

On *Holwaya*, *Crinula*, *Claussenomyces*, and *Corynella*¹

RICHARD P. KORF AND GEORGE S. ABAWI

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

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A monographic investigation of the genus *Holwaya* Sacc. leads to acceptance of a single species, *H. mucida* (Schulzer) comb. nov., for which a longer-spored variant from Japan, *H. mucida* subsp. *nipponica* subsp. nov., is described. The prominent stilbaceous imperfect state present in both subspecies is *Crinula caliciiformis* (Fr.) ex Fr. *Crinula* Sacc. non Fries, *Ditiola* Schulzer non Fries, and *Jugglerandia* Lloyd are synonyms of *Holwaya*. Two species previously referred to the genus are excluded: *H. salicis* becomes *Durandiella salicis* (Müller & Ahmad) comb. nov.; *H. pusilla* belongs to the genus usually called *Corynella* Boud., but that generic name is an invalid later homonym. *Claussenomyces* Kirschst. is available to accommodate species previously placed in *Corynella*, and three new combinations are proposed, *Claussenomyces atrovirens* (Pers. ex pers.), *C. prasinulus* (Karst.), and *C. pusillus* (Rehm); a key to the four accepted species of that genus is provided.

Introduction

A large collection by the senior author and his colleagues in Hokkaido, Japan, of a fungus on the fallen trunk of a *Tilia* tree, closely resembling the common North American discomycete *Holwaya leptosperma* (Peck) Durand (= *H. gigantea* Durand), sparked our monographic investigation of the genus *Holwaya*.

The type species of the genus is characterized by rather prominent, black, often shiny apothecia ranging in size from about 7 mm to 15 mm in diameter, occurring singly or in groups, with a short to rather long stipe, protruding through the cracks in the bark of fallen trees. It is nearly always restricted to *Tilia*, though reported on other hosts including *Acer*, *Castanea*, *Fagus*, *Fraxinus*, *Magnolia*, *Quercus*, and *Ulmus*. The inoperculate asci have filiform, multiguttulate, eventually multiseptate, hyaline ascospores. In addition to the apothecia, and sometimes appearing in their absence, are large synnemata of the imperfect state, with shiny black stalks about 2 mm thick and 3 to 10 mm tall, which taper upward to the inflated, broadly elliptical, viscid, grey head bearing the conidia. Like the apothecia, synnemata may occur singly or several together. The two states often occur in the same clump (Fig. 1).

The genus was erected by Saccardo (1889) for one species, *Holwaya ophiobolus* (Ellis) Sacc. Durand (1901a) correctly placed in synonymy three other described discomycete species, and

proposed two new combinations in the genus, both for the only species he accepted, based on the oldest perfect and the oldest imperfect state names known to him. At that time the Rules of Nomenclature were not precise regarding the validity of imperfect state names when applied to the perfect state of a fungus.

Both states of *Holwaya* have been known for much longer than Durand surmised, however. The imperfect state was apparently first described by Fries in 1818 as *Acrospermum caliciiforme*. In the first volume of the *Systema Mycologicum*, Fries (1821) adopted instead the generic name *Crinula* for this state. Schulzer von Müggenburg (1860) found both the imperfect and perfect states together, which he described as a new species, *Ditiola ? mucida*. His reason for insertion of the question mark was his intention in that paper to emend the generic concept of *Ditiola* Fr. That genus, known today as a member of the Dacrymycetaceae (Basidiomycetes), he assumed to be a genus of imperfect fungi, and he intended by his emendation to make the name apply to the Ascomycete as well. Masee (1891) mistakenly referred the synnematal state of *Holwaya* to *Dacryopsis* Masee, another dacrymycetaceous genus. This prompted Burt (1898) to present a paper questioning whether there might not be a basidiomycetous stage in the life cycle of some Ascomycetes. A lively, even bitter, controversy ensued (Masee 1901; Durand 1901b; Burt 1921; Lloyd 1923). To make matters even more confusing, Saccardo (1889), followed by Boudier (1907), Clements (1909), and Juel (1922), adopted the name

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Crinula "Fries" for the ascomycetous element, though clearly the Friesian genus is based on the imperfect state only, as correctly indicated by von Höhnelt (1912).

The position of *Holwaya* in the classification has always presented some problems, despite excellent descriptions of the type species by Durand (1901a) and Juel (1922). The somewhat gelatinous apothecia led Saccardo (1889) and Clements and Shear (1931) to place the genus in the Bulgariaceae, and Seaver (1951) to place it in the Helotiaceae, Ascotremelleae. The mucilage present does not form a gelatinous matrix in which the hyphae are immersed, as is typical of the Leotioideae (= Ombrophileae), but is excreted through the hyphal walls and collects in small globules at gliatopes (Moore 1965) in the medullary tissues (Fig. 8), followed by a limited sheathing of the hyphae. Boudier (1907, as *Crinula*) placed the genus next to *Encoelia* Fr., and was apparently the first to recognize its true affinities. Nannfeldt (1932) and Korf (1971) both place *Holwaya* in the Encoelioideae. The scurfy ectal excipulum, composed of textura globulosa, and a prominent pseudoepithecium formed of the swollen paraphysis apices and a brownish, amorphous material, are diagnostic features (Fig. 5). The placement by Durand (1901a) and by Lloyd (1923) of the genus in the Patellariaceae had little basis other than the black color of the apothecia and the "epithecium."

The oldest available epithet for the perfect state of our common *Holwaya* is provided by *Ditiola mucida* Schulzer, as pointed out by Lloyd (1923) when he coined, as a joke, the generic name *Jugglerandia* McGinty, and the combination *J. mucida* "Baron Stephan Schulzer von Müggenberg von Oesterreich & McGinty." Schulzer's epithet has not previously been combined in *Holwaya*. In view of the exceptionally complex and confused synonymy (*Jugglerandia* was rather appropriately coined), we provide here full synonymies for the perfect and imperfect generic names, and for the only

species we accept (including a new subspecies based on the Japanese material). The synonymies are based on our studies of type specimens and, in a few instances, of the literature. Unfortunately we have been unable to locate any of Schulzer's original material. His detailed description and illustrations serve as the type of the species name.

***Holwaya* Sacc. (Leotiaceae, Encoelioideae)
and *Crinula* Fries (Stillbaceae)**

Holwaya Saccardo, Syll. Fung. 8: 646. 1889 (typus: *Bulgaria ophiobolus* Ellis).

= *Ditiola* Schulzer, Verh. Zool.-Bot. Ges. Wien, 10: 321. 1860 (*pars ascoph.*), (typus: *D. mucida* Schulzer), non *Ditiola* Fries, Syst. Mycol. 2: 169. 1822.

≡ *Crinula* Sacc., Syll. Fung. 8: 606, 1889 (*pars ascoph.*), (lectotypus: *Ditiola mucida* Schulzer), non *Crinula* Fries, Syst. Mycol. 1: 493. 1821.

≡ [*Jugglerandia* Lloyd (ut "McGinty," a joke), Mycol. Writ. 7: 1231. 1923.]

Crinula Fries, Syst. Mycol. 1: 493. 1821 [typus: *C. caliciiformis* (Fr.) ex Fr.], non *Crinula* Sacc., Syll. Fung. 8: 606. 1889.

≡ [*Crinium* Fries, Nov. Fl. Suec. 5: 79. 1819.]

Accepted Species of *Holwaya*

Holwaya mucida* (Schulzer) Korf & Abawi, comb. nov., subsp. *mucida

STAT. ASCOPH.

≡ *Ditiola mucida* Schulzer, Verh. Zool.-Bot. Ges. Wien, 10: 322, Pl. 1, Figs. 1-9 (infra). 1860 (*pars. ascoph.*).

≡ *Crinula mucida* (Schulzer) Sacc., Syll. Fung. 8: 607. 1889.

≡ [*Jugglerandia mucida* (Schulzer) Lloyd (ut "Baron Stephan Schulzer von Müggenberg von Oesterreich & McGinty," a joke), Mycol. Writ. 7: 1231. 1923.]

= *Patellaria leptosperma* Peck, Annu. Rep. N.Y. State Mus., 30: 62. 1878.

FIGS. 1, 2, 5, 7, 8, *Holwaya mucida* subsp. *mucida*; FIGS. 3, 6, *Holwaya mucida* subsp. *nipponica*; FIG. 4, *Claussenomyces pusillus*. Fig. 1. Median longitudinal section through a synnema and an apothecium. $\times 10$. Fig. 2. Ascus with two bundles of four spores. $\times 800$. Fig. 3. Ascus with a single fascicle of eight spores. $\times 800$. Fig. 4. Clavate ascus with irregularly disposed ascospores. $\times 800$. Fig. 5. Median section through an apothecium. $\times 180$. Fig. 6. Branching system of phialides from the synnematal head. $\times 800$. Fig. 7. Ascospores germinating by budding microconidia. $\times 880$. Fig. 8. Medullary hyphae of the apothecium showing granulations on hyphae and gel excretion. $\times 1200$.

gel
immer
excretet!

??



C. pusillus

↓ PLATE I



1



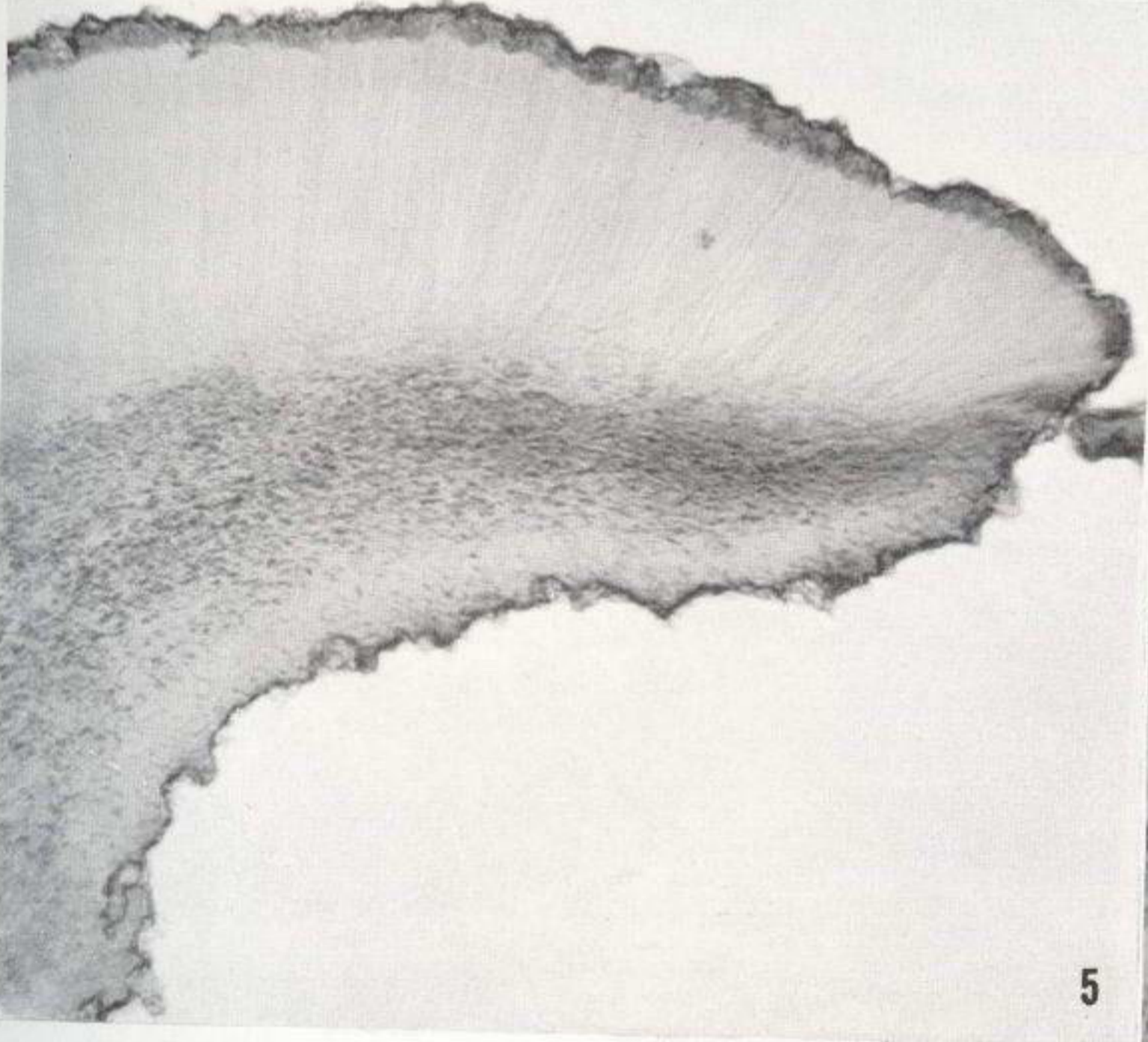
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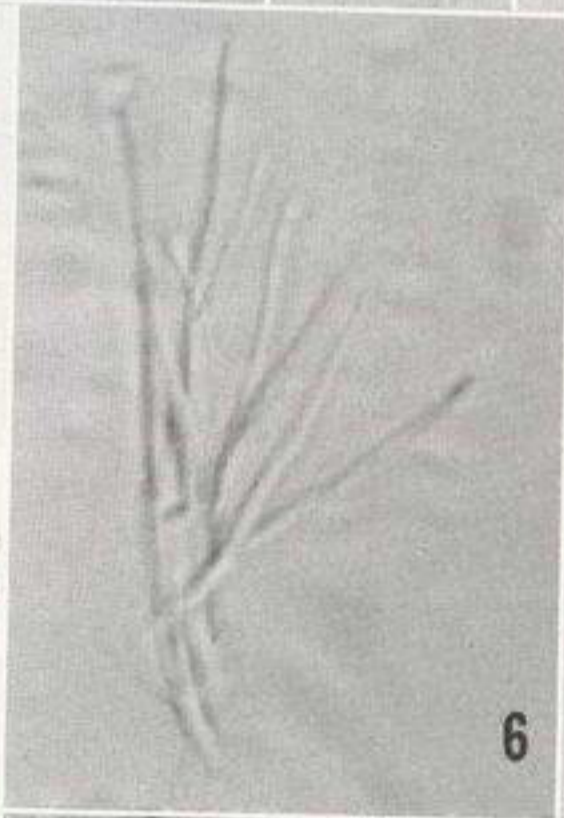
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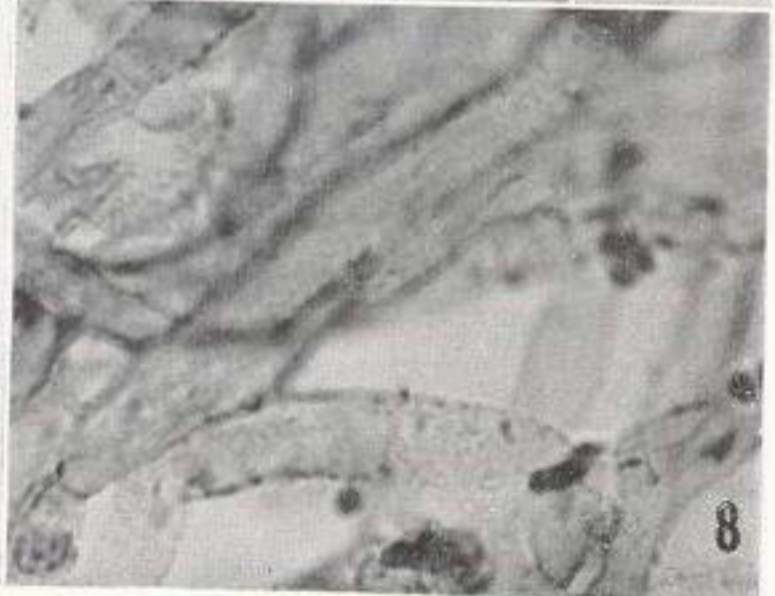
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6



7



8

rank Medullas hypha
("Glaucopis") Exudate
Pigment?

≡ *Lecanidion leptospermum* (Peck) Sacc., Syll. Fung. 8: 800. 1889.

≡ *Holwaya leptosperma* (Peck) Durand, Bull. Torrey Bot. Club, 28: 353. 1901.

≡ *Holwaya gigantea* Durand (ut "(Peck) Durand"), Bull. Torrey Bot. Club, 28: 353, 354. 1901, an alternative name.

≡ *Coryne gigantea* (Durand) Kirschstein (ut "(Peck)"), Verh. Bot. Ver. Prov. Brandenburg, 65: 124. 1923.

≡ [*Jugglerandia gigantea* (Durand) Lloyd (ut "(Peck) McGinty," a joke), Mycol. Writ. 7: 1231. 1923.]

= *Bulgaria ophiobolus* Ellis, Am. Nat. 17: 193. 1883.

≡ *Holwaya ophiobolus* (Ellis) Sacc., Syll. Fung. 8: 646. 1889.

= *Chlorosplenium canadense* Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia, 41: 146. 1893.

= *Holwaya tiliacea* Ellis & Everh., Am. Nat. 31: 427. 1897.

= *Crinula caliciiformis* Juel (ut "Fries"), Ark. Bot. 18(6): 13-15. 1922 (*pars ascoph.*), non *C. caliciiformis* (Fr.) ex Fr. 1821.

STAT. CONIDIOPH.

Crinula caliciiformis (Fr.) ex Fr., Syst. Mycol. 1: 493. 1821.

≡ [*Acrospermum caliciiforme* Fr., Obs. Mycol. 2: 311. 1818.]

= *Ditiola mucida* Schulzer, Verh. Zool.-Bot. Ges. Wien, 10: 322, Pl. 1, Figs. 1-3 (infra). 1860 (*pars conidioph.*).

= *Stilbum giganteum* Peck, Annu. Rep. N.Y. State Mus. 24: 93. 1872.

≡ *Graphium giganteum* (Peck) Sacc., Syll. Fung. 4: 611. 1886.

≡ [*Stilbum magnum* Peck ex Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia, 41: 147. 1893, lapsus calami.]

= *Coryne ellisii* Berk., Grevillea, 2: 33. 1873.

≡ *Dacryopsis ellisiana* Masee (ut "ellisiana"), J. Mycol. 6: 181. 1891, a name change.

= *Dendrostilbella ulmicola* Naumov, Bull. Angew. Bot. 6: 207-208. 1913.

EXSICCATAE: Ellis, North American Fungi 996 (*Bulgaria ophiobolus*), 1383 (*Coryne ellisii*); Ellis & Everhart, Fungi Columbiana 1216, (*Dacryopsis ellisiana*); Reliquiae Farlowianae 126a, b (*Holwaya gigantea*).

Holwaya mucida subsp. *nipponica* Korf & Abawi, subsp. nov.

Subspeciei typicae similis, sed ascosporae in fasciculo octosporo productae, majores, 97-133 μm longae, ad apicem 3.3-4.4 μm crassae, infra angustatae; status conidialis: *Crinula caliciiformis* (Fr.) ex Fr.; holotypus: CUP Fungi of Japan 2628.

NOTES: The Japanese subspecies differs from typical *H. mucida* in having very much longer ascospores borne in a single fascicle of eight spores (Fig. 3), whereas in both American and European collections the ascospores are borne in two fascicles of four each, one above the other in the ascus (Fig. 2). Not all collections of typical *H. mucida* have septate ascospores, but those that do have about half as many septa as do those of the Japanese subspecies. Germination of the ascospores in *H. mucida* subsp. *mucida* is often by budding of microconidia (Fig. 7), but this has not been observed in *H. mucida* subsp. *nipponica*. We find the asci of both subspecies very similar, the length of both being 132-187 μm ; ascus width in the Japanese subspecies is 10-15 μm , that of the typical subspecies being 10-12 μm . The *Crinula* imperfect states of the two subspecies are, as far as we can see, indistinguishable (Figs. 1, 6).

Excluded Species: *Claussenomyces* Kirschst. (= *Corynella* Boud.) and *Durandiella* Seaver

Holwaya pusilla Rehm (1906) differs from the type species of *Holwaya* in several respects, notably the absence of textura globulosa as the outermost layer of the ectal excipulum, and the presence of copious mucilage forming a gel in which the excipular and medullary hyphae are embedded. The ascocarps also release large quantities of a purple-brown dye into KOH solutions (the ionomidotic reaction). Rehm reported the ascospores to be 35-38 \times 3-3.5 μm , and noted that the collector, Fairman, found the spores to be up to 60 μm long. We find the ascospores in Fairman's portion of the type collection to be 38-78 \times 2-3 μm (Fig. 4). Rehm's species is clearly congeneric with the monotype of the little-known genus *Claussenomyces*, *C. jahnianus* Kirschstein (1923). Kirschstein had earlier orally described his new fungus in *Holwaya*, which Harms (1917) inadvertently misspelled "Holmaya;" *Holwaya*

jahniana Kirschst. in Harms is technically a nomen nudum, however. Both Rehm's and Kirschstein's species are anatomically very similar to species referred to *Corynella* Boudier (1885), a later homonym of *Corynella* DC. 1825 (Leguminosae). We propose to transfer the two commonest members of Boudier's genus to *Claussenomyces*, from which they seem to differ somewhat in lacking an ionomidotic reaction. Three new combinations are necessary, and it appears appropriate to present a key to the four species now recognized in *Claussenomyces*.

Claussenomyces atrovirens (Pers. ex Pers.) Korf & Abawi, comb. nov.

≡ [*Peziza atrovirens* Pers., Syn. Meth. Fung. p. 635. 1801.]

≡ *Peziza atrovirens* Pers. ex Pers. (ut "*atrovirens*"), Myc. Eur. 1: 306. 1822; Fries, Syst. Mycol. 2: 141. 1822.

Claussenomyces prasinulus (Karst.) Korf & Abawi, comb. nov.

≡ *Peziza prasinula* Karst., Not. Sällsk. F. Fl. Fenn. 10: 155. 1869.

Claussenomyces pusillus (Rehm) Korf & Abawi, comb. nov.

≡ *Holwaya pusilla* Rehm, Ann. Mycol. 4: 337. 1906.

KEY

1. Apothecia nearly black, ionomidotic

2. Apothecia 2–4 mm diam, ascospores 90–120(–150) μm long, seven-septate.....*C. jahnianus*
2. Apothecia 0.2–0.3 mm diam, ascospores 38–78 μm long, mostly 15-septate.....*C. pusillus*

1. Apothecia light to dark green, often finally black, not ionomidotic

3. Apothecia 0.5–1.5 mm diam, ascospores 15–30 μm long, 5- to 11-septate.....*C. atrovirens*
3. Apothecia 0.2–0.4 mm diam, ascospores 10–13 μm long, three-septate.....*C. prasinulus*

Mueller and Ahmad (1959) referred a new species from Pakistan, growing on willows, to *Holwaya*. It represents a member of the genus *Durandiella*, though not one of the species which appears in Groves' (1954) monograph of the genus, and we propose a new combination for it here.

Durandiella salicis (Müller & Ahmad) Korf & Abawi, comb. nov.

≡ *Holwaya salicis* Müller & Ahmad, Biologia, 5: 9. 1959.

Critical Specimens Examined

Type or authentic materials upon which the following names are based were examined, as well as a very large number of additional collections of the common *Holwaya mucida* subsp. *mucida* in CUP and the personal herbarium of the senior author.

Bulgaria ophiobolus: [E. W. Holway] 280, on old log, [Decorah, Iowa], Sept. 1882 (HOLOTYPE: NY-Ellis 1027a); E. W. Holway, on bark of old logs, Decorah, Iowa, Oct. 1882 (AUTHENTIC, TOPOTYPE: Ellis, North American Fungi 996, CUP-A, CUP-D 1221).

Chlorosplenium canadense: J. Dearness 2032, bark of *Tilia*, London, Canada, Oct. 3, '92 (ISOTYPES: CUP-D 2063, 4521).

Claussenomyces jahnianus: Kirschstein, auf abgefallenem Ast von *Quercus pedunculata* (inner label as *Q. robur*), Stadtforst, Berlin-Spandau, 12.3.16. (LECTOTYPE: B); Kirschstein, auf gefallenen Ästen von *Quercus robur*, Spandauer Stadtforst, 13.3.16. (LECTOPARATYPE: B).

Holwaya mucida subsp. *nipponica*: T. Yokoyama, E. Yamaguchi, & R. P. Korf, on wood of *Tilia japonica*, north shore of Lake Panke, Akan National Park, Kushiro, Hokkaido, Japan, 30.IX.1963 (HOLOTYPE: CUP-JA 2628; ISOTYPES: K, NY, TNS).

Holwaya pusilla: C. E. Fairman 1953, on wood in the woods, Lyndonville, N.Y., May 1906 (ISOTYPE: CUP-F); C. E. Fairman 3879, on rotten limb in wood pile, Lyndonville, N.Y., Jan. 7, 1913 (TOPOTYPE: CUP-F).

Holwaya salicis: S. Ahmad, on twigs of *Salix* sp., Pakistan (West), Shogran, 28.7.1956 (HOLOTYPE: ZN 14096).

Holwaya tiliacea: J. Macoun 259, on basswood bark, Canada, Oct. 3, '96 (ISOTYPES: CUP-D 2006, 5049).

Patellaria leptosperma: H. A. Warne, Oneida, N.Y., 1875 (SYNTYPE: NYS; ISOSYNTYPE: CUP-D 6099); G. W. Clinton, Buffalo [N.Y.] (SYNTYPE: NYS).

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