A Taxonomic Analysis of Section Athele of the Genus Corticium. I. Genus Xenasma

Anthony E. Liberta

A TAXONOMIC ANALYSIS OF SECTION ATHELE OF THE GENUS CORTICIUM. I. GENUS XENASMA [1]

Anthony E. Liberta [2]

(with 20 figures)

C. H. Persoon, in 1794, erected the genus *Corticium,* describing it in the terms "pileo obliterato, hymenio effuso resupinato toto adnexo." In 1796, he expanded the generic description to "effusum, substantia varium, totum adnexum; pileus inconspicuus, obliteratus, hymenium hinc resupinatum laeviusculum, papillisque obtutum." S. F. Gray's transfer of *Thelephora quercina* Pers. to *Corticium* amounted to typification of the genus in 1821.

In 1879, M. C. Cooke created a nomenclatural problem when he based his genus *Peniophora* on the type of *Corticium.* In addition, the acceptance of *Peniophora* and the enlargement of the concepts of this genus by most later workers led to the placing of cystidiate forms in *Peniophora,* and noncystidiate forms in *Corticium.* Other characteristics which might have been of greater taxonomic importance were not fully considered, and the result was an agglomeration of unrelated species in both genera.

Bourdot & Galzin (1911) made one of the first attempts to segment *Corticium* by establishing "Groupes" or "Sections," each composed of what seemed to be closely related species. Although not altogether natural, these sections are at least convenient.

One of these sections was section *Athele,* and it was described by Bourdot & Galzin (1928) as follows: "Ceraceous or subpellicular, dry,

[1] Based on a portion of a thesis submitted to the Graduate College of the University of Illinois in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

[2] I acknowledge with deepest gratitude the encouragement and guidance of Dr. Donald P. Rogers. He introduced me to the thelephoraceous basidiomycetes and made available his accumulated materials. Special thanks are extended to Dr. Luella K. Weresub for critically reading the manuscript. Material for this study was borrowed from the herbaria of the Museum National d'Histoire Naturelle in Paris, the Farlow Herbarium at Harvard, the Royal Botanic Gardens at Kew, the University of Toronto, Dr. John Eriksson, and Dr. D. P. Rogers.

adherent, trama formed of few hyphae, short or more often indistinct; spores generally clinging together in groups of 2–4, species living especially on dry wood or herbaceous debris, rarely on very decayed wood. The hyphae are fairly distinct in the first five species, generally indistinct in the others."

H. S. Jackson (**1950a**) suggested that the *Peniophora rimicola* group, composed of *P. rimicola* (Karst.) Höhn. & Litsch., *P. pruinosa* (Pat.) Jackson, *P. pulverulenta* (Litsch.) Jackson, and *P. praeterita* Jackson, was closely related to "the more characteristic members" of section *Athele* because of the manner of growth and the method of basidial development. *Corticium Aurora* Berk. & Br., *C. juncicolum* Bourd., *C. filicinum* Bourd., and *C. Lloydii* Bourd. & Galz. were the four species considered by Jackson (**1950b**) as the more characteristic members.

Using the *Peniophora rimicola* group as a nucleus, M. A. Donk (**1957**) erected the genus *Xenasma* with *P. rimicola* as the type species. In the generic description, the hyphae were described as "slender, the walls thin and gelatinised . . . parallel to the substratum, indistinct." The basidia were described as being scattered in the hymenium and "reposing directly on the subicular layer usually with hidden bases (pleurobasidious)."

Pleurobasidia are typically found in species whose basidiocarp consists almost entirely of prostrate hyphae, from which these basidia arise as perpendicular, or lateral, swellings. This type of development results in a two-rooted, or bifurcate, basidial base that lacks a basal septum, and in some instances, additional basal extensions produce a final effect of a several-rooted basidium.

Although Donk included this type of basidium in the generic description of *Xenasma,* he cautioned against overrating its taxonomic significance, reporting that in species which eventually produce a thick hymenium, such as *Peniophora aurantiaca* (Bres.) Höhn. & Litsch., some of the first basidia to form are pleurobasidious while all later basidia develop "normally." A similar condition was described in *Tubulicrinis accedens* (Bourd. & Galz.) Donk by L. K. Weresub (**1957**).

The primary concern of the present analysis has been to restudy section *Athele* and determine which of its members have affinities in the genus *Xenasma.* The combination of characteristics which appear to be taxonomically significant in determining these affinities is: the method of basidial development, the basidial morphology, and the condition of the hyphae. Therefore, as herein delimited, *Xenasma* includes only those species possessing basidia that are produced almost exclusively as lateral extensions of the prostrate hyphae. Such basidia are cylindro-clavate and have a rooted base that lacks a basal septum. In some species now included in the genus, terminal basidia occasionally occur, but these are solitary on short upright hyphae or merely the result of the transformation of an upturned tip of a prostrate hypha into a basidium. In addition, when sterile structures such as cystidia, cystidioles, or gloeocystidia are present, these too are quite often produced as a perpendicular swelling of a prostrate hypha. The hyphae are mostly parallel to the substratum, and although these may be distinct and loosely interwoven when first formed, they either become conglutinate with the walls remaining distinct, or become an amorphous matrix as the result of hyphal wall gelatinization.

Only the members of section *Athele* whose affinities appear to lie in the genus *Xenasma* will be discussed at this time. The remaining members of the section will be considered in a subsequent paper. Several species which have been suggested at one time or other as belonging to either section *Athele* or to *Xenasma* are also discussed at this time.

Drawings were made from slide preparations stained in 0.5 N NH_4OH and Congo Red. This concentration of ammonium hydroxide was found to be quite adequate in promoting swelling of dried material, yet less violent than KOH in its dissolving properties. Melzer's solution was used to determine amyloidity and for study of structures eventually soluble in ammonium hydroxide; sulfuric-benzaldehyde, as recommended by Boidin (**1951**), was used to determine the presence of positively reacting gloeocystidia or test the reaction of previously described gloeocystidia.

Colors given with the initial letter capitalized are in accordance with Ridgway's *Color Standards*. Names of herbaria are abbreviated as in the fourth edition of the *Index Herbariorum,* the brackets indicating the location of the specimens cited. The sign (!!) following a binomial indicates that the type or lectotype was examined, while the sign (!) indicates that authentic material was seen. Brackets ([ ]) around dates are used where a correct date has been substituted for that carried on a title page.

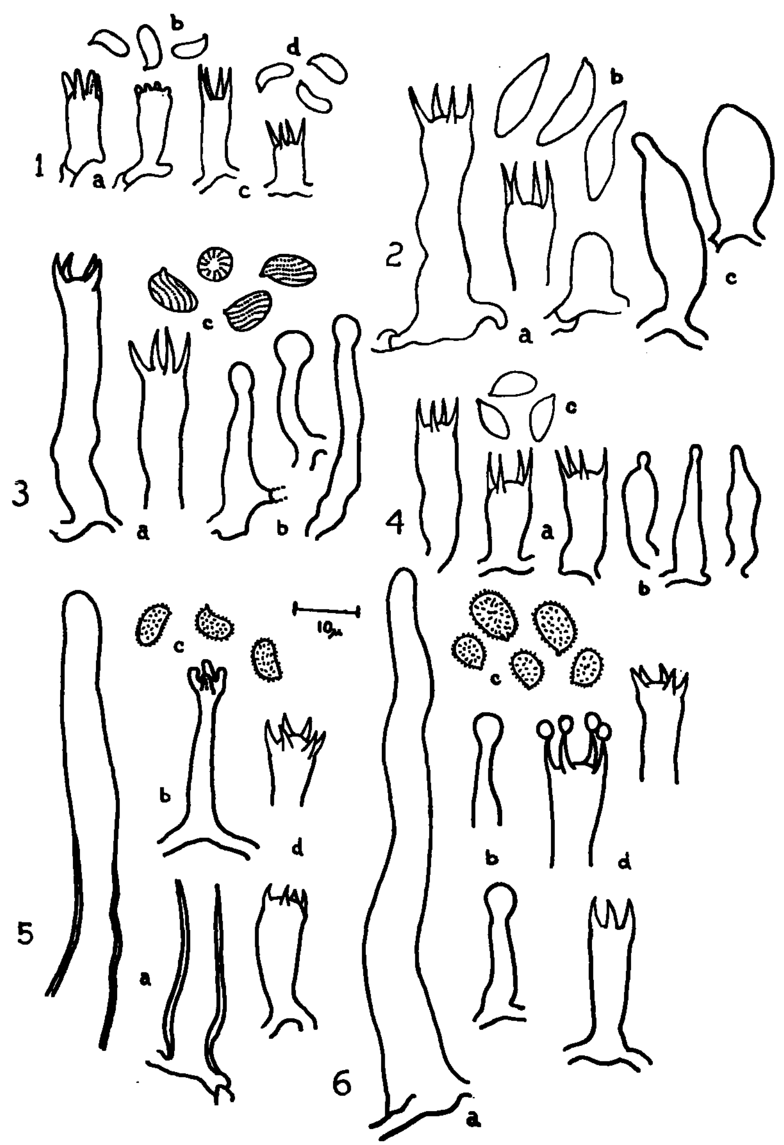
XENASMA Donk, Fungus **27**: 25. 1957.

Fructification resupinate, effused, usually very thin, soft-ceraceous to gelatinous, drying to a vernicose film, under a lens usually appearing pruinose or pulverulent, adnate; subiculum thin to rather thick, composed of indistinct, thin-walled hyphae that are conglutinate, or the walls becoming gelatinized; cystidia, cystidioles, or gloeocystidia present or absent, the walls thin or thick, usually arising as a perpendicular extension of the prostrate hyphae; basidia scattered, cylindrical to subclavate, usually arising as lateral extensions of prostrate hyphae, the base nonseptate, two-rooted or several-rooted (pleurobasidious); sterigmata 2–7; spores hyaline, the wall smooth or roughened, amyloid or nonamyloid.

TYPE: *Peniophora rimicola* (Karst.) Höhn. & Litsch.

KEY TO SPECIES

a. Spores slightly amyloid, ellipsoid to suballantoid or allantoid, 5–6.5 × 2–3.5 μ; basidia 7.5–16(–24) × 4–5(–6) μ........................1. *X. rallum*
a. Spores nonamyloid..b
b. Cystidia, cystidioles, or gloeocystidia present............................c
b. Cystidia, cystidioles, or gleocystidia absent...............................l
c. Gloeocystidia present, staining in sulfuric-benzaldehyde; spores smooth, subclavate, 12–18.5 × 3–4.5 μ..................................2. *X. Aurora*
c. Gleocystidia absent, cystidia or cystidioles present.........................d
d. Cystidia, or both cystidia and cystidioles present...........................e
d. Cystidia lacking, cystidioles present.......................................f
e. Cystidia and cystidioles present..g
e. Cystidia present, cystidioles lacking, the walls of the cystidia thick, lamellate..i
f. Cystidioles capitate; spores ellipsoid, 8–12 × 4.5–6 μ, wall markings in longitudinal spiral lines, not evident in KOH or NH_4OH...3. *X. pulverulentum*
f. Cystidioles with an elongate projection at the apex; spores oblong-ellipsoid to subfusiform, 6–9.5 × 3–4.5 μ, the wall smooth..4. *X. albo-glaucum*
g. Cystidioles lobed at the apex; basidia bearing five to six sterigmata; spores ellipsoid, laterally depressed, 5–7 × 3–4 μ, the spore wall minutely asperulate, the markings not evident in KOH or NH_4OH......5. *X. pruinosum*
g. Cystidioles simple or capitate...h
h. Cystidia with thin walls throughout; basidia bearing three to five sterigmata; spores broadly ellipsoid to subglobose, (5.5–)7–9 × (4.5–) 6–7 μ, the spore wall minutely asperulate, the markings persistent in KOH and NH_4OH..................................6. *X. praeteritum*
h. Cystidia with thickened walls at the base; basidia bearing two to four sterigmata; spores broadly ellipsoid to obovate, (6.5–)8.5–10.5 × (3.5–) 4.5–7 μ, the spore wall minutely asperulate, the markings not evident in KOH or NH_4OH......................................7. *X. rimicola*
i. Cystidial wall externally roughened; paraphysoid hyphae present, with caps of acicular crystals; spores globose to obovate, (4–)5–9 × (4–)4.5–7.5 μ, the wall asperulate..................................8. *X. clematidis*
i. Cystidia usually sheathed in dendritic hyphae; the spore wall smooth..........j
j. Cystidia up to 15 μ broad above the base; spores lunate to falcate, 7.5–14 × 4.5 μ...9. *X. Dussii*
j. Cystidia broader than 15 μ above the base...................................k
k. Spores oblong-cylindrical or oblong-ellipsoid to broadly subnavicular, 12–19 × 4.5–7 μ.......................................10. *X. macrosporum*
k. Spores flexuous navicular, 12–30 × 3.5–5 μ.................11. *X. vermiferum*



FIGS. 1–6.

FIG. 1. *Xenasma rallum,* a: basidia, b: spores, from TRTC 17825; c: basidia, d: spores, from D. P. Rogers 290. FIG. 2. *X. Aurora,* a: basidia, b: spores, c: gloeocystidia, from Bourd. 29765. FIG. 3. *X. pulverulentum,* a: basidia, b: cystidioles, c: spores, from TRTC 23200. FIG. 4. *X. albo-glaucum,* a: basidia, b: cystidioles, from TRTC 17603; c: spores, from TRTC 16288. FIG. 5. *X. pruino-*

l. Basidia bearing two large sterigmata; spores turbinate with five tubercles at the apex, 5–9 × 4.5–8 μ..........................12. *X. ludibundum*
l. Basidia bearing four sterigmata..........................m
m. Spores finely asperulate..........................n
m. Spores smooth..........................p
n. Spores globose or subglobose to obovate, 3.5–6 × 3–6 μ; basidia 9–17 (–20) × 5–8 μ; sterigmata (3–)3.5–6(–9) μ long......13. *X. tulasnelloideum*
n. Spores ellipsoid or ovoid; basidia 6 μ or less in width..........................o
o. Spores ellipsoid, straight on one side, 4–4.5 × 2–2.5 μ; basidia 8.5–13 (–15) × 4–6 μ; sterigmata 1.5–3.5 μ long..........................14. *X. insperatum*
o. Spores ellipsoid or ovoid, occasionally laterally depressed near the apiculus, 4–5 × 2.5–3 μ; basidia 10–14 × 4–5 μ; sterigmata 3.5–8 μ long..........................15. *X. tenuiculum*
p. Fructification Light Brownish Olive; basidia ellipsoid-subcylindrical, externally surrounded by brownish-olive granules; spores oblong-ellipsoid to suballantoid..........................16. *X. Lloydii*
p. Fructification and basidia not as above..........................q
q. Basidia 11–26 × 5–7.5(–8) μ; sterigmata 2.5–6(–8) μ long; spores obovate or broadly ellipsoid to subellipsoid-navicular, 5–10.5 × 3–5 μ....17. *X. filicinum*
q. Basidia 20 μ or less in length..........................r
r. Basidia 13–20 × 5–6 μ; sterigmata 3–4.5 μ long; spores obovate or oblong and abruptly attenuated at the base..........................18. *X. thymicola*
r. Basidia 15 μ or less in length..........................s
s. Spores obovate to broadly oblong-ellipsoid, 5–7(–7.5) × 3.5–4.5(–5) μ; basidia (8–)9.5–14 × (4.5–)5–7 μ..........................19. *X. subnitens*
s. Spores oblong-ellipsoid and laterally depressed to short-allantoid, 4–4.5 × 2.5–3 μ..........................20. *X. grisellum*

1. **Xenasma rallum** (Jackson) Liberta, comb. nov. FIG. 1
Corticium rallum Jackson, Can. Jour. Res. **28**(C): 723, *fig. 8.* 1950(!!).

Fructification effused, thin, in section 20–60 μ thick, gray or bluish-gray to light buff, subceraceous, under a lens appearing waxy-pruinose, closely adnate; subiculum either inconspicuous and giving rise to short, upright, nodulose hyphae, or rather thick and composed of hyphae parallel to the substratum, nodose-septate, 1–2.5 μ in diam, conglutinate or the walls becoming gelatinized; basidia cylindrical to subclavate, the base bifurcate, often obscure, 7.5–16(–24) × 4–5(–6) μ, bearing four erect, subulate sterigmata 4–7.5 μ long; basidiospores hyaline, the wall smooth, weakly amyloid, ellipsoid and laterally depressed to suballantoid or allantoid, 5–6.5 × 2–3.5 μ.

---

sum, a: cystidium and cystidial base, b: cystidiole, c: spores, d: basidia, from V. Litsch. 8.VIII.1929. FIG. 6. *X. praeteritum,* a: cystidium, b: cystidioles, c: spores, d: basidia, from TRTC 17598.

On decayed wood and bark of *Picea sitchensis, Pseudotsuga taxifolia, Tsuga canadensis, Castanea grandidentata, Quercus macrocarpa, Vitis vulpina, Acer,* and *Fraxinus.* Known from British Columbia, Ontario, Iowa, Massachusetts, New York, Oregon, and Rhode Island.

Specimens examined: British Columbia: *W. G. Ziller* (V 4805; DAOM 31868).

Ontario: *H. S. Jackson* (TRTC 17825, 18717 TYPE).

Iowa: *D. P. Rogers 49, 290* (TRTC), *711; L. W. Miller* (D.P.R. 228).

Massachusetts: *D. H. Linder* (D.P.R. 741; FH; TRTC), (D.P.R. 742; FH).

New York: *D.H.L.* (D.P.R. 743; FH).

Oregon: *A. M. & D. P. Rogers 596.*

Rhode Island: *A. M. & D. P. R. 3903* (TRTC).

Although at the present time, this species is the only member of *Xenasma* possessing amyloid spores, it is included because it coincides with other members in all characteristics herein considered to be taxonomically significant. To exclude it would be to ignore these significant features. In Donk's (**1957**) generic description, the spores of *Xenasma* were described as nonamyloid. In the present study, his generic description has been expanded to include the character of spore amyloidity.

The collections from Massachusetts, New York, and Oregon differ somewhat from the type. The spores in these collections are predominantly allantoid rather than ellipsoid with one side depressed, and the basidia are shorter than those of the type. However, the collection from Iowa, *D. P. Rogers 290,* possesses both spore types and both basidial types. Thus, there is little doubt that the collections from Massachusetts, New York, and Oregon are *Xenasma rallum* rather than a separate species.

2. **Xenasma Aurora** (Berk. & Br.) Liberta, comb. nov. FIG. 2

Corticium Aurora Berk. & Br. Outl. Brit. Fungol. p. *276.* 1860 (!!); M. C. Cooke, Handb. Brit. Fungi **1**: 326. 1871; Fries, Hym. Eur. p. 657. 1874; J. Stevenson, Brit. Fungi **2**: 281. 1886; Massee, Linn. Soc. Bot. Jour. **27**: 141. 1890; Höhn. & Litsch., Sitzungsber. K. Akad. Wiss. Wien Math.-Nat. Kl. **115** (Abt. I): 1552. 1906; W. G. Smith, Synop. Brit. Basidio. p. 413. 1908; Bourd. & Galz., Bull. Soc. Myc. Fr. **27**: 251. 1911; Hym. Fr. p. 209. *fig. 62.* 1928; Talbot, Bothalia **6**: 18. 1951.

Corticium juncicolum Bourd., Rev. Sci. Bourb. **23**: 11. 1910 (p. 9 of repr., 1910) (!!); Bourd. & Galz., Bull. Soc. Myc. Fr. **27**: 251. 1911; Hym. Fr. p. 209. *fig. 63.* 1928 (as "subsp." under *C. Aurora*).

Fructification effused, thin, in section 36–60 μ thick, white or Cartridge Buff to Cream Buff, waxy-pruinose or waxy-farinose to waxy-submembranous, the margins pruinose to farinose, adnate; hyphae mostly parallel to the substratum, nodose-septate, 1.5–7 μ in diam, conglutinate or the walls becoming gelatinized; gloeocystidia irregular, staining in sulfuric-benzaldehyde, the base often bifurcate or obscure, up to 37 μ long and 15 μ broad; basidia cylindrical to subclavate, occasionally flexuous, borne directly on the horizontal hyphae, the base bifurcate, often obscure, 24–44.5 × 6–10.5(–12) μ, bearing four slender sterigmata 5–7.5(–8) μ long; basidiospores hyaline, the wall smooth, nonamyloid, subclavate, slightly curved, attenuating gradually toward the base and more abruptly toward the obtuse apex, 12–18.5 × 3–4.5 μ.

On dead leaves and stems of *Juncus effusus* and *Carex*. Known from England and France.

Specimens examined: England: Batheaston, 2.XII.1851 (K), TYPE. France: Mas de Barthe, Aveyron, 5.IX.1909, *Galz. 4480* (Bourd. 7456; PC); Marais de Frégefont, Tarn, 5.IX.1909, *Galz. 4527* (Bourd. 7457; PC); 18.VI. 1910, ex herb Bres. (K); St. Priest, Allier, 17.VII. 1911, *Bourd. 29765* (PC); Mas de Barthe, Aveyron, *Galz. 7128* (TYPE of *C. juncicolum;* PC).

The characteristics which readily distinguish this species from other members of this genus are the large subclavate spores and gloeocystidia, the latter previously undescribed. These gloeocystidia are quite prominent in preparations stained with either ammonium hydroxide and Congo Red or sulfuric-benzaldehyde.

Massee's (**1890**) description of the spores as "ellipsoid, basally apiculate, 10–11 × 7–8 μ" does not agree with the collections studied, either in spore morphology or size. His description led Höhnel & Litschauer (**1906**) to consider *Corticium Aurora* as synonymous with *C. laetum* (Karst.) Bres. The differences between *C. Aurora* and *C. laetum,* both in texture and spore morphology, are discussed by Talbot (**1951**) who, along with Bourdot & Galzin (**1928**), disagrees with the proposed synonymy of Höhnel & Litschauer.

Corticium juncicolum was first described by Bourdot (**1910**) as a distinct species, but its apparent close affinity to *C. Aurora* prompted Bourdot & Galzin (**1928**) to reduce *C. juncicolum* to subspecific rank under *C. Aurora.* This analysis has revealed that *C. juncicolum* coincides with *C. Aurora* in all respects, including the presence of gloeocystidia. Therefore, *C. juncicolum* is herein reduced to synonymy.

Since none of the species originally included in *Xenasma* by Donk (**1957**) possessed gloeocystidia, this character was not included in his generic description. In the present study, the generic description has been expanded to include this character.

3. XENASMA PULVERULENTUM (Litsch.) Donk, Fungus **27**: 25. 1957. FIG. 3

Corticium pulverulentum Litsch., Österr. Bot. Zeits. **88**: 112. *fig. 2.* 1939.

Peniophora pulverulenta (Litsch.) Jackson, Can. Jour. Res. **28**(C): 532. *fig. 3.* 1950 (!); J. Boidin, Rev. de Mycologie, Mémoire hor-séries **6**: 119. *fig. 34.* 1958.

Fructification effused, thin in section 20–30 μ thick, when fresh hyaline to bluish-gray, cartilaginous-gelatinous, drying to a whitish to bluish-gray vernicose film, under a lens the surface appearing pruinose, closely adnate; hyphae parallel to the substratum, nodose-septate, 2–3 μ in diam, conglutinate or the walls becoming gelatinized; cystidioles thin-walled, cylindrical or somewhat subulate, simple or capitate, 16–37 $\times$ 3–3.5(–4) μ, the apical bulb 4.5–5(–6) μ in diam; basidia cylindrical to subclavate, borne directly on the horizontal hyphae, the base bifurcate, very often obscure, 20–42 $\times$ 5.5–8 μ, bearing four arcuate sterigmata 4–5 $\times$ 1.5–2 μ; basidiospores hyaline, the wall bearing longitudinal markings arranged in a broad spiral, the marking evident in Melzer's solution, disappearing in KOH or NH_4OH, nonamyloid, ellipsoid, slightly depressed on one side, 8–12 $\times$ 4.5–6 μ.

On decayed bark and wood of *Fagus grandifolia, Fraxinus excelsior, Tilia americana, Tsuga canadensis, Cornus,* and *Quercus.* Known from Austria, France, and Ontario.

Specimens examined: Ontario: *H. S. Jackson* (TRTC 16698, 17582, 17710, 18656, 19122, 22437, 22438, 23200).

4. **Xenasma albo-glaucum** (Bourd. & Galz.) Liberta, comb. nov. FIG. 4

Corticium albo-glaucum Bourd. & Galz., Bull. Soc. Myc. Fr. **27**: 251. 1911 (!!).

Corticium expallens Bres. var. *albo-glaucum* Bourd. & Galz., Hym. Fr. p. 214. 1928.

Fructification effused or irregularly maculiform, in section 20–130 μ thick, white or Cartridge Buff to Cream-Buff, arid-ceraceous to ceraceous-glaucous, often cracked, under a lens appearing ceraceous-pruinose or ceraceous-pulverulent to occasionally ceraceous-membranous, adnate; hyphae mostly parallel to the substratum, clamp connections rare, 1.5–3.5 μ in diam, conglutinate or the walls becoming gelatinized; cystidioles subcylindrical, subulate, or ventricose-subulate, not projecting or projecting only a few microns, very often bearing a small elongate or spherical projection at the apex, 13.5–24.5 × 3–5(–7.5) μ; basidia cylindrical to subclavate, borne directly on the horizontal hyphae, the base bifurcate, often obscure, or occasionally terminal on short upright hyphae, 12–25 × 4.5–7.5 μ, bearing four slender sterigmata, 3–5(–6) μ long; basidiospores hyaline, the wall smooth, nonamyloid, oblong-ellipsoid to subnavicular or subfusiform, 6–9.5 × 3–4.5 μ, often clinging together in groups of two or four.

On decayed wood and bark of *Salix alba* and *Acer*. Known from France, Ontario, and Ohio.

Specimens examined: France: St. Priest, Allier, 13.VII.1910, *Bourd. 7349* (PC), LECTOTYPE.

Ontario: *H. S. Jackson* (TRTC 16262, 16288, 17445, 17603).

Ohio: *C. G. Lloyd 07372* (TRTC 18115).

This species is easily distinguished from other members of *Xenasma* by its cystidioles, which Jackson (**1950b**) considered to be gloeocystidia. However, since these structures occur almost exclusively among the basidia rather than in the subhymenium, their designation as cystidioles seems more appropriate.

The data on the jacket of *Bourd. 7349* are identical to those given at the time the species was originally described. In addition, a later notation made on the jacket by Bourdot in 1920 indicated that this species had not been collected again. Therefore, *Bourd. 7349* is herein designated lectotype.

5. XENASMA PRUINOSUM (Pat.) Donk, Fungus **27**: 25. 1957; M. P. Christiansen, Dansk Bot. Arkiv **19**(2): 103. *fig. 90.* 1960. FIG. 5

Corticium pruinosum Pat., Cat. Rais. Pl. Cell. Tunisie p. 60. 1897 (!!); Sacc. & Syd., Syll. Fung. **14**: 222. 1899.

Peniophora chordalis Höhn. & Litsch., Sitzungsb. K. Akad. Wiss. Wien Math.-Nat. Kl. **115** (Abt. I): 1598. *fig. 4.* 1906 (!!); Wiesner-Festschr. p. 71. 1908; Bourd. & Galz., Bull. Soc. Myc. Fr. **28**: 382. [1913]); Hym. Fr. p. 280. 1928; Litsch., in Pilat & Lindtner, Bull. Soc. Sci. Skoplje Sect. Sci. Nat. **18**: 184. 1938; Österr. Bot. Zeits. **88**: 115. 1939.

Peniophora subgelatinosa Litsch., Österr. Bot. Zeits. **77**: 128. 1928.
Peniophora pruinosa (Pat.) Jackson, Can. Jour. Res. **28**(C): 530. *fig. 2.* 1950 (!!); J. Boidin, Rev. de Mycologie, Mémoire hors-série **6**: 118. *fig. 33.* 1956; A. Slysh, Syracuse Univ. Tech. Publ. **#83**: 22. *fig. 8.* 1960.

Fructification, effused, thin, in section 30–45 μ thick, grayish, when fresh cartilaginous-gelatinous, drying to a bluish-gray to gray vernicose film, under a lens the surface appearing pruinose, closely adnate; hyphae parallel to the substratum, nodose-septate, 2–3 μ in diam, conglutinate or the walls becoming gelatinized; cystidia cylindrical or slightly subulate, the walls thin above, thickened below, the base often bifurcate, 60–100 × 4–7(–9.5) μ; cystidioles sparse, often devoid of cytoplasm and only the partially collapsed walls remaining, cylindrical or somewhat subulate, simple, capitate, or with three to five blunt lobes, 20–60 × 2.5–3.5 μ; basidia cylindrical to subclavate, borne directly on the horizontal hyphae, the base bifurcate, often obscure, 15–25 × 6–8 μ, bearing (4–)5–6(–7) short sterigmata 3–3.5 μ long; basidiospores hyaline, the wall minutely asperulate, the asperulations evident in Melzer's solution, disappearing in KOH or NH_4OH, nonamyloid, ellipsoid, laterally depressed, 5–7 × 3–4 μ.

On decayed wood and bark of *Fagus sylvatica, Platanus occidentalis, Populus, Quercus, Salix caprea,* and conifer (*Pinus*?). Known from Brazil, Austria, Denmark, France, Yugoslavia, South Africa, Tunisia, and New York.

Specimens examined: Austria: *V. Litsch. 27* (as *P. pruinosa;* TRTC); in der Grossen Klause bei Aspang, Nieder-Österreich, Wechsel, 2.VI.1906 (TYPE of *P. chordalis;* FH).

Tunisia: El Fedja, I.1893, *N. Patouillard* (TYPE of *C. pruinosum;* FH).

New York: King's Ravine, N. of Frontenac Point, W. side Cayuga Lake, 8.VIII.1937, *H. S. Jackson* (TRTC).

6. XENASMA PRAETERITUM (Jackson) Donk, Fungus **27**: 25. 1957. FIG. 6

Peniophora praeterita Jackson, Can. Jour. Res. **28**(C): 533. *fig. 4.* 1950 (!!); A. Slysh, Syracuse Univ. Tech. Publ. **#83**: 21. *fig. 6.* 1960.

Fructification effused, thin, in section 20–30 μ thick, when fresh hyaline or bluish-gray, cartilaginous-gelatinous, drying to a whitish vernicose film, under a lens the surface appearing pruinose, closely adnate; hyphae parallel to the substratum, nodose-septate, 1.5–2.5 μ in diam, conglutinate or the walls becoming gelatinized; cystidia numerous, subcylindrical, somewhat flexuous, thin-walled, the base often bifurcate, 48–92 × 6–11 μ; cystidioles few, cylindrical or capitate, the base often bifurcate, 12–25 × 3–5 μ, the apical bulb 4–5 μ in diam; basidia cylindrical to subclavate, borne directly on the horizontal hyphae, the base bifurcate, very often obscure, 18–25 × 6–8.5 μ, bearing three to five divergent, subulate sterigmata, 4.5–5 × 1.5 μ; basidiospores hyaline, the wall prominently asperulate, nonamyloid, broadly ellipsoid to subglobose, 5.5–9 × 4.5–7.5 μ.

On decayed deciduous wood and bark—*Acer, Betula, Populus, Salix,* and *Ulmus americana.* Known from Ontario, Connecticut, and Illinois.

Specimens examined: Ontario: *R. F. Cain* (TRTC 13713, 13714, 13715, 13716, 15126, 15184, 17595, 17596, 17597 TYPE, 17598, 17599).

Illinois: Brownfield Woods, Urbana, 6.VIII.1960, *A. E. Liberta 202* (ILL; TRTC); 19.IX.1960, *A. E. L. 203, 205* (ILL; TRTC).

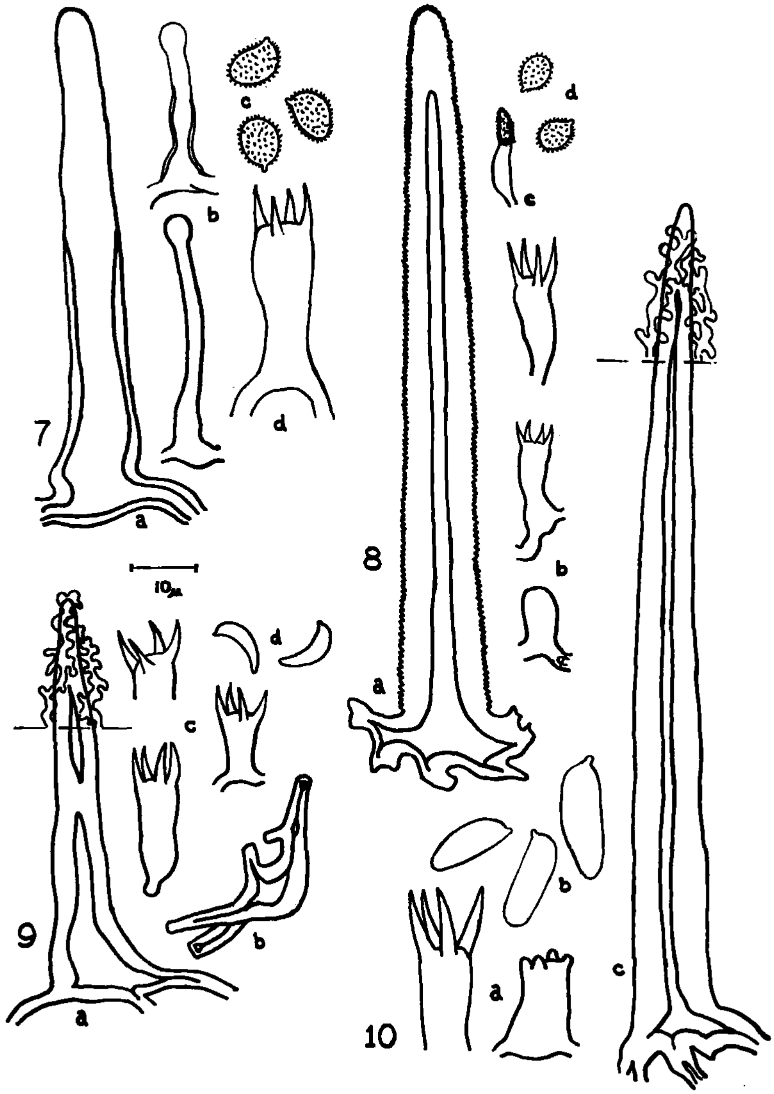
This species is easily distinguished by its thin-walled cystidia and asperulate spores which do not become smooth in KOH or NH_4OH.

7. XENASMA RIMICOLA (Karst.) Donk, Fungus **27**: 26. 1957. FIG. 7

Corticium rimicolum Karst., Hedwigia **35**: 45. 1896 (!); Bidr. Känned Finl. Nat. Folk **62**: 93. 1903; Sacc. & Syd., Syll. Fung. **14**: 221. 1899.

Peniophora rimicola (Karst.) Höhn. Litsch., Sitzungsber. K. Akad. Wiss. Wien Math.-Nat. Kl. **115** (Abt. I): 1556. 1906 (!); Bourd. & Galz., Hym. Fr. p. 281. 1928; Rogers, Univ. Iowa Studies Nat. Hist. **17**: 31. *fig. 16.* 1935; Jackson, Can. Jour. Res. **28**(C): 527. *fig. 1.* 1950; Cunningham, Trans. Roy. Soc. New Zealand **83**: 288. *fig. 21.* 1955; A. Slysh, Syracuse Univ. Tech. Publ. #**83**: 22. *fig. 7.* 1960.

Fructification, effused, thin, in section 20–50 μ thick, when fresh hyaline or bluish-gray, sometimes yellowish in older portions, cartilaginous-gelatinous, drying to a whitish gray semitransparent vernicose film, under a lens the surface appearing pruinose, sometimes with fertile strands extending over the surface or at the margins, closely adnate; hyphae parallel to the substratum, nodose-septate, 1.5–2.5 μ in diam, conglutinate or the walls becoming gelatinized; cystidia cylindrical to slightly subulate, the base often bifurcate, walls thin above, thickened below, 50–125 × 10–15 μ, the thickened portions remaining as tubules in old collections; cystidioles cylindrical or subclavate, simple or capitate, 24–37 × 2.5–3.5 μ, the bulb at the apex 3–5 μ in diam; basidia cylindrical to subclavate, borne directly on the horizontal hyphae, the base bifurcate, very often obscure, 15–24(–29.5) × 7–8 μ, bearing two



FIGS. 7–10.

FIG. 7. *Xenasma rimicola,* a: cystidium, b: cystidioles, c: spores, d: basidium, from type of *Corticium rimicolum.* FIG. 8. *X. clematidis,* a: cystidium, b: basidia, c: incrusted paraphysoid hypha, d: spores, from Galz. ex herb. Bres. FIG. 9. *X. Dussii,* a: cystidium with a portion of the hyphal sheath, b: cystidial base, c: basidia, d: spores, from type of *Peniophora vermicularis.* FIG. 10. *X. macrosporum,* a: basidia, b: spores, c: cystidium with a portion of the hyphal sheath, from type.

to four short, arcuate sterigmata 3–4.5 × 1.5 μ; basidiospores hyaline, the wall finely asperulate, the asperulations evident in Melzer's solution, disappearing in KOH or NH_4OH, broadly ellipsoid to obovate, slightly depressed on one side with a lateral apiculus, (6.5–)8.5–10.5 × (3.5–) 4.5–7 μ.

On *Fomes conchatus,* stems of *Rubus,* wood and bark of *Acer macrophyllum, Populus tremuloides, Quercus Garryana, Alnus, Fraxinus, Salix,* and *Ulmus.* Known from Finland, France, Sweden, Brazil, New Zealand, British Columbia, Ontario, Missouri, Oregon, and Washington.

Specimens examined: Finland: Mustalia, *P. Karsten* (as *C. rimicolum;* FH).

Brazil: Sao Leopoldo, IX.1932, *J. Rick* (as *Tulasnella metallica* Rick; MO 71742, in herb. D. P. Rogers).

Ontario: *H. S. Jackson* (TRTC 12499, 18213, 19121, 20554, 20667).

Missouri: *A. M. Rogers 818, 819.*

Oregon: *A. M. & D. P. Rogers 731, 817.*

The texture and cystidia of this species are very similar to the texture and cystidia of *Xenasma pruinosum.* However, the cystidioles of *X. rimicola* are simple or capitate in contrast to the lobed cystidioles of *X. pruinosum,* and the spores of the former are larger than those of the latter. In addition, the basidia of *X. rimicola* bear two to four sterigmata while those of *X. pruinosum* bear four to seven sterigmata.

8. **Xenasma clematidis** (Bourd. & Galz.) Liberta, comb. nov. FIG. 8

Peniophora clematitis (sic) Bourd. & Galz., Bull. Soc. Myc. Fr. **28**: 383. [1913]; Hym. Fr. p. 286. *fig. 84.* 1928 (!); J. Boidin, Ann. Univ. Lyon Sci. Nat. **10**(C): 29. *fig. 1.* 1958; as *P. clematidis,* Sacc., Syll. Fung. **23**: 535. 1925; Jackson, Can. Jour. Res. **28**(C): 716. 1950.

Peniophora abietis Bourd. & Galz. (as "subsp." under *P. aegerita* Höhn. & Litsch.), Bull. Soc. Myc. Fr. **28**: 383. [1913]; Sacc., Syll. Fung. **23**: 535. 1925; as species, Bourd. & Galz., Hym. Fr. p. 286. 1928; J. Eriks., Sv. Bot. Tidskr. **48**: 193. 1954; Donk, Fungus **26**: 15. 1956; M. P. Christiansen, Dansk Bot. Arkiv **19**(2): 136. *fig. 128.* 1960; A. Slysh, Syracuse Univ. Tech. Publ. #**83**: 56. *fig. 48.* 1960.

Peniophora gladiola Cunn., Trans. Roy. Soc. New Zealand **83**: 283. *fig. 22.* 1956 (!).

Fructification effused or maculiform, thin, in section 30–50 μ thick, grayish-white, porous or closely reticulate, hispid, adherent; hyphae mostly parallel to the substratum, nodose-septate, 1.5–3 μ in diam, conglutinate and often surrounded by acicular crystals, or the walls becoming gelatinized; cystidia conical, perpendicular to the horizontal hyphae, the base several-rooted, the walls thick, lamellate, the outer layer roughened, the inner layer strongly pseudoamyloid in Melzer's solution, 75–225 × (6.5–)10–17 μ; paraphysoid hyphae with caps of acicular crystals often abundant in the hymenium, arising as perpendicular branches of the horizontal hyphae; basidia cylindrical to subclavate, borne directly on the horizontal hyphae, the base bifurcate or several-rooted, often obscure, or occasionally terminal on short upright hyphae and subtended by a clamp, 10–26 × (4.5–)5–9 μ, bearing two to four stout sterigmata 6.5–9 × 1.5–2.5 μ; basidiospores hyaline, the wall asperulate, nonamyloid, globose to obovate, (4–)5–9 × (4–)4.5–7.5 μ.

On decayed wood of *Clematis Vitalba,* bark of *Hedycarya arborea, Brachyglottis repanda, Weinmannia racemosa,* and conifer—*Tsuga.* Known from Denmark, France, New Zealand, Ontario, and New York.

Specimens examined: France: Aveyron, Galz. (ex Bres. ex orig. exs.; NY; TRTC).

Ontario: *R. F. Cain* (TRTC 16312); *H. S. Jackson* (TRTC 17593), both as *P. abietis.*

New Zealand: *J. M. Dingley* (as *P. gladiola;* N.Z.P.D.D. herb. no. 11444; TRTC).

This species has been critically studied and discussed by L. K. Weresub (**1957**) and J. Boidin (**1958**). Weresub suggested that it might be related to such taxa as *Corticium insperatum* Jackson and *C. pseudotsugae* Burt. Both of these species have already been transferred to *Xenasma,* the former by Donk (**1957**) and the latter by J. Eriksson (**1958**).

X. clematidis is easily recognized by its long, thick-walled cystidia with a roughened outer wall, asperulate spores, and paraphysoid hyphae which are capped with acicular crystals.

Weresub's proposed synonymy has been accepted in this analysis.

9. **Xenasma Dussii** (Pat.) Liberta, comb. nov. FIG. 9

Hypochnus Dussii Pat., Bull. Soc. Myc. Fr. **15**: 202. 1899; Sacc., Syll. Fung. **16**: 197. 1902.

Epithele Dussii (Pat.) Pat., Essai tax. p. 59. 1900 (!!); Duss, Fl. Crypt. Ant. Fr. p. 226. 1903; Burt, Ann. Missouri Bot. Gard. **6**: 265. 1920.

Peniophora Dussii (Pat.) Höhn. & Litsch., Sitzungsber. K. Akad. Wiss. Wien Math.-Nat. Kl. **116**: 749. *fig. 2.* 1907.

Peniophora vermicularis Wakef., Kew Roy. Bot. Gard. Bull. **1915**: 371. *fig*. v. 1915 (!!); Sacc., Syll. Fung. **23**: 540. 1925; G. H. Cunningham, Trans. Roy. Soc. New Zealand **83**: 287. *fig*. *25*. 1955.

Fructification maculiform, thin, in section 25–35 μ thick, white, forming a thin film over the substratum, under a lens appearing pruinose and prominently hispid, easily separable; hyphae mostly parallel to the substratum, nodose-septate, 2–2.5 μ in diam, conglutinate or the walls becoming gelatinized; cystidia conical, perpendicular to the horizontal hyphae, the base several-rooted, the walls thick, lamellate, the outer layer coated with scattered crystals or more often sheathed by delicate dendritic hyphae about 1 μ in diam, 55–100 × 8.5–15 μ; basidia cylindrical to subclavate, somewhat sinuate, borne directly on the horizontal hyphae. The base bifurcate, often obscure, or terminal on short upright hyphae and subtended by a clamp, 12.5–17 × 5–6 μ, bearing four arched sterigmata, 3.5–5 × 1.5 μ; basidiospores hyaline, the wall smooth, non-amyloid, lunate to falcate, 7.5–14 × 2.5–3.5 μ.

On dead stipes of tree ferns—*Cyathea medullaris, Hemitelia smithii,* and *Alsophila aspera.* Known from Colombia, Guadeloupe, and New Zealand.

Specimens examined: Colombia: *G. W. Martin 3657* (as *P. Dussii;* IA; DAOM 72146).

Guadeloupe: Tannes, 1899, *C. Duss* (Pat. 3, TYPE of *E. Dussii;* NY; FH).

New Zealand: Whakarewarewa, 1914, *W. N. Cheesman* (TYPE of *P. vermicularis;* K).

This species is easily recognized by its conical, thick-walled cystidia that are sheathed in dendritic hyphae, and lunate to falcate spores.

The synonymy proposed by Weresub (1957) has been confirmed in the present study. The method of basidial development, the rooted base of the cystidia, and the conglutinate or gelatinized condition of the hyphae indicate the close affinity of this species with other members of *Xenasma.*

10. **Xenasma macrosporum** Liberta, sp. nov. FIG. 10

Fructificatio effusa, tenuissima, in sectione 30–50 μ crassa, alutacea, cereo-pruinosa, sub lente hispida; hyphae haud clarae, glutinosae, substrato parallelae, nodose-septatae, 1.5–2 μ diam; cystidia conica, basi multo-radicosa, tunica crassa, lamellata, extus a hyphis dendriticis circumtexta, c. 1 μ diam, lamina interiore ad basim pseudoamyloidea, 125–164 × 9.5–22.5 μ; basidia cylindracea vel subclavata, basi biradicosa, haud clara, interdum terminalia et haud radicosa ansa subtenta, 16.5–22.5 × 5–9.5 μ; sterigmata 4, crassa, 9–11 × 2 μ gerentia; basidiosporae hyalinae, tunica tenui, levi, haud amyloidea indutae, oblongo-cylindraceae, oblongo-ellipsoideae, vel late subnaviculares, 12–19 × 4.5–7 μ.

Fructification effused, thin, in section 30–50 μ thick, Cartridge Buff to Cream Color, waxy-pruinose, under a lens appearing hispid, adnate; hyphae mostly parallel to the substratum, nodose-septate, 1.5–2 μ in diam, conglutinate or the walls becoming gelatinized; cystidia conical, perpendicular to the horizontal hyphae, the base several-rooted, the walls thick, lamellate, externally sheathed by delicate dendritic hyphae approximately 1 μ in diam, the inner lamella strongly pseudoamyloid in Melzer's solution, especially near the rooted base, 125–164 × 9.5–22.5 μ; basidia cylindrical or subclavate, borne directly on the horizontal hyphae, the base bifurcate, very often obscure, or less often terminal on short upright hyphae and subtended by a clamp, 16.5–22.5 × 7–9.5 μ, bearing four stout sterigmata 9–11 × 2 μ; basidiospores hyaline, the wall thin, smooth, nonamyloid, oblong-cylindrical or oblong-ellipsoid to occasionally subnavicular, 12–19 × 4.5–7 μ.

On decayed wood. Known from Panama.

Specimen examined: Panama: Prov. Chiriqui: Valley of upper Rio Chiriqui Viejo, 1600–1800 m, 28.VI.1935, *G. W. Martin 2097* (IA; D. P. Rogers; A. E. Liberta), TYPE.

Although the description of this species is based upon a single collection, the size and morphology of the spores readily distinguish it from previously described species having thick-walled cystidia sheathed in dendritic hyphae. Its affinities appear to lie in *Xenasma* for the same reasons as cited under *X. Dussii.*

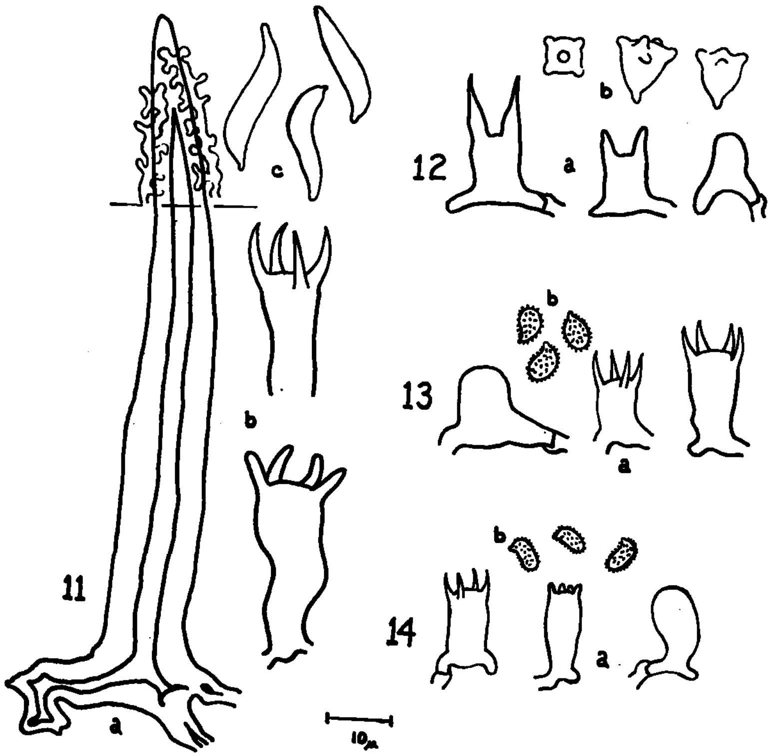
11. **Xenasma vermiferum** (Bourd.) Liberta, comb. nov. FIG. 11

Peniophora vermifera Bourd., Rev. Sci. Bourb. **23**: 13. 1910 (p. 11 of repr., 1910) (!); Sacc., Syll. Fung. **21**: 408. 1912; Bourd. & Galz., Bull. Soc. Myc. Fr. **28**: 384. [1913]; Hym. Fr. p. 285. 1928; Weresub, Can. Jour. Bot. **31**: 773. *fig. 9.* 1953; G. H. Cunningham, Trans. Roy. Soc. New Zealand **83**: 286. *fig. 24.* 1955; Donk, Fungus **26**: 14. 1956.

Peniophora subglebulosa Höhn. & Litsch., Sitzungsber. K. Akad. Wiss. Wien Math.-Nat. Kl. **116**: 823. *fig. 10.* 1907; Sacc., Syll. Fung. **21**: 408. 1912; Bourd. & Galz., Hym. Fr. p. 286. 1928 (fide Weresub, p. 143, 1957).

Tubulicrinis vermifera (Bourd.) M. P. Christiansen, Dansk Bot. Arkiv **19**(2): 136. *fig. 127.* 1960.

Fructification effused or maculiform, in section up to 200 μ thick, white or cream to Buff Yellow, arid crustaceous, smooth or cracked, under a lens the surface appearing densely hispid, adherent; hyphae mostly parallel to the substratum, nodose-septate, 1.5–2.5 μ in diam, conglutinate or the walls becoming gelatinized; cystidia conical, perpendicular to the horizontal hyphae, the base several-rooted, the walls thick, lamellate, externally covered with a roughened crystalline shell or more



FIGS. 11–14.

FIG. 11. *Xenasma vermiferum,* a: cystidium with a portion of the hyphal sheath, b: basidia, c: spores, from Galz. 1911 ex herb. Bres. FIG. 12. *X. ludibundum,* a: basidia, b: spores, from type. FIG. 13. *X. tulasnelloideum,* a: basidia, b: spores, from V. Litsch. 12.VII.1927. FIG. 14. *X. insperatum,* a: basidia, b: spores, from type.

often sheathed by dendritic hyphae approximately 1 μ in diam, 75–185 $\times$ 10–25 μ; basidia sinuately cylindrical to subclavate, borne directly on the horizontal hyphae, the base bifurcate, often obscure, or occasionally terminal on short upright hyphae and subtended by a clamp, 20–45 $\times$ (5–)8.5–11.5 μ, bearing four divergent, arcuate sterigmata 6.5–7.5

(–10.5) × 2.5 μ; basidiospores hyaline, the wall smooth, nonamyloid, flexuous navicular, pointed at both apices, but broader at the apiculate end, (10–)15–25(–30) × (3–)4–5.5 μ.

On stems and decayed wood or bark of *Dysoxylum spectabile, Erica arborea, E. cinerea, Gaultheria shallon, Metrosideros lucida, Olearia furfuracea, Pseudopanax crassifolium, Salix cinerea, Senecio rotundifolius,* and *Vitex lucens.* Known from Corsica, Denmark, France, New Zealand, British Columbia, Hawaii, and California.

Specimens examined: France: 1911, *Galz.* (ex Bres.; K).

New Zealand: *S. D. Baker* (N.Z. P.D.D. herb. no. 13737; TRTC).

California: *H. E. Parks 4028* (TRTC).

Hawaii: *D. P. Rogers 1961* (TRTC; BISH).

Christiansen (**1960**) recently transferred this species to the genus *Tubulicrinis* Donk, but Weresub's (**1957**) critical analysis of section *Tubuliferae* of the genus *Peniophora* led her to report that *Peniophora vermifera* was excluded from *Tubulicrinis,* as delimited by her, because it possessed intertwined, mainly horizontal hyphae, sheathed cystidia with a multi-rooted base, and basidia intimately connected with the hyphae. The present analysis has confirmed her report, and on the basis of the characters enumerated above, *P. vermifera* has been herein transferred to *Xenasma.*

12. **Xenasma ludibundum** Rogers & Liberta, sp. nov. FIG. 12

Fructificatio effusa, tenuissima, in sectione 20–30 μ crassa, alba, haud conspicua, sub lente pruinosa vel tenuiter cereo-crustosa; hyphae haud clarae, glutinosae, substrato parallelae, nodoso-septatae, 1.5–3 μ diam; basidia cylindracea vel subclavata, basi biradicosa, haud clara, 6.5–10.5 × 6.5–7 μ, sterigmata 2 crassa, 7–10.5 × 2.25(–3) μ gerentia; basidiosporae hyalinae, tunica tenui, haud amyloidea indutae, turbinatae, tuberculis una apicali atque quattuor in margine faciei superioris insidentibus ornatae, basi prominenter apiculatae, 5–9 × 4.5–8 μ.

Fructification effused, thin, in section 20–30 μ thick, white, forming an inconspicuous film over the substratum, under a lens appearing pruinose to thinly ceraceous-crustaceous, closely adnate; hyphae parallel to the substratum, nodose-septate, 1.5–3 μ in diam, conglutinate or the walls becoming gelatinized; basidia cylindrical to subclavate, borne directly on the horizontal hyphae, the base bifurcate, 6.5–10.5 × 6.5–7 μ, bearing two stout sterigmata 7–10.5 × 2–2.5(–3) μ; basidiospores hyaline, nonamyloid, turbinate with one central and four diagonally arranged tubercles about the periphery of the apex, prominently apiculate at the base, 5–9 × 4.5–8 μ.

On bark of *Quercus* and decayed wood of *Chamaecyparis thyoides.* Known from Massachusetts, Oregon, and Rhode Island.

Specimens examined: Massachusetts: Blue Hill, 31.XI.1935, *D. P. Rogers 4* (FH; TRTC; A. E. Liberta), TYPE.

Oregon: Reedsport, 22.X.1938, *A. M. & D. P. Rogers 973.*

Rhode Island: Exeter, 4.XI.1941, *A. M. & D. P. R. 949.*

X. ludibundum can be immediately recognized by its unique spores and basidia which bear only two large sterigmata. The conglutinate or gelatinized hyphae, the manner of basidial development, and the basidial morphology indicate that the affinities of this species lie in the genus *Xenasma.*

13. XENASMA TULASNELLOIDEUM (Höhn. & Litsch.) Donk, Fungus **27**: 26. 1957; M. P. Christiansen, Dansk Bot. Arkiv **19**(2): 105. *fig. 92.* 1960. FIG. 13

Corticium tulasnelloideum Höhn. & Litsch., Sitzungsber. K. Akad. Wiss. Wien Math.-Nat. Kl. **117** (Abt. I): 1118. *fig. 10.* 1908 (!); Wakef. & Pears., Trans. Brit. Myc. Soc. **8**: 217. 1923; Bourd. & Galz., Hym. Fr. p. 235. 1928; Rogers, Univ. Iowa Studies Nat. Hist. **15**(3): 20. *fig. 27.* 1933; Litsch., in Pilat & Lindtner, Bull. Soc. Sci. Skoplje Sect. Sci. Nat. **18**: 177. 1938; Österr. Bot. Zeits. **88**: 114. 1939; Rogers & Jackson, Farlowia **1**: 292. 1943; G. H. Cunningham, Trans. Roy. Soc. New Zealand **82**: 300. *fig. 16, 16b.* 1954.

Corticium incanum Burt, Ann. Missouri Bot. Gard. **13**: 205. 1926.

Hypochnus tulasnelloideum (Höhn. & Litsch.) Rea, Trans. Brit. Myc. Soc. **12**: 222. 1927.

Tomentella tulasnelloidea (Höhn. & Litsch.) Skovsted, Compt. Rend. Travaux Lab. Carlsberg Ser. Physiol. **25**(1): 14. *fig. 7.* 1950.

Fructification effused, thin, in section 20–60 μ thick, Pallid Mouse Grey or Pale Smoke Grey to Warm Buff, forming a ceraceous film over the substratum or when thicker glaucous or chalky to arid-crustaceous, under a lens appearing waxy-pruinose or minutely porous-reticulate to occasionally raduloid, closely adnate; hyphae mostly parallel to the substratum, nodose-septate, (1–)1.5–2.5 μ in diam, conglutinate or the walls becoming gelatinized; basidia cylindrical to subclavate, borne directly on the horizontal hyphae, the base bifurcate, often indistinct, 9–17(–20) $\times$ 5–8 μ, bearing four subulate sterigmata (3–)3.5–6(–9) μ long; basidiospores hyaline, the wall finely asperulate, nonamyloid, globose or subglobose to obovate and abruptly laterally attenuated at the base, 3.5–6 $\times$ 3–6 μ.

On *Acacia Koa, Agathis australis, Beilschmiedia tawa, Carpinus betulus, Corylus avellana, Dacrydium cupressinum, Fagus grandifolia, F. sylvatica, Fuchsia excorticata, Nothopanax aboreum, Populus tremuloides, Tilia americana, Wintera colorata, Acer, Aleurites, Betula, Hamamelis, Metrosideros, Prunus, Oxylobium, Quercus, Salix, Ulmus,* and decayed coniferous wood and bark—*Pinus strobus* and *Cupressus macrocarpa.* Known from Austria, Denmark, England, France, Sweden, Yugoslavia, Hawaii, New Zealand, British Columbia, Ontario, Quebec, Colombia, Connecticut, Georgia, Iowa, Massachusetts, Missouri, New Jersey, New Hampshire, New York, Ohio, Oregon, and Rhode Island.

Specimens examined: all as *C. tulasnelloideum* unless otherwise cited.

Austria: Lainzer-tiergarten bei Wien, 12.VII.1927, *V. Litsch.* (IA).

Hawaii: *D. P. Rogers 663, 1946, 3184, 3185, 3187; I. A. Abbot & R. Kuykendall* (D.P.R. 662; BISH).

Ontario: *H. S. Jackson* (TRTC 9297); *R. F. Cain* (TRTC 13758).

Colombia: Magdalena: *G. W. Martin 3244* (IA), *3585* (IA).

Iowa: *D. P. Rogers 78* (OSC), *256* (IA; W), *348* (IA, K), *1321* (NY; OC; TRTC; UPS), *3891, 3894* (FH), *3895, 3896* (IA), *3897, 3898, 3899, 3900, 3901, 3902; A. M. & D. P. Rogers 3890;* Iowa City, 6.X.1932, *G. W. Martin* (D.P.R.); Esterville, 15.VII.1932, *H. C. Gilbert* (D.P.R.).

Massachusetts: Blue Hill, Canton, 29.V.1936, *A. M. & D. P. R.* (FH); Waltham, 4.VIII.1936, *G. D. Darker* (D.P.R.); Sharon, 14.XI. 1936, *A. P. D. Piguet* (FH; D.P.R.); Springfield, 18.VIII.1943, *D. P. R. 3908;* Forest Park, Springfield, 19.VIII.1943, *A. M. & D. P. R.;* Great Cedar Swamp, Milton, 15.VII.1942, *A. M. & D. P. R. 3877, 3878, 3879.*

Missouri: *A. M. L. Rogers* (D.P.R. 3909).

New Hampshire: Pequaket, on Piper Trail, 25–26.VII.1941, *D. H. Linder & R. Singer* (FH).

New York: *A. M. & D. P. R. 3880, 3881* (FH).

Ohio: *D. P. R. 3882, 3883, 3884, 3885, 3886, 3887, 3888, 3889.*

Oregon: *D. P. R. 1076* (OSU).

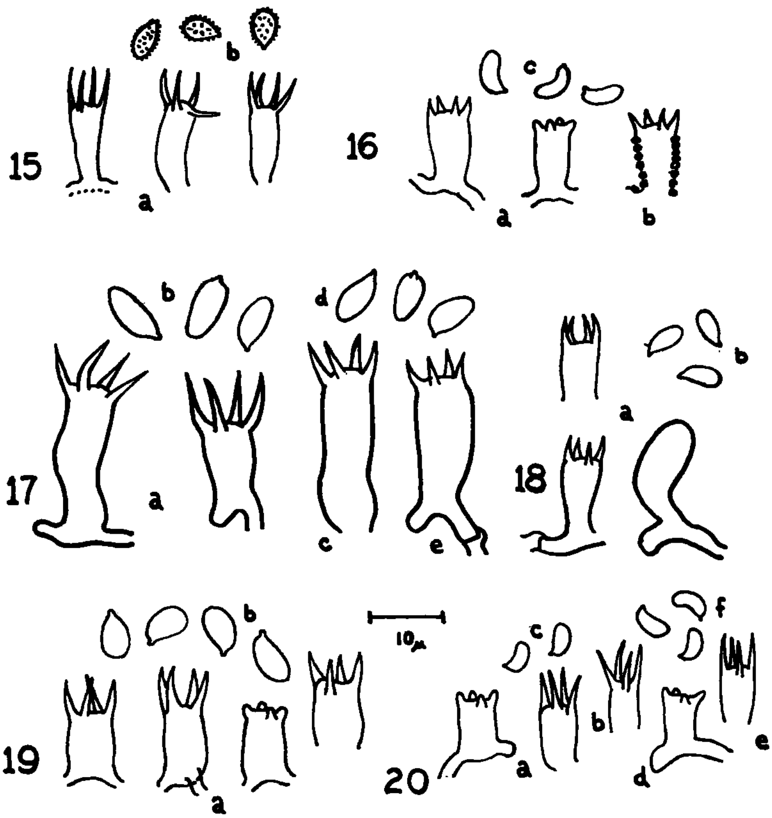
Rhode Island: *D. P. R. 3910; A. M. & D. P. R. 3911, 3912, 3913.*

This species appears to have a wide distribution. It is easily recognized by its finely asperulate spores which are mostly globose or subglobose in contrast to the ellipsoid spores of *Xenasma insperatum* (Jackson) Donk or ovoid-ellipsoid spores of *X. tenuiculum* (Litsch.) J. Eriks.

14. XENASMA INSPERATUM (Jackson) Donk, Fungus 27: 25. 1957.
FIG. 14

Corticium insperatum Jackson, Can. Jour. Res. 28(C): 718. *fig. 2.* 1950 (!!).

Fructification effused, thin, in section 30–45 μ thick, gray to bluish-gray, subceraceous to ceraceous-pruinose, adnate; subiculum meager,



FIGS. 15–20.

FIG. 15. *Xenasma tenuiculum,* a: basidia, b: spores, from type. FIG. 16. *X. Lloydii,* a: basidia, b. basidium with a few incrusting granules, c: spores, from type. FIG. 17. *X. filicinum,* a: basidia, b: spores, from Bourd. 7493; c: basidium, d: spores, from D. P. Rogers 3561; e: basidium, from type of *Corticium pseudotsugae.* FIG. 18. *X. thymicola,* a: basidia, b: spores, from Bourd. 14189. FIG. 19. *X. subnitens,* a: basidia, b: spores, from type. FIG. 20. *X. grisellum,* a, b: basidia, c: spores, from type of *Corticium grisellum;* d, e: basidia, from type of *C. pruina;* f: spores, from Eriks. 3320.

composed of horizontal hyphae which are nodose-septate, 1–2.5 μ in diam, conglutinate or the walls becoming gelatinized, the subhymenium of compact nodulose hyphae 1.5–2.5 μ in diam; basidia cylindrical to subclavate, the base very often bifurcate, 8.5–13(–15) $\times$ 4.5–6 μ, bearing four short sterigmata 1.5–3.5 μ long; basidiospores hyaline, the wall closely and finely asperulate, nonamyloid, ellipsoid and laterally depressed, 4–4.5 $\times$ 2–2.5 μ.

On bark of deciduous branches. Known from Ontario.

Specimen examined: Ontario: *C. G. Lloyd* (BPI 16008; TRTC), TYPE.

15. XENASMA TENUICULUM (Litsch.) J. Eriks., Symb. Bot. Upsal. 16(1): 66. 1958. FIG. 15

Corticium tenuiculum Litsch., Ann. Mycol. 39: 130. *fig. 9.* 1941 (!!).

Fructification irregularly effused, thin, in section 15–30 μ thick, when fresh subhyaline, ceraceous, drying whitish, crustaceous, the margin thinning, under a lens appearing subpruinose, closely adnate; hyphae parallel to the substratum, nodose-septate, 1–2 μ in diam, conglutinate or the walls becoming gelatinized, scattered crystals often present; basidia subcylindrical to subclavate, borne directly on the horizontal hyphae, the base bifurcate, very often obscure, 9.5–13.5 $\times$ 3.5–4.5 μ, bearing four long, slender sterigmata 3.5–7.5(–8) μ long; basidiospores hyaline, the wall densely and minutely asperulate, nonamyloid, ellipsoid or ovoid, occasionally slightly depressed laterally, the base obliquely subacute, 4–5 $\times$ 2.5–3 μ.

On decayed wood of *Fagus*. Known from Sweden.

Specimen examined: Sweden: Småland: Lidhult parish, Gåshult, 15.XII.1910, *L. Romell 3461,* TYPE.

16. **Xenasma Lloydii** Liberta, nom. nov. FIG. 16

Corticium Lloydii Bourd. & Galz., Hym. Fr. p. 210. *fig. 65.* 1928 (!!) (not *C. Lloydii* Bres., 1926).

Fructification effused, thin, in section 20–30 μ thick, Light Brownish Olive, vernicose-crustose, under a lens appearing pruinose, closely adnate; hyphae parallel to the substratum, nodose-septate, 1.5–3.5 μ in diam, conglutinate or the walls becoming gelatinized; basidia surrounded by minute olivaceous granules which give the fructification its color, cylindrical to subclavate, borne directly on the horizontal hyphae, the base bifurcate, very often obscure, 9–12 $\times$ 4.5–6 μ, bearing four short sterigmata 2.5–3 μ long; basidiospores hyaline, the wall smooth, nonamyloid, oblong-ellipsoid and laterally depressed to suballantoid, 5.5–7 × 2.5–3 μ.

On *Pinus* sp. and *Pinus Banksiana.* Known from Sweden and Ontario.

Specimens examined: Sweden: Bygget, 1909, *C. G. Lloyd 09131* (BPI 5211; Bourd. 13776; PC), TYPE.

Ontario: *H. S. Jackson* (TRTC 14621).

This species was placed in section *Athele* by Bourdot & Galzin (**1928**), and was considered to be one of the more typical members of that section by Jackson (**1950b**).

Notations made by Lloyd on the jackets of both the BPI and PC specimens indicate that they are portions of the same collection. Additional notations made by Bourdot indicate that he saw the entire collection.

Bourdot & Galzin described and illustrated the spores of *C. Lloydii* as "oblong-subcylindric, occasionally attenuated at the base, 5–6 × 2.5–3 μ, hyaline, with two deep green polar granules." The structures described as spores, without the aid of an oil immersion lens, are in reality unicellular algae. Although basidiospores are sparse in the type material, a sufficient number was seen to allow their redescription. Therefore, the fungus material of the Lloyd collection, which has been redescribed in the formal description, is designated the type of *Xenasma Lloydii.*

17. XENASMA FILICINUM (Bourd.) M. P. Christiansen, Dansk Bot. Arkiv **19**(2): 106. *fig. 94.* 1960. FIG. 17

Corticium filicinum Bourd., Rev. Sci. Bourb. **23**: 12. 1910 (p. 10 of repr., 1910) (!!); Bourd. & Galz., Bull. Soc. Myc. Fr. **27**: 250. 1911; Hym. Fr. p. 209. *fig. 64.* 1928; G. H. Cunningham, Trans. Roy. Soc. New Zealand **82**: 307. *fig. 23.* 1954.

Corticium pseudotsugae Burt, Ann. Missouri Bot. Gard. **13**: 246. 1926 (!!).

Corticium asserophilum Litsch., Ann. Mycol. **32**: 55. *fig. 2a, b.* 1934 (!).

Xenasma pseudotsugae (Burt) J. Eriks., Symb. Bot. Upsal. **16**(1): 65. 1958 (!); M. P. Christiansen, Dansk Bot. Arkiv **19**(2): 107. *fig. 95.* 1960.

Fructification effused or maculiform, thin to rather thick, in section up to 400 μ thick, when fresh Smoke Gray to Glaucous-Gray, drying white or Light Buff to Warm Buff, glaucous or chalky to ceraceous-crustaceous, smooth or deeply cracked when thick, under a lens appearing as an evenly pruinose surface overlying a vernicose crust, closely adnate; hyphae mostly parallel to the substratum, nodose-septate, 1.5–3.5(–5) μ in diam, conglutinate or the walls becoming gelatinized; basidia cylindrical to subclavate, borne directly on the horizontal hyphae or on short upright hyphae, the base bifurcate, very often obscure, 11–26 × 5–7.5(–8) μ, bearing four straight, slender sterigmata 2.5–6(–8) μ long; basidiospores hyaline, often pluriguttulate, the wall smooth, nonamyloid, obovate or broadly ellipsoid to narrowly or broadly subellipsoid-navicular, i.e., rather broad near the middle and tapering toward the apex and abruptly, laterally toward the apiculus, 5–10.5 × 3–5 μ.

On stems of *Athyrium filix-foemina, Blechnum fraseri, Cyathea dealbata, Hemitelia smithii, Polystichum* (*Dryopteris*) *filix-mas, Pteridium aquilinum, P. esculentum,* and decayed wood of *Pinus rigida, P. strobus, Pseudotsuga taxifolia, Thuja plicata, Tilia americana,* and *Quercus.* Known from Austria, Denmark, France, Sweden, New Zealand, British Columbia, Ontario, Idaho, Massachusetts, New York, Oregon, Pennsylvania, and Rhode Island.

Specimens examined: all as *C. filicinum* unless otherwise cited.

Austria: Tirol, Klosterberg bei Innsbruck, 1.IV.1926, *V. Litsch.* (as *C. asserophilum;* TRTC).

France: Château Charles, Allier, 20.VII.1909, *Bourd. 6810* (PC), LECTOTYPE; Marais de Frégèfont, Tarn, 27.VI.1910, *Galz. 6428* (Bourd. 7453; PC); Le Rec, près St. Sernin, Aveyron, 28.VIII.1911, *Galz. 9917* (Bourd. 18070; K); Massalas, Aveyron, 20.X.1911, *Galz. 9965* (Bourd. 29717; PC).

Sweden: Småland: Varnamo, between Björs and Wörningsnäs, 14.VIII.1959, *J. Eriks.; J. Eriks. 8357* (both as *X. pseudotsugae*).

British Columbia: *I. Mounce F6512* (TRTC).

Ontario: TRTC 12927; *H. S. Jackson* (TRTC 15156) (both as *C. asserophilum*).

Idaho: *E. E. Hubert* (J. R. Weir 11617; TRTC, FH) (TYPE of *C. pseudotsugae*).

Massachusetts: *D. P. Rogers 712; A. M. & D. P. R. 184, 185, 3918, 3920; D. H. Linder,* (D.P.R. 111; FH), (D.P.R. 3914; FH; OC; TRTC), (D.P.R. 3915; FH; OC; UPS; TRTC), (D.P.R. 3916; TRTC), (D.P.R. 3917; FH).

New York: *A. M. & D. P. R. 3921, 3922.*

Oregon: *A. M. & D. P. R. 385, 471, 586* (OSC; FH), *587, 588* (OSC), *589* (TRTC), *590, 591* (OSC), *592, 597* (OSC; TRTC), *599*

(OSC), *700, 709, 710, 2653, 2742, 2743, 2744, 2745, 2746, 2747, 2748, 2950, 3226, 3269, 3300, 3306, 3559, 3560, 3561, 3583, 3592, 3594, 3598, 3602, 3747, 3761* (all four digit numbers at ILL).

Pennsylvania: Pine Hall, Center Co., 1.VIII.1921, *L. O. Overholts & J. C. Donegon* (as *C. asserophilum;* TRTC ex Overholts).

The color and texture of the fructification, the size of the basidia, and the more or less navicular spores make it possible to recognize this species easily.

The American and European collections of *Corticium* (*Xenasma*) *pseudotsugae* on wood and bark agree in color, texture, and basidial morphology with the authentic European material of *C. filicinum* on fern. In the collections on wood and bark, the breadth of the spores is somewhat greater in proportion to the length than in the collections on fern, but the variation in this respect is too great, not only among various collections, but also within single collections, to permit satisfactory separation of *X. pseudotsugae* from *X. filicinum.* Therefore, *X. pseudotsugae* is herein reduced to synonymy.

On the jackets of the two specimens collected prior to or during the year in which *C. filicinum* was first described, sketches or measurements do not appear. Therefore, on the basis of its earlier date of collection, *Bourd. 6810* is designated lectotype.

18. **Xenasma thymicola** (Bourd. & Galz.) Liberta, comb. nov. FIG. 18
Corticium thymicolum Bourd. & Galz. (as "subsp." under *C. gemmiferum*), Hym. Fr. p. 211. 1928 (!).

Fructification effused, in section up to 200 μ thick, Pinkish-Buff to Cinnamon-Buff, arid-crustaceous, under a lens appearing pulverulent to pseudoporous, the surface often cracked, the margins thin, pruinose to vernicose, adnate; hyphae mostly parallel to the substratum, nodose-septate, 1–3 μ in diam, conglutinate and appearing slightly yellow in mass or the walls becoming gelatinized; basidia cylindrical to subclavate, borne directly on the horizontal hyphae, the base bifurcate, very often obscure, 13–20 × 5–6 μ, bearing four slender sterigmata 3–4.5 μ long; basidiospores hyaline, the wall smooth, nonamyloid, obovate to oblong and abruptly attenuated at the base, 4.5–7 × 3–4 μ.

On stems of *Thymus.* Known from France.

Specimen examined: France: près Millau, Aveyron, 8.V.1911, *Galz. 8960, 9081* (Bourd. 14189; PC).

This species may be recognized by its texture and spores, the latter being larger than those of *Corticium grisellum* Bourd., and narrower than those of *C. subnitens* Bourd. & Galz.

Although Bourdot & Galzin (**1928**) originally published *C. thymicolum* in "slanted type" to indicate that it was to be considered a subspecies under *C. gemmiferum,* there appears to be no close relationship between these two taxa. Therefore, *C. thymicolum* is herein given specific rank and transferred to *Xenasma* on the basis of its basidial morphology, its manner of basidial development, and the conglutinate or gelatinized condition of the hyphae.

19. **Xenasma subnitens** (Bourd. & Galz.) Liberta, comb. nov. FIG. 19
Corticium subnitens Bourd. & Galz., Hym. Fr. p. 224. 1928 (!!).

Fructification effused, thin, in section 15–30 μ thick, when dry a nearly invisible bloom to a grayish-white vernicose film, under a lens appearing ceraceous-pruinose, occasionally finely cracked, closely adnate; hyphae parallel to the substratum, nodose-septate, (1–)2.5–4(–5) μ in diam, somewhat irregular, conglutinate or the walls becoming gelatinized; basidia short-cylindrical, borne directly on the horizontal hyphae, the base bifurcate, very often obscure, (8–)9.5–14 × (4.5–)5–7 μ, bearing four erect sterigmata 4–4.5 μ long; basidiospores hyaline, the wall smooth, nonamyloid, obovate to broadly oblong-ellipsoid, 5–7(–7.5) × 3.5–4.5(–5) μ.

On decayed wood of *Pinus, Pseudotsuga taxifolia,* and *Quercus.* Known from France, Iowa, and Oregon.

Specimens examined: France: Causse Noir, Aveyron, XI.1914, *Galz. 16600* (Bourd. 30464; PC), TYPE.

Iowa: Iowa City, 24.X.1931, *D. P. Rogers 3904.*

Oregon: N. Santiam road, N. of Detroit, 5.XI.1938, *A. M. & D. P. R. 598* (FH; OSC; TRTC).

This species is easily recognized by its texture and spore morphology.

Donk's (**1957**) suggestion that *Corticium subnitens* might be related to members of the genus *Xenasma* has been confirmed in the present study and the appropriate transfer made.

Bourdot & Galzin (**1928**) placed this species in group C of section *Ceracea* of *Corticium,* and reported the spores as obovate, 4–5 × 3–4 μ. Examination of the type revealed the presence of occasional oblong-ellipsoid as well as obovate spores, and a spore size that was larger than originally described. In addition, the basidia were found to be mostly short-cylindrical with a bifurcate base rather than obovate.

A sketch and measurements on the jacket of *Galz. 16600* coincide with the measurements given at the time of description. Also, the locale and substratum are identical to those originally reported. Therefore, *Galz. 16600* is herein considered type.

20. **Xenasma grisellum** (Bourd.) Liberta, comb. nov. FIG. 20

Corticium grisellum Bourd., Rev. Sci. Bourb. **1922**: 17. 1922 (p. 6 of repr., 1922) (!!); Bourd. & Galz., Hym. Fr. p. 223. 1928.

Corticium sebacinaeforme Bourd. & Galz., Hym. Fr. p. 224. 1928 (!!).

Corticium pruina Bourd. & Galz., Hym. Fr. p. 224. 1928 (!!).

Xenasma pruina (Bourd. & Galz.) J. Eriks., Symb. Bot. Upsal. **16**(1): 65. 1958 (!); M. P. Christiansen, Dansk Bot. Arkiv **19**(2): 105. *fig. 93.* 1960.

Fructification effused, thin, in section 15–60 μ thick, white or Cartridge Buff to Cream-Buff, subglaucous, under a lens appearing ceraceous-pruinose to gelatinous-membranous, older portions often finely cracked, adnate; hyphae parallel to the substratum, nodose-septate, 1.5–2.5 μ in diam, conglutinate or the walls becoming gelatinized; basidia cylindrical to subclavate, borne directly on the horizontal hyphae, the base bifurcate, often obscure, (6–)7.5–12(–12.5) $\times$ 4–4.5(–5) μ, bearing four slender sterigmata 3.5–5(–6) μ long; basidiospores hyaline, the wall smooth, nonamyloid, short-allantoid to oblong-ellipsoid and laterally depressed, 4–4.5 $\times$ 2.5–3 μ.

On decayed wood and bark of *Alnus, Castanea, Corylus, Juglans,* and *Quercus.* Known from France, Sweden, and Panama.

Specimens examined: France: Aveyron, 28.VIII.1911, *Galz. 9880* (Bourd. 30039; PC); Boutaran, Aveyron, 9.IX.1914, *Galz. 16037* (Bourd. 30049, LECTOTYPE of *C. grisellum;* PC); St. Priest, Allier, 18.VI.1912, *Bourd. 30466* (LECTOTYPE of *C. pruina;* PC); Moncan, Aveyron, 19.III.1912, *Galz. 11077* (Bourd. 8690, LECTOTYPE of *C. sebacinaeforme;* PC).

Sweden: *B. & J. Eriks. 3320* (as *X. pruina*).

Panama: Prov. Chiriqui: Valley of upper Rio Chiriqui Viejo, 1600–1800 m, 28.VI.1935, *G. W. Martin 2070* (as *X. grisellum;* IA; D. P. Rogers; A. E. Liberta).

Although *X. grisellum* closely resembles *X. subnitens* in texture and basidial morphology, the two are easily separated by spore morphology.

In this analysis, *C. pruina, C. sebacinaeforme,* and *C. grisellum* were found to coincide with one another in all respects. In all three species, the spores were of two types: short-allantoid, and ellipsoid with one side depressed. Therefore, *C. pruina* and *C. sebacinaeforme* have herein been reduced to synonymy.

The notations on the jacket of *Galz. 16037* coincide with the measurements given at the time *C. grisellum* was first described. It is therefore designated lectotype. *Bourd. 30466* is designated the lectotype of *C. pruina* for the same reason.

The Bourdot herbarium contains two collections under the name *C. sebacinaeforme*. A fungus quite different from the description of this species was found in one of these collections. The second collection corresponded to the original description and has been therefore designated lectotype.

SPECIES EXCLUDENDAE

As already mentioned in the introduction, the members of section *Athele* that do not have affinities in the genus *Xenasma* will be discussed in a later paper. However, the species of *Xenasma* which have been excluded on the basis of this analysis are discussed below.

XENASMA MINUTUM J. Eriks., Symb. Bot. Upsal. **16**(1): 65. *fig. 13, r–t.* 1958 (!); M. P. Christiansen, Dansk Bot. Arkiv **19**(2): 103. *fig. 91.* 1960.

In all probability, this species was placed in *Xenasma* because of the conglutinate or gelatinized condition of the hyphae. However, the obpyriform basidia with a basal septum are quite different from the nonseptate, rooted, cylindro-clavate basidia of the species herein included in *Xenasma*.

In addition to the type locality, this species has been collected in Quebec, Connecticut, Massachusetts, and Oregon. I tentatively suggest that it be placed temporarily in the genus *Peniophora* until further studies can determine its exact taxonomic position.

XENASMA AURANTIACUM M. P. Christiansen, Dansk Bot. Arkiv **19**(2): 107. *fig. 96.* 1960.

Judging from the description and illustrations of this species, it is not closely related to any of the species herein placed in *Xenasma*. First, the basidia are described and illustrated as occurring in clusters. This type of basidial development is quite different from that found among the members of *Xenasma*. Secondly, the hyphae are illustrated as being quite distinct rather than indistinct in an agglutinated mass.

I tentatively suggest that it be temporarily placed in the genus *Corticium* until its exact affinities can be determined.

XENASMA PYRIFORME M. P. Christiansen, Dansk Bot. Arkiv **19**(2): 108. *fig. 97.* 1960.

This species is excluded from *Xenasma* for essentially the same reasons discussed above under *X. aurantiacum*. The hyphae of *X. pyriforme* are described as "rather distinct," and illustrated to show branching very similar to that found in members of the genus *Pellicularia* Cke. emend. Rogers. In addition, the illustration of the basidia indicates that these structures are produced in heads rather than borne directly on the horizontal hyphae.

SUMMARY

The manner of basidial development, the basidial morphology, and the conglutinate or gelatinized condition of the hyphae were found to be a combination of characters which are taxonomically significant in determining the limits of *Xenasma*. As herein delimited, this genus is considered to be a natural taxon now composed of twenty species. The generic description has been expanded somewhat to include both non-amyloid- and amyloid-spored species, and to include gloeocystidiate species. Three species previously placed in *Xenasma* have been excluded.

DEPARTMENT OF BIOLOGICAL SCIENCES
ILLINOIS STATE NORMAL UNIVERSITY
NORMAL, ILLINOIS

LITERATURE CITED

Boidin, J. 1951. Les réactifs sulfo-aldéhydiques leur intérêt pour la determination et classification des Thelephoracées (Basidiomycetes). Bull. Soc. Nat. Oyonnax **5**: 72–79.

——. 1958. Hétérobasidiomycètes saprophytes et homobasidiomycètes resupines III. *Peniophora clematitis* Bourd. & Galz. Ann. Univ. Lyon **10**(C): 29–40. *fig. 1–3.*

Bourdot, H. 1910. Corticiés nouveaux de la flore mycologique de France. Rev. Sci. du Bourb. et Centre Fr. **23**: 1–15.

Bourdot, H., and A. Galzin. 1911. Hyménomycètes de France III. Bull. Soc. Myc. Fr. **27**: 223–226.

—— **and** ——. 1928. Hyménomycètes de France. **761** pp. *185 figs.* Paris.

Christiansen, M. P. 1960. Danish resupinate fungi II. Homobasidiomycetes. Dansk Bot. Arkiv **19**(2): 63–388. *fig. 1–372.*

Cooke, M. C. 1879. On *Peniophora.* Grevillea **8**: 17–21.

Donk, M. A. 1957. Notes on resupinate Hymenomycetes IV. Fungus **27**: 1–29.

Eriksson, J. 1958. Studies in the Heterobasidiomycetes and Homobasidiomycetes —Aphyllophorales of Muddus National Park in north Sweden. Symb. Bot. Upsal. **16**(1): 1–172. *fig. 1–50. pl. 1–24.*

Gray, S. F. 1821. A natural arrangement of British plants. 824 pp. *21 pl.* Baldwin, Cradock & Joy. London.

Höhnel, F., and V. Litschauer. 1906. Beiträge zur Kenntnis der Corticieen. Sitzungsber. K. Akad. Wiss. Wien Math.-Nat. Kl. **115** (Abt. I) : 1549–1620.

Jackson, H. S. 1950a. Studies of Canadian Thelephoraceae VI. The *Peniophora rimicola* group. Can. Jour. Res. **28**(C) : 525–534. *fig. 1–4.*

——. 1950b. Ibid. VII. Some new species of *Corticium* section *Athele.* Ibid. **28**(C) : 716–725. *fig. 1–9.*

Massee, G. 1890. A monograph of the Thelephoraceae Part II. Linn. Soc. Bot. Jour. **27**: 113–205. *pl. 5–7.*

Persoon, C. H. 1794. Tentamen dispositionis methodicae fungorum. N. Mag. Bot. (Romer) **1**: 81–128. *pl. 1–4.*

——. 1796. Observations mycologicae **1**: 1–116. *pl. 1–5.* Leipzig.

Talbot, P. H. B. 1951. Studies of some South African resupinate Hymenomycetes. Bothalia **6**: 1–116. *pl. 1–48.*

Weresub, Luella K. 1957. A taxonomic analysis of sect. *Tubuliferae* B. & G. of the genus *Peniophora* Cke. Ph.D. thesis. Univ. of Toronto.