

## Dr. Jean H. Langenheim

Jean Langenheim (née Harmon) is Professor Emerita of Biology at the University of California, Santa Cruz. She is well recognized nationally and internationally as a trailblazer in several areas of the plant sciences and ecology. Her major fields of interest in biology include physiographic ecology, biochemical ecology, tropical ecology, the evolution of terpenoid-producing plants, fossil resins (amber), and the human use of plants.

Jean was born in Homer, Louisiana, September 5, 1925 and grew up in Tulsa, Oklahoma, where she developed an interest in botany and geology. She married Ralph L. Langenheim, a young geologist, in 1946 and both completed their Ph.D. degrees at the University of Minnesota. Jean studied with William Skinner Cooper, a leading plant ecologist and geobotanist, finishing her Ph.D. in 1953, a time when there were few women field scientists. Jean later published a reminiscence, "W. S. Cooper as I Knew Him: Teacher, Mentor, and Friend" [*Bulletin of the Ecological Society of America* 96 (2015): 184-208], in which she commented that Cooper's efforts to give women advanced training in ecology and help them overcome hurdles had not been generally recognized. It was departmental policy at the time to allow women to do only master's degrees, with the idea that they would become teachers. Although Cooper supported women in ecology and sponsored nine women for M.S. degrees, Jean was the only one for whom he bucked departmental policy by sponsoring her as a Ph.D. student.

Her husband Ralph took a faculty position at UC Berkeley and then at the University of Illinois at Urbana, but anti-nepotism regulations prevented Jean from obtaining a faculty position. Nevertheless she advanced her research and teaching while holding various positions, including Research Associate in the Botany Department at UC Berkeley, Assistant Professor at San Francisco College for Women, instructor in field ecology at the Rocky Mountain Biological Laboratory at Gothic, Colorado, and teacher at the University of Illinois. She pursued her research in paleobotany and ecology during these years.

After her divorce in 1962, Jean became a Scholar at the Radcliffe Institute for Independent Studies and a Research Fellow in the Biological Laboratories of Harvard University. Her work took on new dimensions in the laboratory of E. S. Barghoorn, as she added chemistry to her original interests in botany and geology. At Harvard her research focused on the botanical origins of amber (fossil resin), and the ecology and evolution of tropical resin-producing trees. She worked on the genus *Hymenaea*, large flowering plants mostly native to tropical America, and she formed links to Brazilian Amazonia and researchers there with help from the Harvard ethnobotanist, Richard Schultes. Jean and her students later did long-term chemical ecological research on the evolution of resin-producing trees in the equatorial tropics. She published a major reference book on this subject, *Plant Resins: Chemistry, Evolution, Ecology, and Ethnobotany*, in 2003.

In 1966 Jean returned to the University of California as Assistant Professor at the newly founded campus of UC-Santa Cruz. She was a founding member of Adlai E. Stevenson College and for many years lived in the college as a Faculty Preceptor. Her botany course, taught with Kenneth Thimann, a leading plant physiologist, was highly popular because of the way it related plants to

human affairs. Their course resulted in a jointly authored textbook, *Botany: Plant Biology and Its Relation to Human Affairs*, published in 1982. She also taught graduate courses that offered new perspectives in tropical and chemical ecology, as well as the history of ecological concepts.

Jean has had longstanding interests in language development and the understanding of ecological and systematic concepts, recognizing that often ecological controversies hinge on linguistic or conceptual problems. In 1957 she co-authored an article with Herbert L. Mason on “Language Analysis and the Concept ‘Environment’”, published in *Ecology* (38: 325-340). They applied ideas from C. W. Morris’s discussion of the theory of signs (1938) to create a definition of the word “environment” that was precise and ecologically meaningful. Ecological texts tended to adopt very broad, comprehensive definitions of the environment as the sum total of anything that might have an impact on organisms, but these conceptions were far too broad, creating the impression of overwhelming complexity. Mason and Langenheim cut through this complexity by proposing a definition of “environment” that was operationally meaningful: the specific environmental conditions that had measurable impact on organisms was what mattered, not the sum total of all environmental conditions. In trying to clarify the concept of the “environment” Mason and Langenheim took on some of the heavy-weights of ecological thought, including Frederic Clements, Arthur Tansley, W. Dwight Billings, and Eugene Odum.

Jean was the only woman in the natural sciences at UCSC from 1966 to about 1972, and was the first woman to be promoted to Professor in 1973, when she became Chair of the Biology Department. During her years at UCSC she sponsored or cosponsored more than 40 graduate students, including some from Brazil and Mexico. During the 1980s she rose rapidly to the top of her profession and took on many leadership roles, all of which reflected the interdisciplinary nature of her research. She was elected to several prestigious positions, as well as being elected President of four national or international professional societies. She was the first woman president of the Association for Tropical Biology (1985-1986) and the International Society of Chemical Ecologists (1986-1987), and was the second woman president of the Ecological Society of America (1986-1987) and the Society for Economic Botany (1993-1994). Many other awards and honors were bestowed on her during these years. Although she officially retired in 1994, she remained very active in her administrative work, research, and mentoring of doctoral students.

Jean’s pioneering interdisciplinary approach to ecology over the course of her multi-faceted career is recounted in her memoir, *The Odyssey of a Woman Field Scientist* (2010). In addition to examining the history of ecology over her long career, her biography helps us to understand the changes in the status of women in science over many decades, changes that Jean herself helped to bring about. Jean’s pioneering work extends to the history of ecology: she has written broadly about women in ecology, publishing a study on “The Early History and Progress of Women Ecologists: Emphasis on Research Contributions” [*Annual Review of Ecological Systems* 27 (1996): 1-53], which serves as an excellent starting point for readers interested in the history of women in ecology.