

ECOLOGY OF MAN: HIS ARTS AND SCIENCE

Dr. Stanley A. Cain, Assistant Secretary for Fish and Wildlife and Parks, Department of the Interior, at the Seminar for Environmental Arts and Sciences Sponsored by the Thorne Ecological Foundation, Aspen, Colorado, July 23-29, 1967

This symposium seeks to deal with two exceedingly complex areas of contemporary interest: one called ecology in the area of science; the other called conservation in the area of societal action.

Scientists do many different things under the rubric of ecology and many scientists carry on ecological research that they wouldn't dream of calling ecology. Physicists, chemists, and astronomers usually don't have this uncertainty about labels, nor do many biologists such as cytogeneticists, physiologists, and morphologists.

The hesitance of some scientists to call themselves ecologists goes back in part to natural history approaches based largely on observation and unsophisticated instrumentation. And it is true, to a degree at least, that many ecological problems are so complicated that they are not even now amenable to refined mathematical treatment. Also, many of the measurements and past attempts at quantification seem not to have led to solutions of the problems posed. Many ecological studies have piled up data on climate, geomorphology, soils, the composition and structure of vegetation, and the relations between one species and another, or a species and selected environmental conditions, without putting the data to work by revealing a convincing causal relationship between them. Many things and conditions that vary together have not been shown to be coordinated in a cause-and-effect relationship, or not to be so coordinated.

One distinguished physiologist, after associating with ecologists for several days under pleasant circumstances, announced to the group his discovery that "Ecology is the physiology of togetherness." Another scientist on a different occasion said wryly and with a touch of arrogance, "Ecology is what I do and others think they are doing."

Perhaps the most widely accepted simple definition is that ecology is the science of life and environment. Following this thought, that ecology is concerned with interrelations—interrelations among things and conditions and processes—one can see that there is inevitably an unlimited scope for ecology.

It runs the circuit from intra- and inter-molecular phenomena, as particles interact under different physical conditions, to global phenomena and impingements on our world from space. In between there are the interrelations between life and environment at the intracellular level, the intra-organismal level of tissues and systems, the species population level, and that of multi-species communities of plants and animals together. Having reached the community level of organization, one finds identifiable and describable communities that range from those of relatively simple composition and structure, occupying small space, to global formations.

Examples of small and, as you will see, intimate communities I would mention are termite colonies and their associated species that have evolved together over millennia, and man, I mean one man, and his collection of ectoparasites and the fauna and flora of his gut. At a larger scale are small ponds, the communities of restricted rock outcrops, or patches of peculiar soil. At the large end of the scale are the pantropic rain forests, temperate grasslands, and circumboreal tundra.

As one passes along this continuum of the organization of life, its internal complexity increases as does the variety of interrelations of it with the external environment, both physical and biological. Also in passing along this continuum, scientists find it increasingly difficult to qualify their data, to express it mathematically, and to perform controlled experiments. Nevertheless, in a general way, there is predictability, always cherished by scientists, even for the largest life units. For example, in Brazil where high tropical rain forest often meets grass and brush savanna with a sharply demarcated boundary, the disturbance