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GLOMUS GERDEMANNII SP. NOV.

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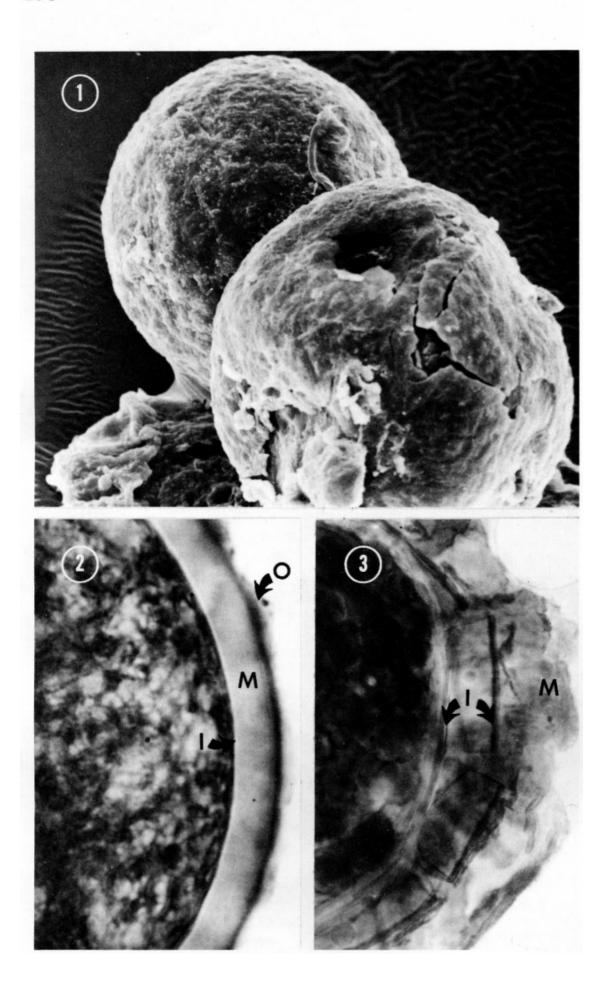
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GLOMUS GERDEMANNII Rose, Daniels & Trappe sp. nov.

Figs. 1-3

Sporae globosae, subglobosae, vel ellipsoideae, 140-198 x 149-230 μ m, juventute hyalinae, laeves, deinde pallide avellaneae, asperae. Sporae tunica 5-10(-13) μ m crassa, stratis quinque: exteriore 0.5-1.0 μ m crasso, hyalino; secundo 2-5 μ m crasso, hyalino, lamellato; tertio 1-2 μ m crasso, hyalino, secedenti; quarto \pm 0.1 μ m crasso, hyalino; interiore 2-3 μ m crasso, luteo. Hypha affixa recta, 7-12 μ m diam, hyalina.

Spores naked, formed singly or in loose clusters or small sporocarps in soil, globose to subglobose or ellipsoid, 140-198 x 149-230 μm (broader than long when not globose), hyaline and smooth in youth, becoming pale yellow brown and roughened with age. Spore walls 5-10(-13) μm thick, of 5 layers: the outermost ± 0.5 -1.0 μm thick, hyaline, and smooth in youth, with age becoming roughened and cracked and flaking away in pieces; the 2nd layer inward 2-5 μm thick, hyaline and fused-laminated in youth,



with age becoming pale yellowish brown and degrading progressively inward to flake away as amorphous pieces of laminations; the 3rd layer inward 1-2 μm thick, hyaline smooth, separable; the 4th layer inward $\pm 0.1~\mu m$ thick, hyaline, adherent to the 5th and innermost layer 2-3 μm thick and yellow. Spore contents of hyaline oil globules 7-25(-50) μm diam. Attached hypha straight, readily detaching, 7-12 μm diam, hyaline, the walls thickened a short distance from the point of attachment, occluded by thickening of the 2nd spore layer. Reaction to Melzer's reagent not distinctive.

DISTRIBUTION AND HABITAT: Cascade Range and Siskiyou Mountains of Oregon on volcanic soils in climatically stressed and pioneer sites.

MYCORRHIZAL ASSOCIATIONS: Associated in the field with vesicular-arbuscular mycorrhizae of *Ceanothus* velutinus Dougl., *C. prostratus* Benth., and *C. integerrimus* Hook. & Arn.; forming mycorrhizae in pot culture with *C. velutinus*. No other host genera have been discovered thus far.

ETYMOLOGY: In honor of Dr. James W. Gerdemann for his contributions to knowledge of the Endogonaceae, particularly those of Oregon.

COLLECTIONS EXAMINED: TYPE: OREGON, Deschutes Co., ca. 1 km north of Benham Falls at Fort Benham, elev. 1100 m, July 1976, 15 cm deep in soil under Ceanothus velutinus Dougl. Rose S101(OSC).

Figs. 1-3. Glomus gerdemannii. 1. Two spores by scan electron microscopy; the foreground spore shows the outer wall layer cracked and separating from the adjacent inner layer. x425. 2. Young spore in cotton blue-lactophenol, with early stage of outer layer (0) formation, thick middle layer (M), and a single, thin inner layer (I). x1,000. 3. Crushed mature spore in cotton blue-lactophenol with outer layer missing, thick middle layer (M) degraded to separable, amorphous flakes, and 2 thin, separable inner layers (I), the innermost composed in turn of 2 nonseparable layers. x400.

OTHER COLLECTIONS: OREGON--Douglas, Jackson, and Lane Counties--used in experiments and thus not available for herbarium deposit.

The complex layering of spore walls of *G. gerdemannii* strikingly separate it from all other known *Glomus* spp. The outermost, thin layer is apparent only in relatively young, smooth spores, because it flakes off soon after spores have reached full size and the 2nd layer inward has begun to thicken. At this stage, the inner 3 layers are not distinctly differentiated. As the outer 2 layers begin to flake away, however, the inner 3 differentiate clearly. The inner 3 layers persist, so that well-matured spores appear to have 3 thin wall layers enclosed in the rough, amorphous remnants of the degenerating outer walls.

The complex wall structure of *G. gerdemannii* resembles azygosporic species in *Acaulospora* and *Gigaspora* more than other species of *Glomus* (Gerdemann and Trappe 1974). Its hyphal attachment, however, places it in *Glomus* as an apparent chlamydospore. Sexual fusion could, of course, take place some distance below the attachment to the spore, but we have not observed it. In any event, *G. gerdemannii* is morphologically suggestive of a relationship between "chlamydosporic" Endogonaceae and azygosporic species.

Spores of *G. gerdemannii* sink rapidly in water. In retrieving them from soil by wet-sieving and decanting, the soil suspension must be decanted within less than a minute after stirring or most of the spores will have settled to the bottom.

Spores colonized by other fungi have been observed fairly often. One relatively frequent colonizer grows as brown, septate hyphae appressed to the degenerated surface of maturing spores (the outer walls of the spores degenerate whether or not microfungi colonize the surface). The brown, septate hyphae produce globose to irregular structures $10\text{-}25~\mu\text{m}$ diam. These structures, of undetermined function, remain attached to the *Glomus* spore walls. Hyaline globose cells $35\text{-}45~\mu\text{m}$ diam are attached to the surface of occasional spores of *G. gerdemannii*. These resemble the sporangia of *Rhizidiomycopsis stomatosa* Sparrow, reported by Schenck and Nicolson (1977) to parasitize Endogonaceae.

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