycenopsis

14. Stipe less than 1 mm. thick; spores ochraceous tawny or darker in KOH ---------- 15

15. Spores 10½14 x 6-7 μ; cheilocystidia 6-9 μ broad----------87. G. subfiliformis var. subfiliformis

15. Spores 9-11 (12) x 5.5-6.5 μ; cheilocystidia 7-12 μ broad----87a. G. subfiliformis var. microspora

Stirps Bullulifera

This stirps, 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 vesiculose 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.

94. G. bullulifera has spores 8-9 x 4.8-5.2 μ, verrucose and with well marked plage, and, of course, the globose-pedicellate cheilocystidia.

Subsection Porospora

Spores smooth or nearly so, germpore present but small and apex not truly truncate; pleurocystidia none; cheilocystidia present; pileus glabrous or with a few fibrils from the veil variously disposed.

Type species: Galerina stagnina (Fr.) Kühner

Key to Species

1. Pileus latericius; habitat on wood; cheilocystidia ventricose-capitate ----------88. G. latericia

1. Pileus rusty brown to ochraceous tawny; habitat on moss or wet soil ---------- 2

2. Spores 7-9 x 4-5 μ ----------89. G. subtruncata

2. Spores larger ---------- 3

3. Basidia 2-spored; spores 15-25 x 7-11 μ ------- ---------- 90. G. macrospora

3. Basidia 4-spored ---------- 4

4. Spores 12-16 x 8-10 μ; cheilocystidia 30-80 x 6-12 μ, apices subacute to subcapitate------- ---------- 91. G. stagnina

4. Not as above ---------- 5

5. Veil present; cheilocystidia 20-30 x 6-9 μ; stipe reddish brown below - 92. G. subdecorens

5. Veil absent; cheilocystidia 30-45 x 6-12 μ; stipe not darkening at base---93. G. nybergii

Subsection Inoderma

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, similar fibrils 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 crooked, or Phaeomarasmius-like hyphae; pleurocystidia either present or absent. It is remarkable that all except the most atypical species come from the Pacific Coast Area.

Type species: Galerina fibrillosa Smith

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 ----------95. G. tsugae
2. Cheilocystidia not with conspicuous flexuous necks;

lamellae broad; on duff under Vaccinium spp. near or above timber line in the mountains---96.G.vaccinii

3. Pileus dark vinaceous cinnamon; pleurocystidia none; taste mild ----------97. G. fibrillosa

3. Pileus more or less clay color; pleurocystidia present; taste of raw cucumber----- 98. G. insignis.

Subsection Physocystis

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

Type species: Galerina pruinatipes Smith

Key to Species

1. Spores 9-12 μ long (2-spored or 4-spored)---------- 2

1. Spores 7-10 μ long and basidia 2-spored or with a variable number of spores per basidium, or mostly 4-spored---- 6

2. Stipe typically with a fibrillose annular zone----- ---------- 99. G. subannulata

2. Stipe not as above ---------- 3

3. Gills thickish; veil fibrils yellow; on wood of Populus trichocarpa; ----------100. G. Olympiana

3. Not as above ---------- 4

4. Stipe densely pruinose-tomentose over all from a grayish pallid tomentum; bister within; cheilocystidia more or less clavate ----------101. G. farinosipes

4. Not as above ---------- 5

5. Tawny fibrils or pubescense around base of stipe or appressed tawny fibrils extending up it for some distance -------102. G. pruinatipes var. pruinatipes

5. Lower part of stipe naked; basal mycelium when present white to pallid ----------see G. latispora

6. Gills thickish; veil yellow; growing on wood of Populus trichocarpa; 4-spored ----------G. olympiana

6. Not as above ---------- 7

7. Stipe 1.5-4 mm. thick; with a conspicuous glaucous veil ----------104. G. microcephala

7. Not with above combination of characters --------- 8

8. Annulus typically present and well developed--- 9

8. Annulus typically lacking (veil remnants may be appressed to stipe over basal half ---------- 10

9. Spores strongly warty; warts dark rusty brown--- ----------105. G. arenaria

9. Spores with fine exosporial punctation--
----------106. G. subbullulifera

10. Pileus 6-13 mm. broad; fusoid-ventricose pleurocystidia with subacute apices present along with the broadly rounded type-----107. G. papillata

10. Pileus 2-3 mm. broad; pleurocystidia all of one type----108. G. minor

Subsection Naucoriopsis (Kühner) S. & S.

Margin of pileus typically incurved at first; carpophore with aspect of Naucoria or Pholiota; spores varying from subsmooth to strongly verrucose because of the exosporial ornamentation and furnished with a smooth plage; cheilocystidia and pleurocystidia present but the latter not broadly rounded.

Type species: Galerina marginata (Batsch ex Fr.) Kühner

Key to Stirpes

1. Pileus with a thin to thick gelatinous pellicle, hence ... viscid to lubricous when moist----Stirps Autumnalis p. 37

1. Pileus typically merely moist at first; gelatinous pellicle lacking---------- 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 p. 39

Stirps Marginata

This stirps as well as the following one contains the species with the general appearance of G. marginata, i.e., species formerly considered as belonging in Pholiota. In this stirps are found species characterized by the well developed veil, the absence of caulocystidia on the lower two thirds of the stipe, the initially incurved cap margin, the darkening of the color of the stipe in its lower portion, the slightly to strongly warty-ridged exosporial ornamentation (spores never calyptrate) which may, however, loosen around the episporium in several forms, and-- the most important character distinguishing it from the stirps Autumnalis -- the poor development or absence of the pellicle of the pileus. Consequently the pileus is moist to lubricous but never viscid.

Key to Species

1. Taste farinaceous at first, becoming very disagreeable and leaving a burning sensation in the throat--110. G. venenata

1. Not as above, taste slightly farinaceous at times------2

2. Spores with an outer, loosely enveloping, very wrinkled layer which tends to separate over all parts of the spore leaving a smooth episporium (when remnants are mechanically removed) ----115. G. helvoliceps (see G. rudericola also)

2. Spores with more adherent ornamentation---------- 3

3. Habitat in Sphagnum bogs or in old bogs with a Sphagnum base; South American-----111. G. riparia

3. Habitat typically on wood or moss other than Sphagnum ---------- 4

4. Spores 10-13 x 5-6.5 μ; pleurocystidia hyaline; stipe with white zones below annulus; epicuticular hyphae non-gelatinized; on wet moss---------- ---------- 112. G. platyphylla

4. Spores 7-10 (11) μ long, more rarely up to 11 (12) μ, but then a slight pellicle on the pileus demonstrable in most specimens---------- 5

5. Pleurocystidia with yellowish walls, the walls thickened somewhat---------- 6

5. Pleurocystidia not so ---------- 7

6. Spores 4-5 μ broad (see G. rudericola and G. physospora)

6. Spores 5-6.5 μ broad ---------114. G. vialis

7. Species growing on pine needles; spores in KOH pale ochraceous and with thin walls, tending to collapse in herbarium material, very faintly marbled ------ ----------121. G. pinetorum

7. Lignicolous species, or habitat not on pine needles; spores different ---------- 8

8. Spores 9-11 x 5-6.5 μ, deep red brown in Melzers' reagent, the wall only faintly marbled; odor faintly acidulous; pileus lubricous---------- ----------120. G. mesites

8. Spores 7-10 (12) μ long and pileus merely moist, rarely somewhat lubricous---------- 9

9. South American species, frequently with broad and rounded to subvesiculose bodies on gill edge; odor none or raphanaceous --------- 10

9. North American, North Asiatic, North African and European; cheilocystidia usually similar to the pleurocystidia ---------- 11

10. On Libocedreus, Myrceugenia, Nothofagus; upper part of stipe not bright yellow; many pleurocystidia with finger-like appendages----------117. G. patagonica

10. On subtropical hosts; upper portion of stipe yellow (sunlight); pleurocystidia not normally with finger-like appendages----------116. G. physospora

11. Spores minutely though distinctly asperulate, 4-5 μ broad; on debris of old avalanches--113. G.rudericola

11. Spores more distinctly verruculose to rugose and frequently borader---------- 12

12. Stipe 2.5-9 mm. thick; pileus typically repand; lamellae typically narrow; annulus flaring before collapsing; cap surface moist, not lubricous; on conifer wood (see G. helvoliceps also) ------ ----------118. G. marginata

12. Stipe 1-2.5 mm. broad; pileus typically conic to campanulate; lamellae typically broad (3-4 mm.); annulus typically funnel shaped; pileus lubricous to subviscid---------119. G. unicolor

Stirps Autumnalis

The characters are those of the stirps Marginata but the pileus is distinctly lubricous to viscid because of a thin to thick gelatinous pellicle. The species are typically lignicolous and usually with darkening stipes; G. subochracea is an exception having a non-darkening stipe and terrestrial habitat.

Key to Species

1. Terrestrial; stipe not darkening appreciably; stipe 1-2 mm. thick; spores minutely asperulate (see G. reflexa also)----------122. G. subochracea

1. Not with above combination of characters ---------- 2

2. Pileus 5-25 (30) mm. broad and at first conic to campanulate; stipe 1-2.5 mm. thick; hyphae of epicutis of about the same diameter as those of the trama and not truly gelatinous----see G. unicolor and G. mesites

2. Hyphae of cuticle narrower than those of the trama and distinctly gelatinous---------- 3

3. Central and South American, subantarctic and thermophilous species, or those in green houses-------- see key to stirps Marginata

3. Not as above---------- 4

4. Two types of cheilocystidia present; a) those similar to the pleurocystidia and b) clavate to saccate or mucronate cells often with yellow content in KOH--123. G. viscida

4/ Not as above; cheilocystidia similar to pleurocystidia--5

5. Pleurocystidia 60-90 x 10-15 (20) μ; stipe 5-11 mm. thick; on coniferous wood----124. G. megalocystis

5. Not with above combination of characters---------- 6

6. Annulus typically present; pleurocystidia mostly with somewhat enlarged apices; stipe 4-8 mm. broad; typically on hardwood----125. G. autumnalis

6. Annulus typically absent; veil when present fibrillose---------- 7

7. Veil absent; spore ornamentation often ending in a ragged line just back of spore apex--------
----------126. G. castaneipes

7. Veil present but fibrillose; spores not as in above---------- 8

8. Spores 7-8.5 x 4-5 μ, subellipsoid -------
----------127. G. oregonensis

8. Spores 8.5-11 x 5.5-6.5 μ, inequilateral in side view ---------128. G. cinnamonea

Stirps Cedretorum

This stirps is not very sharply delimited from stirps Marginata. The essential characters all agree in both stirps but differ mostly quantitatively. In stirps Cedretorum are placed all the naucorioid species of the subsection Naucoriopsis differing from the two preceding stirps in the absence of an annulus. The veil is thin and even though in some species an early annuliform fibrillose belt is formed, it collapses and disappears in the mature specimens. In other species, the veil is greatly reduced. When comparing this stirps with stirps Minima and stirps Vittaeformis, most emphasis should be placed on the Naucoria-like aspect. Such forms were placed in Naucoria by Fries whereas the representatives of last two stirps mentioned were invariably determined as Galeras by authors using the Friesian classification; unless the annulus was pronounced enough to cause them to be placed in Pholiota. Furthermore, it should be taken into consideration that in case of doubt the habitat also seems to be of importance. Species growing on conifer debris and on wood, even though small (caps less than 15 mm. broad) should be considered as belonging in stirps Cedretorum. When delimited in this way, the stirps appears to be quite natural.

Key to Species

1. Spores 10-13 x 5-7 μ ---------- 2
1. Spores smaller ---------- 3

2. A superior subannular fibrillose zone present on the stipe; on conifer debris (if on hardwood, see G. mesites) ----------130. G. consobrina
2. Veil thin and not leaving a superior zone (lower half of stipe with a thin coating)-----see 2-spored G. cedretorum and G. cedretorum var. filiformis

3. Spores distinctly ornamented ---------- 4
3. Spores inconspicuously (under oil) ornamented---- 7

4. Wall of the apex of the pleurocystidia thickened; Patagonian species; on frondose wood---------- ----------135 G. victoriae
4. Wall of the apex of the pleurocystidia not thickened; European, North and Central American species, not on frondose wood ---------- 5

5. Exosporium adnate or rarely loosening to form blisters---see G. saltenais also---------- ----------131. G. cedretorum
5. Exosporium loosely enveloping the spores-- 6

6. Cespitose on logs; Cuba-----133. G.subpectinata

6. Gregarious among liverworts on a clay bank, Mexico---see G. reflexa & G. bryophila ------ ----------134. G. hepaticola

7. Spores 5-6.5 μ broad----------See G. cedretorum

7. Not as above ---------- 8

8. Lamellae "cinnamon"; on sand dunes-----132 G. arenicola

8. On Woody debris in Douglas fir forests---------- ----------129. G. subglabripes

Subsection Galerina

The species placed here are typically Mycena-like in aspect and all those studied in detail so far have a straight pileus margin when young or it is merely bent in slightly; pleurocystidia are present but their apices are acute to obtuse--not broadly rounded; the spores are roughened and have a smooth plage but are not calyptrate.

The difference between this subsection and the preceding subsection is cheifly one of aspect when the carpophores are compared, and is maintained out of deference to the history of the classification of this group. This same difference was

the chief distinction between Naucoria and Galera in the old Friesian classification. In the main it is also a practical, workable grouping with a relatively small degree of intergradation.

Type species: Galerina vittaeformis (Fr.) Singer

Key to Stirps

1. Stipe either with remains of a veil present or if veil is lacking caulocystidia are present only over the apical portion ----------Stirps Minima
1. Stipe lacking a veil and characteristically covered to below the middle with caulocystidia---Stirps Vittaeformis..

Stirps Minima

In the species of this group the pileus margin is typically appressed against the stipe in young buttons, a veil is often present, and if not, then the stipe is not covered with caulocystidia below the middle. The spores are ornamented and with a smooth plage in all except G. diabolissima and pleurocystidia are present. The veilless species show a connection to the next stirps, but if one cannot observe a fine pubescence, with the aid of a 10X hand lens, over the entire

stipe, he should try stirps Minima first.

Key to Species

1. Spores 8-14 x 5-6 μ or larger (2- and 4- spored)----- 2
1. Spores of 4-spored basidia shorter---------- 7

2. Veil leaving an annular zone------see G. subannulata
2. Veil slight or none ---------- 3

3. Lamellae distant and decurrent; aspect that of an Omphalina----------136. G. fontinalis
3. Not as above ---------- 4

4. Cheilocystidia with the ventricose part and pedicel having ochraceous to cinnamon walls and wall in pedicel often thickened---see 2-spored G. oreina also --------137. G. mainsii
4. Not as above----------5

5. Pileus 10-30 mm. broad; growing on burned ground along with Funaria hygrometrica-----
----------138. G. funariae
5. Not as above ---------- 6

6. Spores 8-11 x 5-6 μ, near "russet" (very dark) in KOH, rather coarsely warty-wrinkled ----see G. saltensis also--139. G.nordmaniana

6. Spores 11-12 (15) x 6-6.3 μ, very finely ornamented; near tawny in KOH---140. G. inconspicua

6. Spores 9-11 x 6-7.5 μ (4-spored), very finely ornamented; more or less tawny in KOH-------
----------141. G. latispora

7. Pileus slightly viscid, depressed at maturity; tropical species----------142. G. reflexa

7. Not as above---------- 8

8. Pileus dry; tropical ----------see G. bryophila

8. Pileus moist when fresh, not depressed; extratropical species---------- 9

9. Pileus hoary furfuraceous when freshly faded; stipe usually annulate from a zone of delicate fibrils; surface layer of pileus giving rise to cystidioid end-cells ----------143. G. minima

9. Not as above---------- 10

10. Pleurocystidia 12-18 μ broad; lamellae close and narrow, growing singly on old herbaceous stems (of Capnoides) --------144. G. mollis

10. Not as above ---------- 11

11. Pleurocystidia often branched--145. G. thujina

11. Pleurocystidia not branched---------- 12

12. Pleurocystidia with their ventricose part having ochraceous to pale tawny slightly thickened walls; spores lacking a smooth plage--- 146. G. diabolissima

12. Not as above---------- 13

13. Pleurocystidia subacute; lamellae distant; pileus with broad transparent striations---147. G. oreina

13. Pleurocystidia obtuse to subcapitate; lamellae subclose; pileus not strongly striate---148. G. saltensis

Stirps Vittaeformis

This stirps is characterized by the warty to punctate exosporial ornamentation, medium to large sized spores without a germ pore but with an appreciable callus, by the essentially straight margin of the pileus when young, and general appearance of the Galerina hypnorum type, but differing sharply in the presence of pleurocystidia and caulocystidia, the latter not being confined to the apex of the stipe but covering at least the upper half of the stipe and sometimes extending down to the base.

Key to Species

1. Stipe pale umber over all; pleurocystidia dimorphic----------149 G. umbrinipes

1. Not with above combination of characters---------- 2

2. Spores only faintly ornamented (under oil immersion)-3

2. Spores well to conspicuously ornamented----------4

3. Spores 9-12 x 4-5 μ; basidia 2-spored; stipe rather conspicuously pubescent from caulocystidia ---------- 150. G. pubescentipes

3. Spores 8-11 x 5-6.6 μ; basidia 2- and 4-spored; cheilocystidia tinted cinnamon in basal area; gills narrow and close-----151. G. angustifolia

3. Spores 7.5-9.5 x 6-7 μ; basidia 4-spored; pleurocystidia rare to scattered.--- 152. G. karstenii

4. Pilocystidia abundant to scattered---------- 5

4. Pilocystidia typically absent to rare-------- 6

5. Pleurocystidia small and scattered------- ----- 153b.G. atkinsoniana var. idahoensis

5. Pleurocystidia with flexuous walls or neck almost cork-screw-like; on sphagnum--------- --- 153c. G. atkinsoniana var. sphagnorum

5. Pleurocystidia abundant, walls hyaline to slightly tinted cinnamon---153a. G. atkinsoniana var. atkinsoniana

6. Stipe darker below than at apex; pileus near cinnamon buff faded---154. G. vittaeformis var. vittaeformis

a) Spores 8-10 x 5-6 μ; basidia 4-spored ----------G. vittaeformis f. tetraspora

b) Spores 10-12 x 5-6.5 μ; basidia 2-spored----------G. vittaeformis f. bispora

6. Stipe evenly colored to apex; pileus whitish when faded----------G. vittaeformis var. albescens

a) Spores 6-9 x 4.5-5 μ; basidia 4-spored-------var. albescens f. tetraspora

b) Spores 9-12 x 6-7 μ; basidia 2-spored--------var. albescens f. bispora

Subsection Inocyboides

Pleurocystidia thick-walled above the ventricose portion and often incrusted, reminding one of the cystidia of Inocybe; spores well ornamented, with a plage; veil present; clamp

connections present. The wall of the apex of the pleurocystidia in G. victoriae is thickened somewhat.

Type species: Galerina nana (Petri) Kühner

Key to Species

1. Pileus lacking a gelatinous pellicle-----155. G. nana
1. Pileus with a well-developed gelatinous pellicle------
----------156. G. monticola

Subsection Pseudotubaria

Spores smooth, plage lacking; pleurocystidia and cheilocystidia differentiated; clamp connections present.

Type species: Galerina fuegiana Singer

Key to Species

1. Pileus 3-5 mm. broad; stipe up to 0.5 mm. broad; spore wall thick; European species.----------157. G. clavus
1. Pileus and stipe considerably broader; spore-wall medium thick; South American species----158. G. fuegiana