

These concern, for example, the ecological interrelationships of the component populations, the cause and effect of changes in vegetation and its associated animal life through time, or the influence of upwelling ocean currents on the productivity of marine life—and in turn they often generate ideas for further studies on the functions and processes of ecosystems.

As was pointed out earlier, ecology is sometimes said to be the scientific outgrowth of natural history. In the ecology program of the Smithsonian a strong foundation for research concerned with basic descriptions is provided by the vast collections and the enormous bank of taxonomic knowledge in its Museum of Natural History, a bank to which the Smithsonian has contributed for over 100 years through its expeditions into the "virgin" areas of the Western States, the Arctic regions, the Tropics, and elsewhere throughout the world.

The massive task of curating the collections from these expeditious leads naturally into systematic and evolutionary biology, and as a consequence, taxonomists have often become so specialized in the systematics and biogeography of their own particular group of organisms that they have had little time or inclination to explore the significance of ecological studies. Ecologists, on the other hand, have often tended to underestimate the importance of these basic descriptions and the significance of systematic biology and ecology at the species level. A related objective of the Smithsonian ecology program is, therefore, to bridge the gap that has developed between systematics and ecologists and to renew the close relationships that formerly existed between these two disciplines. Obviously, such interdisciplinary integration is essential if we are to increase our knowledge of how ecological systems work in nature.

The second type of research required to increase understanding of how ecosystems work is concerned with interpretive, ecosystem-oriented studies rather than basic descriptions. Examples of such studies would be: (1) the role of social behavior or the significance of predator-prey relationships in the numerical regulation of animal populations; (2) the principles of vegetation change; (3) the flow of energy through the system as expressed in rates and amounts of primary and secondary productivity; (4) the cycling of mineral nutrients; or (5) the consequences of man's environmental manipulations. These examples point the direction in which the new quantitative ecology is developing. These are the studies at the higher levels of biological intergation, although usually below the level of human-society-plus-environment, that excite ecologists intellectually.

To sum up: the Smithsonian program in ecological research embraces both basic descriptions and ecosystem-oriented studies. It emphasizes studies of significance to both ecological theory and to the understanding of man's place in nature. Its aim is to form a small group of scholars, each of whom will advance knowledge significantly in his own specialty—be it vegetation science, animal behavior, the dynamics of animal populations, or the energetics of ecosystems—and who will also help construct a new interdisciplinary framework that will enable us to assemble a broad spectrum of knowledge relevant to the current ecological problems of our society. By this means, it is hoped, a viable scientific basis can be established for maintaining and improving the quality of man's environment.

In this challenging new era of multiple, competing demands and shifting perspectives, the Smithsonian Institution, as a privately en-