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James Wessell Gerdemann, 1921–2008

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Jim Gerdemann died peacefully of natural causes on December 19, 2008, at the age of 87. Janice, his wife of nearly 60 y, was at his hospital bedside in Newport, Oregon. He was a pioneer in the modern taxonomy of Glomeromycota, a world recognized authority on arbuscular mycorrhizae (AM) and a revered teacher.

Jim was born November 13, 1921, in Pendleton, Missouri, to Carl and Cora Gerdemann. He attended a one-room school and graduated from high school at age 16. From an early age he learned botany from his grandmothers and developed a passion for growing plants; he grew a cactus collection that he tucked in the cellar during Missouri's cold winters. Jim's father and uncle owned and operated the Gerdemann Store, which had been in the family about 90 y. He worked there but was not destined to be a storekeeper. On buying trips to St Louis Jim's father dropped him off at the Missouri Botanical Garden for a day of immersion in its renowned diversity of plants.

He entered the University of Missouri, where he earned bachelor and master's degrees in botany. He financed his studies as a waiter in the girls' dormitory, living cheaply at the co-op and working for 35 cents per hour at the university herbarium. In summer he worked for the Bureau of Land Management and the U.S. Forest Service in Oregon on control of white pine blister rust (*Cronartium ribicola*). During this work Jim developed his appreciation of the climate and flora of Oregon, enthusiasms he pursued the rest of his life.

Jim entered a doctoral program in plant pathology at the University of California at Berkeley, receiving the degree in 1949. His dissertation, "The resistance of two tomato varieties to formae of *Fusarium oxysporum*," was published in *Phytopathology* (Gerdemann and Finley 1951) and is still cited in *Fusarium* literature.

Jim accepted a teaching position in plant pathology at the University of Illinois at Champaign-Urbana, where he met and married Janice Olbrich. He continued research on plant pathogens for a few years during which he became fascinated with mycorrhizae and mycorrhizal fungi. Early on he determined that the large spores he found in soil were of AM fungi and had curious attributes (Gerdemann 1955a, b; 1961, 1965). He paid increasing attention to their systematics.

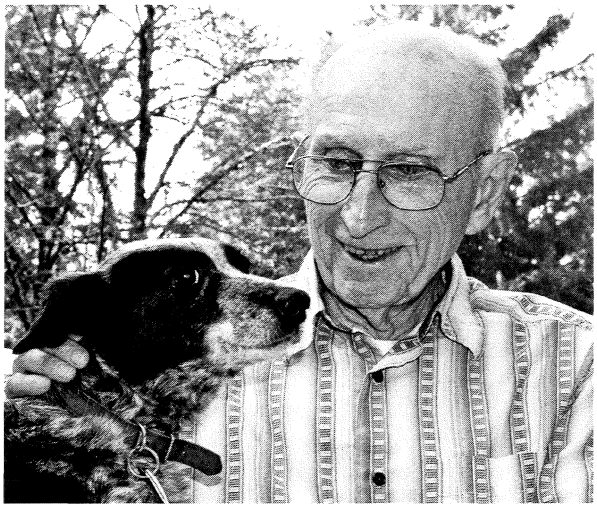

FIG. 1. Jim Gerdemann and friend Emily in 2008. Photo courtesy of Greg Scott.

In this pursuit he found a kindred spirit in Prof Tom Nicolson of the University of Dundee, Scotland, with whom he formed a lifelong friendship. Jim, Janice and their sons Steve, Dale and Glenn enjoyed his sabbatical at Dundee in 1961. Using Jim's plant pathology experience with wet-sieving and decanting of soil to obtain nematode cysts, he and Tom discovered spores of many previously unknown AM fungi (Gerdemann and Nicolson 1962, 1963; Nicolson and Gerdemann 1968). Indeed the spores of AM fungi sufficiently resembled nematode cysts to confuse some students. Jim recalled a plant pathology student who attended his illustrated lecture on these fungi. Afterward the student stated with the certitude of youth, "Dr Gerdemann, I hate to tell you this, but those structures you think are spores are actually nematode cysts." Jim took the lad to his laboratory and showed him the spores under the microscope, where their origin from fungal hyphae was plain to see. Despite Jim's patience, the student left still convinced that the spores were nematode cysts, Jim said with a laugh.

Jim continued research on AM fungus taxonomy to his retirement. He was internationally recognized for this work by the time I first met him in 1969 at Urbana at the 1st North American Conference on Mycorrhizae, which he co-chaired and organized with Dr Edward Hacskaylo. I subsequently sent spores and

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sporocarps to him for identification. This he tended to promptly, always with a detailed exposé of what characteristics led to a specimen's identification; as often as not the collections were undescribed taxa. Due for another sabbatical in 1972, Jim, Janice and their boys moved to Corvallis, Oregon. There Jim pursued his AM research at the U.S. Forest Service Forestry Sciences Laboratory where I was employed. As Jim brought me up to speed in taxonomy of AM fungi, we shared and debated ideas on their place in kingdom Fungi. One result was a new look at their systematics (Gerdemann and Trappe 1974). As more mycologists worked with these fungi over ensuing years and especially as molecular tools became available, the systematics of AM fungi proved far more complex than we imagined at the time. Still that publication set the stage for today's understanding of what has become a new phylum of fungi, Glomeromycota. Together with colleagues and students, Jim published two new genera, 22 new species and 18 new combinations of AM fungi.

While on sabbatical, Jim frequented the Oregon State University tropical botanical conservatory. On his first visit he returned to the Forestry Sciences Laboratory much excited: "You've got to come to the conservatory with me!" He led me to a potted banana: on the mossy soil surface were multitudes of tiny white to brown balls: "I think this is *Sclerocystis coremioides*!" We looked at other pots of plants with fallen leaves and moss on the soil and found other AM fungi, including a new species and several known only from the tropics. This posed a dilemma because we wanted to include them in our 1974 manuscript, "The Endogonaceae of the Pacific Northwest," but they were not "of the Pacific Northwest." Jim's eyes lit up and he smiled his bright smile when a lovely, simple solution came to his mind: "Why don't we call it 'The Endogonaceae *in* the Pacific Northwest?'" Problem solved!

In addition to taxonomy Jim and students pioneered use of radiotracers to elucidate functions of AM fungi in nutrient uptake from soil and transfer to and between host plants (Gray and Gerdemann 1967, 1969, 1973; Hattingh et al. 1973; Hirrel and Gerdemann 1977, 1979b; Rhodes and Gerdemann 1975, 1976, 1978a, b, c, 1980). The application of these concepts to AM was new and required novel approaches. Other cutting-edge studies explored the role of AM in water relations of plants (Safir et al. 1971, 1972) and various other aspects of mycorrhizal associations (Becker and Gerdemann 1975a, b; Hatingh and Gerdemann 1975; Hirrel and Gerdemann 1979a, 1980; Hirrell et al. 1977; Kleinschmidt and Gerdemann 1972; Menge et al. 1975; Murdoch et al. 1966).

Jim was skilled at synthesizing information from many sources into an intelligible whole. He honored numerous requests to write reviews on AM and their fungi; he did this because such papers are so valuable to the science. But in 1980 he told me, "Now I've said all I have to say, so no more review papers."

He was highly regarded as a teacher and delighted in inserting humor into his lectures and demonstrations. He attracted capable graduate students. One of these, Dr Landon Rhodes (pers comm), now professor emeritus at Ohio State University, wrote, "Almost every day for the past 35 y I have used something that I learned from Jim. I was glad to learn he still retained his great sense of humor. I think sometimes people missed that, especially since his sense of humor was often a bit offbeat. He was one of the most interesting and genuinely nice people I have ever known." Jim won the "Best Teacher of the Year" award in the first year the University of Illinois offered the prize.

Jim also was generous even with young scientists whom he had never met. Prof David Janos (pers comm) of the University of Miami, Department of Biology, relates his experience: "When I was planning my dissertation work at University of Michigan, no one there was working on AM. So I corresponded with Jim Gerdemann because of his landmark review (Gerdemann 1968) and invited myself to visit him at Urbana. He spent most of two days teaching me about mycorrhizae. Now that I've been a faculty member for many years and understand the demands on faculty time, it is increasingly remarkable to me that Jim would just drop what he had to do and spend two days with an unknown, neophyte, grad student from Michigan. He was incredibly gracious and generous of his time. Since then, I've always tried to 'pay it forward' and honor Jim's generosity by helping new investigators of mycorrhizae. I'm no Jim Gerdemann, but I hope that my efforts honor his memory."

When Jim retired in 1981 the Gerdemanns moved to Yachats on the Oregon coast. Jim's meticulous study of climate data convinced them this would be an ideal spot to grow rhododendrons and multitudes of other interesting plants. They acquired an acre of spruce-hemlock forest and related land bordering Siuslaw National Forest, built their home and developed a botanical garden. Today that garden has grown to almost four acres and is a treasure of botanical diversity with abundant native species, exotics not ordinarily grown in this region, and hybrids bred by Jim to survive in the coastal climate, all growing in a natural setting as an understory to the native forest. The garden draws scientists, naturalists, landscapers, gardeners and students from around the world. Janice described it especially well: "It is a special place of beauty and serenity, where the public

has always been welcome to stroll along meandering paths, enjoy the sight of a blooming rhododendron or a tropical palm, and marvel at the extraordinary range of plants that grow in this sheltered glen just a few blocks from the roaring surf of the Pacific." An irrevocable conservation easement has been established to ensure the entire garden, now the Gerdemann Botanical Preserve, will remain intact as a public, living legacy.

Jim, Tom Nicolson from Shetland Islands, Dr Barbara Mosse from England and France and Dr Geoff Baylis from New Zealand, the "Big Four" of AM research in the mid-20th century, formed an abiding friendship. They periodically assembled in one or another's country for relaxation, sight-seeing, engaging conversation, and good food and wine. Janice Gerdemann and Helen Nicolson were an integral part of the gathering. Oregon mycorrhiza researchers were thrilled when this august group assembled in Oregon at the Gerdemann's home at Yachats in 1983.

To celebrate the formal recognition of the Gerdemann Botanical Preserve, April 12, 2008, was declared Gerdemann Day in Yachats with speeches, displays and tours of the garden. Dr Ian Hall, who had spent a year's sabbatical with Jim many years before, came from New Zealand to give the keynote address. Jim attended the entire event, which was a fitting tribute to this talented husband, father, teacher and scientist.

ARBUSCULAR MYCORRHIZAL FUNGI AUTHORED BY JIM GERDEMANN AND COLLABORATORS

Acaulospora Gerd. & Trappe (1974)
A. laevis Gerd. & Trappe (1974)
A. elegans Gerd. & Trappe (1974)
Endogone acrogena Gerd., Trappe & Hosford in Gerd. & Trappe (1974)
E. alba (Petch) Gerd. & Trappe (1974)
E. flammicorona Trappe & Gerd. (1972)
E. oregonensis Gerd. & Trappe (1974)
E. verrucosa Gerd. & Trappe (1974)
Gigaspora Gerd. & Trappe (1974)
G. gigantea (Nicol. & Gerd.) Gerd. & Trappe (1974)
≡ *Endogone gigantea* Nicol. & Gerd. (1968)
Glomus boreale (Thaxt.) Trappe & Gerd. in Gerd. & Trappe (1974)
G. caledonium (T.H. Nicolson & Gerd.) Gerd. & Trappe (1974)
≡ *Endogone macrocarpa* var. *caledonia* T.H. Nicolson & Gerd. (1968)
G. canadense (Thaxt.) Trappe & Gerd. in Gerd. & Trappe (1974)
G. convolutum Gerd. & Trappe (1974)
G. etunicatum Becker & Gerd. (1977c)
G. fasciculatum (Thaxt.) Gerd. & Trappe (1974)
G. fragile (Berk. & Broome) Trappe & Gerd. in Gerd. & Trappe (1974)
G. fuegianum (Speg.) Trappe & Gerd. in Gerd. & Trappe (1974)
G. fulvum (Berk. & Broome) Trappe & Gerd. in Gerd. & Trappe (1974)
G. geosporum (T.H. Nicolson & Gerd.) C. Walker
≡ *Endogone macrocarpa* var. *geospora* T.H. Nicolson & Gerd. (1968)
≡ *Glomus macrocarpum* var. *geosporum* (T.H. Nicolson & Gerd.) Gerd. & Trappe (1974)
G. melanosporum Gerd. & Trappe (1974)
G. monosporum Gerd. & Trappe (1974)
G. mosseae (T.H. Nicolson & Gerd.) Gerd. & Trappe (1974)
≡ *Endogone mosseae* T.H. Nicolson & Gerd. (1968)
G. multicaule Gerd. & B.K. Bakshi (1976)
G. pubescens (Sacc. & Ellis) Trappe & Gerd. in Gerd. & Trappe 1974)
G. pulvinatum (Henn.) Trappe & Gerd. (1974)
G. radiatum (Thaxt.) Trappe & Gerd. in Gerd. & Trappe (1974)
G. rubiforme (Gerd. & Trappe) R.T. Almeida & N.C. Schenck
≡ *Sclerocystis rubiformis* Gerd. & Trappe (1974)
G. sinuosum (Gerd. & B.K. Bakshi) R.T. Almeida & N.C. Schenck
≡ *Sclerocystis sinuosa* Gerd. & B.K. Bakshi (1976)
Modicella malleola (Harkn.) Gerd. & Trappe (1974)
M. reniformis (Bres.) Gerd. & Trappe (1974)
Mycoleptodiscus terrestris (Gerd.) Ostaz.
≡ *Leptodiscus terrestris* Gerd. (1953)
Scutellospora calospora (T.H. Nicolson & Gerd.) C. Walker & F.E. Sanders
≡ *Endogone calospora* T.H. Nicolson & Gerd. (1968)
≡ *Gigaspora calospora* (T.H. Nicolson & Gerd.) Gerd. & Trappe (1974)
S. coralloidea (Trappe, Gerd. & I. Ho) C. Walker & F.E. Sanders
≡ *Gigaspora coralloidea* Trappe, Gerd. & Ho in Gerd. & Trappe 1974
S. gilmorei (Trappe & Gerd.) C. Walker & F.E. Sanders
≡ *Gigaspora gilmorei* Trappe & Gerd. In Gerd. & Trappe (1974)
S. heterogama (T.H. Nicolson & Gerd.) C. Walker & F.E. Sanders
≡ *Endogone heterogama* T.H. Nicolson & Gerd. (1968)
≡ *Gigaspora heterogama* (T.H. Nicolson & Gerd.) Gerd. & Trappe (1974)
Youngiomyces stratosus (Trappe, Gerd. & Fogel in Gerd. & Trappe) Y.J. Yao
≡ *E. stratosa* Trappe, Gerd. & Fogel in Gerd. & Trappe (1974)

FUNGUS NAMES HONORING JIM GERDEMANN

Acaulospora gerdemanii N.C. Schenck & T.H. Nicolson

Ambispora gerdemannii (S.L. Rose, B.A. Daniels & Trappe) C. Walker, Vestberg & A. Schüssler

≡ *Glomus gerdemannii* S.L. Rose, B.A. Daniels & Trappe

≡ *Archaeospora gerdemannii* (S.L. Rose, B.A. Daniels & Trappe) J.B. Morton & D. Redecker

≡ *Appendicispora gerdemannii* (S.L. Rose, B.A. Daniels & Trappe) Spain, Oehl & Sieverd.

Ambispora jimgerdemannii (Spain, Oehl & Sieverd.) C. Walker

≡ *Appendicispora jimgerdemannii* Spain, Oehl & Sieverd.

Gerdemanniaceae C. Walker, Blaszk., Schüssler & Schwarzott

Gerdemannia C. Walker, Blaszk., Schüssler & Schwarzott

ACKNOWLEDGMENTS

Thanks to Landon Rhodes and David Janos for sharing their thoughts about Jim. Kathleen and Jerry Sands purchased the Gerdemann property in 2008, established the Gerdemann Botanical Reserve, granted the conservation easement that ensures it will be preserved for the public, and developed an accessible trail for public use. The garden website is http://gerdemanngarden.org/. They were instrumental organizers of Gerdemann Day at Yachats.

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