5. Desert species. Much physiological work has been carried out on succulent species from arid regions; more work is needed on nonsucculent plants of the deserts, some of which are of considerable interest to man.

6. Freshwater species. Cooperative projects with the Subcommittee on Productivity of Freshwater Communities (IBP) on jointly selected species would bring together physiological and ecosystem approaches on an international scale. That Subcommittee is planning an intensive ecological survey of selected drainage basins. These studies should provide physical and biological data which will be useful for physiological research on aquatic communities.

PHYSIOLOGICAL MECHANISMS OF ADAPTATION

Productivity in different environments depends not only on the flow of energy, food, and water but also on adaptability of organisms to these environments and on the reactions to one another of different species.

Selected communities and species should be intensively studied. The understanding of communities and of their production of organic matter demands study of the physiological bases of adaptability in relation to the specific ecological niche of each constituent organism. Research on physiological mechanisms of adaptation overlaps with studies of population differentiation, but the approaches are different in that studies of mechanisms of adaptation are concerned with detailed physiology and biochemistry of single species and include cellular and molecular measurements; they need not be comparative and need not include ecology or population dynamics.

Physiological differences which are adaptive can best be identified by stress tests. They are in two categories. Resistance adaptations are related to environmental extremes and their tolerance by whole organisms, tissues, or enzymes, and these must be correlated with the natural limits of species. Capacity adaptations permit normal activity in an altered but tolerable environmental range. Both are homeostatic in permitting survival and reproduction in an altered environment.