Life History Studies of Brazilian Ascomycetes 9. *Fluviostroma wrightii* gen. et sp. nov. (Syn.: *Sphaerostilbe wrightii* nom. illegit.) and its Synnematous Anamorph (*Stromatostilbella* gen. nov.)

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Introduction

Sphaerostilbe Tulasne & Tulasne (Ascomycetes, Hypocreaceae) is characterized by having a *Nectria*-like teleomorph and a *Stilbella*-like anamorph. The genus is considered to be synonymous with *Nectria* Fries (Samuels & Rossman, 1979) but most of the species have yet to be redisposed. The present paper proposes redisposition of one such species, *S. wrightii* Berkeley & Curtis (Berkeley 1869), based upon a study of holotype (K) and isotype (FH) specimens, as well as of recent collections from Brazil and Venezuela.

The original description of *S. wrightii* is enigmatic because it refers to synnemata and "confluent, irregular perithecia" and to two types of propagules: "spores .0001 inch (2.2 μm) long; sporidia .0005 (12.5 μm) long, .00025 (ca. 6 μm) wide, uniseptate." The holotype and isotype specimens contain only synnemata which bear unicellular 1.5—2.0 × 1.0—1.5 μm conidia. There are no uniseptate "sporidia" (ascospores?) or ascomata and there is no suggestion that there ever were ascomata on the specimens. The "confluent perithecia" described by Berkeley & Curtis do not agree with the ascomata that Theissen (1911) described from a specimen that he studied or with those that we found in a recent collection from Brazil. Therefore *Sphaerostilbe wrightii* is an illegitimate name (Art. 59, International Code of Botanical Nomenclature 1978) because both the original description and holotype of *S. wrightii* pertain only to the asexual phase of an Ascomycete.

Though *Sphaerostilbe wrightii* is an illegitimate name, the species described as *S. wrightii* is distinctive and unmistakable. It is common in the American tropics where it grows over the surface of decaying wood. The black shining stroma appears like a lobed stream of liquid

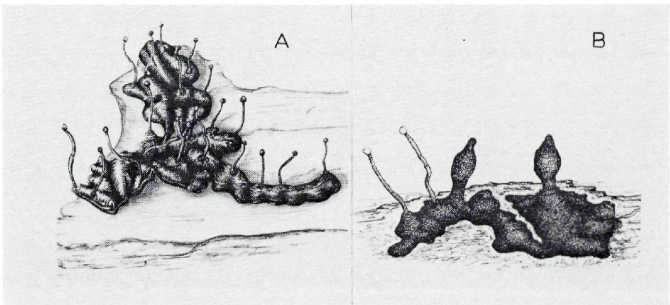

Fig. 1. *Fluviostroma wrightii* — A. Habit sketch of stroma bearing synnemata. B. Habit sketch of stroma with two ascomata and two synnemata

metal or wax that spread over the substrate before cooling and solidifying. Hair-like, black synnemata, each with an orange to yellow drop at its tip, are scattered over the stromal surface giving the stroma a distinctive hirsute aspect. We found perithecia on only one of six specimens examined. They are not confluent, as described by BERKELEY and CURTIS, but are solitary and elevated above the stromal surface by a pedestal. Asci are unitunicate and have an inamyloid apical ring. Paraphyses, whose tips are free, originate in the hymenium and are interspersed with the asci. These characters are consistent with those of the Sphaeriaceae (*sensu* MÜLLER & ARX, 1973) and not of the Hypocraeaceae. It cannot, however, be referred to any known genus and we propose the name *Fluviostroma wrightii* gen. et sp. nov.

Although we were unable to prove the connection of *F. wrightii* to its synnematous anamorph through culturing, there is no doubt that each is a phase of the same life cycle because of the continuity of synnemata, stroma and ascomata. The synnematous phase agrees well with the original description of *Stilbum stromaticum* BERKELEY (1843). However, *Stilbum* TODE ex MÉRAT is now recognized as a genus of Basidiomycetes (see discussions in BENJAMIN, 1968; Sutton, 1973) and it is necessary to redispose of *S. stromaticum*. Because of its extensive stromal formation, black, brittle synnemata with conidiophores that arise from pseudoparenchymatous cells at the tip of the synnemata and sequentially produced, intercalary phialides, *S. stromaticum* cannot be placed in any of the known genera of Hyphomycetes and we propose the new anamorph genus *Stromatostilbella* for it. Although we do not see any close relatives of this genus, its basic form suggests *Saccardaea* CAVARA and *Crinula* FRIES, both of which have dark synnemata and phialidic conidiogenesis. However, conidiophores of both *Saccardaea* and *Crinula* arise as simple extensions of hyphae of the synnemata, and not from a pseudoparenchymatous base as is the case in *Stromatostilbella*. The conidiophores of *Saccardaea* bear more or less penicillately arranged phialides, the conidia are dark and the head of the synnema is setose (ELLIS, 1971). Conidiophores of *Crinula* are more or less verticillately branched (SUTTON, 1973). *Crinula caliciiformis* FRIES is the anamorph of the inoperculate discomycete *Holwaya leptosperma* (PECK) DURAND. The sequentially produced phialides are an interesting feature of *Stromatostilbella* but they are not unique. They are also found in several taxonomically distinct genera (e. g. the hyphomycetous *Sesquicillium* GAMS, and the coelomycetous genera *Phomopsis* (SACCARDO) SACCARDO and *Ceuthospora* FRIES).

Description of the species

Fluviostroma SAMUELS & E. MÜLLER, gen. nov.

Ad familiam Sphaeriacearum pertinens. Stromata nigra, dispergentia. Ascomata nigra, stromatibus inserta, superficie parietis ascomatis a contigua

superficie stromatis non distincta. Periphyses ostiolaris canalis superficiem intus tegentes. Asci unitunicati, praediti poro iodo non coerulescenti. Paraphyses apicaliter non iunctae, ascis intermixtae. Synnemata e superficie stromatis exorientia, cellulis conidiiferis phialidicis.

Species typica: *Fluviostroma wrightii* SAMUELS & E. MÜLLER.

Stromatostilbella SAMUELS & E. MÜLLER, gen. nov.

Ad familiam hyphomycetum Stilbellacearum pertinens. Conidiomata synnematis facie, nigra. Conidiophora e pseudoparenchymaticis cellulis apice synnematis insitis exorientia. Cellulae conidiiferae monoblasticae, phialidicae, et terminales et intercalares, catenulatae.

Species typica: *Stromatostilbella* status anamorphosis *F. wrightii* SAMUELS & E. MÜLLER.

Fluviostroma wrightii SAMUELS & E. MÜLLER, sp. nov.

Stromata nigra, nitentia, elevata, ad 2 mm alta, lobata, saepe erumpentia atque e centro radiatim exorientia. Stromatis superficies laevigata, irregulariter convoluta, hemisphaericis processubus praedita, e quibus synnemata ascomataque oriuntur. Superficies crustosa, cellulis stromaticis tenuitunicatis, fuscis, pseudoparenchymaticis. Synnemata 1—5 mm longa, erecta, plurima, solitaria, non ramosa, nigra, liquoris flavoaurantiaci guttulam ferentia; synnematis stipes cylindraceus, fragilis, tenuiter striatus, ad 100 µm crassus; cellulae apicis synnematis pseudoparenchymaticae, fuscae, tenuitunicatae, 3—5 µm crassae, ex quibus conidiophora exoriuntur. Conidiophora 60—100 µm longa, non ramosa vel rare ramosa, 1—2 µm crassa, tortuosa, saepius circinata. Cellulae conidiiferae monophialidicae, phialidibus intercalaribus, subulatis, 3—10 × 1—2 µm, 2—4-catenulatis, terminalibus quoque, cylindraceis, solitariis, 11—17 (—30) × 1—2 µm. Conidia oblongata, elliptica vel subglobosa, 1.5—2.0 (—3.) × 1.0—1.5 µm, simplicia, hyalina, basipetale genita, in flavoaurantiaco liquore contenta. Ascomata e superficie stromatis orta, brevi pedunculo insidentia, nigra, perithecioidea, obpyriformia vel ovata, papilla apicali praedita, 1000—1200 µm alta atque 500—600 µm crassa, glabra. Ascomatis paries ad 55 µm crassa; ostioli canalis periphysibus reticulum formantibus praeditus. Asci cylindracei, 150—200 × 10—11 µm, unitunicati, octospori, apice distincto poro praediti iodo non coerulescenti. Ascosporae uniseriatae, fusiformes vel unilateraliter applanatae, (19—)23—26(—30) × 4—5(—10) µm, 3—5-septatae, septis non constrictis, hyalinae. Paraphyses ad 300 µm longae ac 5 µm crassae, ramosae, septatae, tenuitunicatae, ascis intermixtae, apicibus subacutis. Habitat in ligno emortuo putrescentique plantarum monocotyledonum dicotyledonumque. Holotypus: Brazil, in regione dicta "Territorio do Roraima", ad km 240 viae Bona Vista — Sta Elena, Venezuela, ad corticem arboris dicotyledonis, legit K. P. DUMONT (DUMONT-BR 769), D. R. HOSFORD, W. R. BUCK, G. J. SAMUELS, I. ARAUJO, M. A. SOUSA, J. C. BERNARDI, 29. Nov. 1977 (NY; ISOTYPUS: INPA, ZT).

Fluviostroma SAMUELS & E. MÜLLER (Sphaeriaceae)

Stroma black, spreading. Ascomata black, seated on the stroma, surface of ascomatal wall continuous with surface of stroma. Asci unitunicate, with an inamyloid apical ring. Paraphyses apically free, interspersed with asci. Ostiolar canal periphysate.

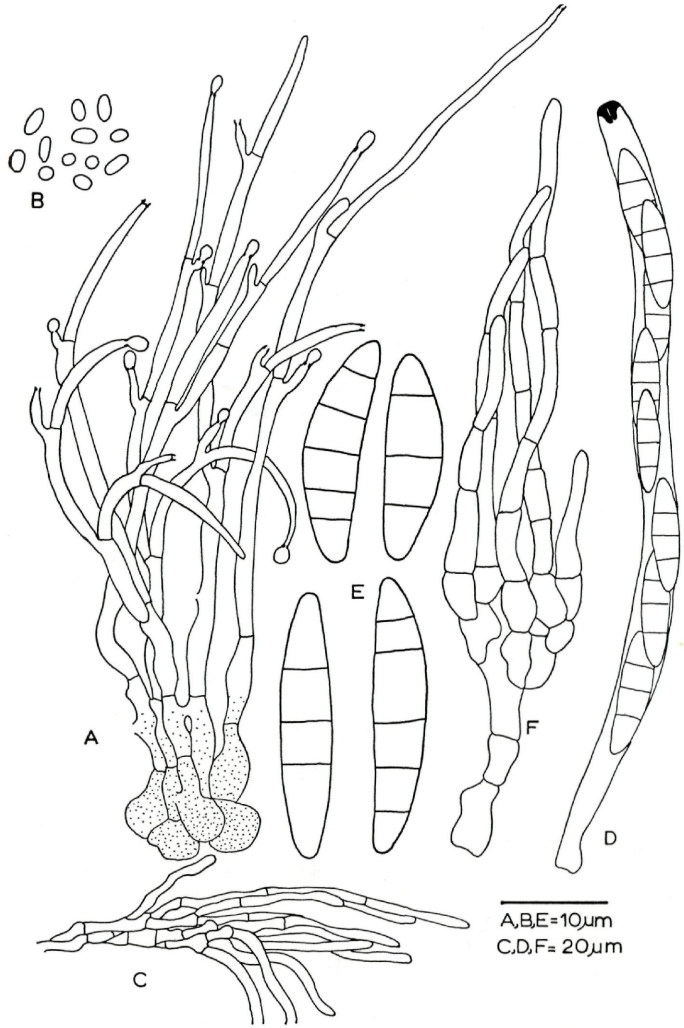

Fig. 2. *Fluviostroma wrightii* — A. Conidiophores and phialides from tip of synemma. B. Conidia. C. Periphyses. D. Ascus (phase contrast microscopy, lactic acid). E. Ascospores (in Melzer's Reagent). F. Young paraphyses

Synnemata arising from surface of stroma, conidiogenous cells phialides.

Type species: *Fluviostroma wrightii* SAMUELS & E. MÜLLER.

Etymology of the generic epithet: From Latin 'fluvius' (river) stroma and refers to the flowing aspect of the stroma.

Stromatostilbella SAMUELS & E. MÜLLER (Stilbellaceae)

Conidiomata synnematous, black. Conidiophores arising from pseudoparenchymatous cells at tip of synnemata. Conidiogenous cells monoblastic, phialidic, both terminal and intercalary, produced in chains.

Type species: *Stromatostilbella* anam. *Fluviostroma wrightii* SAMUELS & E. MÜLLER.

≡ *Stilbum stromaticum* BERKELEY, London J. Bot. 10: 642. 1843.

Fluviostroma wrightii SAMUELS & E. MÜLLER. — Figs. 1, 2

≡ *Sphaerostilbe wrightii* BERKELEY & CURTIS in BERKELEY, J. Linn. Soc. Bot. 10: 377. 1869 [1868], *nomen illegitimum.*

Anamorph: *Stromatostilbella* sp.

≡ *Stilbum stromaticum* BERKELEY, London J. Bot. 2: 642. 1843.

Stroma black and shining, raised, ca. 2 mm high, lobed, spreading and appearing like molten metal or wax that cooled after spreading over the surface of the substrate, often erumpent and radiating from a central point; surface of stroma smooth with irregular folds and ridges and with hemispherical protuberances from which synnemata and ascomata arise; surface crustose, cells within stroma thin-walled, brown, pseudoparenchymatous.

Synnemata 1—5 mm long, numerous, solitary, unbranched, black, bearing a single, terminal drop of yellow to orange liquid; erect, arising from and continuous with surface of stroma, stalk cylindrical, brittle, finely striate, ca. 100 µm diam, composed of tightly bound, branching, thin-walled hyphae having short, 10—20 × 3—4 µm cells; cells at tip of synnemata pseudoparenchymatous, brown, thin-walled, 3—5 µm across, forming a base from which conidiophores arise. Conidiophores 60—100 µm long, unbranched or infrequently branched, 1—2 µm wide, flexuous and often circinate, septate or aseptate. Conidiogenous cells monophialidic, phialides intercalary, each immediately subtending a septum, subulate, 3—10 × 1—2 µm, forming a chain of 2—4; and terminal, cylindrical, 11—17 (—30) × 1—2 µm, solitary. Conidia oblong, elliptic to subglobose, 1.5—2.0(—3.0) × 1.0—1.5 µm, unicellular, without an obvious abscission scar, hyaline, produced in basipetal succession, held in an orange to yellow drop of liquid.

Ascomata arising from surface of stroma, seated on a short cylindrical pedestal, black, perithecioid, obpyriform to egg-shaped,

with an apical papilla, 1000—1200 μm high × 500—600 μm wide, smooth-walled, collapsing by lateral pinching or becoming cupulate when dry. Ascomatal wall ca. 55 μm wide, cells in surface view circular to angular in outline, brown, ca. 10 μm across, thin-walled; in longitudinal section cells of outer layers angular in outline, 8—15 μm across, brown, thin-walled; cells of innermost 2—3 layers ± rectangular; cells of papilla vertically oriented, ± rectangular in outline, ca. 15 μm long × 6—8 μm wide, thin-walled. Ostiolar canal periphysate, periphyses 40—90 × 1—2 μm, forming an extensive, branching system.

Asci cylindrical, 150—200 × 10—11 μm, unitunicate, 8-spored, apex with a prominent, inamyloid ring; arising from a pseudoparenchymatous base ascospores uniseriate with overlapping ends. Ascospores fusiform or with one side flattened, (19—)23—26 (—30 × 4—5(—6) μm, 3—5 septate, not constricted at the septa, hyaline. Paraphyses up to 300 μm long × ca. 5 μm, infrequently branched, septate, thin walled arising between asci, tips subacute.

Habitat: Decaying wood of monocotyledonous and dicotyledonous plants.

Holotype: Brazil: Territorio do Roraima, 204 km N. of Boa Vista on the Boa Vista-Sta. Elena, Venezuela, Rd, on bark of dicot. tree, K. P. Dumont (Dumont-BR 769), D. R. Hosford, W. R. Buck, G. J. Samuels, I. Araujo, M. A. Sousa, J. C. Bernardi, 29 Nov. 1977 (NY; ISOTYPE: INPA ZT).

Additional Specimens Examined (Anamorph only): Brazil: data as holotype (Dumont-BR 720: INPA, NY). — Cuba: Fungi Cubensis Wrightiani No. 761, C. Wright (K, FH: HOLOTYPE & ISOTYPE, respectively, of *Sphaerostilbe wrightii*). — Venezuela: Edo. Miranda, vic. El Bachillar, ca. 9 km W. of point where Rio Cupira crosses Rte 9, between Caracas and Cumana, on unidentified wood, K. P. Dumont, G. J. Samuels, R. F. Cain, G. Morillo, 5 Jul. 1972 (Dumont-VE 3983: NY); Dto. Fed., *vic* El Portachuelo, NE of Colonia Tovar, on unidentified wood, K. P. Dumont, R. F. Cain, G. J. Samuels, B. Manara, 10 Jul. 1972 (Dumont-VE 6634: NY); Ed. Bolivar, 134 km S. of El Dorado, on road between El Dorado and Sta. Elena, on unidentified wood, K. P. Dumont, R. F. Cain, G. J. Samuels, C. Blanco, 4 Aug. 1972 (Dumont-VE 6865: NY, VEN).

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