



SOCIETY ACTIONS

Awards

ROBERT H. MACARTHUR AWARD



Robert V. O'Neill

If Robert O'Neill's career were to be described in a single word, "thoughtful" comes immediately to mind, as his B.A. in philosophy from Cathedral College in 1961 might portend. His Ph.D. was from the University of Illinois in ecology in 1967. Since then he has been a research ecologist at the Oak Ridge National Laboratory, recently raised to the highest rank of Corporate Fellow (the only environmental scientist to achieve that lofty distinction). His association with the University of Tennessee-Knoxville and with Oak Ridge Associated Universities provided the opportunities for advising graduate students.

He began his scientific career as a millipede biologist in the 1960s, conscious of the ecological benefits of knowing, in depth, the biology of a specific taxonomic group. But he was always interested in the theory underlying his studies. His arrival at Oak Ridge coincided with the inception of the International Biological Program, in which ORNL was to play a large role. Those were heady days, when Bob and his peers were exploring ecosystem principles using the first computers able to simulate reasonably complex systems. Over the next decade O'Neill led his colleagues in the simulation of terrestrial and aquatic ecosystems, redefining the very concept of the ecosystem. Tansley (1935) coined the term "ecosystem" and Linderman (1942) began to put it into operation, but species and community were still in the foreground, even as late as Odum's (1969) synthesis. The achievement of O'Neill and his colleagues at Oak Ridge was to emphasize the importance of pathways, processes, and storage compartments. Stream biologists came to the ecosystems theorists asking why minerals were not washed out of their systems, and O'Neill and his colleagues showed how the notion of stream spiraling could account for the dilemma (Newbold et al. 1982). Stream spiraling is now a workaday idea for stream biologists, proving the utility

of theory in developing major ecological applications. Comparing aquatic and diverse terrestrial systems, O'Neill (1976) highlighted the role of heterotrophs in influencing nutrient status, thus setting the stage for the diverse use of trophic cascade concepts in subsequent decades. Although the species-centered approaches were frustrated by the Gordian knot of diversity, complexity, and stability, O'Neill and his student Peter Van Voris, using a series of microcosms, gave one of the few unequivocal tests of the relationship of complexity and stability. By stepping away from species diversity, Van Voris et al. (1980) employed ecosystem flux of carbon dioxide as the signal to demonstrate that increased complexity can lead to increased stability in an ecological system.

The simulation work proved useful in assessing the patterns of persistence of pollutants and poisons in ecological systems, leading to the assessment of ecological risk. Through the decade of the 1980s, with a new generation of colleagues and students at ORNL, O'Neill was a leading participant in ecological risk analysis, culminating in a definitive book on the subject (Bartell et al. 1992). Risk analysis led O'Neill and his colleagues into two other lines of investigation that have developed as major efforts in ecology. One is the relation-

ship of carbon dioxide and climate change (King et al. 1989). The other is what O'Neill and his colleagues called regional ecology in the 1970s (subsequently changed to landscape ecology). At the 1995 Minneapolis summer meeting of the International Association of Landscape Ecology, O'Neill was recognized as one of its distinguished leaders.

Bob O'Neill's interest in large-scale systems is only part of his general interest in the issue of scale at large, and the relationship between levels of organization. Before Arthur Koestler had coined the term "holon" the young Robert O'Neill (1966) was contemplating the organism as a dual entity. So when other ecologists turned their attention to the issue of scale in ecology, Bob O'Neill was there waiting. Hierarchy theory, a dialect of general systems theory, is now manifest as the science and theory of complexity. A major contribution to hierarchy theory is the Princeton monograph, "A hierarchical concept of ecosystems" (O'Neill et al. 1986). Having worked through the 1970s to define any new process-functional definition of ecosystem, in his hierarchy book he weaves the notion of ecosystem back in with community and population concepts.

Beyond his massive research productivity of over 230 publications, including several books, Bob O'Neill has been very active in service to the scientific community. He has served as an Associate Editor of *Ecology*, on NSF panel for Ecological Sciences, and on the NAS committee on global ecology. He was recognized as a Distinguished Statistical Ecologist in 1994 by the International Association for Statistical Ecology. But more than all this, Bob O'Neill has been a mentor to many, and a stimulating friend and colleague to even more. More than almost any other senior ecologist, he makes himself available not only to his own past students, but to everyone else's students too. He is a devoted attendee at ESA and IALE meetings, where he makes himself particularly available to all comers.

He does attend the formal symposium and paper sessions, but is often far too busy, positioned carefully at some meeting crosswalk, talking to old friends and new acquaintances about theory and practice across ecology. At one moment he can be nurturing the interest and confidence of a student, while in the next he will be having an animated and combative argument with an old friend about theory. At one IALE poster session, he just stood in front of a flip chart, talking to anyone who would engage him. He was his own poster!

Having been a foundation member of several ecological subdisciplines, at this stage in his career Bob O'Neill has more paths available to him than most ecologists. One might expect him to continue in the theory of scaling, risk analysis, landscape or ecosystem ecology, but none of these is his primary focus at this time. With its own new journal, ecological economics is the latest emerging subdiscipline in the ecological sciences. It is probably only a matter of time before Bob O'Neill becomes a major figure in yet another area of ecology. Pulling together his thoughts over the last few years, he has a paper in *Ecological Applications* entitled "Perspectives on economics and ecology." Time will tell whether this is yet another O'Neill contribution that redefines the scope of ecology at large.

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R. H. MacArthur Subcommittee

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