

ACAULOSPORA TRAPPEI SP. NOV.

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Acaulospora trappei is a new species of vesicular-arbuscular (VA) mycorrhizal fungus isolated from Easter lily fields in the Pacific Northwest. The epithet honors James M. Trappe for his contributions to mycorrhiza research.

The genus *Acaulospora*, as erected by Gerdemann and Trappe (1974), is distinguished from other Endogonaceae by the production of sessile azygospores budded below a terminal vesicle, which empties as the spore matures. The two species *A. elegans* Trappe & Gerd. and *A. laevis* Gerd. & Trappe have pigmented spores and produce lobed vesicles as part of the mycorrhizal association. *A. trappei*, as described herein, differs from those two species by having smaller, nonpigmented spores; by lacking, fine, emergent, branched hyphae below the spore attachment; and by forming round to irregular but not lobed vesicles within host cells of VA roots. Trappe (personal communication) has stated that still other *Acaulospora* spp. have been found and will soon be described.

Spores were collected by mixing 100 cc of soil in 1000 ml water, allowing one minute settling time, and decanting the solution through a series of screens. Contents of the lowest mesh screen (45-63 μ m) were washed and suspended in water, and individual spores were collected with a pipetting device under a dissecting microscope (32X). Spores

were mounted in distilled water for observation under a compound light microscope.

Mycorrhizae were examined by a modification of the technique of Phillips and Hayman (1970). Roots were cleared in 10% KOH at 55° C for 12 to 15 hours, washed twice in distilled water, acidified in dilute HCl (5.6 ml conc. HCl in 100 ml distilled water) for one hour, stained in 0.05% trypan blue in lactophenol at 55° C for 15 minutes, destained in clear lactophenol, and mounted in clear lactophenol for microscopic examination. This modification prevented air-bubble formation in the roots.

ACAULOSPORA TRAPPEI Ames & Linderman sp. nov. (see Figs. 1 and 2).

DESCRIPTION: Sporocarpia ignota. Sporae singulae in solo aut radicibus eformatae, sessiles, gestae lateraliter in cellula inramosa hyphali in vesiculo 50-82 X 42-72 μ m prope terminatae. Sporae minute scabridae, 42-99 X 42-70 μ m, globosae, ellipsoideae vel obovoideae, incolores; tunica ut vedetur singula, 1.2-2.3 μ m crassa vel 3-4 μ m crassa prope colligationem. Vesiculae intra mycorrhizas vesiculares-arbusculares inlobatae.

Sporocarps unknown. Spores formed singly in soil or occasionally within roots, sessile, borne laterally on a smooth, unbranched hyphal cell that terminates nearby in a subglobose to ellipsoid or obovoid vesicle 50-82 X 42-72 μ m diam.; vesicles develop to full size before spore formation, with colorless oily contents that are transferred to the budding spore; the emptied vesicle often does not collapse. Spores are minutely roughened, 42-99 X 42-70 μ m globose to ellipsoid or obovoid, colorless, containing rounded to polyhedral oil globules; wall apparently single, 1.2-2.3 μ m thick, except sometimes thickened to 3-4 μ m near attachment. Vesicles within VA mycorrhizae are not lobed.

DISTRIBUTION, HABITAT, AND SEASON: To date, *A. trappei* is known only from Easter lily fields along southern Oregon and northern California coastal areas. Spores can be sieved from soil throughout the year. Spores are formed abundantly in potted plant cultures after 4 months.

MYCORRHIZAL ASSOCIATIONS: *A. trappei* forms VA mycorrhizae with very finely branched arbuscules and unlobed vesicles. It is associated in field collections with roots

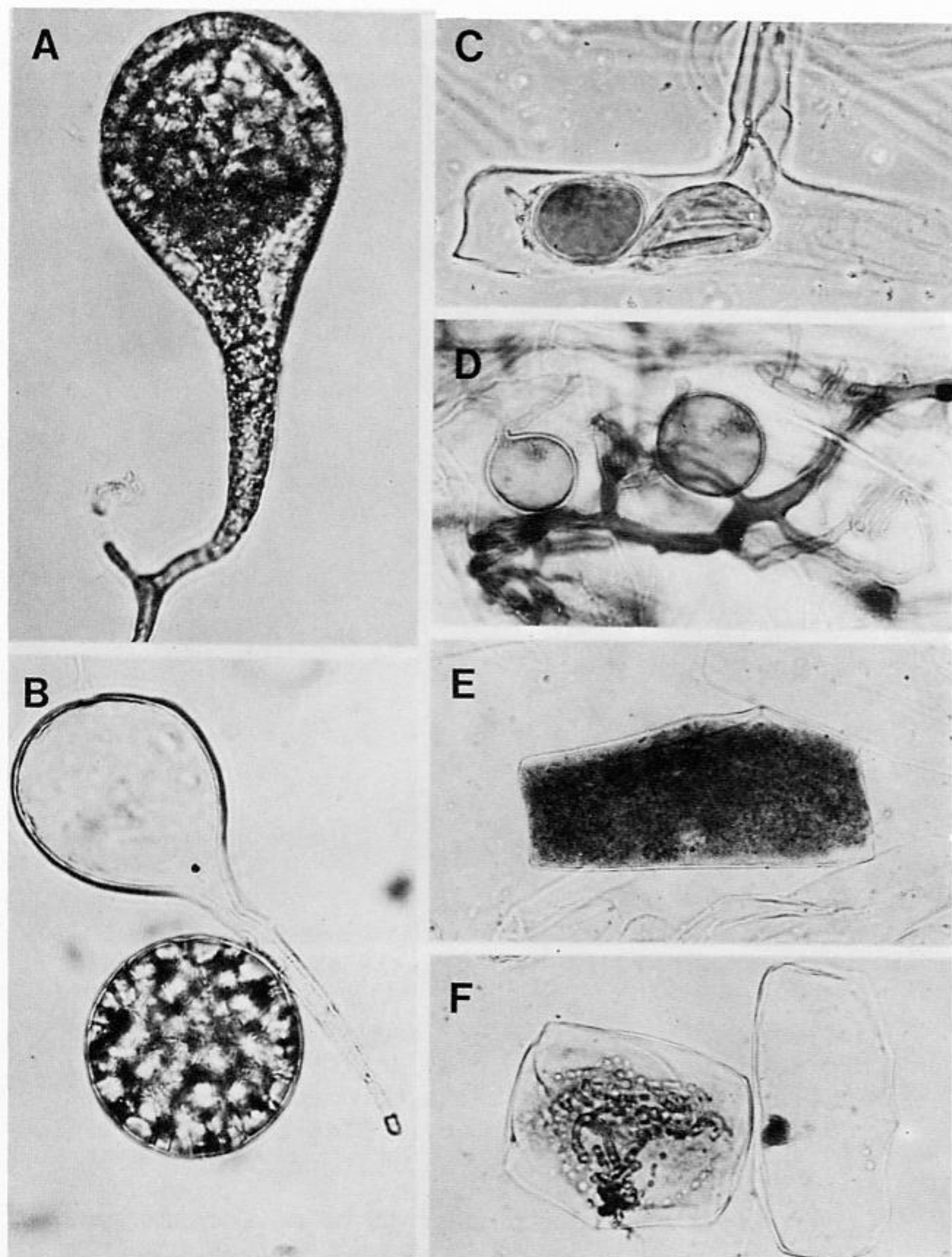


Fig. 1. (A-B) Fresh specimens mounted in water, X 500. (A) Immature vesicle before spore formation. (B) Mature spore with attached empty vesicle. (C-F) Squashed preparation of cleared and stained Easter lily roots in clear lactophenol, X 250. (C) Mature spore with attached vesicle in root-hair cell. (D) Vesicles. (E) Young arbuscule. (F) Partially digested arbuscule.

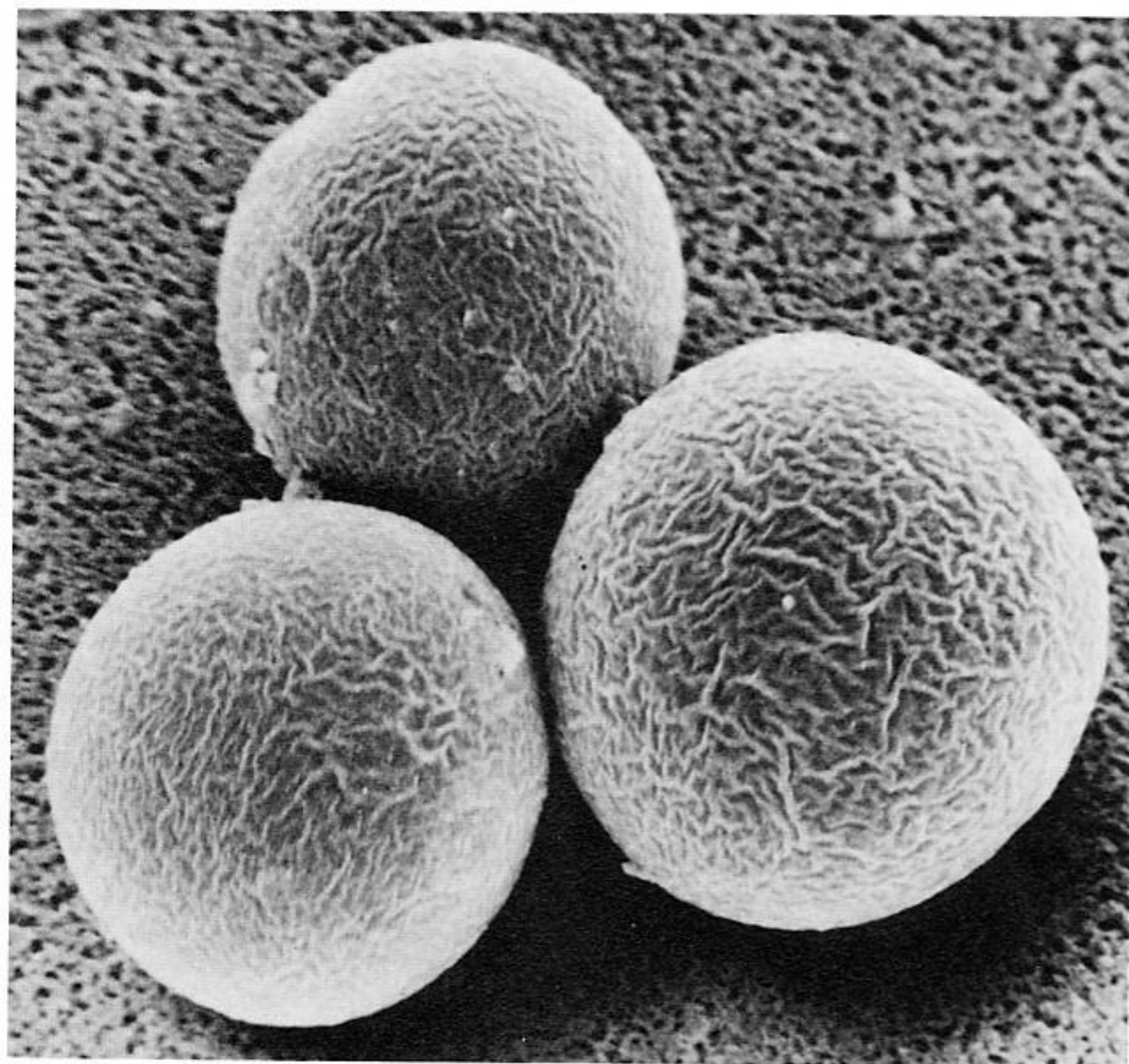


Fig. 2. Scan electron micrograph of *A. trappei* spores (X 700).

of Easter lily (*Lilium longiflorum* Thunb.) and it forms VA mycorrhizae in pot culture with Easter lily, red clover (*Trifolium pratense* L.), and onion (*Allium cepa* L.).

COLLECTIONS: Sieved soil, collected in April, 1975 from fields of *Lilium longiflorum*, was added to autoclaved sand in which seeds of *Trifolium pratense* were then planted. In September, 1975, newly formed spores were collected from the *T. pratense* pot cultures and used for the type and paratype specimens.

TYPE: OREGON, Curry Co., 4-8 km north of the Oregon-California boundary, at the Oregon Agricultural Experiment Field Station on U.S. Highway 101, near Harbor, Oregon; April, 1975, Ames #01 (OSC). PARATYPE: CALIFORNIA, Del Norte Co., 7.5 km south of the Oregon-California boundary on U.S. Highway 101, near Smith River, California; April, 1975, Ames #02 (OSC).

This study was supported in part by the Fred C. Gloeckner Foundation Inc.

The authors wish to thank Dr. James Trappe for the Latin description.

LITERATURE CITED

- Gerdemann, J. W. and Trappe, J. M. 1974. The Endogonaceae in the Pacific Northwest. *Mycologia Memoir* 5:1-76.
- Phillips, J. M. and Hayman, D. S. 1970. Improved procedures for clearing roots and staining parasitic and vesicular-arbuscular mycorrhizal fungi for rapid assessment of infection. *Trans. Brit. Mycol. Soc.* 55:158-161.