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ENTROPHOSPORA SCHENCKII: A NEW SPECIES IN THE ENDOGONACEAE FROM COLOMBIA

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SUMMARY

Entrophospora schenckii forms small (less than 100 μm in diam.) hyaline spores singly in soil and in roots. Except for spores no other fungal structures stain with trypan blue or other common dyes. For positive identification of E. schenckii spores lacking intact hyphal attachments we recommend that single spore pot cultures be set up to produce spores of different development stages.

RESUMEN

Entrophospora schenckii forma esporas hialinas pequeñas (menor de 100 μm en diam.) solas en el suelo y en la corteza de las raíces. Excepto para esporas ninguna otra estructura del hongo se tiñe con azul de tripano u otros colorantes. Para determinar el género de esporas carentes de conexiones hifales, se recomienda de establecer cultivos puros en potes a partir de una sola espóra. Así, observando esporas en diferentes estados de desarrollo se puede clasificarlo.

INTRODUCTION

Species of vesicular arbuscular mycorrhizal fungi from different edapho-climatic conditions of Colombia are maintained in pot cultures on the tropical pasture legume Pueraria phaseoloides (Roxb.) Benth., at CIAT Palmira, Valle, Colombia. From pots inoculated with soil from a rose nursery, hyaline, small sized spores were recovered lacking a hyphal attachment. Subsequent pot cultures with these spores were observed and

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and the development stages of the fungus showed that the spores were an undescribed species in the genus Entrophospora Ames & Schneider. In this description the spore wall terminology follows that of Walker (1983). For the use of the term "sporiferous saccule" we refer to Walker et al. (1984).

ENTROPHOSPORA SCHENCKII Sieverding & Toro sp. nov. (Figs. 1, 2 and 3)

Sporocarpia ignota. Sporae singillatim in solo vel radicibus efformatae; spora intra collum, diam. 8-10 μ m, sacculi sporangiferi, diam. (37-) 50-60 (-68) μ m, crescet; paries sacculi sporangiferi 0.5 μ m crassus; sacculus primo hyalinus deinde perlucidus festur simulatque materia interna in adulescentem sporam exhausta; hypha sporam et sacculum 6-26 μ m longa. Sporae adultae globosae vel subglobosae, (37-) 50-65 (-77) μ m, vel ellipsoidae, 48-97 x 25-60 μ m diam. Crassitudo plenus parietis sporarum 1.5-2.5 μ m; sporae paries e stratis tribus: exteriorum idem paries hyphae in quam spora crescet, hyalinum, evanidum, 0.5 μ m crassum adhaerentum strato secundo; secundum hyalinum solidum, 0.5-1.0 μ m crassum; tertium separabilis e strato secundo, membrana hyalina, 0.5-1.0 μ m crassa. Hyphae extra radicium nonsepta vel septa.

Sporocarps unknown. spores hyaline, globose to subglobose, (37-) 50-60 (-77) μ m diam. or ellipsoid to ovoid, 48-97 x 25-60 μ m, formed singly in soil and in the cortical cells of roots, within the 8-10 μ m diam. neck of a globose to subglobose sporiferous saccule, (37-) 50-60 (-68) μ m diam.

Spore wall structure consists of three walls (walls 1-3) in two groups (groups A&B). Wall group A of two walls (walls 1&2). Wall 1 approx. 0.5 μ m thick, formed by the wall of the sporiferous saccule neck, usually adherent to wall 2, a unit wall 0.5-1.0 μ m thick. Wall group B is a single, membranous wall (wall 3) 0.5-1.0 μ m thick. Spores found occasionally with the collapsed sporiferous saccule still attached, but usually broken away from it near the spore.

Extra-radical mycelium dimorphic, coenocytic in youth with septae sometimes forming with age; consisting of broad (1.5-5.0 μ m diam.) hyphae from which emanate narrow hyphae (1-2 μ m diam.).

TYPE: Colombia, Valle, Palmira, Centro Internacional de Agricultura Tropical. From culture no. C-133-8 on Pueraria phaseoloides (Holotype OSC, isotypes FLAS, COL).

ETYMOLOGY: Named in honor of N.C. Schenck, University of Florida, Gainesville, for his taxonomic work with the Endogonaceae.

DISTRIBUTION: To date, *E. schenckii* is only known from Colombia, South America. The type was isolated from a pot culture of tropical kudzu established with soil from a former rose nursery of Melecio Ospina, 2 km from Cajica towards Tabío, Cundinamarca. *Entrophospora schenckii* was also isolated from a sugarcane field, Ingenio Manuelita, Palmira, Valle del Cauca (CIAT culture no. C-117-6). In both cases the soils were fertile, with pH 7.4 and 6.8, 5.4 and 3.5% organic matter, 274 and 20 μg P/g soil (Bray II extr.), 22 and 20 meq. Ca, 2.2 and 11 meq. Mg, 0.3 and 1.3 meq. K/100 g soil for M. Ospina and Manuelita, respectively.

DISCUSSION: *Entrophospora schenckii* is easily separated from the other two species in this genus, *E. infrequens* (Hall) Ames & Schneider and *E. colombiana* Spain & Schenck by its hyaline and thinner walls and smaller spore diameter. Spores of *E. schenckii* are often devoid of the subtending hypha and remain of the collapsed sporiferous saccule, making the genus determination impossible. For total confidence in distinguishing *E. schenckii* from other hyaline, small-spored species of the Endogonaceae we recommend the establishment of single spore pot cultures as proposed by Yu-Cheng Fang *et al.* (1983). In this way a positive determination can be made with spores at all development stages.

Wall characteristics of *E. schenckii* may be difficult to observe. Wall 1 (Fig. 2) usually is present on spores and may be detected by observing the point where the neck of the sporiferous saccule is connected to the spore (Fig. 3). On some specimens, wall 1 is absent, having been lost as the saccule collapses. This is not precisely the same phenomenon as the evanescent wall described by Walker (1983), but because the wall is present at an early developmental stage of the spore and can be lost later, we have chosen to extend the concept to include this type of wall. On broken spores, wall 1 may wrinkle and because of this, may more easily be observed. Wall 2 is always distinct. Wall 3 (wall group B, Fig. 2) is distinct in specimens mounted in polyvinyl alcohol lactophenol (Walker 1979); this wall encloses the plasmalemma with the spore content. On most specimens wall 3 is flexible and thus is characterized as a membranous wall after Walker (1983), though on some specimens, it may be more rigid and thus may appear as an unit wall.

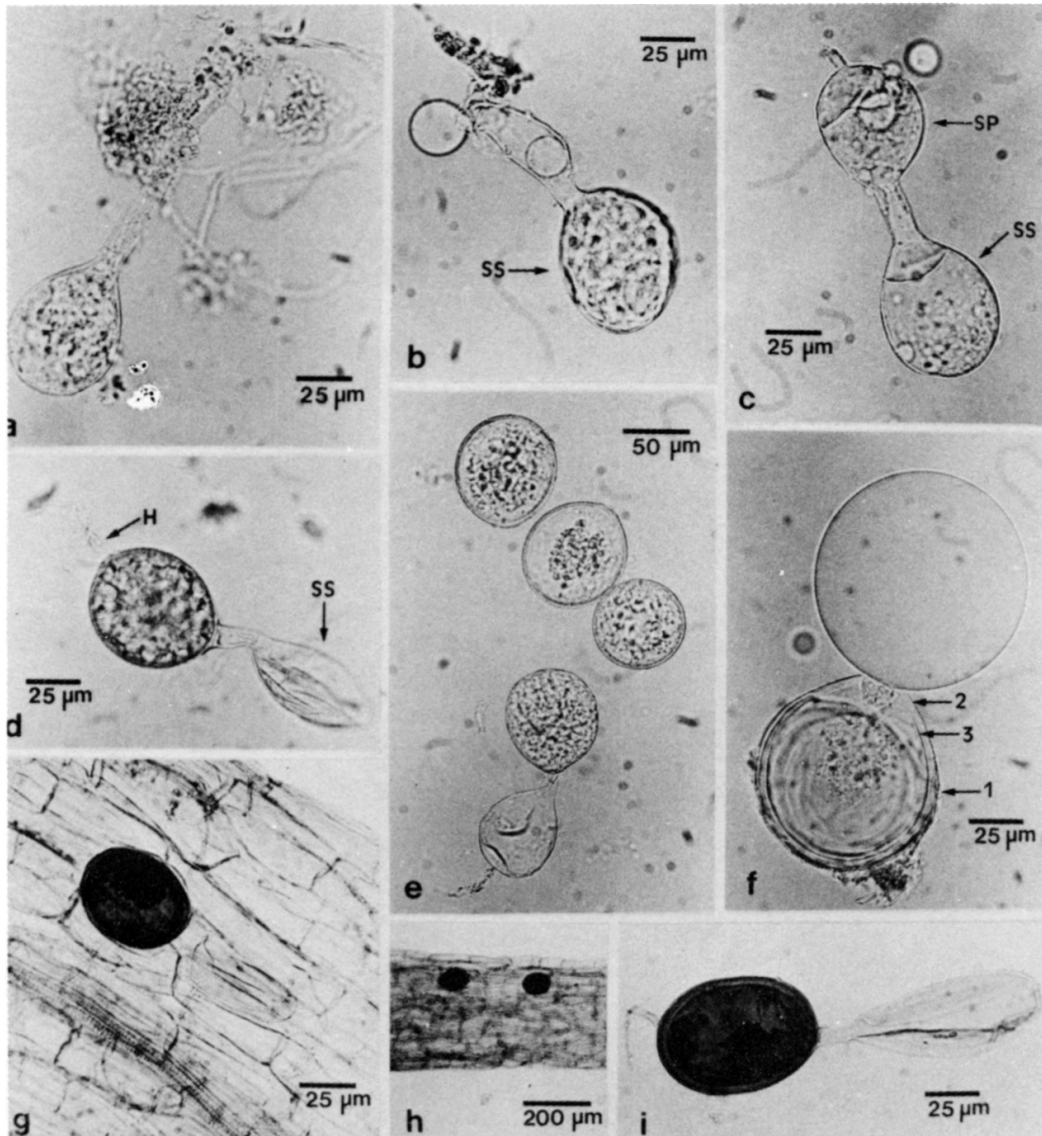


FIG. 1: Light photomicrographs of *Entrophospora schenckii*. a) Young and b) mature sporiferous saccule (SS = Sporiferous saccule). c) Initial stage of spore formation (SS = Sporiferous saccule; SP = Young spore). d) Mature spore with collapsed sporiferous saccule (SS) and subtending hypha (H). e) Group of spores. f) Broken spore with three walls (1,2,3), wall 1 partly sloughed off. g)h) Spores in the cortex of roots stained with trypan blue. i) Spore stained with trypan blue and wall swollen by lactophenol. a)b)c)e)i) Material mounted in lactophenol; d) mounted in water; f) mounted in Melzer's reagent.

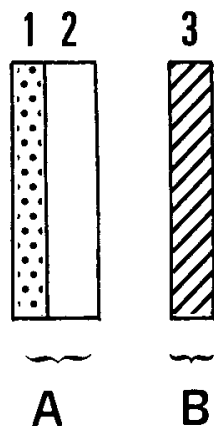


FIG. 2. Murograph of the wall structure of Entrophospora schenckii. Diagram after Walker (1983).

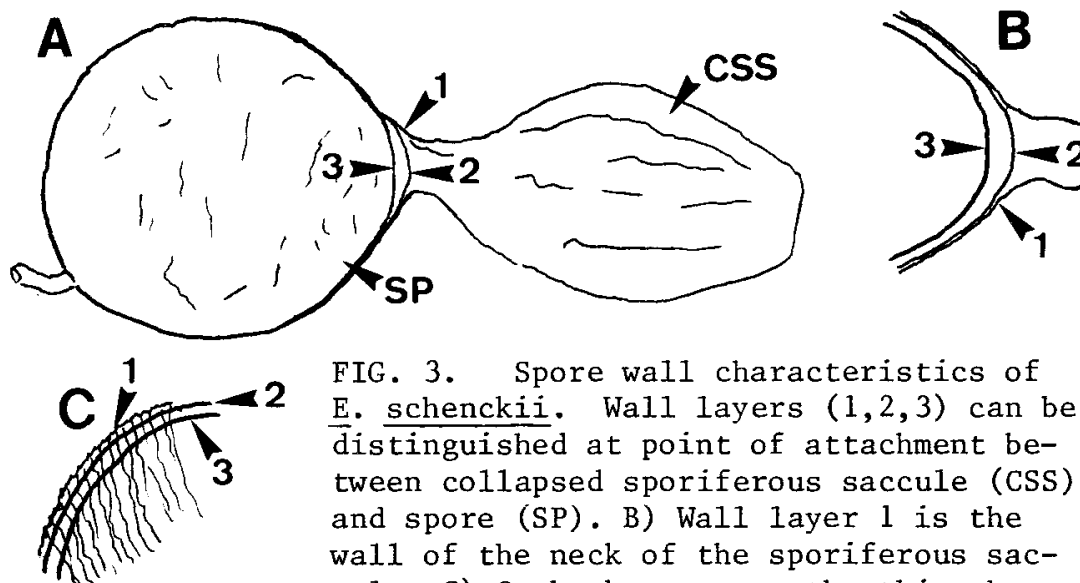


FIG. 3. Spore wall characteristics of E. schenckii. Wall layers (1,2,3) can be distinguished at point of attachment between collapsed sporiferous sacculus (CSS) and spore (SP). B) Wall layer 1 is the wall of the neck of the sporiferous sacculus. C) On broken spores the thin, hyaline wall 1 often wrinkles.

Except for spores, the fungal structures of E. schenckii were resistant to staining by any of the common methods. Thus, we could not confirm whether this species forms vesicular-arbuscular mycorrhizae. We conclude from the presence of spores in the cortical cells of the roots that E. schenckii forms endomycorrhizae.

In some specimens of E. schenckii we found globose to subglobose, 25-35 μm diam., hyaline, thin walled structures formed terminally on the narrow hyphae of the external mycelium. These often collapsed in lactophenol. We did not determine

whether these were developing sporiferous saccules or vesicle-like structures similar to, but smaller than, those reported for Acaulospora appendicula Spain, Sieverding & Schenck (Schenck et al. 1984). Therefore these structures were not included in the description.

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