

ON BOUDIER'S GENUS *LEPIDOTIA* (PEZIZACEAE)

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(With two Text-figures and Plates 17-19)

A stipitate Operculate Discomycete with asci that blue in iodine, *Lepidotia hispida*, has been rediscovered growing on *Sphagnum*-pots in North America. The species was first found nearly a century earlier by Quélet in France, and has not been reported since. It is the type species of the nearly forgotten generic name *Lepidotia*, which is not accepted here but placed in synonymy with *Peziza*. An unnamed imperfect state is formed, and apothecia are quickly and easily produced in pure culture. When treated as a species of *Peziza*, a new name is required, *P. quelepidotia* Korf & O'Donnell, nom. nov.

The genus *Lepidotia* Boudier (1885) was erected for one species (and possibly a second) of Operculate Discomycetes referred to the family Pezizés, "groupe" Aleuriés. Boudier characterized the group by asci blueing in iodine at the apex, and by apothecia having furfuraceous or somewhat filamentose, but never hairy, outer surfaces. Four of the six genera he included were characterized by ellipsoidal ascospores; among these, *Lepidotia* was distinguished by its ascospores lacking oil guttules and by distinctly stipitate or obconic apothecia bearing triangular, submembranaceous scales.

Boudier's (1907) later treatment of these genera with iodine-positive asci did not differ significantly, except in the exclusion of *Sphaerosoma* Klotzsch in Dietr. and the inclusion of *Pachyella* Boud. in what he now termed the tribe Aleuriées. Two species were listed under *Lepidotia*, *L. hispida* (Quélet) Boud. and *L. subrepanda* (Cooke & Phill.) Boud., neither combination having been formally proposed earlier. These were the same species originally mentioned by Boudier (1885), where in the notes under the generic name *Lepidotia* he wrote, "Comme espèces, la *Peziza hispida* Quel.<sup>2</sup> et peut-être *subrepanda* Phill." His expressed doubt about the assignment of *P. subrepanda* to the genus automatically fixes *P. hispida* as the only possible type (i.e., originally designated type) of the generic name. When Eckblad (1968) listed *Lepidotia*

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<sup>2</sup> Neither Boudier nor Cooke used the accent mark on Quélet's name in their published accounts, spelling it "Quelet." I do not feel the accent marks should be restored while quoting these authors.

under "Insufficiently known and excluded genera" (because he did not know of the Quélet specimen discussed below), he 'selected' *Lachnea hispida* as the type of the generic name.

Neither species of *Lepidotia* appears to have been reported as being collected again after both were illustrated by Cooke (1877, 1879) nearly a century ago. And thus Boudier's genus has remained forgotten, or at least doubtful. Mme Le Gal (1947) excluded it from her tribe Aleurieae as a doubtful genus: "N'ayant pu examiner aucune des deux espèces que BOUDIER y fait rentrer, nous ne saurions prendre position à leur sujet."

In the absence of specimens, *L. subrepanda* seems indeed to be a 'lost' species, known only from Cooke's (1877: fig. 260) description and drawing reproduced here (Plate 17). The triangular scales are shown to be composed of cohering, septate hyphae, and the spores are illustrated as smooth, and without guttules. Whether or not the asci blue in iodine is not known.

The other original species, *Lepidotia hispida*, is more critical, since the generic name *Lepidotia* is tied to it nomenclaturally. Quélet (1879) described it at the 'séance' of December 13, 1878, of the Société Botanique de France. Actual publication of the species, under the name *Lachnea hispida* Quélet., could not have appeared in print before June of the following year (see Bull. Soc. bot. Fr. 25: 317. "1878", where there is a "Note ajoutée pendant l'impression, juin 1879" referring to the same 'séance'). In Quélet's description he refers specifically to "Cooke, *Peziz.* f. 402," which identifies Cooke's (1879: fig. 402) plate published in March, or earlier, 1879. This drawing (reproduced here, Plate 17) is described on the accompanying page of the text, with the notations "*Peziza hispida* Quélet, in litt." and "Figured from specimens communicated by Dr. Quélet."

Since Quélet published *Lachnea hispida* later than Cooke had published *Peziza hispida* Quélet. *ex* Cooke, one might consider the Quélet name to be a new combination, i.e., one would cite it as *Lachnea hispida* (Quélet. *ex* Cooke) Quélet. However, *Peziza hispida* Quélet. *ex* Cooke is a later homonym of *P. hispida* Huds. per Purton, validly published in 1821, and is thus an invalid name. There being no obstacle to the use of the epithet 'hispida' in the genus *Lachnea*, Quélet's transfer should instead be treated as the proposal of a *nomen novum* (Art. 72, International Code of Botanical Nomenclature) and he alone should be cited as the author of the name *Lachnea hispida*.

Some twenty years ago, when I began my studies of generic names in the Pezizales that are only now reaching fruition (Korf, 1972), I obtained the Quélet specimen from which Cooke had drawn up his diagnosis and illustration of *Peziza hispida* on loan from the Herbarium of the Royal Botanic Gardens, Kew. I found that the asci indeed blued in iodine, and that there were few if any characters to separate it generically from *Peziza* St-Amans.

## AN AMERICAN COLLECTION

Approximately two years ago, Mr. Kerry O'Donnell, a graduate student at Michigan State University, sent me an interesting Operculate Discomycete for identification. The stipitate apothecia (Plate 18 Fig. a) and yellow-green colors exhibited by the fungus were unusual, and recalled to me the genus *Gelatinodiscus* Kanouse & Smith, where I tentatively assigned it. Mr. O'Donnell correctly pointed out to me features in which his fungus differed from the only species of that genus, *G. flavidus* Kanouse & Smith. He noted that the ascospores of his fungus were lightly marked (Fig. 1) and that the paraphyses were unbranched, as opposed to the smooth ascospores and branching paraphyses of *G. flavidus*.<sup>3</sup> Eventually I advised him that his fungus could best be referred to the very large and difficult genus *Peziza*. I had,

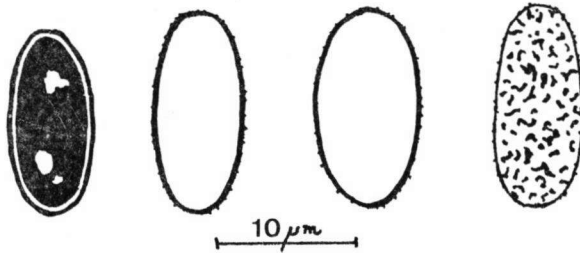


Fig. 1. *Peziza quelepidotia* ascospores; at left, young ascospore with cyanophilic perispore and cyanophilic cytoplasm, with polar granules and spore wall not taking up cotton blue dye; in center, two mature ascospores devoid of guttules, viewed in optical section; at right, mature ascospore in face view. — All from mounts in cotton blue dye in lactic acid, Specimen No. Korf 4074, drawn with the aid of a Wild drawing tube,  $\times 1900$ .

at that time, little hope of being able to put a specific epithet on his fungus in view of our chaotic state of knowledge of the species of this genus.

Quite as an afterthought, I remembered having examined the type specimen of *Lepidotia hispida* many years earlier. I consulted the slide I had prepared from that specimen, and to my surprise found that the spores of *L. hispida* were not smooth, as reported by Cooke and by Quélet, but were lightly though densely marked and wholly indistinguishable from those of Mr. O'Donnell's collection. Likewise the hairs and scales on the apothecium are indistinguishable between collections (Fig. 2).

Two characters of the recent collection seem irreconcilable with Cooke's drawings (Plate 17): the presence of a distinct stipe, and the yellow-green colors recalling not only *Gelatinodiscus* but such Inoperculate Discomycetes as '*Rutstroemia*' *luteovirescens* (Rob.) White and its allies. Scarcely any stipe is visible in Cooke's drawing, who

<sup>3</sup> I have since had opportunity to examine a recent collection of *G. flavidus*, which demonstrated to me that it is not at all closely related to the Pezizaceae where I had assigned it (Korf, 1972).

in fact clearly indicated that the species was sessile. The colors of the plate, rendered in the description as "incarnato-pallida," scarcely agree at all with the O'Donnell fungus when it produces its apothecia in culture.

It was particularly instructive for me to examine Quélet's (1879) description, and to compare it with Cooke's (1879) description and drawings. At once it becomes apparent that Cooke knew the fungus only from dried and rehydrated material. The stipe is easily broken off in dried specimens, and at the time I examined the Cooke Herbarium specimen, I made no note of the presence of any stipe. The very characteristic colors of the living fungus are lost on drying, and a rehydrated apothecium might indeed look as devoid of yellow or green tones as does the original Cooke plate. On the other hand, Quélet's description, drawn up from living material (probably the same collection), agrees remarkably well with the American collection in all respects except for the initial color of the apothecium, "blanche" according to Quélet. Ours, as it grows in culture, is initially yellow-green, but of course our substrate is not a natural one, which might influence the colors. Quélet's description of the final color, "jaune sale", is not inappropriate for the colors we see; old apothecia in culture are olive-brown. The two conflicting diagnoses are reprinted here to facilitate the reader's understanding:—

Cooke (1879: 238):

Sessilis, sparsa, incarnato-pallida, demum explanata, extus marginique squamulis acutis obsita. Ascis cylindraceis. Sporidiis ellipticis, hyalinis. Paraphysibus gracilibus.

*Peziza hispida* Quelet, in litt.

Attached to mosses.

France.

Cups 1 cm. diam. Sporidia .015 × .008 mm. Scales triangular, composed of parallel hyaline connate hairs.

Figured from specimens communicated by Dr. Quelet.

Quélet (1879: 291):

Cupule épaisse, globuleuse puis cyathiforme (0<sup>m</sup>,01) et stipitée, charnue, fragile, blanche puis jaune sale, hérissée de poils sétacés et rameux, souvent connés en écaille. Hyménium opalin. Spore ellipsoïde allongée (0<sup>mm</sup>,015), hyaline. (Cooke, *Peziz.* f. 402).

*Printemps.*—Sur l'humus marécageux des forêts de la plaine.

Quélet italicized features which he considered diagnostic, notably that the apothecia were stipitate (Cooke, it should be recalled, described them as sessile) and that the apothecia were clothed with branching, setaceous hairs that were often grouped into scales. Cooke, on the contrary, only illustrated hairs that were cemented together to form scales, not mentioning nor illustrating any separate hairs or any branching of these. In Mr. O'Donnell's fungus, not all of the hairs are cemented into teeth, and branching of these also occurs (Fig. 2). I have no hesitancy in identifying the recent collection with Quélet's species.

Most of my observations on *Lepidotia hispida* have been made on apothecia produced in culture in the laboratory in petri dishes on a medium concocted by Mr.

O'Donnell, and which we call "Jiffy-7 Pellet agar." This is easily constituted by suspending two 'Jiffy-7 Pellets,' a commercially available peat-moss product,<sup>4</sup> in a liter of water, to which is added 30 to 50 g agar, the mixture being autoclaved for fifteen to twenty minutes at 117 °C. The suspension is poured into petri dishes, and on solidification is seeded with a bit of the agar or a portion of an apothecium from a previous culture. If the dishes are placed under constant fluorescent lights at normal laboratory temperature, apothecia begin development within four days to a week, and are mature within ten days to two weeks.

Jiffy-7 pellets consist of a compacted *Sphagnum*-moss mixture which when placed in water expands to form a spongy mass held in place by a mesh net on the outside; they are then ready for planting seeds for eventual transfer to the garden. Mr. O'Donnell's collection of *L. hispida* was originally brought into the laboratory at Michigan State University by a homeowner, who found a crop of apothecia developing on his planted Jiffy-7 pellets. We believe that the original source of the Jiffy-7 pellet material is in Scandinavia, but whether *L. hispida* was imported along with the pellets or came from spores in America is impossible to ascertain. Quélet indicated that his species grew on swampy humus, while Cooke indicated that the apothecia of Quélet's specimen were attached to mosses. Our assumption is that Quélet's specimen grew on some decaying *Sphagnum*-like moss in a swampy area, surely a habitat not too dissimilar from a moistened Jiffy-7 pellet.

Mr. O'Donnell successfully isolated the fungus, and developed the Jiffy-7 Pellet agar as a fruiting medium (O'Donnell & Beneke, 1973). He was later able to isolate single ascospores and to prove that the species is homothallic (capable of developing apothecia from a single ascospore), and to demonstrate that the ascospores are uninucleate (Plate 18 Fig. e).

My studies of *L. hispida* in culture confirm my earlier conclusion that the genus *Lepidotia* cannot satisfactorily be separated from *Peziza*, which I take in the broad sense (Korf, 1961) to include *Aleuria* sensu Boudier (non Fuckel), *Galactinia* (Cooke) Boud., and *Plicaria* Fuckel.<sup>5</sup> The presence of a stipe does not appear to be of generic significance among these iodine-positive species. Boudier (1904-11: pl. 266) illustrated the distinctly stipitate *Aleuria asterigma* Vuill. (a *Peziza* in my sense) among the many sessile species he assigned to that genus. A portion of his plate is reproduced here (Plate 19). The illustration immediately recalls the gross morphology of *L. hispida*. Here, however, the squamules on the outer surface are composed of globose

<sup>4</sup> The product is listed in the catalogues of all major seedsmen in the U.S., and is also available at garden supply stores. I found it also in the garden department of a supermarket in Belgium, marketed by the Jiffy-Pot Benelux S.A. company. It is said to consist of compacted peat-moss and added fertilizer.

<sup>5</sup> This is the same taxonomic group which Mme Le Gal (1953) tentatively proposed and later adopted (Le Gal, 1962) as *Galactinia* (Cooke) Boud. emend. Le Gal. *Peziza* as conceived by Eckblad (1968) differs in including two genera I consider amply distinct, *Sarcosphaera* Auersw. and *Pachyella* Boud. emend. Pfister. On the other hand, he recognized *Plicaria* for species of *Peziza* which essentially differ only in having spherical ascospores.

cells (Plate 19 Fig. m) and not of triangular scales composed of filaments, characters upon which Boudier (1885) had established *Lepidotia*. While the apothecia of *L. hispida* do possess hyphae which are sometimes glued into more or less triangular scales, best seen in dried specimens and overemphasized in Cooke's drawing, the hyphae are very similar to those present in a number of species of *Peziza*, and recently described well and in some detail by Svrček (1970). The structure of the apothecium is much as in other species of *Peziza*, with the outermost layers composed mainly of greatly enlarged, subglobose to pyriform cells (Fig. 2; Plate 18 Fig. d). The asci are typically operculate (Plate 18 Fig. c), and the spores, though devoid of oil drops and with essentially homogeneous cytoplasm at maturity, do have small droplets and granulations aggregated into two polar groups at an early stage of development (Fig. 1; Plate 18 Fig. b). The cytoplasm of young ascospores is cyanophilic, as is the perispore, but at maturity the cytoplasm no longer stains blue and distinct, closely spaced, cyanophilic spore markings, scarcely visible in optical section but obvious in face view, develop (Fig. 1).<sup>6</sup>

Some of the species of *Peziza* have been shown to produce an imperfect state. These are usually of the *Botrytis*-like genera *Oedocephalum* Preuss or *Chromelosporium* Corda [earlier called *Ostracoderma* Fr., but see the paper by Hennebert (1973) in which the status of *Ostracoderma* as a peridiate genus — more recently called *Lycoperdellon* — is at last made clear]. *Lepidotia hispida* also produces an imperfect state under certain conditions, but it is not of this type, and belongs perhaps to an undescribed genus according to Prof. Hennebert (Plate 18 Figs. f, g).

It is impossible to transfer the epithet of *Lepidotia hispida* to *Peziza*, or to accept

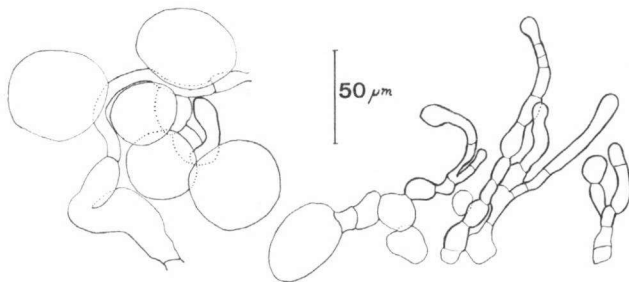


Fig. 2. *Peziza quelepidotia*; at left, thin-walled, hyaline, globose to pyriform cells of the ectal excipulum a few cells in from the surface, interspersed with hyphal elements; at right, pale brown excipular cells giving rise to darker brown, hair-like processes, some of which branch, that make up the tomentum and which cohere to form the scales on the apothecial surface. — From mounts in 50 percent aqueous glycerine, Specimen No. Korf 4074, drawn with the aid of a Wild drawing tube,  $\times 250$ .

<sup>6</sup> Mr. O'Donnell is proceeding with his Ph. D. studies on this fungus, at the completion of which cultures will be deposited in the American Type Culture Collection and in the 'Centraalbureau voor Schimmelcultures' for the use of others. It grows so easily in culture that its adaptability for use in class work for students of mycology or even of general botany is readily apparent.

Cooke's name in that genus, because of the existence of an earlier homonym. Since we are unaware of any earlier epithet which can be applied, a new name for the species is hereby proposed:—

***Peziza quelepidotia* Korf & O'Donnell, *nom. nov.***

Figs. 1—2, Plate 18

[*Peziza (Sarcoscypha) hispida* Quél. *ex* Cooke, *Mycographia* 1: 238. 1879, March or earlier (basonym); non *Peziza hispida* Huds. *per* Purton, *Append. Midl. Flora* 3: 462. 1821.] — *Lachnea hispida* Quél. *in* Bull. Soc. bot. Fr. 25: 291. [“1878”] 1879, June or later [*nom. nov.*, see Art. 72, *Int. Code Bot. Nomencl.*]. — *Neottiella hispida* (Quél.) Sacc., *Syll. Fung.* 8: 192. 1889. — *Lepidotia hispida* (Quél.) Boud., *Hist. classific. Discom. d'Eur.* 43. 1907.

ETYMOLOGY: From Quélet and the generic name *Lepidotia*.

ILLUSTRATION: Cooke, *Mycogr.* 1: pl. 112, fig. 402. 1879.

HOLOTYPE: *Quklet*, sine no., sine dat., Hérimoncourt, Doubs, France, Herb. M. C. Cooke (K)

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## EXPLANATION OF PLATES 17-19

## PLATE 17

Cooke's (1877, 1879) illustrations of *Peziza subrepanda* (Fig. 260) and of *P. hispida* (Fig. 402).

## PLATE 18

*Peziza quelepidotia* from specimens grown on agar. — a. Apothecia in various stages of development. — b. Young ascospores in glycerine-Melzer's Reagent mount (1 : 1) showing polar aggregations of globules and granules. — c. Empty asci with the opercula thrown back. — d. Vertical section through a portion of an apothecium. — e. Young ascospores stained in propionic iron haematoxylin demonstrating the single nucleus in each spore. — f, g. Conidia and conidiophores. (Fig. a:  $\times 3.8$ ; Fig. b:  $\times 1000$ ; Figs. c, e:  $\times 1330$ ; Fig. d:  $\times 20$ ; Figs. f, g:  $\times 535$ .)

## PLATE 19

Boudier's (1904-1911) illustration of *Aleuria asterigma*, only a portion reproduced showing apothecia (*a, b, d, e, f*) and globose cells which make up the squamules (*m*). The apices of two paraphyses are shown between *m* and *f*.



