

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/237158822>

The psilopezoid fungi. IV. The genus *Pachyella* (Pezizales)

Article in *Canadian Journal of Botany* · January 2011

DOI: 10.1139/b73-262

CITATIONS

16

READS

371

1 author:



Donald Pfister

Harvard University

416 PUBLICATIONS 3,651 CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:



Laboulbeniales taxonomy [View project](#)



Interactions between ants and Laboulbeniales fungi [View project](#)

Canadian Journal of Botany

Published by
THE NATIONAL RESEARCH COUNCIL OF CANADA

Volume 51 Number 11 November 1973

Journal canadien de botanique

Publié par le
CONSEIL NATIONAL DE RECHERCHES DU CANADA

Volume 51 numéro 11 novembre 1973

The psilopezoid fungi. IV. The genus *Pachyella* (Pezizales)¹

DONALD H. PFISTER²

Department of Plant Pathology, Cornell University, Ithaca, New York 14850

Received February 20, 1973

PFISTER, D. H. 1973. The psilopezoid fungi. IV. The genus *Pachyella* (Pezizales). Can. J. Bot. 51: 2009–2023.

Pachyella, characterized by amyloid asci, globose cells in the ectal excipulum, hyphoid hairs, and gelatinous tissue, is treated monographically. A total of six species are discussed. The new combinations *P. adnata*, *P. violaceonigra*, and *P. megalosperma* are proposed and one new species, *P. punctispora*, is described.

PFISTER, D. H. 1973. The psilopezoid fungi. IV. The genus *Pachyella* (Pezizales). Can. J. Bot. 51: 2009–2023.

L'auteur présente un traitement monographique du genre *Pachyella*, qui est caractérisé par des asques amyloides, des cellules globulaires dans la partie externe de l'excipulum, des poils hyphoïdes et un tissu gélatineux. Un total de six espèces sont discutées. Une nouvelle espèce, *P. punctispora*, est décrite et trois nouvelles combinaisons sont effectuées: *P. adnata*, *P. violaceonigra* et *P. megalosperma*.

[Traduit par le journal]

Much of the confusion concerning the genus *Pachyella* Boud. has already been discussed by Pfister (1973a, 1973b). The genus at its inception was listed with 10 European species, most of which were previously described as psilopezias. Though the name was used to some extent in Europe, it was not generally accepted until Le Gal's (1953b) study of the genus. From the original species, Le Gal chose *Peziza barlaeana* Bres. as lectotype of the genus; at that time *Pachyella clypeata* (Schw.) Le Gal was the only other species included.

Le Gal distinguished *Pachyella* from *Psilopezia* Berk., a genus with which *Pachyella* has often been confused, by the amyloid reaction of

the asci of *Pachyella*. These circumscriptions were followed by Gamundi (1964). Later Le Gal (1963) stated, "Le genre *Pachyella* ainsi amendé, se montre si affine aux *Galactimia* qu'il n'y pas lieu de l'éloigner de ces espèces." On this basis, *Pachyella* was synonymized with *Peziza* [Dill.] St-Amans by Eckblad (1968) as it had been previously by Seaver (1928).

Pfister (1973a) has accepted both *Psilopezia* and *Pachyella* and has provided restricted delimitations based on anatomical and histochemical studies of the species. *Psilopezia* has been treated elsewhere (Pfister 1973b).

Pachyella as here delimited includes six species; most of these were originally described in *Peziza*. As suggested by Le Gal (1963), *Pachyella* clearly shows affinities to *Peziza*. Both genera have large globose or subglobose cells in the ectal excipulum. Both genera also have amyloid asci. *Pachyella* differs from *Peziza* in that *Pachyella* possesses gelatinous tissues and hyphoid hairs embedded in gel. These hairs have been considered to be an outer layer of the

¹Presented in part to the Graduate School of Cornell University in partial fulfillment of the Doctor of Philosophy Degree. Supported in part by National Science Foundation grant GB-8548 and a Cornell University Faculty Research grant to Dr. R. P. Korf, a University of Michigan Biological Station grant to the author, and a University of Puerto Rico faculty research grant.

²Present address: Tropical Mycology Laboratory, Department of Biology, University of Puerto Rico, Mayaguez, Puerto Rico, 00708.

excipulum by some authors (Eckblad 1968). Another distinction can be made on the basis of the ascus reaction in iodine solution. The asci of *Pachyella* are diffusely amyloid while those of *Peziza* generally have an apical amyloid ring. In species of both genera, the flesh of the apothecium sometimes becomes discolored when broken. The value of this characteristic in differentiating species of *Pachyella* is not known, since several of the species have not been seen in fresh condition.

Undoubtedly there remain species of *Pachyella* masquerading as pezizas. Because *Peziza* is a large, difficult genus, these species will probably remain concealed until comprehensive monographic work is completed on *Peziza*.

The species now included in *Pachyella* form a closely related group. They all share the same general apothecial anatomy. Four of the species, *P. adnata* (Berk. & Curt.) Pfister, *P. clypeata* (Schw.) Le Gal, *P. megalosperma* (Le Gal) Pfister, and *P. violaceonigra* (Rehm) Pfister, are distinguished from one another by differences in their spore ornamentations; their apothecial anatomy is almost identical.

Materials, methods, and terminology are those used by Pfister (1973b). When large numbers of specimens were examined, herbaria abbreviations and numbers alone are given rather than complete specimen citations.

PACHYELLA Boud. emend. Pfister

≡ *Pachyella* Boud., Hist. Class. Discom. Eur. p. 50. 1907. (Lectotype species: *Peziza barlaeana* Bres. = *Pachyella violaceonigra* (Rehm) Pfister, selected by Le Gal 1953b.)

≡ *Peltidium* Kalchb., Hedwigia, 2: 58. 1862. (Holotype species: *Peltidium oocardii* Kalchb.) non *Peltidium* Zoll. 1820 (Compositae).

= *Pulvinaria* Velen., Mon. Discom. Boh. 1: 332. 1934. (Lectotype species: *Peltidium oocardii* Kalchb., selected by Eckblad 1968) non *Pulvinaria* Bonorden, 1951 (Sphaerales), nec *Pulvinaria* Rodway, 1918 (Sphaeropsidales).

Apothecia flat, generally broadly attached to the substrate, occasionally more centrally attached, 0.4–8 cm in diam, becoming convoluted in some species, sometimes the apothecial flesh becoming yellow when broken, generally drying to a thin film; *hymenium* dark to pallid, some-

times with vinaceous or reddish tints; on the outside pallid with grey or vinaceous tints, smooth and shining when fresh. *Ectal excipulum* with a discrete layer of *textura globulosa* to *textura angularis*, outer cells terminating in flexuous hairs which are embedded in a gelatinous matrix. *Medullary excipulum* of *textura intricata*, either loosely woven or dense, J+ or J– gel present. *Subhymenium* not differentiated from the medullary excipulum, J+ or J–. *Margin* not present as a distinct zone, the hairs of the ectal excipulum continuing (though sometimes becoming shorter) toward the hymenium. *Asci* with a terminal operculum, without prominent croziers, usually J+, sometimes J– in dried material, contents sometimes golden in Melzer's reagent, eight-spored, long-cylindrical, 250–500 × 15–20 μm. *Ascospores* hyaline, ellipsoidal, mostly less than 25 μm long, smooth or variously marked with cyanophilic ornamentation, outer spore wall usually cyanophilic, two-guttulate, with or without deBary bubbles, uninucleate. *Paraphyses* septate clavate, generally with definite internal dark granules in the apical cells, neither branching nor anastomosing frequently.

SUBSTRATE AND RANGE: Usually on water-soaked rotten wood, though occasionally on soil surrounding wood, or on other decaying plant parts, also on wood submerged in water; worldwide.

NAME: From the Greek "pachy," thick or stout, and "ella," the diminutive suffix.

NOTES: The asci of *Pachyella* species are usually amyloid. The nature of the amyloid material is not known chemically. The amyloid reaction is not restricted to the ascus; it is also present in the subhymenium and medullary excipulum of *P. adnata*. In *Pachyella* species, the amyloid material is present either as an external layer on the ascus wall (which may separate from the ascus wall proper), or occurs in the gel which surrounds the asci and paraphyses and is not restricted to the wall. Since the reaction is not restricted to the apex of the ascus, nor is it in the form of a J+ ring at the apex of the ascus as in *Peziza*, the reaction in *Pachyella* is said to be diffuse. This diffuse reaction is also common in the Ascobolaceae, which, however, can be distinguished by their eguttulate spores.

Le Gal (1953b) described the asci of *Pachyella babingtonii* (Berk. & Br.) Boud. as J– and included the species in *Psilopezia*. Rehm (1895) and

Bayliss Elliott (1927) both had previously reported the asci as J+. Study of both fresh and dried material indicates the blueing is usually present in fresh material, but may be lacking in dried specimens. In this species the amyloid reaction is not restricted to the wall, but is present in the hymenial gel. Le Gal (1953b) was followed by Gamundi (1964) and Eckblad (1968) in her placement of *Pachyella babingtonii* in *Psilopezia*. Since anatomically and histochemically *Pachyella babingtonii* agrees with the present delimitation of *Pachyella*, it is treated here in *Pachyella*.

Ingold (1954), in his observation of *Pachyella babingtonii* (as *P. depressa* (Phill.) Boud.), described the contents of the asci at one stage of development as forming a granular mass which separates into eight parts, the parts becoming ascospores. Though the cytoplasm of the asci has been observed to become dense because of the presence of large granules, the direct origin of ascospores from this mass has not been observed. The contents of the asci of some species of *Pachyella* have been observed to become golden in Melzer's reagent. This phenomenon is most pronounced in *P. babingtonii* and *P. clypeata*.

Though never placed in the Sarcoscyphineae, *Pachyella babingtonii* has been described as having suboperculate asci (Le Gal 1953b). In this study of both fresh and dried material, no suboperculum has been observed in this or any other species of *Pachyella*.

The excipular structure distinguishes *Pachyella* both from *Peziza* and from other operculate Discomycetes. In *Pachyella* there is always a well-developed cortical zone of globose to compressed globose cells which, on the outside, terminate in hyaline, hyphoid hairs. Gel is always present in the medullary excipulum and also surrounds the hairs. Excipular gel has been noted in *Pachyella babingtonii* (as *P. depressa*) by Ingold (1954). Because of the large size of the excipular cells and the large amounts of gel in some species, the apothecia often collapse when dried. In *P. babingtonii*, dried apothecia are so poorly preserved that almost no anatomical features remain. Differences in apothecial anatomy may be used to distinguish species in some cases. Four species, *P. adnata*, *P. clypeata*, *P. megalosperma*, and *P. violaceonigra*, have almost identical excipular structure while *P. babingtonii* and *P. punctispora* Pfist. are both distinctive.

KEY TO THE SPECIES OF *Pachyella*

- A. Hyphoid hairs forming a palisade layer at the base of the apothecium.....B
 A. Hyphoid hairs not forming a discrete palisade layer at the base of the apothecium.....E
- B. Ascospores smooth, apothecium umber to chestnut color.....*P. clypeata*
 B. Ascospores variously ornamented.....C
- C. Ascospores warted, warts large (greater than 1 μm high), each wart with parallel sides and flat top; apothecium umber to sepia (sometimes reddish).....*P. adnata*
 C. Ascospores with smaller warts (less than 1 μm high).....D
- D. Warts anastomosing, hymenium reddish brown with yellow areas.....*P. megalosperma*
 D. Warts not anastomosing, hymenium dark brick to sepia.....*P. violaceonigra*
- E. Ascospores smooth or punctate, margin attached, apothecia less than 1 cm in diam.....*P. babingtonii*
 E. Ascospores ornamented with fine warts, margin free, apothecia larger than 1 cm in diam.....*P. punctispora*

Pachyella adnata (Berk. & Curt). Pfister, comb. nov. Fig. 1d-f

= *Peziza adnata* Berk. & Curt., J. Linn. Soc. Bot. 10: 365. 1869.

= *Discina adnata* (Berk. & Curt.) Sacc., Syll. Fung. 8: 100. 1889.

= *Psilopezia trachyspora* Ell. & Everh., Erythea 1: 200. 1893.

= *Peziza pseudoclypeata* Seaver, The North American cup-fungi (operculates). Supplement ed. p. 332. 1942.

Apothecium flat, sometimes becoming convoluted, appressed, in age sometimes becoming shallow-cupulate, to 5 cm in diam, gregarious or scattered; *hymenium* umber to sepia, black when dried. *Ectal excipulum* textura globulosa, somewhat compressed, 5-10 cells thick, outer cells 25-40 μm in diam, terminating in hyphoid hairs, 3-4 μm in diam, up to 400 μm long, embedded in gel, hairs sometimes slightly swollen at the tip. *Medullary excipulum* textura intricata, gel sparingly present, J+ or J-, cells 5-22 μm in diam.

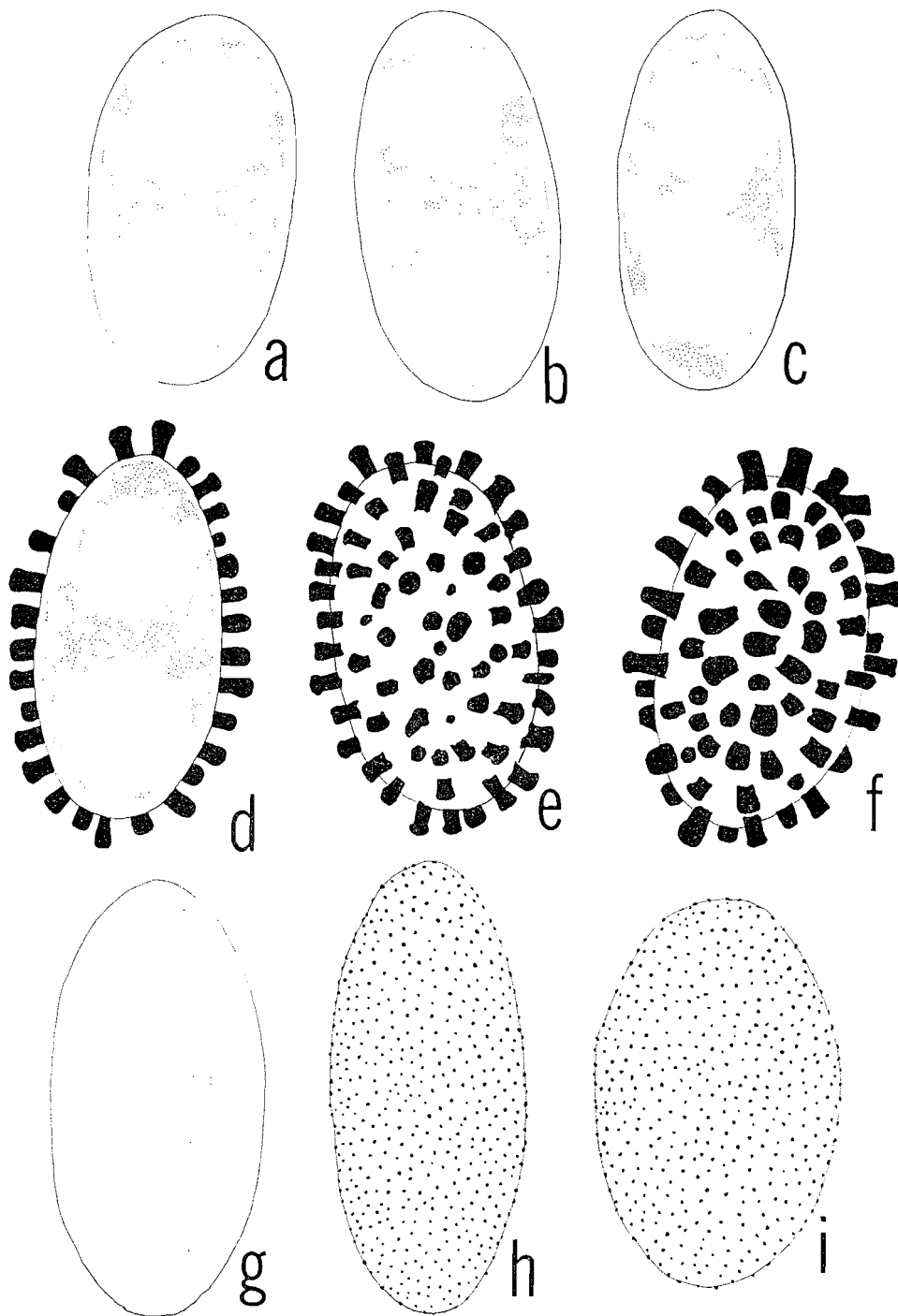


FIG. 1. Camera-lucida drawings of ascospores. *a-c*, Ascospores of *P. clypeata* in optical section. CUP 51618, $\times 2000$. *d-f*, Ascospores of *P. adnata* in optical section and surface view. CUP 51609, $\times 2000$. *g-i*, Ascospores of *P. violaceonigra* in optical section and surface view. CUP 50943, $\times 2000$.

Asci diffusely J+, 387–450 × 18–20 μm. *Ascospores* relatively thin-walled, ellipsoid, 10–12(–14) × 18–20 μm (exclusive of markings), ornamented with long blunt warts (exceeding 1 μm in length), warts sometimes anastomosing, two- or sometimes one-guttulate (sometimes obscure), deBary bubbles absent. *Paraphyses* expanded at the tip to 6–9 μm, extending beyond the asci, the apical cells containing large dark granules, not reacting in Melzer's reagent.

SUBSTRATE AND RANGE: On rotten, usually water-soaked wood; North America, the Caribbean, and Japan.

NAME: from the Latin "*adnatus*," broadly attached, referring to the broad attachment of the apothecium to the substrate.

ILLUSTRATIONS: Cooke, *Mycographia*, 1. Pl. 67, Fig. 259. 1879 (as *Peziza adnata*); Seaver, *The North American cup-fungi* (operulates), supplemented ed. Pl. 62. 1942 (as *Peziza pseudoclypeata*).

EXSICCATI: None.

HOLOTYPE: Wright, *Fungi Cubensis* 658 (K).

SPECIMENS EXAMINED: U.S.A.: Montana: on fallen log, Lake McDonald, Glacier Natl. Park, Montana, 19.VIII.1948, F. Korf and R. P. Korf (R.P.K. 1422). New York: on wood, Six-Mile Creek, near Ithaca, 17.X.1960, R. P. Korf and E. J. Moore (R.P.K. 3087); on wood, Ringwood near Ithaca, 3.X.1960, R. P. Korf (R.P.K. 3093); rotting wood, Michigan Hollow, Danby, 8.X.1956, L. R. Batra (R.P.K. 56–44). Ohio: Holotype of *Peziza pseudoclypeata*, on water-soaked log of *Tilia americana*, Cleveland (no date), Maurice B. Walters (NY = CUP 50905); on decayed sugar maple log, Cleveland, 15.VIII.1948, M. B. Walters (FH = CUP 51609). Pennsylvania: wood, Bethlehem (no date), Schweinitz (PH, Schw. Syn. No. 765 = CUP 51619, CUP-D-3460, CUP-D-3849). Washington: Holotype of *Psilopezia trachyspora*, on rotten wood, North Bend, King Co., Aug. 1872, Adella M. Parker, No. 92 (NY = CUP-D-4644). Puerto Rico: on *Cecropia peltata*, El Yunque, 5.VI.1970, R. P. Korf *et al.* (CUP-PR-3844, NY); (as above) (CUP-PR-3847, NY); on fallen log of *Cyrilla racemiflora* (as above) (CUP-PR-3852, NY); on fallen log of *Cecropia peltata*, El Yunque, 10.VI.1970, R. P. Korf *et al.* (CUP-PR-4007); on wood, El Yunque, January 24 to April 5, 1923, F. J. Seaver and Carlos E. Chardon

(CUP-PR-1831, NY). CUBA: Wright, *Fungi Cubensis* No. 658 (K, FH). JAPAN: on dead wood (Shiia), 7.XI.1964, K. Tubaki (CUP-J-2904). TRINIDAD: on wood, Heights of Aripo, 16.III.1921, F. J. Seaver (NY).

NOTES: Several collections of this species have asci which appear to be spirally thickened. This characteristic was mentioned by Seaver in his description of *Psilopezia trachyspora*. Since it has not been observed in fresh material, this is apparently an artifact produced by drying. The large warts are characteristic of this species and distinguish it from the other species in the genus.

This is the only species of *Pachyella* which may have J+ sterile tissue in the subhymenium and medullary excipulum. The significance of this characteristic is not known.

The excipular structure is similar to that of *P. clypeata*, *P. violaceonigra*, and *P. megalosperma*. Morgan (1902) mistakenly synonymized *Peziza adnata* with *P. clypeata*.

The distribution of the species is undoubtedly much more uniform than the collections cited above would indicate. In the north its fruiting time coincides with that of *Pachyella clypeata*; thus the two may be confused.

Pachyella babingtonii (Berk. & Br.) Boud.

Fig. 2a–f

- ≡ *Peziza babingtonii* Berk. & Br., *Ann. Mag. Nat. Hist.* II, 7: 179. 1851 (ut "*Babingtonii*").
- ≡ *Psilopezia babingtonii* (Berk. & Br.) Berk., *Outlines of Fungology*, p. 373. 1860; as "(Berk. & Br.) Le Gal," *Prodr. Flore Mycol. Madagascar*, 4: 171. 1953.
- ≡ *Rhizina babingtonii* (Berk. & Br.) Masee, *Br. Fung. Flora*, 4: 455. 1895.
- ≡ *Pachyella babingtonii* (Berk. & Br.) Boud., *Hist. Class. Discom. Eur.* p. 51. 1907.
- = *Peltidium oocardii* Kalchb., *Hedwigia*, 2: 58. 1862 (ut "*Oocardii*").
- ≡ *Peziza oocardii* (Kalchb.) Karst., *Myc. Fenn.* 1: 84. 1871.
- ≡ *Humaria oocardii* (Kalchb.) Rehm in *Rabenh. Kryptog.-Fl.* 1(3): 954. 1894.
- ≡ *Rhizina oocardii* (Kalchb.) Masee & Crossl., *Fungus Flora of Yorkshire* p. 251. 1905.
- ≡ *Psilopezia oocardii* (Kalchb.) Sacc. & D. Sacc., *Syll. Fung.* 18: 11. 1906.
- ≡ *Pulvinaria oocardii* (Kalchb.) Velen., *Mon. Discom. Bohm.* 1: 332. 1934.

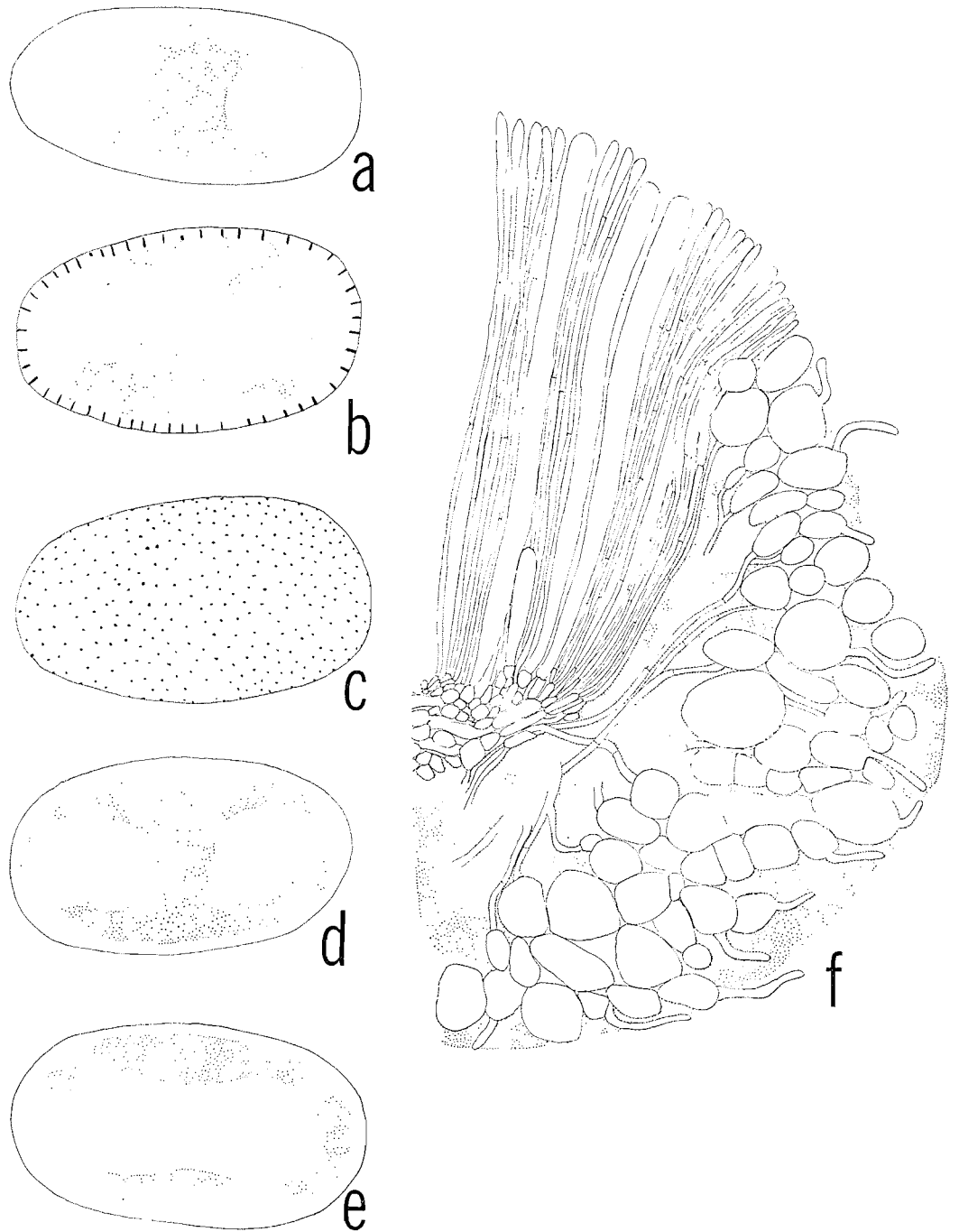


FIG. 2. Camera-lucida drawings of *Pachyella babingtonii*. *a-e*, Ascospores in optical section and surface view. *a, b, c*, CUP 52289, $\times 2000$; *d, e*, CUP 50897, $\times 2000$. *f*, Cross section of apothecium; stippled area indicates gel. CUP 52284, $\times 250$.

- = *Peziza rivularis* Cr. & Cr., Florule du Finistere, p. 55. 1867 (non *Peziza rivularis* Clements. 1894).
 ≡ *Humaria rivularis* (Cr. & Cr.) Sacc., Syll. Fung. 8: 144. 1889.
 ≡ *Pachyella rivularis* (Cr. & Cr.) Boud., Hist. Class. Discom. Eur. p. 51. 1907.
- = *Peziza oocardii* (Kalchb.) Karst. var. *lignaria* Karst., Mon. Pez. Fenn. p. 128. 1869.
 ≡ *Peltidium lignarium* (Karst.) Hazsl., Oesterr. Bot. Z. 32: 7. 1882.
- = *Psilopezia myrothecioides* Berk. & Br., Ann. Mag. Nat. Hist. IV, 15: 39. 1875.
 ≡ *Rhizina myrothecioides* (Berk. & Br.) Masee, Br. Fung. Flora, 4: 455. 1895.
 ≡ *Humaria myrothecioides* (Berk. & Br.) Boud., Hist. Class. Discom. Eur. p. 70. 1907.
- = *Peziza depressa* Phill. in Cooke, Mycographia, 1: 233. 1879 (non *Peziza depressa* Pers., 1822).
 ≡ *Geoscypha depressa* (Phill.) Rehm in Sydow. Mycoth. March. No. 884. 1886.
 ≡ *Humaria depressa* (Phill.) Sacc., Syll. Fung. 8: 145. 1889.
 ≡ *Pachyella depressa* (Phill.) Boud., Hist. Class. Discom. Eur. p. 51. 1907.
- = *Peziza psilopezoides* Cooke & Phill., Grevillea, 9: 104. 1880.
 ≡ *Humaria psilopezoides* (Cooke & Phill.) Sacc., Syll. Fung. 8: 144. 1889.
- = *Peltidium cookei* Hazsl., Oesterr. Bot. Z. 32:7. 1882.
- = *Peziza saccharina* Bres., Fungi Trid. 1: 24. 1882.
 ≡ *Pezicula saccharina* (Bres.) Sacc., Michelia, 2: 536. 1878.
 ≡ *Pachyella saccharina* (Bres.) Boud., Hist. Class. Discom. Eur. p. 51. 1907.
- = *Psilopezia bohémica* Velen., České Houby, p. 879. 1922.
 ≡ *Pulvinaria bohémica* (Velen.) Velen., Mon. Discom. 1: 332. 1934.
- = *Humaria oocardii* (Kalchb.) Rehm var. *stadleri* Ade, Allg. Bot. Z. 30-31: 21. 1925.
- = *Pachyella depressa* (Phill.) Boud. var. *pallida* Rea in Bayliss Elliott, Trans. Br. Mycol. Soc. 12: 294. 1927.
- = *Psilopezia albida* Kanouse, Pap. Michigan Acad. Sci. 19: 99. 1934.
- = *Pachyella dearnessii* Gamundi, Darwiniana, 13: 581. 1964.
Apothecium flat, convex-pulvinate, appressed,

drying to a thin film, up to 1 cm in diam, attached at the margin, gregarious to scattered; *hymenium* hazel to umber, drying black. *Ectal excipulum* of textura globulosa, sometimes slightly compressed, three to five cells thick, outer cells 20-60 μm in diam, terminating in hyphoid hairs 7-10 μm in diam and up to 100 μm long, embedded in gel, hairs shorter toward the margin than at the base of the apothecium. *Medullary excipulum* very loose textura intricata, highly gelatinous, cells sometimes constricted at the septa, 5-12 μm in diam. *Asci* J+ (or J-, especially in dried material), contents sometimes golden in Melzer's reagent, 250-325 \times 15-20 μm . *Ascospores* thick-walled, broadly ellipsoid, (9-)10-16 \times 17-23 μm , smooth or with small puncti, epispore highly cyanophilic, two- or sometimes one-guttulate (indistinct in some cases), deBary bubbles sometimes present. *Paraphyses* expanded at the tip to 7-15 μm extending beyond the ascus, apically pigmented with small, dark, highly cyanophilic granules.

STRATE AND RANGE: On water-soaked, rotten logs, sometimes underwater, or on leaves and woody debris or on encrusted algae; cosmopolitan.

NAME: For Mr. Babington, collector of the holotype.

ILLUSTRATIONS: Berkeley and Broome, Ann. Mag. Nat. Hist. IV. 15, Pl. 2, Fig. 5. 1875 (as *Psilopezia myrothecioides*); Boudier, Icones Mycol. 2, Pl. 312. 1910. (as *Pachyella depressa*); Bresadola, Fungi Trid. 1, Pl. 29, Fig. 1. 1882 (as *Peziza saccharina*); Bresadola, Icon. Mycol. 25, Pl. 1237(1). 1933 (as *Pezicula saccharina*); Cooke, Mycographia, 1, Pl. 110, Fig. 392. 1879 (as *Peziza depressa*); Dennis, British Cup-Fungi, Pl. 4, k, 1960 (as *Psilopezia babingtonii*); Dennis, British Ascomycetes, Pl. 4, k, 1968 (as *Psilopezia babingtonii*); Ingold, Trans. Br. Mycol. Soc. 37, Fig. 1. 1954 (as *Pachyella depressa*); Kalchbrenner, Hedwigia, 2, Pl. 10, 3. 1862 (as *Peltidium oocardii*); Le Gal, Prodr. Flore Mycol. Madagascar, 4: 174, 175. 1953 (as *Psilopezia babingtonii*).

EXSICCATI: Karsten, Fungi Fenn. No. 636 (as *Peltidium oocardii* var. *lignaria*); Rabenhorst, Fungi Europ. No. 521 (as *Peltidium oocardii*).

HOLOTYPE: On rotten wood, Grace Dieu Wood, Lancashire, Great Britain, Rev. C. Babington (K).

SPECIMENS EXAMINED: U.S.A.: Idaho: MICH

(= CUP 50962). Maryland: CUP 51573. Massachusetts: CUP 51625, 51626, 51615, 51636. Michigan: Holotype of *Psilopezia albida*, on sticks submerged in running water, Au Sable Falls, Grand Marais, Alger Co., 8.IX.1932, E. B. Mains (32-646), (MICH = CUP 50893), 12 specimens in MICH, slides of which are deposited in CUP under the following accession numbers: CUP 50896, 50900, 50901, 50904, 50950-50954, 50957, 50660, 50963, 50964, 52305. Minnesota: CUP-D-10706. Montana: MICH (= CUP 50192). New York: CUP 52277, 52283, 51620-51624, 51627-51634, 51637-51639, 51641, 51642, 51649, 51650, 52284, 49856, 49858, 49859, 52308, 52309, NY (= CUP 49546), R.P.K. 53-110, R.P.K. 53-22, R.P.K. 2745. Ohio: NY (= CUP 49548), R.P.K. 3966. Oregon: OSC 25047, OSC 23944. South Carolina: CUP-D-2550. Vermont: CUP 51640. Virginia: CUP 52303, 52304. Washington: CUP 50897. AUSTRIA: Two specimens in the Herb. von Höhnel, FH, slides deposited = CUP 51610, 51611; one specimen Herb. Rehm, S = CUP 50932. ARGENTINA: BAFC 20015 (= R.P.K. 2959). BELGIUM: Isotype of *Peziza psilopezoides*, on rotten wood, Libert No. 895 (NY). CZECHOSLOVAKIA: Holotype of *Psilopezia bohémica*, no substrate, Mníchovice: Mirosovice, VII.1926, J. Velenovsky (PR 150227 = CUP 52290), PR 152885 (= CUP 52291), PR 152883 (= CUP 52288), PR 152886 (= CUP 52289). CANADA: Ontario: Holotype of *Pachyella dearnessii*, on wet rotten wood, London, 3.VIII.1889, J. Dearness (359) (NY), CUP 52276, 51635, 51646. CHINA: CUP-CH-322 (also duplicate specimen BPI). COSTA RICA: CUP-CA-25, CUP-CA-53. FINLAND: Isotype of *Peziza oocardii* var. *lignaria*, ad lignum putridum, Tavastia australis, Tammela, Mustiala, Fennia (Fung. Fenn. No. 636, H = CUP 50946, FH), two specimens in H, slides deposited = CUP 50945, 50947. FRANCE: One specimen in Herb. Bresadola, S (= CUP 50949). GERMANY: Three specimens in Herb. Rehm, S (= CUP 50925, 50938, 50941). GREAT BRITAIN: Holotype of *Peziza depressa*, on willow on ground, July 1878, W. Phillips (K. sub *Peziza convexa* Phill.), Holotype of *Psilopezia myrothecioides*, on *Prunus padus*, New Pitsligo, 1876, Rev. J. Fergusson (K), CUP-D-198, CUP 49544, one specimen Herb. Rehm, S (= CUP 50929). HUNGARY: One specimen in Herb. E. Fries, UPS (= CUP 50923), Isotype of *Peltidium oocardii*, in *Oocardio strato*

(Naig.) ad lapides submersos rivuli montani ad Olaszinum Scepusii (Hungar, superioris), C. Kalchbrenner (Rabenh., Fungi europaei No. 521; CUP, FH, BPI). INDIA: CUP-I-25, CUP-I-462. ITALY: Holotype of *Peziza saccharina*, ad Tiliae parvifoliae, 1882, Bresadola (Herb. Bresadola, S = CUP 50948). JAMAICA: CUP-MJ-313, CUP-MJ-314. JAPAN: CUP-J-1426, CUP-J-2738, CUP-J-2839. JAVA: CUP-SEA-470. SWEDEN: One specimen in UPS (= CUP 50917). VENEZUELA: Dumont-VE-243 and 2366 (NY).

NOTES: This is the most common, most widely distributed, and most often described of the *Pachyella* species. Seaver's (1928) concept of *Psilopezia nummularia* was based in part on specimens of this species. *Pachyella babingtonii* has been placed in *Psilopezia* (Le Gal 1953b; Eckblad 1968; Gamundi 1964) because the asci were thought to be J-.

The species is quite variable in size, shape, and color of the apothecium. *Pachyella babingtonii* shows little substrate preference, occurring on wood, leaves, and encrusted algae. Fruit bodies, though sometimes found on water-soaked wood, are often situated below the surface of swiftly flowing water.

Some specimens have ascospores which are punctate. The specimens with these spores are anatomically identical with those with smooth spores. The punctate spores occur in few collections and are few in number in any given specimen. The collections having these spores come from throughout the geographic range of the species. It is thought that these puncta develop very late in the ontogeny of the spore and may characterize the completely mature spore.

Type material of several synonymized species has not been seen. *Peziza rivularis* Cr. & Cr. is synonymized here on the basis of Le Gal's (1953a) study of the holotype. *Pachyella depressa* var. *pallida* is synonymized on the basis of the original description, since type material has not been located at either the British Museum or Kew. *Humaria oocardii* var. *stadleri* was also synonymized on the basis of the original description, since Ade's specimens seem to have been destroyed during World War II.

Pachyella clypeata (Schw.) Le Gal Figs. 1a-c, 3
= *Peziza clypeata* Schw., Schrift. Naturf. Ges.
Leipzig, 1: 117. 1822 (non *Peziza clypeata*
Boud. ex. Sacc. 1889).



FIG. 3. Camera-lucida drawings of cross section of an apothecium of *Pachyella clypeata*. Stippled area indicates gel. CUP 51618, $\times 250$.

- = *Discina clypeata* (Schw.) Sacc., Syll. Fung. 8: 101. 1889.
 = *Pachyella clypeata* (Schw.) Le Gal. Prodr. Flore Mycol. Madagascar, 4: 27. 1953.
 = *Bulgaria bicolor* Peck, Ann. Rep. N.Y. State Mus. 32: 49. 1879.
 = *Peziza orbicularis* Peck, Bull. N.Y. State Mus. 1: 20. 1887. (a name change, non *Peziza bicolor* Bull. ex Fr. 1822).
 = *Discina orbicularis* (Peck) Sacc., Syll. Fung. 8: 103. 1889.
 = *Psilopezia orbicularis* (Peck) Dodge, Trans. Wis. Acad. Sci. 17: 1052. 1914 (ut "*Psilopeziza*").

Apothecium flat, sometimes becoming convoluted, appressed, in age sometimes becoming shallow cupulate, up to 8 cm in diam, flesh sometimes becoming yellow when broken, pallid to glaucous grey on the outside, gregarious to scattered; *hymenium* umber to chestnut. *Ectal excipulum* textura globulosa, somewhat compressed, three to five cells thick, outer cells 10–30 μm in diam, terminating in hyphoid hairs up to 400 μm long, hairs sometimes pigmented and swollen at the tip, hairs embedded in gel. *Medullary excipulum* dense textura intricata, gel sparingly present, hyphae 3–16 μm in diam. *Asci* diffusely J+, rarely J–, 387–500 \times 20–25 μm . *Ascospores* at maturity: hyaline, thin-walled, smooth, ellipsoid, 13–16 \times 18–25(28) μm , two-guttulate, guttules sometimes appearing granular or resinous, deBary bubbles sometimes present. *Paraphyses* expanded at the tip to 10 μm , extending beyond the asci, pigmented with large, dark, internal amorphous granules in the apical cell, granules becoming reddish purple in Melzer's reagent (in fresh material).

SUBSTRATE AND RANGE: On rotten logs and stumps, mostly water-soaked; North America and Japan.

NAME: From the Latin "*clypeatus*," like the circular Roman shield (*clypeus*); referring to the form of the apothecia.

ILLUSTRATIONS: Peck, Ann. Rep. N.Y. State Mus. 32. Pl. 2, Figs. 4–6. 1879 (as *Bulgaria bicolor*). Peck, Bull. N.Y. State Mus. 1. Pl. 2, Figs. 4–6. 1887 (as *Peziza orbicularis*). Seaver, Mycologia, 8. Pl. 191. 1916. Seaver, North American cup-fungi (operculates). Pl. 34. 1928.

EXSICCATI: Ellis and Everhart, North American Fungi, No. 568 (as *Psilopezia nummularia*).

HOLOTYPE: Synopsis Fungorum Carolinae

Superioria No. 1170 (PH = CUP-D-3839, CUP 50198).

SPECIMENS EXAMINED: U.S.A.: Delaware: CUP-D-4638. Illinois: CUP-D-10838. Indiana: CUP-D-2688, NY (= CUP 49550). Hawaii: BPI (Shear). Iowa: CUP-D-4641. Maine: NY (= CUP 49553). Michigan: CUP 51535. Nebraska: CUP-D-10914. North Carolina: CUP 52279. New York: CUP 51534, 51536, 51562, 51564, 51620, 51621, 52278, 52297–52301, 22991, 19472, 2955, 15889, 43155, 35988, 33105, 25724, 37254, 36692, 22987, CUP-A-316, CUP-D-354, CUP-D-4635, CUP-D-653, CUP-D-1003, CUP-D-1031, CUP-D-1068, CUP-D-1211, CUP-D-1637, CUP-D-1740, CUP-D-1769, CUP-D-1802, CUP-D-9580, Isotype of *Bulgaria bicolor*, on wet decaying birch wood, Brewerton, Sept., Dr. Peck (CUP-D-3026), CUP-D-5778, CUP-D-6191, R.P.K. 53–224, R.P.K. 53–228, R.P.K. 53–242, R.P.K. 54–36, R.P.K. 55–1, R.P.K. 335, R.P.K. 796, R.P.K. 1696, R.P.K. 1992, R.P.K. 2676, R.P.K. 2715, R.P.K. 2719, R.P.K. 2864, R.P.K. 3242, NY (= CUP 49549). Ohio: CUP-D-2706, CUP-D-2137, R.P.K. 4001. Pennsylvania: CUP-A-21573, CUP-A-(no number, collected by Ravenel), CUP-D-9223, CUP-D-5122. South Carolina: CUP-D-3445, CUP-D-2755, CUP-D-3443, CUP-D-3350, UPS Herb. E. Fries (= CUP 50920). Tennessee: CUP 52280–CUP 52282. CANADA: Ontario: CUP 51563, CUP-D-4636, CUP-D-4639. JAPAN: CUP-J-1824.

NOTES: This is the largest of the *Pachyella* species and is commonly collected. It is anatomically similar to *P. violaceonigra*, *P. adnata*, and *P. megalosperma*, but is easily distinguished by its smooth spores. Its distribution in North America and Japan coincides with that of *P.*

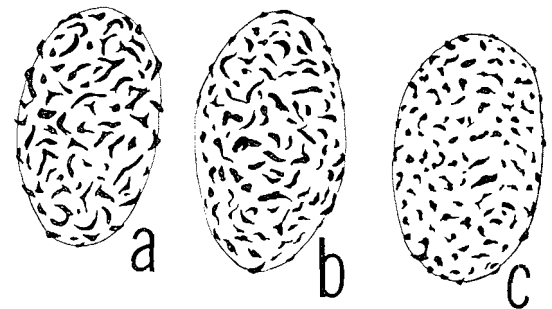


FIG. 4. a–c. Camera-lucida drawings of the ascospores of *Pachyella megalosperma*. $\times 1000$. Drawn from the holotype.

adnata. Recently I have seen photographs of a specimen from India which also appears to be *P. clypeata*. Seaver (1928) treats this species as *Peziza clypeata*.

Pachyella megalosperma (Le Gal) Pfister, comb. nov. Fig. 4a-c

≡ *Galactinia megalosperma* Le Gal, Prodr. Flore Mycol. Madagascar, 4: 63. 1953. A name change, non *Galactinia macrospora* (Wallr.) Boud.

≡ *Galactinia pseudosuccosa* Le Gal forma *macrospora* Le Gal, Rev. Mycol. 10(5-6): 95. 1945.

≡ *Peziza megalosperma* (Le Gal) Eckblad, Nytt Mag. Bot. 15: 76. 1968.

Apothecia flat, sessile, becoming somewhat convoluted and lobed, smooth, blue gray on the outside, exuding a yellow juice when broken; *hymenium* according to Le Gal "brun roux brillant" with yellow zones. *Ectal excipulum* of globose to elongate cells intermixed with filamentous cells, the globose and elongate cells reaching a diameter of 32-40 μm , these cells become smaller toward the outside, and terminate in hyphoid hairs, 5-7 μm in diam, 165-198 μm long, hairs sometimes densely cytoplasmic, embedded in gel. *Medullary excipulum* of closely woven textura intricata, the cells reaching a diameter of 5-9.6(12.8) μm , occasionally globose swellings up to 24 μm in diameter present. *Subhymenium* 50-60 μm thick, composed of globose and filamentous cells, the walls of which may be slightly pigmented. *Asci* J+ (in some cases slight), long cylindrical, 330-500 \times 19-24 μm . *Ascospores* ellipsoid, sometimes almost subfusiform (20.5)22.5-28.5 \times 10.5-14.5 μm . *Paraphyses* expanded at the tip to 8-10 μm , filled apically with dark granules (appearing at times to be embedded in a gelatinous matrix).

SUBSTRATE AND RANGE: On rotten wood, among mosses. Madagascar.

NAME: From greek "megus," large, and "sperma," seed or spore, referring to the large ascospores.

ILLUSTRATIONS: Le Gal, Rev. Mycol. 10. Figs. 1 and 2. 1945. Le Gal, Prodr. Flore Mycol. Madagascar, 4. Figs. 22-25. 1953.

EXSICCATI: None.

HOLOTYPE: "Ad vetus lignum putridum muscique coopertum, la forêt de Fotsialana, le 12 novembre 1934." Madagascar.

SPECIMENS EXAMINED: MADAGASCAR: Sur bois pourri, forêt Fotsialana, 12 novembre 1934, leg. R. Heim.

NOTES: I find the specimen much as described by Le Gal (1953b) except for some differences in measurements. In the only specimen available to me for study, I found no spores with measurements as large as those listed by Le Gal, though the spores present appeared to be completely mature. I did not observe the anastomosis of paraphyses illustrated and described by Le Gal.

The apothecial anatomy agrees perfectly with that of *P. adnata*, *P. violaceonigra*, and *P. clypeata*, from which *P. megalosperma* differs in its type of spore ornamentation. Eckblad (1968) included this species in *Peziza* and stated that the anatomy "differs slightly from the rest of the genus [*Peziza*]."

This species seems rare. It will most likely be confused with *P. violaceonigra*, but in that species the spores are finely marked with small isolated cyanophilic dots which do not anastomose.

Pachyella punctispora Pfister, sp. nov. Fig. 5a-d

Apothecium bubalinum, usque ad 2.5 cm diam, planum. *Asci* cylindranei, jodo caerulescentes, usque ad 450 μm longi, 19-25 μm diam, octospori. *Ascospori* ellipsoidei, biguttulati, 12-15 \times 21-25 μm , verrucati, hyalini. *Paraphyses* usque ad 8 μm diam, rectae, brunneae.

TYPUS: On wet wood, Gorge of Carp Creek, Cheboygan Co., Michigan, 27.VI.1969, N. J. Smith (CUP 52285).

Apothecium flat to concave, attached broadly but margins free, reaching a diameter of 2.5 cm, gregarious to scattered, *hymenium* bay to umber sometimes with vinaceous tints. *Ectal excipulum* textura globulosa to angularis, up to six cells thick, merging on the inside almost imperceptibly with the medullary excipulum; outer cells (especially toward the base) 20-40 μm in diam, terminating in short hyphoid, septate, sometimes appressed hairs up to 5 μm in diam, hairs longer at point of attachment, sometimes interwoven, embedded in gel. *Medullary excipulum* textura intricata, gel present, cells short, sometimes constricted at the septa, 5-7 μm in diam. *Asci* diffusely J+, contents sometimes becoming golden in Melzer's reagent, (375-)400-450 \times 19-25 μm . *Ascospores* ellipsoid, 12-15 \times 21-25 μm , marked with minute cyanophilic warts, one-

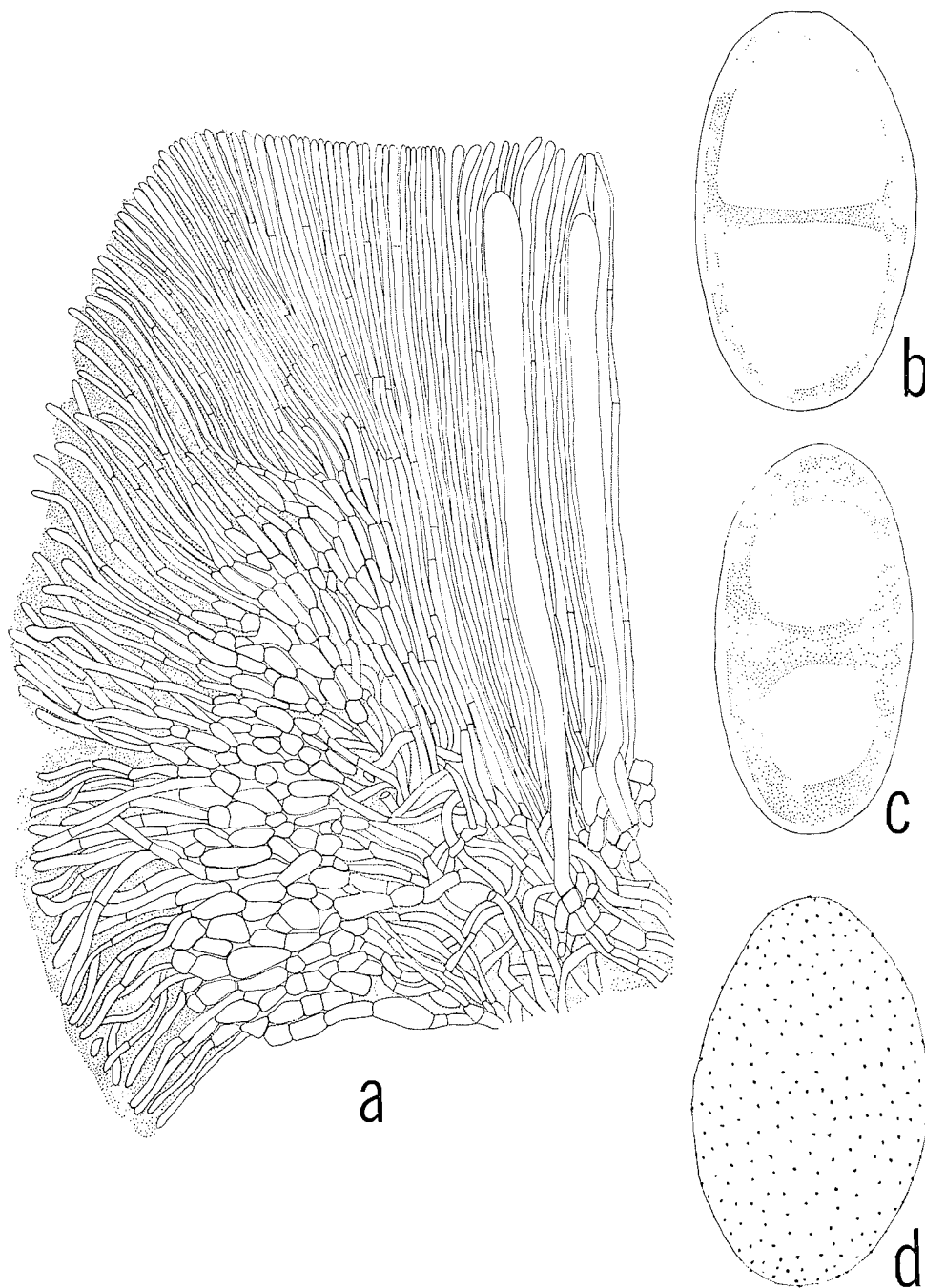


FIG. 5. Camera-lucida drawings of *Pachyella punctispora*. *a*, Cross section of apothecium, stippled area indicates gel. CUP 52268, $\times 250$. *b-d*, Ascospores in optical section and surface view. CUP 52268, $\times 2000$.

guttulate, more commonly two-guttulate, deBary bubbles absent. *Paraphyses* expanded at the tip to 8 μm , extending beyond the asci to form a thin epithecium, with internal dark granules in the apical cells, granules not reacting in iodine.

SUBSTRATE AND RANGE: On water-soaked rotten wood. New York, Michigan, and Illinois.

NAME: From Latin "*punctus*," dotted, and "*spora*," spore, referring to the spore surface.

ILLUSTRATIONS: None.

EXSICCATI: None.

HOLOTYPE: On wet wood, Gorge of Carp Creek, Cheboygan Co., Michigan, 27.VI.1969, N. J. Smith (CUP 52285).

SPECIMENS EXAMINED: U.S.A.: Illinois: (No substrate), Glencoe, VI.1903, E. T. and S. A. Harper (S, Herb. Rehm = CUP 50924). Michigan: On wet wood, Gorge of Carp Creek, Cheboygan Co., 27.VI.1969, N. J. Smith (Holotype CUP 52285); on rotten wood, Carp Creek Gorge, UMBS, Cheboygan Co., 7.IX.1969, N. J. Smith (2324) (CUP 52265); on moss-covered wood, Reese's Bog near UMBS, Cheboygan Co., 30.VII.1969, N. J. Smith (CUP 52266); on rotten wood, Reese's Bog near UMBS, Cheboygan Co., 30.VII.1969, N. J. Smith (CUP 52267); as above (CUP 52268); as above (CUP 52269); on water-soaked wood, Carp Creek Gorge near UMBS, Cheboygan Co., 3.VII.1969, D. H. Pfister (CUP 52270); on wood in running water, Reese's Bog near UMBS, Cheboygan Co., 8.VIII.1969, D. H. Pfister and E. Wells (CUP 52271); on wet wood, locality as above, 30.VII.1969, N. J. Smith (CUP 52272); on wet wood, Tahquamenon Falls State Park, at lower falls, 15.VIII.1969, D. H. Pfister (CUP 52273); on water-soaked wood, Carp Creek Gorge, Cheboygan Co., 7.IX.1969, N. J. Smith (CUP 52275); on wood, Old Saw Mill N. of Burt Lake, Cheboygan Co., 8.VII.1967, N. J. Smith (194) (CUP 50965, MICH); on wood, the Gorge, UMBS, Cheboygan Co., 12.VII.1967, N. J. Smith (237) (CUP 50958, MICH). New York: On wet wood, Pack Forest, Warrensburg, 28.IX.1969, R. P. Korf, D. H. Pfister, and J. R. Dixon (CUP 52307).

NOTES: Characteristically this species is more centrally attached than other species of *Pachyella*, has finely warted spores and short hairs embedded in gel. It might be mistaken for a *Peziza* if the gel is not seen.

This species seems to be transitional between the small, relatively simple *P. babingtonii* and the

other larger more complex species of the genus. It is probably more common than the number of specimens listed here indicates. Since it resembles a *Peziza* in its attachment and coloration, and since *Peziza* species are seldom properly identified, more specimens are likely located among the unknown pezizas of various herbaria.

Pachyella violaceonigra (Rehm) Pfister, comb. nov. Fig. 1g-i

\equiv *Pustularia violaceonigra* Rehm, Hedwigia, 21: 98. 1882 (ut "*violaceo-nigra*").

\equiv *Humaria violaceonigra* (Rehm) Sacc., Syll. Fung. 8: 150. 1889.

\equiv *Plicaria violaceonigra* (Rehm) Rehm in Rabenh. Kryptog.-Fl. 1(3): 1007. 1894.

\equiv *Peziza barlaeana* Bres., Fungi Trid. 2: 74. 1898 (ut "*Barlaeana*").

\equiv *Pachyella barlaeana* (Bres.) Boud., Hist. Class. Discom. Eur. p. 50. 1907 (ut "*Barlaeana*").

\equiv *Aleuria barlaeana* (Bres.) Bres., Icon. Mycologia, 25. Pl. 1202. 1933 (ut "*Barlaeana*").

Apothecium flat, becoming somewhat convoluted, appressed, the margin sometimes turned up, to 5 cm in diam; **hymenium** dark brick to sepia (from Boudier's plate), drying black. **Ectal excipulum** textura globulosa, somewhat compressed, three to five cells thick, outer cells 25–55 μm in diam, terminating in hyphoid hairs 3–5 μm in diam, embedded in gel, hairs up to 400 μm long, not swollen at the tip. **Medullary excipulum** dense textura intricata, becoming less dense toward the ectal excipulum, gel sparingly present, cells 5–12 μm in diam. **Asci** diffusely J+, 410–425 \times 19–20 μm . **Ascospores** thin-walled, ellipsoid, 19–27 \times 11–13 μm , marked with fine cyanophilic warts which do not anastomose, two-guttulate, deBary bubbles sometimes present. *Paraphyses* expanded at the tip to 8 μm , extending beyond the asci, the apical cells containing amorphous dark granules, granules not reacting in Melzer's reagent.

SUBSTRATE AND RANGE: On moss-covered wood and on soil, Europe.

NAME: From Latin "*violaceous*," violet, and "*niger*," black, especially glossy black.

ILLUSTRATIONS: Boudier, Icones Mycol. 2. Pl. 310. 1910 (as *Pachyella barlaeana*); Bresadola, Fungi Trid. 2. Pl. 187. 1898 (as *Peziza barlaeana*); Bresadola, Icon. Mycologia, 25. Pl. 1202. 1933 (as *Aleuria barlaeana*).

EXSICCATI: None.

HOLOTYPE: Auf faulen Holz und der daneben befindlichen Erde, Alpen bei Partenkirchen, bei München, IX.1874. Arnold (S, Herb. Rehm = CUP 50934).

SPECIMENS EXAMINED: AUSTRIA: On wood and soil, Vorarlberg, IX.1897, (no collector) (S, Herb. Rehm). FRANCE: Holotype of *Peziza barlaeana* (no substrate), Nice (no date), M. Barla (PC = CUP 52293). GERMANY: (Substrate and locality unknown), VII.1887, Dr. Arnold (S, Herb. Rehm = CUP 50943). RUSSIA: Ad truncum putridum, Tsebelda, Furjerosvoje (Alcharia), 20.III.1912, G. Woronow (S, Herb. Rehm = CUP 50942). SWITZERLAND: Kant Graubunden: Arosa, Seetobelbach, 21.VII.1961, E. Rahm (UPS = CUP 50922); (same as above), 30.IX.1961, E. Rahm (UPS = CUP 50921).

NOTES: *Pustularia violaceonigra*, published in 1882, is conspecific with *Peziza barlaeana* Bres., published in 1898. It thus provides an older name for *Pachyella barlaeana*. *Pachyella barlaeana* was selected as type of *Pachyella* by Le Gal (1953b). Anatomically this species is nearly identical in excipular structure with *P. clypeata*, *P. adnata*, and *P. megalosperma*. *Pachyella violaceonigra* appears to be limited to Europe whereas *P. clypeata* is primarily North American. *Pachyella clypeata* always occurs on rotten wood, but *P. violaceonigra* is sometimes found on soil. The other species which it closely resembles, *P. adnata* and *P. megalosperma*, both differ in the form of their spore markings.

Doubtful and Excluded Species

1. *Pachyella barlaeana* (Bres.) Boud. var. *stephensoniana* (Ellis in Rehm ex Sacc.) Boud., Hist. Class. Discom. Eur. p. 50. 1907 (ut "*Barlaeana* Bres. var. *Stephensonii* Rehm").
 ≡ *Discina repanda* (Wahl. ex Fr.) Sacc. subsp. *stephensoniana* Ellis in Rehm ex Sacc., Syll. Fung. 8: 100. 1889 (ut "*Stephensoniana* Ellis in Rehm").
 ≡ *Peziza stephensoniana* Ellis in Rehm, Ascom. Lojkani, p. 3. 1882, pro synonym. (ut "*Stephensoniana* Ellis").
 ≡ *Pustularia stephensoniana* (Ellis in Rehm ex Sacc.) Rehm in Rabenh. Kryptog.-Fl. 1(3): 1019. 1894 (ut "*Stephensoniana* (Ellis) Rehm").
 ≡ *Discina stephensoniana* Ellis ex Mussat in

Sacc., Syll. Fung. 15: 126. 1901, pro synonym. (ut "*Stephensoniana* Ellis").

This taxon was synonymized by Seaver (1928) with *Peziza repanda* Pers. ex Pers. Examination of an isotype specimen (Oct. 11, 1878, W. C. Stevenson 320, CUP-D-447) indicates that his conclusions were correct.

2. *Pachyella melaleuca* (Bres.) Boud., Hist. Class. Discom. Eur. p. 51. 1907.
 ≡ *Discina melaleuca* Bres., Fungi Trid. 2: 74. 1898.
 ≡ *Peziza melaleuca* (Bres.) Seaver, North American cup-fungi (operculates). p. 225. 1928.
 ≡ *Paradiscina melaleuca* (Bres.) Benedix, Die Kulturpflanze, 17: 255. 1969.
- Despite the smooth, non-apiculate spores, this species is here referred to *Discina* on the basis of its apothecial anatomy. This species is also the type of the genus *Paradiscina* Benedix.
- HOLOTYPE EXAMINED: Sub Pino sylvestri, Gocciador, Italy, 1897, Bresadola (Herb. Rehm, S = CUP 50937).

3. *Pachyella rhizinoides* (Rabenh.) Boud., Hist. Class. Discom. Eur. p. 51. 1907.
 ≡ *Fleischhakkia rhizinoides* Rabenh., Hedwigia, 17: 114. 1878.
 ≡ *Psilopezia rhizinoides* (Rabenh.) Rehm, Rabenhorst Kryptog.-Fl. 1(3): 1137. 1895.
- Neither type nor authentic material has been located. This taxon has been treated by Hennings (1903) and Rehm (1895) as a species of *Psilopezia*. It was synonymized with *P. nummularia* by Seaver (1928).

Acknowledgments

The author gratefully acknowledges the loan of specimens from the following herbaria: Royal Botanic Gardens, Kew; National Museum, Praha; Museum National d'Histoire Naturelle, Paris; The Museum of Natural History, Stockholm; Botanischer Garten und Botanisches Museum, Berlin-Dahlem; Naturhistorisches Museum, Wien; Herbarium Hamburgense, Hamburg; Botanical Museum, University of Helsinki; Orto Botanico, Padova; University of Michigan Herbarium, Ann Arbor; The New York Botanical Garden, Bronx, New York; Institute of Systematic Botany, University of Uppsala; Academy of Natural Sciences, Philadelphia;

National Fungus Collections, Beltsville; and The Farlow Herbarium and Library of Cryptogamic Botany, Cambridge.

The author also thanks Dr. Richard P. Korf for his guidance throughout this study and Cathleen Pfister for proofreading the manuscript.

- BAYLISS ELLIOTT, J. S. 1927. Studies in Discomycetes. IV. *Trans. Br. Mycol. Soc.* **12**: 290-294.
- ECKBLAD, F.-E. 1968. The genera of the operculate discomycetes. A re-evaluation of their taxonomy, phylogeny and nomenclature. *Nytt Mag. Bot.* **15**: 1-191.
- GAMUNDI, I. J. 1964. "Discomycetes" operculados del Nahuel Huapi. *Darwiniana* (Buenos Aires), **13**: 580-591.
- HENNINGS, P. 1903. Einige neue und interessante deutsche Pezizeen II. *Hedwigia*, **42**: 17-20.
- INGOLD, C. T. 1954. Aquatic Ascomycetes: Discomycetes from lakes. *Trans. Br. Mycol. Soc.* **37**: 1-18.
- LE GAL, M. 1953*a*. Les Discomycètes de l'herbier Crouan. *Rev. Mycol. (Paris)*, **18**: 73-132.
- 1953*b*. Les Discomycètes de Madagascar. *Prodr. Flore Mycol. Madagascar*, **4**: 1-465.
- 1963. Valeur taxonomique particulière de certains caractères chez le Discomycètes supérieurs. *Bull. Soc. Mycol. (France)*, **79**: 456-470.
- MORGAN, A. P. 1902. The discomycetes of the Miami Valley, Ohio. *J. Mycol.* **8**: 179-180.
- PFISTER, D. H. 1973*a*. The psilopezioid fungi. I. History, nomenclature, and delimitation of the psilopezioid genera. *Mycologia*, **65**(2): 321-328.
- 1973*b*. The psilopezioid fungi. III. The genus *Psilopezia* (Pezizales). *Am. J. Bot.* **60**(4): 355-365.
- REHM, H. 1887-1896. Ascomyceten: Histeriaceen und Discomyceten. In Dr. L. Rabenhorst's *Kryptogamen-Flora von Deutschland, Oesterreich und der Schweiz*. Vol. 1. Part 3. Edited by G. Winter and H. Rehm. pp. 1-1275.
- SEEVER, F. J. 1928. The North American cup-fungi (operulates). Published by the author, New York, N.Y.