ELASMOMYCES, ARCANGELIELLA, AND MACOWANITES[1]

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Elasmomyces and *Arcangeliella* were erected by Cavara to receive those forms related to *Hydnangium* but having a columella. In *Elasmomyces* the gleba may pull away from the base of the substipitate columella at maturity, while in *Arcangeliella* the gleba remains attached to the columella although the peridium may break away from the base partially exposing the lower part of the gleba. *Arcangeliella* also has lactiferous ducts in the trama, the peridium, and the columella. These characters seem important from the standpoint of comparative morphology and are worthy of generic distinction. The lactiferous ducts at times are scant and may require careful staining. The study of the columella in fresh material is rather simple, but in dry herbarium specimens it may not show more than as a line. If whole or large sections of specimens are present they may be made to regain almost natural stature by soaking, rendering even a slight columella apparent and readily studied. When the fructifications have been sliced thin, as in many of the older collections, this character may be ambiguous.

Macowanites is similar to the above two genera in some respects, but for the most part the species are larger and are more pileate than in *Elasmomyces*. One species with lactifer-

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ous ducts in the fundamental tissues may be most closely allied to *Arcangeliella.*

We have used the same color standards (Ridgeway) and in citing specimens studied have used the same abbreviations as in our other recent papers. Besides those whose aid was gratefully acknowledged in previous papers we are indebted for financial aid to the American Association for the Advancement of Science (grant in 1923 to the senior author), to the John Simon Guggenheim Memorial Foundation which appointed the junior author a fellow to Europe in 1930, and to the Science Research Fund of Washington University for a grant in 1933 to the junior author.

ELASMOMYCES

Elasmomyces F. Cavara, Malpighia **11**: 414–428. 1897; Rev. Myc. **21**: 23. 1899; Saccardo & Sydow in Sacc. Syll. Fung. **14**: 258. 1899; Petri, Fl. Ital. Cryptog. 1^5: 29. 1909; Hollós, Magyar. Földalatti Gombai, 81–82, 201. 1911.

Secotium sect. *Elasmomyces* E. Fischer in Engler & Prantl, Die Nat. Pflanzenfam. I. 1^{**}: 300. 1900.

The type species of the genus is *Elasmomyces Mattirolanus* F. Cavara.

Fructifications subspherical when young, sometimes expanding like a small agaric button, but the gleba only slightly separating from the stipe, which is usually short and slender; peridium covering the gleba but pulling away around the base of the stipe, exposing the gleba below and sometimes flaking off irregularly on other parts of the fructification; gleba of anastomosing cavities; spores spherical, echinulate.

1. ELASMOMYCES BORNEENSIS (Petri) Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 370. 1935.

Octaviania borneensis Petri, Malpighia **14**: 128. 1900; Saccardo & Sydow in Sacc. Syll. Fung. **16**: 248. 1902.

Illustrations: Petri, Malpighia **14**: *pl. 2, f. 12, 19, 20; pl. 3, f. 4.*

Type: in Ist. Bot. Univ. Firenze.

Fructifications spherical to slightly elongate, attenuated below; surface dirty white, felt-like, covered with patches where

the peridium is thicker; columella penetrating beyond the center of the fructification; sterile base present; peridium about 1 mm. thick, not separable, similar in texture to the gleba, the outside hyphae larger, forming a loosely woven layer, irregular in thickness; gleba very dark, cavities very small; septa thick in comparison with the cavities, trama of hyphae irregularly traversing a gelatinous stratum; basidia cylindrical, 4-, rarely 2-spored, sterigmata short; spores spherical, yellow-greenish, 9–10 μ in diameter, spines similar to those of *Arcangeliella asterosperma.*

Sarawak, Borneo.

The presence of the columella and the hyphae being embedded in a gelatinous layer in the septa seem to indicate that this species may belong in *Arcangeliella,* near *A. vulvaria,* although no lactiferous ducts were found.

BORNEO: Sarawak, *O. Beccari 1867,* type (Univ. Firenze).

2. ELASMOMYCES ECHINOSPORUS Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 370. 1935.

Macowanites echinosporus Zeller & Dodge, Ann. Mo. Bot. Gard. **6**: 57–58. 1919.

Type: in Univ. Cal., Dodge, and Zeller Herbaria.

Fructifications subspherical to irregular, 1 × 1.5 cm., even, smooth, very delicate salmon-color, becoming tawny-olive in alcohol; peridium thin, 90–120 μ thick, extending over the upper half of the fructification, consisting of hyaline pseudoparenchyma; stipe concolorous, about 5 mm. long and 2 mm. in diameter, stupose, of fine, hyaline hyphae; sterile base a conical projection of the stipe extending into the gleba but not percurrent; gleba covered above, exposed below, sinuate about the stipe, concolorous with the peridium, cavities minute, irregular; septa 60–80 μ thick (including hymenia), hyaline, composed of pseudoparenchymatous cells, not scissile; cystidia rare, clavate, apiculate, 9–10 × 20–24 μ, hyaline; basidia small, cylindrical to clavate, 2– 4-spored, 5–8 × 18–22 μ; spores spherical to broadly ovoid, hyaline, appendiculate, 6–8 μ in diameter, sparingly echinulate.

Hypogeous under *Quercus.* California. March.

CALIFORNIA: Alameda County, East Oakland, *N. L. Gardner 402*, type (Univ. Cal., Dodge, and Zeller 1624).

3. ELASMOMYCES MATTIROLANUS F. Cavara, Malpighia **11**: 426. 1897; Rev. Myc. **21**: 23–24. 1899; Saccardo & Sydow in Sacc. Syll. Fung. **14**: 258. 1899; Petri, Fl. Ital. Cryptog. 1^5: 30–31. 1909; Hollós, Magyar. Földalatti Gombai, 81–82. 201. 1911.

Secotium (Elasmomyces) Mattirolanum E. Fischer in Engler & Prantl, Die Nat. Pflanzenfam. I. 1^{**}: 301–302. 1900.

Illustrations: F. Cavara, Malpighia **11**: *pl. 7;* Rev. Myc. **21**: *pl. 187, f. 1–5;* E. Fischer in Engler & Prantl, Die Nat. Pflanzenfam. I. 1^{**}: 301–302. *f. 150 A-F;* Petri, Fl. Ital. Cryptog. 1^5: *f. 6–7.*

Type: in R. Ist. Bot. di Napoli, Mattirolo Herb., a portion in Dodge and Zeller Herbaria.

Fructifications 1.5–2.5 cm. in diameter, depressed-globose, resembling the young buttons of *Agaricus,* margin undulate, yellowish-white, pruinose; stipe short, thick, continued as a thick percurrent columella through the gleba, filamentous with islands of pseudoparenchyma; peridium 210–220 μ thick, outer hyphae slender and periclinal, gradually becoming larger and more prosenchymatous within; gleba drying tawny-olive to wood-brown, cavities large, empty; septa 110–120 μ thick, composed of slender, periclinal, loosely woven hyphae; basidia cylindric, 2-spored; spores slightly ellipsoidal, dilute straw-yellow, about 10×7 μ, with slender spines.

Emergent under conifers. Italy and Oregon. (May in Oregon.)

ITALY: Vallombrosa, *F. Cavara,* type (R. Ist. Bot. di Napoli, Mattirolo Herb., Dodge, and Zeller); Firenze, *O. Mattirolo* (Patouillard Herb. at Farlow).

OREGON: Lincoln County, Waldport, *S. M. Zeller 7112* (Dodge and Zeller).

ARCANGELIELLA

Arcangeliella F. Cavara, Nuov. Giorn. Bot. Ital. N. S. **7**: 117–128. 1900; Saccardo & Sydow in Sacc. Syll. Fung. **16**: 255–256. 1902; Lloyd, Myc. Notes **7**: 1142. 1922.

Octaviania Vittadini, Monogr. Tuberac. 15–20. 1831 (pro parte minore).

Octaviania Vittadini em. Corda, Anleit. z. Stud. Myc. 107, lxxxii. 1842; Icones Fung. **5**: 26. 1842; Tulasne, Ann. Sci. Nat. Bot. II. **19**: 376. 1843; Fung. Hypog. 77. 1851; Fries, Summa Veg. Scand. 436. 1849; Berkeley, Outlines Brit. Fungol. 292. 1860; Winter in Rabenhorst, Krypt.-Fl. Deutschl. ed. 2. **1**: 878. 1884; De Toni in Sacc. Syll. Fung. **7**: 158–161. 1888; Hesse, Hypog. Deutschl. **1**: 71–81. 1891; E. Fischer in Engler & Prantl, Die Nat. Pflanzenfam. I. **1****: 310. 1899, and ed. 2, **7a**: 17. 1933; Hollós, Magyar. Földalatti Gombai, 95–96, 206–207. 1911: Lloyd, Myc. Notes **7**: 1139–1142. 1922 (pro parte).

Octavianina O. Kuntze, Rev. Gen. Pl. **3**^{2}: 501. 1898 (pro parte).

Octaviana Rodway, Papers & Proc. Roy. Soc. Tasmania **1923**: 157. 1924.

Gymnomyces Massee & Rodway, Kew Bull. Misc. Inf. **1898**: 125. 1898; Saccardo & Sydow in Sacc. Syll. Fung. **16**: 249. 1898; E. Fischer in Engler & Prantl, Die Nat. Pflanzenfam. I. **1****: 557. 1900, and ed. 2, **7a**: 14. 1933; Zeller & Dodge, Ann. Mo. Bot. Gard. **6**: 54–56. 1919.

The type species of the genus is *Arcangeliella Borziana* F. Cavara. In 1831 Vittadini described seven species of *Octaviania* without designating the type. Six of these species have been universally referred by writers since to *Melanogaster* Corda, published the same year. Some of the type specimens have been lost and some of the species have not been collected and identified with Vittadini's species since. However, *O. variegata* Vitt. has had a continuous tradition and is well known, being the commonest in Italy, and may be considered the type of *Octaviania.*

Corda in 1842, and Tulasne the next year, attempted to transfer the name *Octaviania* to another group of hypogeous Gasteromycetes by selecting *O. asterosperma* (referred by us to *Arcangeliella)* as the type. A careful reading of Vittadini's descriptions and discussions shows that the principal character which he emphasized was the dark color of the spores, the same as Corda for *Melanogaster,* and that the shape of the spore and the distribution of basidia in the gleba were quite secondary characters to Vittadini. He specifically notes that *O. astero-*

sperma is aberrant in the genus because of its sterile base and the shape of its spores, the two characters used by Corda and Tulasne in their later work. Consequently we prefer to regard *Octaviania* as a synonym of *Melanogaster*. O. Kuntze in 1898 recognized this situation and proposed *Octavianina*, treating four species here placed in *Hydnangium* and four which we have treated as *Arcangeliella*. He failed to designate a type and apparently did not study specimens, basing his concept wholly on that of DeToni in Sacc. Syll. Fung. **7**: 158–160. 1888. Any attempt to select a type must be arbitrary. One might choose *Octaviania asterosperma* and place all the species here treated as *Arcangeliella* in *Octavianina*, while if another species were chosen as the type species *Octavianina* would become a synonym of *Hydnangium*, which Kuntze also recognized as a separate genus. We prefer to overlook this name as a source of confusion. It has not been used to our knowledge since proposed by Kuntze.

Octaviana Rodway is evidently only an error in orthography and should not be given separate recognition.

Gymnomyces Massee & Rodway was based on *G. pallidus* and *G. seminudus* without designation of type. Clements & Shear, Gen. Fung. 356. 1931, selected *G. pallidus* as the type but gave no reasons for their choice. Since this species is described as having "no distinct peridium," while *G. seminudus* has a "delicate external downiness which may be considered as a very rudimentary peridium," and since the principal character in Massee & Rodway's generic description is "Peridium haud distinctum vel nullum," their choice is reasonable. Both species are here treated in *Arcangeliella*, most of whose species have a well-developed peridium even though at maturity it may be evanescent or easily dehiscent from the base or lower half of the fructification in several species. To recognize *Gymnomyces* for this group is also undesirable as it has been used for various groups of species and none of the essential characters has been ascribed to it. To adopt it would also be confusing. *Arcangeliella* was very carefully described with all the essential characters of the group and has had a continuous tradition since as additional species have been described. Therefore

we propose to recognize it (although arguments from a strict interpretation of the International Rules of Botanical Nomenclature might be brought for *Octavianina)* and recommend *Arcangeliella* to the next botanical congress as a *nomen conservandum.*

Fructifications gregarious, hypogeous or emergent, fleshy, lactiferous; peridium thin, especially below, where it reaches the base in young specimens but where it is often evanescent at maturity; columella usually percurrent, sometimes branched; base more or less sterile, usually attenuated into a stipe-like attachment to the rhizomorphs, generally lactiferous; gleba fragile or cheesy, lactiferous, cavities variable in size, often minute, irregular, radiating more or less from the columella and base; basidia 2–4-spored; cystidia sometimes present; spores spherical to ellipsoidal, echinulate to verrucose, often alveolate or somewhat reticulate.

KEY TO SPECIES OF ARCANGELIELLA

1. Spores smooth or very slightly wrinkled above, subspherical, 4–6 μ in diameter ..... *1. A. glabrella* (p. 608)
1. Spores echinulate, verrucose, reticulate or alveolate 2
2. Spores definitely obovoid; fructifications viscid 3
2. Spores ellipsoid or ovoid 4
2. Spores spherical 13
3. Fructifications violet; spores finely asperate except the coarse verrucose surface of the distal end, 7.5–9.6 (–10) × 5.5–7.4 μ ..... *2. A. violacea* (p. 608)
3. Fructifications tawny; spores smooth to slightly asperate or verrucose, especially on the upper half, 11–15 × 7.4–8.2 μ ..... *3. A. nana* (p. 609)
4. Spores with a wrinkled utricle, or alveolate or reticulate 5
4. Spores merely rugose, verrucose, or echinulate 8
5. Spores alveolate, ellipsoid, dark brown, 10–12 × 6–7.4 μ ..... *4. A. ellipsoidea* (p. 610)
5. Spores citriform, with the utricle inconspicuously wrinkled longitudinally, 11–15 × 8–11 μ; peridium 1.5 mm. thick ..... *5. A. ambigua* (p. 610)
5. Spores reticulate or reticulate-echinulate 6
6. Spores averaging more than 11 μ long, reticulate-echinulate, broadly ellipsoid, 10–13 × 6–11 μ ..... *6. A. Gardneri* (p. 611)
6. Spores averaging less than 11 μ long, reticulate 7
7. Peridium whitish, of fine hyphae, 100–300 μ thick; spores hyaline, broadly ellipsoid, areolate-reticulate, 8–11 × 7.4–9 μ ..... *7. A. Curtisii* (p. 612)
7. Peridium violet, of gelified hyphae, 100–115 μ thick; spores light brown, ellipsoid, obtusely pointed, pedicellate, shallowly and finely areolate-reticulate, 8–10 (–11) × 4.4–5.6 (–7) μ ..... *8. A. Campbellae* (p. 613)

9. Peridium more than 1 mm. thick; spores citriform, with slightly wrinkled utricle, 11–15 × 8–11 μ.....*5. A. ambigua* (p. 610)
8. Spores more than 12 μ long..... 9
8. Spores less than 12 μ long..... 12
9. Peridium less than 0.6 mm. thick; spores broadly ellipsoid with round ends 10
10. Spores hyaline, echinulate, 14.5–15.5 × 11–12 μ..*9. A. Stephensii* (p. 613)
10. Spores hyaline, reticulate-echinulate, 10–13 × 6–11 μ.....
.....*6. A. Gardneri* (p. 611)
10. Spores brown, verrucose, 11–20 × 8–13 μ..... 11
11. Peridium duplex, both layers of periclinal hyphae.....*10. A. africana* (p. 614)
11. Surface of peridium of periclinal hyphae.....*11. A. Behrii* (p. 615)
11. Surface of peridium of erect septate hyphae.....
.....*11a. A. Behrii* var. *caudata* (p. 616)
11. Peridium duplex, outer layer prosenchymatous, 110–115 μ thick, inner layers of slender periclinal hyphae.....*12. A. seminuda* (p. 617)
12. Spores alveolate, ellipsoid, dark brown, 10–12 × 6–7.4 μ; peridium 170–350 μ thick.....*4. A. ellipsoidea* (p. 610)
12. Spores verrucose, especially at distal end, ellipsoid, rounded above, brown, 7.5–9.6 (–10) × 5.5–7.4 μ; peridium 60–100 μ thick.....
.....*2. A. violacea* (p. 608)
12. Spores completely verrucose, thick-walled, brown, 9.5–12.5 μ long; peridium 150–500 μ thick.....*Hydnangium purpureum* (p. 589)
12. Spores reticulate, broadly ellipsoid to subspherical, hyaline, 8–11 × 7.4–9 μ; peridium 100–300 μ thick.....*7. Arcangeliella Curtisii* (p. 612)
12. Spores reticulate-echinulate, broadly ellipsoid to subspherical, hyaline, 10–13 × 6–11 μ; peridium 100–150 μ thick.....*6. A. Gardneri* (p. 611)
13. Spores alveolate..... 14
13. Spores echinulate..... 16
13. Spores reticulate..... 27
14. Surface of peridium with layer of erect hyphae, giving plushiness to surface; spores minutely alveolate-echinulate, 10–12 μ in diameter, yellowish.....*13. A. pilosa* (p. 619)
14. Surface without erect hyphae..... 15
15. Spores hyaline, alveolate-reticulate, 11–12.5 μ in diameter (giants 12.5–15.5 μ); peridium of gelified interwoven hyphae.....*15. A. Ravenelii* (p. 622)
15. Spores yellow, alveolate-echinulate, 9–11 μ in diameter; peridium prosenchymatous.....*22. A. cremea* (p. 628)
15. Spores brown, alveolate, and ragged, 12–15 × 11–13 μ; peridium duplex, outer part of prosenchyma and inner of loosely interwoven hyphae.....
.....*12. A. seminuda* (p. 617)
15. Spores very light yellowish, echinulate-reticulate, 8–15 μ in diameter, (giants 16–19 μ); peridium of polyhedral-celled parenchyma covered by a fibrous layer of periclinal hyphae; gleba pinkish.....*16. A. socialis* (p. 623)
15. Spores dark yellowish, very finely and deeply alveolate-echinulate, 11–15 μ in diameter; peridium of parenchyma with outer layer of compact prosenchyma; gleba cream-color.....*17. A. scissilis* (p. 624)
16. Surface of the peridium with erect hyphae; spores 10–12 μ in diameter
.....*13. A. pilosa* (p. 619)
16. Surface without erect hyphae..... 17

17. Spores showing ridges or reticulations on the surface 18
17. Spores strictly echinulate (except short ridges in *A. vulvaria*) 21
18. Spores less than 12 μ in diameter 19
18. Spores more than 12 μ in diameter 20
19. Peridium 100–300 μ thick; spores 8–11 × 7.4–9 μ ..... *7. A. Curtisii* (p. 612)
19. Peridium 55–80 μ thick; spores 7–9 (–11) μ in diameter ..... *14. A. alveolata* (p. 620)
20. Spores hyaline, reticulate-alveolate ..... *15. A. Ravenelii* (p. 622)
20. Spores brown, alveolate ..... *12. A. seminuda* (p. 617)
21. Spores averaging less than 11μ in diameter 22
21. Spores averaging more than 11 μ in diameter 23
22. Spores dark brown, 9–14.5 μ in diameter, with conical echinulae 23
..... *18. A. tasmanica* (p. 624)
22. Spores hyaline, 7–18 μ in diameter, with acicular echinulae ..... *19. A. australiensis* (p. 625)
22. Spores citrine-yellow, sparsely short-echinulate, 8–11.5 μ in diameter ..... *20. A. krjukowensis* (p. 626)
22. Spores hyaline or light yellowish, with acicular echinulae, 8–11 μ (–13 μ) in diameter ..... *21. A. borziana* (p. 628)
22. Spores yellow, alveolate, having about 24 spines per great circle, 9–11 μ in diameter ..... *22. A. cremea* (p. 628)
23. Spores echinulate but also with short ridges, 9–12 μ in diameter ..... *23. A. vulvaria* (p. 629)
23. Spores echinulate 24
24. Echinulae acicular 25
24. Echinulae coarse and conical 26
25. Peridium of slender gelified interwoven hyphae; spores 11–12 μ in diameter, spherical ..... *24. A. occidentalis* (p. 629)
25. Peridium of compact interwoven hyphae; spores 14.5–15.5 × 11–12 μ ..... *9. A. Stephensii* (p. 613)
25. Peridium pseudoparenchymatous with rind of prosenchyma; spores 11–15 μ in diameter; gleba creamy ..... *17. A. scissilis* (p. 624)
25. Peridium of polyhedral-celled parenchyma; spores 8–15 (–19 μ) in diameter; gleba pink ..... *16. A. socialis* (p. 623)
26. Spores hyaline or light yellowish, 11–17 μ in diameter, epispore thick; fructification pale rose ..... *25. A. rosea* (p. 630)
26. Spores dark brown, 13–16 μ in diameter, epispore not easily seen, spines large, 2 μ long; fructification white with rufescent tints, darkening ..... *26. A. asterosperma* (p. 631)
26. Spores brown, 9–14.5 μ in diameter, epispore thick; fructifications brownish, drying black ..... *18. A. tasmanica* (p. 624)
27. Spores with discontinuous ridges, 11–15 μ in diameter; peridium about 640 μ thick ..... *27. A. Beccari* (p. 635)
27. Spores with discontinuous ridges but also echinulate, 9–12 μ in diameter; peridium 1200–1440 μ thick ..... *23. A. vulvaria* (p. 629)
27. Spores with a few irregular ridges and sometimes slightly echinulate, 7–9 (–11) μ in diameter ..... *14. A. alveolata* (p. 620)
27. Spores alveolate-reticulate (reticulations regular), 11–12.5 (–15.5) μ in diameter ..... *15. A. Ravenelii* (p. 622)

27. Spores roughly and irregularly areolate-reticulate, 8–11 × 7.4–9 μ in diameter ..... *7. A. Curtisii* (p. 612)

1. ARCANGELIELLA GLABRELLA Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 368. 1935.

Type: in Lloyd Mus., Dodge, and Zeller Herbaria.

Fructifications 1–1.5 cm. in diameter (drying 0.5–1.0 cm.), subglobose to depressed-globose, smooth, white to brownish, drying sordid white to buckthorn-brown; columella percurrent, of fibrillose tissue with lactiferous ducts and islands of hyaline, soft parenchyma; peridium about 640 μ thick above to 80–130 μ thick on the sides and below, of large-celled parenchyma with a surface or rind layer of compact, interwoven hyphae with lactiferous ducts; gleba white, drying ivory-yellow to cream-buff, cavities nearly spherical; septa thin, extremely scissile, of parallel hyphae with lactiferous ducts; in young specimens cylindrical cystidia (?), the dilated terminals of lactiferous ducts, breaking and exuding globules of latex; spores hyaline, smooth to slightly wrinkled above, pedicellate, subspherical, 4–6 μ in diameter.

Australia and Tasmania. June to July.

The cystidia in this species are similar in size and shape to those reported by Setchell in *Arcangeliella alveolata (Elasmomyces russuloides)*.

AUSTRALIA: Victoria, Lilydale, *F. Campbell 27b* (Broome Herb. at Brit. Mus.); *F. (Campbell) Martin 467* (Kew).

TASMANIA: Kingston, Leslie Road, *L. Rodway 1111* as *Gymnomyces pallidus*, type (Lloyd Mus., Dodge, and Zeller).

2. ARCANGELIELLA VIOLACEA (Massee & Rodway) Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 369. 1935.

Hymenogaster violaceus Massee & Rodway, Kew Bull. Misc. Inf. **1898**: 127. 1898; Saccardo & Sydow in Sacc. Syll. Fung. **16**: 253. 1902; Rodway, Papers & Proc. Roy. Soc. Tasmania **1911**: 29. 1912.

Type: in Kew Herb.

Fructifications spherical to irregular, 2–3 cm. in diameter; surface smooth, viscid, lilac-fuscous then violet, drying orange-cinnamon, Mikado brown, or Saccardo's umber; sterile base small but distinct, with a usually percurrent columella,

with pseudoparenchymatous tissue; peridium 60–100 μ thick, composed of gelified pseudoparenchyma without and interwoven hyphae with lactiferous ducts within; gleba white then brown, drying Sayal brown; septa 36–45 μ thick, composed of hyaline hyphae with lactiferous ducts; basidia 11–16 × 4 μ, cylindrical to clavate, sterigmata variable in length; spores obovoid, usually pedicellate, asperate with coarse warts above, 7.5–9.6 (–10) × 5.5–7.4 μ.

Tasmania.

TASMANIA: Proctors Road, *L. Rodway 1262* (Dodge and Zeller); Cascades, Hobart, *L. Rodway 1106* (Lloyd Mus. 075, and Dodge); *L. Rodway 297*, type (Kew).

3. ARCANGELIELLA NANA (Massee & Rodway) Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 368. 1935.

Hymenogaster nanus Massee & Rodway, Kew Bull. Misc. Inf. **1899**: 180. 1899; Saccardo & Sydow in Sacc. Syll. Fung. **16**: 256. 1902; Rodway, Papers & Proc. Roy. Soc. Tasmania **1911**: 29. 1912; **1923**: 153. 1924.

Type: in Kew Herb.

Fructifications 1.3 cm. high and broad, pyriform with a prominent sterile base, surface tawny-brown drying avellaneous to army-brown, smooth, viscid when moist; sterile base well developed, of prosenchyma with lactiferous ducts; peridium duplex, outer layer 180–200 μ thick, clear hyaline, of very gelified hyphae, inner layer 100–150 μ thick, dark brown, of collapsed stupose tissue, with large lactiferous ducts; gleba dark tawny-brown, drying russet-vinaceous, with a pallid yellowish, percurrent columella which dries pinkish-cinnamon; septa hyaline to brownish, of a loose prosenchyma, with a few lactiferous ducts, 35–40 μ thick; basidia 2–4-spored, 14–20 × 6 μ; spores narrowly obovoid, dark brown, smooth to slightly asperate, especially on the upper half, 11–15 × 7.4–8.2 μ.

Tasmania and South Australia. August.

Rodway 1272 has much broader spores than the type of *A. nana* but seems identical in other characters.

TASMANIA: Hobart, *L. Rodway 609*, type (Kew and Lloyd Mus.); *L. Rodway 1272* (Dodge and Zeller).

AUSTRALIA: S. Australia, Encounter Bay, *J. B. Cleland 5* (Dodge).

4. ARCANGELIELLA ELLIPSOIDEA Zeller & Dodge, Ann. Mo. Bot. Gard. 22: 367. 1935.

Type: in Dodge and Zeller Herbaria.

Fructifications drying 0.7–3.0 cm. broad and 1–2 cm. high, depressed-subglobose, pyriform to reniform in vertical section, smooth, drying honey-yellow to isabella-color; sterile base prominent in young specimens, extended above into a percurrent (or nearly so) columella; peridium 170–350 μ thick, composed of a hyaline prosenchyma of large cells pierced by periclinal strands of hyphae including lactiferous ducts; gleba drying cinnamon-rufous to hazel, cavities relatively large; septa 30–65 μ thick, of fibrous prosenchyma, easily scissile; spores ovoid when young, ellipsoid at maturity, dark brown, finely alveolate, 10–12 × 6–7.4 μ.

Since this collection was originally identified by Rodway as *Hymenogaster violaceus (Arcangeliella)* its colors when fresh doubtless are similar to that species.

TASMANIA: Hobart, *L. Rodway 1286*, as *Hymenogaster violaceus*, type (Dodge and Zeller).

5. ARCANGELIELLA AMBIGUA Zeller & Dodge, Ann. Mo. Bot. Gard. 22: 365. 1935.

Type: in Univ. Cal., Dodge, and Zeller Herbaria.

Fructifications pyriform to irregularly and variously lobed, up to 5 cm. broad and 3 cm. high, dirty white turning blue when touched, then wine-colored or black, drying honey-yellow to light brownish-olive, surface smooth to rimose and flaky due to splitting of a very thick peridium; sterile base prominent, stipitiform in some plants, drying corky, as well as other localized islands of sterile tissue; columella prominent and percurrent; peridium very thick, drying 1.5 mm. thick above, flaking off in patches and sometimes exposing the gleba below, composed of large, closely woven hyphae (4–7.5 μ in diameter) penetrated by numerous lactiferous ducts, and periclinal strands of prosenchyma of smaller hyphae which become the predominant type of tissue next to the gleba; gleba chocolate-color to wine-color when fresh, developing from the base upward, cavities small, sinuous, young parts just under the upper

peridium antique brown to auburn, older parts dry, blackish-brown; septa fragile, disintegrating in older specimens, of large, compactly interwoven hyphae penetrated by scattered lactiferous ducts, 35–45 μ thick; basidia 20–24 × 6–8 μ, clavate, 2- or 4-spored, sterigmata short, about 6–8 μ long, 1–2 μ in diameter; spores dark brown, ovoid to ovoid-citriform, sometimes with a broad apiculus, usually attenuated below to the breadth of the sterigma, with inconspicuous utricle, with 9–10 faintly visible longitudinal ribs; young spores 13–15 × 8–9 μ, mature spores 11–15 × 8–11 μ; odor of old leather.

Cespitose; partly immersed in hard soil under oak. California. May and June.

This large wine-colored species seems to be a transitional complex, partaking of the characters of various genera. Because of its sterile base, percurrent columella, and lactiferous ducts in all the sterile and tramal tissues, the species has been placed in *Arcangeliella.* In sterile tissues it seems to have close affinities within the genus to *A. Beccari* and *A. vulvaria,* as well as *Phallobata* and *Phallogaster,* but the spores are somewhat similar in shape to those of certain species of *Hymenogaster* and their ribbed surface somewhat like that in *Gautieria.*

California: Santa Clara County, Saratoga, *Dale Parks,* type (Univ. Cal. as H. E. Parks 825, Z 31, also Dodge and Zeller 1810, 7820).

6. Arcangeliella Gardneri (Zeller & Dodge) Zeller & Dodge, Ann. Mo. Bot. Gard. 22: 367. 1935.

Gymnomyces Gardneri Zeller & Dodge, Ann. Mo. Bot. Gard. 6: 54–55. 1919.

Type: in Univ. Cal., Zeller, and Dodge Herbaria.

Fructifications subglobose to irregular, depressed, 2.5 × 1.5 × 1.5 cm. in alcohol, drying 1.4 × 0.8 × 0.8 cm., cream-color to yellow-ochre in alcohol, drying tawny-olive; peridium 100–150 μ thick, of homogeneous hyaline prosenchyma, except a narrow scissile layer of periclinal hyphae next to the gleba; columella dendroid, resembling much-thickened septa, of quite gelified, hyaline hyphae, with lactiferous ducts, drying russet-brown; gleba drying cream-color to clay-color, cavities small, globose

to irregular; septa hyaline, 60–80 μ broad, with lactiferous ducts; basidia hyaline, clavate 2-spored, 25–29 × 9–10 μ, sterigmata slender, 6–7 μ long; spores subspherical, usually somewhat elongate, hyaline *sub lente,* 6–11 × 10–13 μ, reticulate, rugose under oil immersion; latex white (Parks).

Under leaves of *Quercus agrifolia.* Pacific coast. December.

The locality in Texas must remain doubtful unless confirmed by further specimens, as the late C. G. Lloyd was sometimes careless in preserving original labels. George L. Fisher sometimes used a printed label with his address and may not have changed it to conform with each collection. Lloyd often recorded the address of a correspondent instead of the locality of collection.

?TEXAS: Harris County, Houston, *Geo. L. Fisher* (Lloyd Mus. 65).

OREGON: Benton County, Corvallis, *L. M. Boozer 41* (Oregon State 3393, and Zeller 2208); *H. P. Barss* (Zeller 1728)

CALIFORNIA: no locality, *H. E. Parks* (Zeller); *Parks 1130* (Dodge); Alameda County, Berkeley, *N. L. Gardner,* type (Univ. Cal. 376, Zeller 1618, and Dodge); Santa Clara County, *H. E. Parks 913,* Call of the Wild, *H. E. Parks 943 A,* Aldercroft, *H. E. Parks 64, H. E. Parks & C. W. Dodge 1528,* Guadaloupe Mines, *H. E. Parks Z11, Z348, Z429,* 5 (1917), *273, 943b,* and 3/4/21, *H. E. Parks & Dale Parks 943,* Saratoga, *H. E. Parks 996* (all Univ. Cal., Dodge, and Zeller).

7. ARCANGELIELLA CURTISII Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 367. 1935.

Hydnangium Ravenelii Farlow in Foerste, Bot. Gaz. **19**: 37. 1894.—*non aliorum.*

Type: in Mo. Bot. Gard., and Curtis Herb. at Farlow.

Fructifications drying 0.7–1.4 cm. in diameter and isabella-color to brownish-olive; peridium 100–300 μ thick, soft, fibrillose, of very fine periclinal hyphae, with lactiferous ducts forming the core of quite definite hyphal strands; gleba drying pinkish-buff to cinnamon-buff; septa drying 30–40 μ thick, stupose, scissile; spores subspherical to broadly ellipsoidal, 8–11 × 7.4–9 μ, roughly areolate-reticulate.

This species differs from *A. Ravenelii* and *A. Gardneri* in spore size, surface characters, and structure of the peridium.

SOUTH CAROLINA: Darlington County, Society Hill, *M. A. Curtis,* type (Mo. Bot. Gard. 5647, and Farlow).

GEORGIA: Bainbridge, *E. Foerste* (Farlow).

8. ARCANGELIELLA CAMPBELLAE Berkeley & Broome in Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 366. 1935.

Hymenogaster Campbellii Berkeley & Broome, herb. nom.

Type: in N. Y. Bot. Gard. Herb., Lloyd Mus., and Kew Herb.

Fructifications subspherical, obovoid to much lobed, attenuated below, 1–2.5 cm. in diameter, cespitose, "violet color outside" [Miss Campbell], drying clay-color to tawny-olive, surface dull, even, glabrous; sterile base prominent, attenuate stalk-like below, extending as a cone into the gleba or as a percurrent or branched columella, white within, of a very spongy, open-meshed prosenchyma of hyaline hyphae; peridium 100–115 μ thick, of very even thickness, composed of gelified, hyaline, interwoven hyphae with lactiferous ducts, periclinal on the surface, diagonal in the outer third, loosely periclinal in the middle third, more slender and closely periclinal in the inner third; gleba ochraceous-tawny (dry), cavities radiating from sterile base; septa scissile, of hyaline prosenchyma, 14–22 μ thick; basidia not seen; spores ellipsoid, obtusely pointed, slightly pedicellate, shallowly and finely areolate-reticulate, light brown (sub lente), 8–10 (–11) × 4.4–5.6 (–7) μ.

Australia. September.

Miss Campbell called this fungus a "Violet Puffball."

AUSTRALIA: Victoria, Melbourne (Lilydale), *F. Campbell 27a (Mrs. Martin 429)* (Kew, Lloyd Mus. 0229, Dodge, and N. Y. Bot. Gard. marked "from Massee Herb."); South Australia, Mt. Lofty, *J. B. Cleland 13, 14* (Dodge, and Zeller, det. as *Hymenogaster fulvus* Rodw. by Rodway); Adelaide, *J. B. Cleland 784* (Dodge and Zeller).

9. ARCANGELIELLA STEPHENSII (Berkeley & Broome) Zeller & Dodge in Dodge, Ann. Mo. Bot. Gard. **18**: 463. 1931; E. Fischer in Engler & Prantl, Die Nat. Pflanzenfam. ed. 2, **7a**: 32. 1933.

Hydnangium Stephensii Berkeley & Broome, Ann. & Mag. Nat. Hist. I. **13**: 352. 1844; Quélet, Ench. Fung. 247. 1886; Patouillard, Bull. Soc. Myc. France **30**: 348. 1914; Soehner, Zeitschr. f. Pilzk. **2**: 153–156. 1923; E. Fischer, Geobot. Inst. Rübel in Zürich, Veröffentl. **3**: 573–576. 1925.

Octaviania Stephensii Tulasne, Fung. Hypog. 78. 1851; Corda, Icones Fung. **6**: 36. 1854; DeToni in Sacc. Syll. Fung. **7**: 159. 1888; Lloyd, Myc. Notes 67: 1140. 1922.

Octavianina Stephensii O. Kuntze, Rev. Gen. Pl. 3²: 501. 1898.

Hydnangium galathejum Quélet, Ench. Fung. 247–248. 1886; Patouillard, Bull. Soc. Myc. France **26**: 199–201. 1910.

Octaviania galatheja DeToni in Sacc. Syll. Fung. **7**: 491. 1888.

Type: in Kew Herb., British Mus., and Paris.

Fructifications about 2 cm. in diameter, dark rufous drying liver-brown to russet or Hays brown, smooth, rooting base and columella with lactiferous ducts yielding a white milky juice which assumes a reddish tint on exposure to the air but disappears from the cut surface on drying; peridium drying 130–200 μ thick, composed of gelified, interwoven hyphae, the outer portion more compact, the inner portion filled with lactiferous ducts 6 μ in diameter; gleba white drying cream-color, finally cinnamon to cinnamon-buff; septa slightly lactiferous, composed of slender hyphae embedded in a gel; spores broadly ellipsoidal to subspherical, with few very fine spines and a thick epispore, 14.5–15.5 × 11–12 μ.

H. galatheja was separated from *H. Stephensii* on its yellower color but it seems to be only a color variation, as microscopically neither Patouillard nor we have been able to separate it.

EXSICCATI: Rabenhorst, Fung. Eur. 1319.

GERMANY: Bayern, Kaufbeurn, *E. Soehner 782* (Soehner and Dodge).

FRANCE: *L. Quélet* (Upsala); Doubs, Hérimoncourt *L. Quelet*, Aout 1892 (Paris); Besançon, *F. Bataille* (Dodge); Jura, Lepinay, *N. Patouillard*, Oct. 1902, 1909 (Farlow); Abbevillars, *L. Quélet* (Upsala); Seine, *G. Malençon*, 1928 (Dodge) (all French specimens sub *H. galathejum*).

ENGLAND: Leigh Wood, *C. E. Broome*, distributed in Rabenhorst, Fung. Eur. 1319 (Farlow); near Bristol, *C. E. Broome* (J. W. Bailey Herb. at Brown Univ.); Bristol, *C. E. Broome* (Curtis Herb. at Farlow); Clifton, *H. O. Stephens & C. E. Broome*, 6 Aug. 1843, type (Kew, Brit. Mus., and Paris).

10. ARCANGELIELLA AFRICANA (Lloyd) Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 365. 1935.

Octaviania africana Lloyd, Myc. Notes 67: 1142. 1922.

Octaviana africana Verwoerd, S. Afr. Jour. Sci. **22**: 164. 1925.

Illustrations: Lloyd, Myc. Notes 67: *f. 2172.*

Type: in Lloyd Mus. and in Stellenbosch Univ. Herb. 2097.

Fructifications spherical, 1–1.5 cm. in diameter, drying cinnamon-brown to Dresden brown; peridium hard, duplex, the outer layer 150–160 μ thick, composed of closely woven, slender, hyaline hyphae 1.5–2 μ in diameter, the inner layer 375–400 μ thick, composed of hyaline, more loosely woven, septate hyphae 3–4 μ in diameter, with lactiferous ducts, separable; gleba drying from ferruginous to snuff-brown; septa 15–30 μ thick, bent, clavate, 25–30 × 7–8 μ, sterigmata 10–15 μ long, filiform; spores brown, ellipsoidal, alveolate, slightly foveolate under the alveolae, 15 × 11 μ, giant spores 18.5 × 15 μ.

South Africa.

South Africa: Knysna, *A. V. Duthie 325*, type (Lloyd Mus. 97, Dodge and Zeller).

11. Arcangeliella Behrii (Harkness) Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 366. 1935.

Splanchnomyces Behrii Harkness, Bull. Cal. Acad. Sci. **1**: 30. 1884.

Hymenogaster Behrii DeToni in Sacc. Syll. Fung. **7**: 174. 1888; Harkness, Proc. Cal. Acad. Sci. Bot. III. **1**: 249. 1899.

Type: cotype in Dudley Herb. at Leland Stanford Jr. Univ., in Farlow Herb., N. Y. Bot. Gard. Herb., Lloyd Mus., and Dodge Herb.

Fructifications depressed-globose, 1–4 cm. in diameter, irregularly lobed, pale yellowish drying honey-yellow to isabella-color, or chestnut-brown to cinnamon-brown; sterile base prominent, pulviniform, cartilaginous; peridium covering the upper half of the fructification, smooth to pulverulent, 85–130 μ thick, very fragile and peeling badly in sectioning, yellowish, somewhat gelatinous, composed of coarse, yellow hyphae; gleba lemon-yellow, drying cinnamon-brown, cavities large, empty; septa 25–30 μ thick, yellow to brown, composed of coarse, gelified, nearly parallel hyphae; basidia cylindrical, projecting beyond the hymenium a short distance, mostly 4-spored, sterigmata 5–6 μ long; spores ellipsoid, ovoid, coarsely and evenly verrucose, with thick epispore, averaging 12 × 8.5 μ, usually pedicellate, 11–14 × 8–10 μ, giant spores 14.5–20 × 11–13 μ; odorless.

In humus, under *Quercus agrifolia* and *Heteromeles arbutifolia*. Oregon and California. December to March.

The collection by Johnston *(219)* has quite a few young spores which show a thick epispore, and the distal end almost umbilicate with a very fine, hyaline apiculus projecting from the depression. Very subject to attack by *Sepedonium*.

OREGON: Benton County, Corvallis, *S. M. Zeller 8198* (Zeller).

CALIFORNIA: Marin County, *H. E. Parks 113* (1918) (Univ. Cal.); Wildwood Glenn, Sausalito, *H. W. Harkness*, type (Stanford, Farlow, N. Y. Bot. Gard., Lloyd Mus., and Dodge); Alameda County, Berkeley, *N. L. Gardner 178* (Univ. Cal., Dodge, and Zeller); Contra Costa County, Richwood Cañon, *H. E. Parks 2015* (Dodge and Zeller); Santa Clara County, Call of the Wild, *H. E. Parks 291*, Guadaloupe, *H. E. Parks Z8, 387, 433 (Z14), 951* (all Univ. Cal., Dodge, and Zeller); San Bernardino County, San Antonio Mts., *I. M. Johnston 219* (Lloyd Mus. and Dodge).

11a. var. CAUDATA Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 366. 1935.

Arcangeliella caudata Zeller & Dodge, Ann. Mo. Bot. Gard. **6**: 49–52. 1919.

Illustrations: Zeller & Dodge, Ann. Mo. Bot. Gard. **6**: 51, *f. 1.*

Type: in Univ. Cal., Dodge, and Zeller Herb.

Fructifications 0.8–2 cm. in diameter, spherical with attenuate base, flattened or plane above, some quite pyriform, "varying from light brown to a dark yellowish brown or maroon except on a limited area on the under side next to the very short stipe which is almost white" [Gardner], mummy-brown to clove-brown above and clay-color to olive-brown below (in alcohol), surface velvety; peridium 200–300 μ thick above, very thin or wanting below, sepia under the microscope, composed of radial septate hyphae perpendicular to the surface, forming pseudoparenchymatous tissue having cells about 9–10 × 11–13 μ, the septa of the hyphae becoming constricted and finally abjointing spherical to oblong oidia-like cells from the surface of the peridium; base sterile, composed of septate, hyaline hyphae 3–5 μ in diameter, with lactiferous ducts 6–8 μ broad, more numerous towards the attenuate point which leads to a heavy, branched rhizomorph; rhizomorphs pseudoparenchymatous, brown, supplied with numerous lactiferous ducts; columella

variable from inconspicuous to percurrent, extending to the peridium above, sometimes with lateral branches, concolorous and continuous with the base, the few lactiferous ducts smaller than in the base; gleba fleshy, white or yellowish, drying isabella-color to brownish-olive, exposed near the base in older specimens, cavities small and irregular, somewhat radiating from the base and columella; septa hyaline, consisting of loosely interwoven, hyaline hyphae, few lactiferous ducts, 50–65 μ broad; cystidia hyaline, large, clavate; paraphyses cylindrical, obtuse, hyaline, septate, 19–20 × 4–5 μ; basidia hyaline, slender, clavate, 2–4-spored, 24–26 × 9–13 μ, sterigmata short, stout, 3–6 μ long; spores mostly ovoid to ellipsoid, verrucose-rugose, pedicellate, yellow-ochre to ochraceous-tawny, 12–14.5 × 9–11.5 μ, one large vacuole, exospore thick.

In leaf mould of *Quercus*. Oregon and California. November.

OREGON: Benton County, Corvallis, *S. M. Zeller 2005* (Zeller).

CALIFORNIA: Alameda County, Berkeley, *N. L. Gardner 219*, type (Univ. Cal., Dodge, and Zeller 1623).

12. ARCANGELIELLA **seminuda** (Massee & Rodway) Zeller & Dodge, comb. nov.

Gymnomyces seminudus Massee & Rodway, Kew Bull. Misc. Inf. **1898**: 125. 1898; Saccardo & Sydow in Sacc. Syll. Fung. **16**: 249–250. 1902; Zeller & Dodge, Ann. Mo. Bot. Gard. **6**: 56. 1919.

Octaviania brunneola Harkness, Proc. Cal. Acad. Sci. Bot. III. **1**: 251. 1899; Saccardo & Sydow in Sacc. Syll. Fung. **16**: 248. 1902.

Arcangeliella brunneola Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 366. 1935.

Hydnangium McAlpinei Rodway, Papers & Proc. Roy. Soc. Tasmania **1923**: 159. 1924.

Octaviania microsporium Mattirolo, herb. nom.

Type: in Kew Herb. Cotype of *O. brunneola* Harkn. in Dudley Herb. at Leland Stanford Jr. Univ. Type of *Hydnangium McAlpinei* in Rodway Herb. at Tasmanian Museum.

Fructifications soft and watery, irregularly spherical, up to

5 cm. in diameter, whitish to muddy brown and ochraceous, drying isabelline, fawn, Natal brown to almost black, 1–2.0 cm. in diameter; sterile base present in young material, wanting at maturity; columella very slender, irregularly developed (arising in two separate places in one specimen) and easily overlooked, composed of closely parallel hyphae loosely interwoven or collapsing into a solid tissue; peridium 500–550 μ thick when fresh and in preserved material, drying 150–200 μ thick in the folds to even 50 μ thick in collapsed portions, outer layer separable, comprising most of the thickness (in the type of *G. seminudus* only half the thickness), composed of strands of more or less parallel hyphae 1.5–3 μ in diameter, very loosely woven, leaving large lacunae or collapsing on drying in the thinner portions and giving a prosenchymatous appearance, brownish, inner layer 35–40 μ thick, continuous with the septa and of the same structure, lactiferous ducts occasional throughout, more frequent in the outer portion of the peridium; gleba dense, dark olive-buff becoming avellaneous or army-brown to almost black from spores (warm buff in the type), cavities small, nearly filled with spores; septa 15–40 μ thick, of slender, interwoven hyphae with lacunae much smaller than those in the peridium except in the angles between the cavities, not otherwise scissile, subhymenium pseudoparenchymatous, lactiferous ducts few; basidia cylindrical, 18–23 × 6–7.5 μ, soon collapsing; spores spherical or nearly so, very slightly attenuate toward the pedicel, dark brown to black, smooth at first with thick epispore which becomes deeply alveolate, easily tearing and appearing unevenly and bluntly echinulate, 12–15 × 11–13 μ, with about 12 spines per great circle.

In duff under conifers, *Quercus* and *Aesculus*. Pacific coast of North America and Tasmania. January to June in North America (no dates accompanying the Tasmanian material).

It is with some hesitation that we have included all these specimens in the same species. Fundamentally the structure is the same but there is much variation in size, color, and peridial measurements, apparently depending in part on the maturity of the specimen and in part on its subsequent reaction to

processes of drying. The very loose character of the peridium as seen in preserved material allows for a variable amount of collapse on drying. The extremes when first encountered were recognized by us as distinct species, but with the accumulation of material intergrading forms have been seen, until in the present state of our knowledge we have failed to find clear distinctions. It is possible that further field work in Tasmania. Oregon, and California, with more careful relating of immature and mature specimens, may solve some of the problems raised in this group.

OREGON: Benton County, Corvallis, *H. P. Barss* (Zeller 8190); Yamhill County, McMinnville, *S. M. Zeller 2166* (Dodge and Zeller).

CALIFORNIA: Humboldt County, Trinidad, *H. E. Parks 4625* (Zeller); Marin County, Mt. Tamalpais, *H. W. Harkness*, cotype of *O. brunneola* (Stanford); Monterey County, Pacific Grove, *N. L. Gardner (299) & M. B. Nichols* (Univ. Cal. and Zeller); Santa Clara County, San José, *H. E. Parks 960b*, Guadaloupe, *H. E. Parks 264, 314, 341, 367, 394, 435, 520, 522, 530, 987, 1125*, Alma, *H. E. Parks 404, H. E. Parks & C. W. Dodge 1158*, without locality, *H. E. Parks 1126* (all Univ. Cal., Dodge, and Zeller).

TASMANIA: *L. Rodway 124*, type (Kew); Hobart, *L. Rodway* (Lloyd Mus. 072, and Dodge); Cascades, *L. Rodway 1110* (Dodge); Tasman Peninsula, *L. Rodway 1278* (Dodge); Mt. Nelson, *L. Rodway*, type of *Hydnangium McAlpinei* (Rodway).

13. ARCANGELIELLA PILOSA Zeller & Dodge, Ann. Mo. Bot. Gard. 22: 368. 1935.

Type: in Dodge and Zeller Herbaria.

Fructifications 3–4.5 cm. broad × 1–4 cm. high, globose to depressed-pyriform, shrinking on drying, at first whitish becoming reddish-brown, drying citrine-drab, light brownish-olive, or olive, smooth, pilose; sterile base prominent, extended above into a branched or plate-like, percurrent columella of loosely interwoven hyphae; peridium 500–1000 μ thick when fresh, drying 240–320 μ thick, of a meshy prosenchyma with lactiferous ducts, gelified at maturity, hyaline, the surface layer of erect hyphae 30–40 μ long and 2–3.5 μ in diameter, producing a plushy surface (matting down in preserved material); gleba firm, gelified, buff, drying hard and cinnamon to Saccardo's umber, cavities small, empty but collapsing; septa 20–35 μ thick, of slender, loosely interwoven, gelified (?) hyphae interspersed by a few lactiferous ducts; basidia clavate, 4-spored;

spores hyaline (light yellowish *en masse),* subspherical, minutely alveolate-echinulate, 10–12 μ in diameter.

In humus soil under oaks. California. February to April.

CALIFORNIA: Santa Clara County, Guadaloupe, *H. E. Parks, 4th Z340* type, *524, 525* (Zeller and Dodge).

14. ARCANGELIELLA ALVEOLATA (Cooke & Massee) Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 365. 1935.

Octaviania alveolata Cooke & Massee, Grevillea **16**: 2. 1887; Saccardo, Syll. Fung. **9**: 280. 1891; Cooke, Handbook Austral. Fungi, 246. 1892; Rodway, Papers & Proc. Roy. Soc. Tasmania **1919**: 112. 1920; **1923**: 159. 1924.

?Octaviania Stephensii var. *nuda* Harkness, Bull. Cal. Acad. Sci. **1**. 258. 1885.

Octavianina alveolata O. Kuntze, Rev. Gen. Pl. 3^2: 501. 1898.

Gymnomyces pallidus Massee & Rodway, Kew Bull. Misc. Inf. **1898**: 125. 1898; Saccardo & Sydow in Sacc. Syll. Fung. **16**: 249. 1902; Rodway, Papers & Proc. Roy. Soc. Tasmania **1911**: 25. 1912; **1923**: 160. 1924; Zeller & Dodge, Ann. Mo. Bot. Gard. **6**: 55–56. 1919.—*not* Zeller, Mycologia **4**: 197–198. 1922.

Elasmomyces russuloides Setchell, Jour. Myc. **13**: 240–241. 1907; Saccardo & Trotter in Sacc. Syll. Fung. **2**: 467. 1912.

?Gymnomyces solidus Rodway, Papers & Proc. Roy. Soc. Tasmania **1920**: 157. 1921; **1923**: 161. 1924; Trotter in Sacc. Syll. Fung. **24**: 1328. 1928.

Hydnangium glabrum Rodway, Papers & Proc. Roy. Soc. Tasmania **1920**: 157. 1921; **1923**: 157–158. 1924; Trotter in Sacc. Syll. Fung. **24**: 1328. 1928.

Hydnangium Hinsbyi Rodway, Papers & Proc. Roy. Soc. Tasmania **1923**: 158. 1924.

Illustrations: Setchell, Jour. Myc. **13**: *pl. 107.*

Type: Cudgegong River, *Hamilton 514,* in Kew Herb. Type of *Gymnomyces pallidus,* Tasmania, *L. Rodway 299,* in Kew Herb. Type of *Hydnangium glabrum,* Tasmania, slopes of Mt. Wellington, *L. Rodway,* not seen. Material from Cascades, *L. Rodway 1280* (stated by Rodway to be cotype) in Dodge and Zeller Herbaria. Type of *Elasmomyces russuloides,* Califor-

nia, Alameda County, Berkeley, *N. L. Gardner & W. A. Setchell.* A specimen so determined in Lloyd Mus. "Herb. Univ. California, Fungi of California 220, *Elasmomyces russuloides* Setchell under *Quercus agrifolia,* Berkeley, N. L. Gardner, Nov. 24, 1904," has been studied by us, and considered to be a portion of the type. Type of *Hydnangium Hinsbyi* from Hobart, *L. Rodway,* in Rodway Herb. at Tasmanian Museum.

Fructifications subspherical, drying 2 cm. in diameter, pinkish-cinnamon drying walnut-brown to Rood's brown; sterile base prominent and gelified, columella inconspicuous and not well developed; peridium thin, fragile, often flaking off, drying 55–80 μ thick (only about 40 μ in the type), composed of slender, periclinal, gelified hyphae; gleba pale red-brown to ochre, drying pinkish-buff; cavities large, subspherical, about 0.2 mm. in diameter; septa thin, 30–40 μ thick, composed of hyaline, periclinal, gelified hyphae with lactiferous ducts which end in large "gloeocystidia"; basidia early collapsing; spores spherical, girdled by ridges, subreticulate, finely and minutely asperate, 7–9 μ in diameter, giant spores 10–11 μ.

Pacific coast of North America, Chile, and Australia.

It is somewhat doubtful whether material from Mt. Wellington and the Cascades, Tasmania, which Rodway referred to *Octaviania alveolata,* is correctly determined, as Rodway states that fructifications were "pale ochre with a dark peridium, gleba dense, waxy, pale ochre becoming dark." This description suggests *Hydnangium compactum* Harkness, but we have seen no material.

OREGON: Linn County, *S. M. Zeller 2590,* near Peoria *S. M. Zeller 2586* (both Zeller).

CALIFORNIA: Marin County, S. Rafael, *H. E. Parks 2110* (Univ. Cal. and Dodge); Alameda County, Berkeley, *N. L. Gardner 245* (Lloyd Mus. and Dodge), *220* (type of *Elasmomyces russuloides,* Univ. Cal. and Dodge); San Mateo County, Redwood Park, *H. E. Parks 2187* (Univ. Cal. and Dodge); Santa Clara County, Saratoga, *H. E. Parks 358, 450, 907, 947, 990, 1127;* Alma, *H. E. Parks 56, N. L. Gardner 508, H. E. Parks,* Guadaloupe, *H. E. Parks 358, 372, 477* (all Univ. Cal. and Dodge); Los Gatos, *H. E. Parks 477 (Z27)* (Zeller).

CHILE: Concepción (dry hill top), *R. Thaxter,* Nov. 1904 (Farlow).

AUSTRALIA: Cudgegong R., *Hamilton 514,* type (Kew); New South Wales, Moona Plains, *without collector* (Kew); Victoria, *without collector 1092* (Kew);

Melbourne, (Lloyd Mus. 0216); *F. Campbell 27b* (Kew); South Australia, Belair, *J. B. Cleland 1*, Mt. Compass, *J. B. Cleland 21*, Mt. Lofty, *J. B. Cleland* (all Dodge).

TASMANIA: *L. Rodway 1277, 299*, type of *Gymnomyces pallidus* (Kew); Cascades, *L. Rodway 1280*, type of *G. glabra* (Dodge and Zeller); Sandfly, *L. Rodway 1107* (Lloyd Mus. and Dodge); Hobart, *L. Rodway* (Lloyd Mus. 088, sub *H. australiense*, and Dodge), *1106* (Lloyd Mus. 075, 0219, as *Hymenogaster violaceus*, and Dodge); unnumbered specimen, type of *Hydnangium Hinsbyi* (Rodway).

15. ARCANGELIELLA RAVENELII (Berkeley & Curtis) Dodge, Ann. Mo. Bot. Gard. **18**: 463. 1931.

Octaviania Stephensii var. *Ravenelii* Berkeley & Curtis in Tulasne, Fung. Hypog. xvii. 1851; Cooke, Grevillea **6**: 133. 1873; DeToni in Sacc. Syll. Fung. **7**: 159. 1888.

Hydnangium Stephensii var. *Ravenelii* Berkeley, Grevillea **2**: 33. 1873.

Hydnangium Ravenelii Berkeley & Curtis in Curtis, Bot. North Carolina, 110. 1867; Lloyd, Myc. Notes 15: 152. 1903; 41: 569. 1916; Patouillard, Bull. Soc. Myc. France **26**: 204. 1910.

Octaviania Ravenelii Lloyd, Myc. Notes 67: 1140. 1922.

Type: Ravenel Herb. at Brit. Mus., Berkeley Herb. at Kew, Curtis Herb. at Farlow Herb., and in Upsala.

Fructifications 2.5–4 cm. in diameter, subspherical to pyriform, drying light fawn; sterile base not prominent; columella slender, percurrent with lactiferous ducts which exude a white aromatic milk; peridium 100–180 μ thick, of gelified, interwoven hyphae with lactiferous ducts 7–8 μ in diameter; gleba white becoming cream-color; septa 11–15 μ thick, of slender hyphae in a gel, with lactiferous ducts; basidia clavate, protruding, 1–4-spored, 30–32 × 13–15 μ, sterigmata very slender, 7–12 μ long; spores subspherical, alveolate-reticulate, 11–12.5 μ in diameter, giant spores from 1-spored basidia, 12.5–15 × 15–15.5 μ.

Partially emergent under leaf mold. Southeastern United States and Oregon.

EXSICCATI: Ravenel, Fung. Carol. II: 71; Fung. Amer. 16; Ellis, N. Amer. Fung. 1211.

WITHOUT LOCALITY: (Lloyd Mus. 52).

SOUTH CAROLINA: Santee Canal, *H. W. Ravenel 883*, type (Brit. Mus., Farlow, Kew, and Upsala); Aiken, *H. W. Ravenel*, in Ellis, N. Amer. Fung. 1211.

GEORGIA: Augusta, *Berry Brown* (N. Y. State Mus. and Zeller 7255).

FLORIDA: *G. Clyde Fisher 12* (Lloyd Mus. 10620); Gainesville, *H. W. Ravenel*, Fung. Amer. 16.

ALABAMA: Auburn, *F. S. Earle* (Lloyd Mus. 0211, 5981, and Dodge); *A. H. Povah 7182, 9080* (in Lloyd Mus., Farlow, Dodge, and Zeller); Spring Hill, *A. S. Bertholet* (Lloyd Mus. 7128, 7182).

OREGON: Corvallis, *S. M. Zeller 2569, 2574* (Zeller).

16. ARCANGELIELLA SOCIALIS (Harkness) Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 369. 1935.

Octaviania socialis Harkness, Proc. Cal. Acad. Sci. Bot. III. **1**: 252. 1899; Saccardo & Sydow in Sacc. Syll. Fung. **16**: 248. 1902.

Illustrations: Harkness, Proc. Cal. Acad. Sci. Bot. III. **1**: *pl. 42, f. 5.*

Type: cotype in Dudley Herb. at Leland Stanford Jr. Univ.

Fructifications depressed-globose, 1–2 cm. in diameter, or cespitose and coalescing into irregular masses 2 × 2.5 × 4 cm., surface smooth, cream-color to pinkish, drying clay-color to tawny-olive; sterile base distinct, stipitiform below, continued above as a slender percurrent columella of interwoven hyphae with lactiferous ducts interspersed with islands of pseudoparenchyma; peridium brownish, 220–380 μ, drying 50–75 μ thick, composed of polyhedral cells 4–5 μ in diameter, with very thin walls covered by a thin layer of periclinal hyphae with lactiferous ducts, easily separable; gleba rose-pink drying pinkish-buff (dark brown in alcohol), cavities of medium size and empty; septa 120 μ thick (drying about 75 μ), scissile, composed of large, thin-walled pseudoparenchyma, cells up to 20–25 μ in diameter; basidia clavate, hyaline, 20–30 × 7–12 μ, 4-spored, sterigmata 7–8 μ long; spores spherical, hyaline, epispore very finely and shallowly alveolate, 8–15 (–19) μ in diameter; odor strongly yeast-like.

Hypogeous under *Eucalyptus, Pasania densiflora,* etc. Oregon and California. Winter and spring.

Unfortunately the field notes with *Parks 966* were evidently based on some *Hymenogaster* collected at the same time. We have been unable to trace the notes made on this collection. Paris 513 is a small, solitary fructification.

OREGON: Benton County, Philomath, *H. M. Gilkey* (Zeller 8189).

CALIFORNIA: *H. E. Parks 909* (Univ. Cal. and Dodge); Humboldt County, Trinidad, *H. E. Parks* (Univ. Cal. and Dodge); Marin County, San Rafael, *H. E. Parks 1134, 2070, 2071, 2107, 3036* (Univ. Cal. and Dodge); San Mateo County, Belmont, *H. W. Harkness 232*, cotype (Stanford); Redwood Park, *H. E. Parks 2180, 2186, 2216* (Univ. Cal., Dodge, and Zeller); Santa Clara County, Aldercroft Creek, *H. E. Parks, 1167, C. W. Dodge 1526, Alma, H. E. Parks 162* (com. N. L. Gardner 545), Almaden Road, *H. E. Parks 1132*, Guadeloupe, *H. E. Parks 529, 966*, Guadeloupe Mines, *H. E. Parks 253, 264, 367* (all Univ. Cal. and Dodge); San Jose, *H. E. Parks 2271, 389* (Univ. Cal., Dodge, and Zeller); Saratoga, *H. E. Parks 219, 449, 450, 456, 460, 979, 981, 1000*, and 2-13-21 (Univ. Cal. and Dodge); Felton Big Trees, *H. E. Parks 513* (Univ. Cal. and Dodge).

17. ARCANGELIELLA SCISSILIS Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 369. 1935.

Type: in Dodge and Zeller Herbaria.

Fructifications irregular in shape, up to 3 cm. broad; surface very smooth, yellowish drying tawny; columella thin, white, reaching about halfway to the apex; peridium tough, easily cracking off when fresh, drying 320–400 μ thick, pseudoparenchyma with compact prosenchyma near the surface, and with lactiferous ducts; gleba creamy, drying antimony-yellow, compact; septa 25–35 μ thick, prosenchyma with lactiferous ducts; spores spherical, very finely and deeply alveolate-echinulate, dark yellowish, 11–15 μ; strong odor of witch-hazel *(Hamamelis)*.

Coniferous association. Northern California. November.

In this species the peridium is shell-like, easily cracking off, hence the name. The wood rats and pine squirrels eat the fructifications and seem especially fond of the peridium.

CALIFORNIA: Humboldt County, Trinidad, *H. E. Parks 4125*, type (Dodge and Zeller).

18. ARCANGELIELLA TASMANICA (Kalchbrenner) Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 369. 1935.

Hydnangium tasmanicum Kalchbrenner in Massee, Grevillea **19**: 95. 1891; Saccardo, Syll. Fung. **11**: 172. 1895; Cooke, Handbook Austral. Fungi, 247. 1892; Rodway, Papers & Proc. Roy. Soc. Tasmania **1911**: 24. 1912.

Octaviania tasmanica Lloyd, Myc. Notes 67: 1141–1142. 1922.

Gymnomyces flavus Rodway, Papers & Proc. Roy. Soc. Tasmania **1917**: 110. 1918; **1923**: 161. 1924; Sacc. Syll. Fung. **24**: 1328. 1928.

Type: location unknown to us, not found in Kew nor in Berlin.

Fructifications 1–2 cm. in diameter, drying black; fibrils present, adnate, black, scanty; columella probably present (although the specimens available have all been sliced too thin); peridium 140–180 μ thick, composed of yellowish varicose, vesiculose hyphae, sometimes simulating pseudoparenchyma, 5 μ in diameter, with latex ducts in the outer portion of the peridium; gleba drying Brussels brown, mottled or marbled by the veins, cavities filled; septa dimorphous, the thicker septa plate-like walls, white, 60 μ thick, composed of hyaline, varicose, vesiculose hyphae, sometimes pseudoparenchymatous, occasionally with lactiferous ducts, the thinner or true septa 20–30 μ thick, yellowish, composed of slender, gelified hyphae; spores spherical, 9–14.5 μ in diameter, dark brown, echinate-tuberculate, with conical spines.

Tasmania.

This species is very similar to *A. asterosperma* in tissue structure, color, and color and markings of spores. It differs, however, in size of spores and the more numerous and smaller echinulae. The specimens examined of *Gymnomyces flavus* were young specimens of *A. tasmanica* in which the mature spores were identical with those of the latter.

TASMANIA: Hobart, *L. Rodway 1279* (Dept. Agr. Victoria [Australia], Lloyd Mus. 090 under *Gymnomyces flavus* Rodw., and Dodge); Wedge Bay, *L. Rodway 1276*, cotype of *Gymnomyces flavus* Rodway (Dodge).

19. ARCANGELIELLA AUSTRALIENSIS (Berkeley & Broome) Dodge, Ann. Mo. Bot. Gard. **18**: 463. 1931.

Hydnangium australiense Berkeley & Broome, Trans. Linn. Soc. London II. Bot. **2**: 66. 1883; DeToni in Sacc. Syll. Fung. **7**: 176. 1888; Massee, Kew Bull. Misc. Inf. **1898**: 128. 1898; Rodway, Papers & Proc. Roy. Soc. Tasmania **1911**: 25. 1912.

Octaviania australiensis Cooke, Handbook Austral. Fungi, 246. 1892; Rodway, Papers & Proc. Roy. Soc. Tasmania **1923**: 157. 1924.

Hydnangium brisbanense Berkeley & Broome in Cooke, Handbook Austral. Fungi, 247. 1892.

Secotium sessile Massee & Rodway in Rodway, Papers & Proc. Roy. Soc. Tasmania **1911**: 30. 1912.

Elasmomyces sessilis Rodway, Papers & Proc. Roy. Soc. Tasmania **1924**: 8. 1925.

Types of both *Hydnangium australiense* and *H. brisbanense* were based on the same specimen, Brisbane, *F. M. Bailey 188,* in Kew Herb. and in British Museum. The type of *Secotium sessile* is Tasmania, *L. Rodway 647,* in Kew, Dodge Herb., and in Lloyd Mus. 0238.

Fructifications subspherical, 2–3 cm. in diameter, pure white drying apricot-buff; stipe short (absent in slice of type available for study), columella vanishing in the gleba; peridium about 100 μ thick, of very loosely woven, periclinal, hyaline hyphae, separable; gleba light buff, cavities large, empty; septa thin, scissile, 50–60 μ thick, of slender, gelified hyphae; basidia clavate, soon evanescent; spores spherical, hyaline, 7–8 μ in diameter.

QUEENSLAND: Brisbane, *F. M. Bailey 188,* type of *H. australiensis* and of *H. brisbanense* (Kew and Brit. Mus.).

VICTORIA: *F. Martin 467* pro parte (Kew); *no collector* (Lloyd Mus. 0240); E. Gippsland, *E. French,* Jan. 1889 (com. Mueller, Kew); Mallee, *J. Dickson,* 7–10–25 (Dept. Agr. Victoria).

SOUTH AUSTRALIA: Mt. Lofty, *J. B. Cleland 10, 17* (Dodge and Zeller); S. Yucca, *E. T. Turner* (Lloyd Mus. 11153, Dodge, and Zeller).

TASMANIA: *L. Rodway 1282* (Dodge and Lloyd Mus. 071); *L. Rodway 647,* type of *Secotium sessile* (Kew, Dodge, and Lloyd Mus. 0328).

NEW ZEALAND: Dunedin, Anderson's Bay, *H. K. Dalyrimple* (Weir Herb. 30049).

20. ARCANGELIELLA KRJUKOWENSIS (Bucholtz) Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 368. 1935.

Secotium (Elasmomyces) krjukowense Bucholtz, Hedwigia **40**: 314–315. 1901; Материалы къ морфологіи и систематикѣ подземныхъ грибовъ . . . Издвн. Естеств. Ист. Музея Графини Е. П. Шереметевой въ С. Михайловскомъ Московской губ. **1**: 142–143. 1902; Ann. Myc. **1**: 159. 1903.

Illustrations: Bucholtz, Ann. Myc. **1**: *pl. 5, f. 8–10;* Материалы къ морфологіи и систематикѣ подземныхъ грибовъ . . . Издвн. Естеств. Ист. Музея Графини Е. П. Шереметевой въ С. Михайловскомъ Московской губ **1**: *pl. 3, f. 8–10.*

Type: Bucholtz Herb. at Farlow, and Berlin.

Fructifications subglobose to irregular, about 3 cm. in diameter, surface smooth, pure white, drying warm buff to buckthorn-brown, lower surface showing groove where peridium reaches the stipe, exposing gleba at maturity; columella percurrent; peridium of interwoven hyphae, with many lactiferous ducts and some islands of pseudoparenchyma, 50–130 μ thick; gleba orange when fresh, drying clay-color to tawny-olive; septa 40–45 μ thick, hyaline, with lactiferous ducts composed of loosely interwoven hyphae and islands of pseudoparenchyma, as also in the columella; basidia 2–4-spored; spores 8–11.5 μ, spherical, citrine-yellow *sub lente*, with short, broadly conic echinulae, young spores sometimes appearing merely asperate.

Hypogeous; cespitose to single. Under *Populus, Betula,* and *Tilia.* U. S. S. R. June.

U. S. S. R. [Russia]: Moskva, Krjukovo, *F. Bucholtz,* type (Farlow and Berlin).

20a. var. MICHAILOWSKJANA (Bucholtz) Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 368. 1935.

Secotium (Elasmomyces) michailowskianum Bucholtz, Hedwigia **40**: 315. 1901; Материалы къ морфологіи и систематикѣ подземныхъ грибовъ . . Издан. Естеств. Ист. Музея Графини Е. П. Шереметевой въ С. Михайловскомъ Московской губ. **1**: 143–144. 1902; Ann. Myc. **1**: 171. 1903.

Elasmomyces michailowskjanus Saccardo & D. Saccardo in Sacc. Syll. Fung. **17**: 218. 1905.

Illustrations: Bucholtz, Ann. Myc. **1**: *pl. 5, f. 11;* Материалы къ морфологіи и систематикѣ подземныхъ грибовъ . . . Издан. Естеств. Ист. Музея Графини Е. П. Шереметевой въ С. Михайловскомъ Московской губ.**1**: *pl. 3, f. 11.*

Type: probably in Bucholtz Herb. at Farlow Herb. but not seen.

Fructifications spherical, about 1 cm. in diameter, rufous; columella rather thick, of the same texture as *Arcangeliella krjukowensis;* gleba grayish-ochraceous; cystidia acute; spores and reactions as in that species.

While we have not seen the type of this species, there seems little to distinguish it from *A. krjukowensis.*

21. ARCANGELIELLA BORZIANA F. Cavara, Nuov. Giorn. Bot. Ital. N. S. 7: 126. 1900; Saccardo & Sydow in Sacc. Syll. Fung. 16: 256. 1902.

Illustrations: Cavara, Nuov. Giorn. Bot. Ital. N. S. 7: *pl. 7, f. 1–15;* Malençon, Trav. dediés à Louis Mangin, *pl. 29, f. 6.*

Type: R. Ist. di Napoli, portion in Dodge and Zeller Herbaria.

Fructifications gregarious, spherical to irregular, oblong, often bilobed, 0.6–0.8 × 1.5–3.0 cm., smooth to pilose, somewhat soft, spotted with yellow; peridium very thin, 70–95 μ thick, of closely interwoven hyphae, fragile, either lacking or lacerate near the base, slightly lactiferous, latex white, sweet, abundant; gleba light rose-colored, lactiferous; septa of interwoven hyphae, 5–75 μ thick, base attenuate, sterile; cystidia conical, acute; basidia conspicuous, strongly exserted above the blunt paraphyses, sterigmata 3–4 μ long, acicular; spores spherical to ellipsoidal, light yellowish, echinulate, 8–11 μ in diameter, giants 12–13 μ, epispore thick.

In fir forests. Italy. Summer.

The specimen from France is referred here with some doubt as the peridium is lacking and lactiferous ducts are very rare.

ITALY: Trentino, *G. Bresadola,* Julio 1884 (probably Upsala); Etruria, Vallombrosa, *F. Cavara,* type (R. Ist. di Napoli, Dodge, and Zeller); Lucca, *C. E. Broome* (Brit. Mus. sub. *H. asterospermum).*

?FRANCE: Jura, *L. Quélet* (sub *Hydnangium candidum* in Cooke Herb. at Kew).

22. ARCANGELIELLA CREMEA Zeller & Dodge, Ann. Mo. Bot. Gard. 22: 367. 1935.

Type: in Dodge and Zeller Herbaria.

Fructifications very irregular in shape, drying subreniform, 1 × 2 × 2 cm., light buff to cinnamon-buff, marbled; columella percurrent, creamy white; peridium variable, up to 250 μ thick, of large, thin-walled, periclinal hyphae more or less prosenchymatous, with lactiferous ducts; sterile tissues a mixture of pseudoparenchyma and strands of prosenchyma with lactiferous ducts; gleba firm, cinnamon-buff; septa 120–130 μ thick, pseudoparenchymatous except for a few large periclinal hyphae in the middle; basidia short-cylindric, 14 × 8 μ, sterigmata slender, about 4 μ long; spores spherical, yellow, 9–11 μ

in diameter, alveolate, having about 24 spines per great circle.

In duff under oak trees. Oregon. March.

OREGON: Benton County, Scott's Hill, south of Corvallis, *R. Sprague*, type (Zeller 7927, and Dodge).

23. ARCANGELIELLA VULVARIA (Petri) Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 369. 1935.

Clathrogaster vulvarius Petri, Malpighia **14**: 126. 1900; Saccardo & Sydow in Sacc. Syll. Fung. **16**: 250. 1902.

Illustrations: Petri, Malpighia **14**: *pl. 2, f. 1, 2; pl. 3, f. 2, 3, 5–8, 10, 11, 13.*

Type: in Herb. Bot. Ist. Univ. Firenze.

Fructifications irregular-reniform, about 4 × 6 cm., russet in alcohol (1934), surface irregularly reticulate-sulcate; sterile base scarcely more than a thickening of the peridium; columella conspicuous, fruticose, branching near the base but branches percurrent; peridium 1200–1440 μ thick in alcohol, composed of densely tangled hyphae without and loose periclinal hyphae within, gelified with abundant large lactiferous ducts 11–12 μ in diameter; gleba ochraceous-tawny, cavities ovoid, radiating from the columella; septa 110–120 μ thick, composed of loose, periclinal hyphae with large lactiferous ducts, not so completely gelified; basidia 2-spored, subcylindric, 37–40 μ long, the upper third collapsing after the separation of the spores, sterigmata short; spores spherical, with short ridges and slender, blunt spines, yellow, 9–12 μ in diameter.

Sarawak, Borneo, known only from the type collection.

BORNEO: Sarawak, near Sibu, *O. Beccari*, type (Univ. Firenze).

24. ARCANGELIELLA OCCIDENTALIS (Harkness) Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 368. 1935.

Octaviania occidentalis Harkness, Proc. Cal. Acad. Sci. Bot. III. **1**: 253. 1899; Saccardo & Sydow in Sacc. Syll. Fung. **16**: 248. 1902.

Illustrations: Harkness, Proc. Cal. Acad. Sci. Bot. III. **1**: *pl. 42, f. 4.*

Type: cotype in Dudley Herb. at Leland Stanford Jr. Univ.

Fructifications depressed-globose, 2–2.5 cm. in diameter, 1 cm. high, ochraceous-tawny to buckthorn-brown in alcohol;

stipe 0.4 cm. long, 0.3 cm. in diameter; columella percurrent, 0.1–0.15 cm. in diameter; peridium not enclosing the base, separating from the gleba, up to 360 μ thick, composed of interwoven, slender, gelified hyphae; gleba ochraceous-tawny to buckthorn-brown in alcohol, cavities empty, large, irregular; septa 120–150 μ thick, composed of loosely interwoven, gelified, slender hyphae, latex very scant; cystidia mucronate or flask-shaped, 36–40 × 8–10 μ; paraphyses truncate, clavate, septate; basidia 52 × 5–6 μ, clavate, sterigmata short; spores hyaline to slightly yellowish, 11–12 μ in diameter, spines acicular, short, numerous.

California, March.

CALIFORNIA: Placer County, Wire Bridge, *H. W. Harkness 137*, cotype (Stanford).

25. ARCANGELIELLA ROSEA (Harkness) Zeller & Dodge in Dodge, Ann. Mo. Bot. Gard. **18**: 462. 1931.

Octaviania rosea Harkness, Bull. Cal. Acad. Sci. **1**: 29. 1884; Proc. Cal. Acad. Sci. Bot. III. **1**: 252. 1899; DeToni in Sacc. Syll. Fung. **7**: 160. 1888.

Octavianina rosea O. Kuntze, Rev. Gen. Pl. **3**^{2}: 501. 1898.

Hydnangium Soderstroemii Lagerheim in Patouillard & Lagerheim, Bull. Soc. Myc. France **9**: 142. 1893; Saccardo, Syll. Fung. **11**: 172. 1895.

Arcangeliella Soderstroemii (Lagerh.) Zeller & Dodge, Ann. Mo. Bot. Gard. **6**: 52. 1919.

Hydnangium pallidum Lloyd, Myc. Notes 65: 1031. 1921.

Octaviania pallida Lloyd, Myc. Notes 67: 1140. 1922.

Octaviania Stillingeri Lloyd, Myc. Notes 67: 1140. 1922; Rick, Egatea **14**: 111. 1934.

Illustrations: Lloyd, Myc. Notes 65: *pl. 171, f. 1867.*

Type: cotypes in Dudley Herb. at Leland Stanford Jr. Univ., Lloyd Mus., Farlow, and Mo. Bot. Gard. Herbaria. Type of *H. Soderstroemii* in Stockholm, Upsala, Berlin, Patouillard Herb. at Farlow Herb., and Lloyd Mus. Type of *H. pallidum* in Lloyd Mus. and Dodge Herb. Type of *O. Stillingeri* in Lloyd Mus. and Dodge Herb.

Fructifications depressed-globose to pyriform, 2–3.5 cm. in

diameter, pinkish or pale rose when fresh, drying ashy or buckthorn-brown to isabella-color; sterile base attenuate, short or inconspicuous; columella rudimentary or percurrent, confluent with the peridium above, always very thin; peridium smooth and persistent above, evanescent below, early breaking away from the sterile base, 50–80 μ thick, of large-celled pseudoparenchyma with large superficial hyphae giving a silkiness to the surface; gleba pale, drying chamois to isabella-color or grayish, fragile, cavities relatively large, mostly radiating from the base and columella; septa thin, fragile, drying about 40 μ thick, of loosely woven, often gelified hyphae with lactiferous ducts; basidia mostly 2-spored, subcylindrical, 40–60 × 6–10 μ; sterigmata stout, conical, 6–10 μ long; spores subspherical, oblate below, pedicellate, rather finely echinulate (about 20 to the circumference), 11–17 μ in diameter, giant spores 17–19 μ, with coarser conical spines, thick epispore; latex white.

Mostly hypogeous in coniferous woods. Pacific Coast of United States and South America. Spring and autumn.

OREGON: Benton County, Corvallis, *S. M. Zeller 2559* (Zeller).

CALIFORNIA: Alameda County, Berkeley, *H. E. Parks 995, 1967, 1967a, 1967b* (Dodge and Zeller); San Francisco, Golden Gate Park, *H. W. Harkness 117*, cotype (Stanford, Lloyd Mus., 0232, Mo. Bot. Gard. 5638, and Farlow), *C. R. Stillinger*, type of *O. Stillingeri* (Lloyd Mus., Dodge, and Zeller); Ingleside, *N. L. Gardner 209* in part (Univ. Cal., Dodge, and Zeller); Parnassus Heights, Sutro Woods, *R. H. Kelley* (com. N. L. Gardner 22, Univ. Cal., Dodge, and Zeller); *W. A. Setchell & C. C. Dobie* (com. N. L. Gardner 25, Univ. Cal.); Santa Clara County, Saratoga, *H. E. Parks 1014, 2161*, Guadaloupe, *H. E. Parks 393*, San José, St. James Park, *H. E. Parks 271, 276, (Z30), 389, 393, 957, Zeller 1666 (H. E. Parks)* (all Univ. Cal., Dodge and Zeller).

ECUADOR: Quito, *L. Soderström & Lagerheim*, 1891, 1892, type of *H. Soderstroemi* (Stockholm, Upsala, Berlin, Farlow, Lloyd Mus. 6395, Dodge, and Zeller); *L. Mille 3*, type of *H. pallidum* (Lloyd Mus. 12127, Dodge, and Zeller).

BRAZIL: *J. Rick 325* (Lloyd Mus., and Dodge).

26. ARCANGELIELLA ASTEROSPERMA (Vittadini) Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 366. 1935.

Octaviania asterosperma Vittadini, Monogr. Tuberac. 17. 1831; Tulasne, Ann. Sci. Nat. Bot. II. **19**: 276. 1843; Fung. Hypog. 77–78. 1851; Berkeley & Broome, Ann. & Mag. Nat. Hist. I. **18**: 76. 1846; Corda, Icones Fung. **6**: 35–36. 1854; Winter in Rabenhorst, Krypt.-Fl. Deutschl. **1**: 878. 1883; De-

Toni in Sacc. Syll. Fung. **7**: 159. 1888; Massee, Ann. Bot. **4**: 31. 1889 [often cited as Monogr. Brit. Gast.]; Hesse, Hypog. Deutschl. **1**: 72–74. 1891; Boudier, Icones Myc. **4**: 97–98. 1905–1910; Hollós, Magyar. Földalatti Gombai, 95–96, 206–207. 1911; Patouillard, Bull. Soc. Myc. France **30**: 347–348. 1914; Lloyd, Myc. Notes 67: 1143. 1922 (pro parte).

Hydnangium asterospora Quélet, Mém. Soc. d'Émulation de Montbéliard **4**: 368. 1873 [often cited as Champ. du Jura et des Vosges **2**]; Ench. Fung. 248. 1886.

Octaviania mutabilis Roumeguère, Rev. Myc. **7**: 23. 1885; DeToni in Sacc. Syll. Fung. **7**: 159–160. 1888; Bucholtz, Bull. Soc. Imp. Nat. Moscou N. S. **21**: 485–486. 1908.

Octaviania brunnea Hesse, Hypog. Deutschl. **1**: 78–79. 1891; Sacc. Syll. Fung. **11**: 169. 1895.

Octavianina asterosperma O. Kuntze, Rev. Gen. Pl. **3**^{2}: 501. 1898.

Octavianina brunnea O. Kuntze, Rev. Gen. Pl. **3**^{2}: 501. 1898.

Octavianina mutabilis O. Kuntze, Rev. Gen. Pl. **3**^{2}: 501. 1898. —*not Octaviania mutabilis* Hesse, Hypog. Deutschl. **1**: 77. 1891.

Octaviania asterospora Th. M. Fries, Svensk Bot. Tidskr. **3**: 272–273. 1909; Th. C. E. Fries, Ark. f. Bot. **17**^{9}: 12. 1922.

Illustrations: Baillon, Dict. **1**: 745, *f. 4;* Boudier, Icones Myc. **1**: *pl. 191;* Cooke, Handbook Brit. Fung. **1**: 355; Corda, Anleit. z. Stud. Myc. *pl. D, f. 45: 5–6;* Fourquignon, Champ. Supér. 123, *f. 94;* Hesse, Hypog. Deutschl. **1**: *pl. 3, f. 1–7; pl. 5, f. 15; pl. 6, f. 4;* Luerssen, Syst. d. Bot. 262, *f. A;* Payer, Bot. Crypt. 114, *f. 529;* Quélet, Mém. Soc. d'Émulation de Montbéliard **4**: *pl. 4, f. 3* [often cited as Champ. du Jura et des Vosges **2**]; Roumeguère, Cryptog. Illustr. *f. 374;* Smith, Brit. Basid. 487, *f. 140;* Swanton, Fungi, *pl. 17, f. 9–11;* Tulasne, Ann. Sci. Nat. Bot. II. **19**: *pl. 17, f. 21;* Fung. Hypog. *pl. 11, f. 1;* Vittadini, Monogr. Tuberac. *pl. 3, f. 7; pl. 5, f. 9a;* Winter in Rabenhorst, Krypt-Fl. Deutschl. ed. 2, **1**: 871.

Type: Material from Vittadini in Brit. Mus. and in Paris. Type of *O. mutabilis* distributed in Roumeguère, Fung. Sel. Gall. Exsicc. 3159, a copy in Farlow Herb., also cotype ex herb. Bommer in Lloyd Mus. Type of *O. brunnea* in Upsala.

Fructifications subspherical to reniform, up to 5 × 3.5 cm.; surface tubercular-verrucose, pulverulent, with numerous fibrils, pure white with pinkish flecks which disappear, becoming greenish passing to deep olive, dirty brown to the touch, avellaneous or warm sepia to wood-brown or bister in alcohol, drying cinnamon-buff to sepia or even black; sterile base pulvinate to palmate in vertical section, prosenchymatous with hyaline lactiferous ducts, on drying prosenchyma partially collapsing; peridium 320–480 μ thick, drying 150–200 μ, hyphae with vesiculose cells on the outside, within prosenchyma of large, vesiculose cells and relatively few lactiferous ducts; gleba white, exuding a salmon-tinted milk, brownish turning blue-black on exposure, becoming warm sepia in alcohol, and drying cinnamon-brown to Prout's brown or snuff-brown; cavities comparatively large, more or less radially arranged, filled with spores; septa hyaline, prosenchymatous, of large, vesiculose cells often appearing pseudoparenchymatous, with lactiferous ducts, the larger, plate-like septa 110–150 μ (drying 75–100 μ) thick, the smaller septa 30–35 μ (drying 20–25 μ) thick; basidia short, clavate, 20–22 μ long, 4-spored, sterigmata 5–6 μ long; cystidia fusiform, 50–60 ×13–14 μ; spores spherical, thickly covered with large conical to pyramidal spines 2 μ long, 13–16 μ in diameter including the spines, warm sepia; odor of acrid meal; latex salmon-color.

Europe and eastern North America.

The texture, the dark color of the spores, and the spore-filled cavities apparently led Vittadini to include this species in his genus *Octaviania* (*Melanogaster* Corda) where it was sharply distinguished from the other species of the genus by its star-shaped spores.

EXSICCATI: Roumeguère, Fung. Sel. Gall. 3159; Rabenhorst, Fung. Eur. 1277.

SWEDEN: Stockholm, *L. Romell*, 1912 (Upsala).

DENMARK: Munkebjerg, *Hj. Jensen*, 1888 (Upsala); Mosn, Lisslund, *F. Rosenkranz*, 25 Aug. 1900 (Upsala).

CZECHOSLOVAKIA: Boehmerwald, Arber, 200 m., *Soehner 773* (Soehner and Dodge).

GERMANY: Marburg, *R. Hesse*, 1886, 1 July, 1890, type of *O. brunnea*, Aug. 19, 1891, 1901 (Upsala); Altmorsehen, *R. Hesse*, 29 March, 1900; also Altmorschen, *R. Hesse*, sub. *O. brunnea* (both Farlow).

ITALY: Lombardia, near Milano, *C. Vittadini*, type (Brit. Mus., Paris); Lucca, *C. E. Broome*, Sept. 1846, and spec. no date (Brit. Mus.).

ALGERIA: Oran, *without collector* (Kew).

FRANCE: Ardennes, Florenville, *E. Bommer & M. Rousseau*, type of *O. mutabilis* in Roumeguère, Fung. Sel. Gall. Exsicc. 3159 (Farlow, also specimen ex herb. Bommer in Lloyd Mus. and Dodge); Seine-et-Oise, Montmorency, *E. Boudier* (Lloyd Mus. 5339, and Dodge); Loiret, Gien. *Tulasne*, 1843 (Paris); Loire-et-Cher, Mer, *N. Patouillard* (Farlow); Jura, Lepináy, *N. Patouillard*, Aug. 1913 (Farlow); *L. Quélet* (Upsala); Vandoucourt, *L. Quélet* (Upsala).

ENGLAND: Cornwall, Boconnoc, near Lostwithiel, *C. E. Broome*, Oct. 1848, Oct. 1849 (Brit. Mus.); Devonshire near Chudleigh, Oct. 1845, *C. E. Broome* (Brit. Mus.); *C. E. Broome* (Farlow); ex herb. J. Ralfs (Brit. Mus.); Wiltshire, Bowood, *C. E. Broome*, Oct. 1863 (Brit. Mus., Kew, and Upsala); Hampshire, Lyndhurst, *C. E. Broome*, (Brit. Mus. and Kew).

NEW YORK: Michigan Hollow, near Ithaca, *H. M. Fitzpatrick 9969*, 25 Sept., 1926 (Dodge and Zeller 1543).

MICHIGAN: Ann Arbor, *C. H. Kauffman*, 2 Oct. 1892, *B. B. Kanouse* (both Univ. Mich., Dodge, and Zeller).

NORTH CAROLINA: Cranberry, *R. Thaxter B2H* (Farlow).

TENNESSEE: Burbank, *R. Thaxter B2, H 1* (Farlow).

26a. var. DEPAUPERATA (Tulasne) Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 366. 1935.

Octaviania asterosperma var. *depauperata* Tulasne, Fung. Hypog. 78. 1851.

Octaviania vacua Tulasne, herb. nom.

Illustrations: Tulasne, Fung. Hypog. *pl. 11, f 2.*

Type: Tulasne Herb. at Paris.

This variety differs from the species in having almost no sterile base, basidia linear, obtuse, spores subobovate, appearing transversely striate, rugulose and appendiculate.

Under fallen leaves of *Quercus suber*. Southern France. December to January.

Gymnomyces vesiculosus Coker & Couch, Gast. E. United States & Canada, 23. *pl. 16, 17, 105.* 1928, may belong here but no material has been seen.

FRANCE: Var, Hyères, *Tulasne*, Dec. 1844, type (Paris).

26b. var. HOLOLEUCA (Hesse) Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 366. 1935.

Octaviania asterosperma var. *hololeuca* Hesse, Hypog. Deutschl. **1**: 74. 1891.

Type: location unknown to us, but specimens labeled *Oc-*

taviania asterosperma var. from Marburg, collected and determined by R. Hesse, at Farlow Herb. and at Upsala, agree with Hesse's description in having very small cavities and a thick, silky, white peridium.

Fructifications large, 3–4 × 2–2.5 cm., depressed-globose to reniform; surface felty-fibrillose, light buff to Prout's brown (in alcohol) to Mars brown where touched; peridium 900–1500 μ thick, stupose, of loosely woven, brownish hyphae, about 3 μ in diameter, consistency of felt; sterile base prominent, of large white hyphae, up to 8 μ in diameter; gleba clay-colored to tawny-olive in younger specimens to hazel and Prout's brown in larger specimens, veins large, white; cavities rather large, becoming filled with spores; septa thick, 85–140 μ thick (80–100 μ not including hymenia), of hyaline, stupose, interwoven hyphae about 3 μ in diameter; basidia 2–4-spored, 19–22 × 8 μ; spores 11–14 μ in diameter (15–18 μ with echinulae), appendiculate, dark brown, warted with large echinulae, about 8–12 to the periphery.

GERMANY: Marburg, *R. Hesse*, type (Farlow, under the name *Octaviania asterosperma* Vitt. var.).

27. ARCANGELIELLA BECCARI (Petri) Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 366. 1935.

Clathrogaster Beccari Petri, Malpighia **14**: 126. 1900; Sacc. & Sydow in Sacc. Syll. Fung. **16**: 250. 1902.

Illustrations: Petri, Malpighia **14**: *pl. 2, f. 3–5, 7–9.*

Type: in Bot. Ist. Univ. Firenze and Dodge Herb.

Fructifications spherical to reniform, 1–3 cm. in diameter, raw sienna in alcohol [1934], surface smooth; no sterile base nor columella evident; peridium about 640 μ thick in alcohol, composed of densely tangled hyphae without, and loose periclinal hyphae within, embedded in a gel with lactiferous ducts 7–8 μ in diameter, relatively straight; gleba amber-brown, cavities elongate, radiating from the base which is scarcely more than a thickened peridium; septa about 110 μ thick, the inner 30–40 μ thick, similar to the inner peridium in structure; basidia clavate, 2-spored, about 80 × 11 μ, only the outer half collapsing after the separation of the spore, sterigmata short;

spores 11–15 μ in diameter, spherical with very high ridges, irregularly disposed over the surface, yellow.

Sarawak, Borneo, known only from the type locality.

This species is closest to *A. Gardneri* in spore markings but differs in the spherical spores, thicker peridium, much larger basidia and spores.

BORNEO: Sarawak, Sibu, *O. Beccari*, type (Dodge and Univ. Firenze).

MACOWANITES

Macowanites Kalchbrenner, Grevillea **10**: 107. 1882; DeToni in Sacc. Syll. Fung. **7**: 179. 1888; E. Fischer in Engler & Prantl, Die Nat. Pflanzenfam. I. **1****: 200–300. 1899; Zeller & Dodge, Ann. Mo. Bot. Gard. **6**: 56–59. 1919.

Macowania Kalchbrenner, Gardeners' Chron. N. S. **5**: 785. 1876.—*non Macowania* Oliver in Hooker, Icon. Pl. III. **1**: 49. 1870.

The type species of the genus is *Macowanites agaricinus* Kalchbrenner.

Fructifications subspherical when young, pileate at maturity, epigeous, stipitate, fleshy; peridium covering the top of the pileus only; gleba covering the under surface of the pileus, free to decurrent, composed of irregular anastomosing cavities, more or less radiating from the stipe; basidia 2-spored; spores spherical, echinulate.

1. MACOWANITES AGARICINUS Kalchbrenner, Grevillea **10**: 107. 1882; DeToni in Sacc. Syll. Fung. **7**: 179. 1888; Lloyd, Myc. Notes **7**: 1198. 1923; Zeller & Dodge, Ann. Mo. Bot. Gard. **6**: 58–59. 1919; Verwoerd, S. Afr. Jour. Sci. **22**: 166. 1925.

Macowania agaricina Kalchbrenner in Gardeners' Chron. N. S. **5**: 785. 1876.

Illustrations: Kalchbrenner, Gardeners' Chron. N. S. **5**: 785, *f. 141;* E. Fischer in Engler & Prantl, Die Nat. Pflanzenfam. I. **1****: *f. 148;* Lloyd, Myc. Notes **7**: *pl. 245, f. 2455, 2456.*

Type: South Africa, *MacOwan 1211,* a slice lacking one corner (which is in N. Y. Bot. Gard.) at Kew, a slice in Upsala; two water-color drawings (reproduced in the 'Gardeners' Chronicle') at Kew, showing pileus buffy brown, gleba isabella, stipe

white with cut surface cartridge-buff or a little darker below. These drawings seem to have been based on another specimen, perhaps the one in Upsala, which is much less expanded.

Fructifications hemispheric when young becoming deep infundibuliform, resembling *Cantharellus floccosus* in habit (judging from the dried slice), pileus drying Sayal brown, flesh thick about the depression, abruptly thinning beyond the disc; peridium continuous over the top of the pileus, about 30 μ thick, of compact, thick-walled, periclinal hyphae, flesh of large, loosely woven, thin-walled hyphae with lactiferous ducts; stipes short, merging into the flesh of the pileus, sometimes resembling the tissues in the stipe of *Lycoperdon,* drying Sayal brown; gleba decurrent, deep olive-buff with snuff-brown septa, cavities contorted, empty, open below; septa variable in thickness, similar to the flesh in texture; basidia clavate, 2–4-spored, soon collapsing; spores ellipsoidal to subspherical, echinulate, asymmetrically placed on the sterigma as in the Hymenomycetes, 11–12 μ in diameter.

Known only from the type collection.

South Africa: Somerset East, *MacOwan 1211,* type (Kew and Upsala).

2. Macowanites magnus Parks in Zeller & Dodge, Ann. Mo. Bot. Gard. **22**: 369. 1935.

Type: in Univ. Cal. Herb.

Fructifications 3–14 cm. broad, resembling a stout agaric or *Boletus,* cap irregular, at first conic then expanded and almost plane, margins irregular to sinuate, surface smooth, viscid, pale tan to dark brown when fresh, drying fawn-brown to army-brown or cinnamon-buff; stipe short, thick, central, up to 3 cm. thick, 3–7 cm. long, white, brittle, hollow-stuffed, bulbose at base, abruptly attenuated below bulb, subglabrous to innate-fibrillose, homogeneous inside, of longitudinal, meshy fibrillae of fine hyphae; gleba white at first, drying warm buff with vinaceous tints, spongy as in *Gautieria morchelliformis,* expanded, more or less radiating from the center of the pileus, free to adnexed, exposed below, covered by a peridium above, cavities large, labyrinthiform; peridium duplex, about 250–380 μ thick, inner layer 150–250 μ thick, loosely stupose with ropy strands