

PROBLEM AREAS

POPULATION DYNAMICS

If man is to stabilize population by means other than starvation and disease, he must learn more about the dynamics of human societies and about regulation of plant and animal populations.

Neither the distribution nor the sources of man's variability in the adaptive process have been rigorously measured. The International Biological Program provides an opportunity to sort out these aspects of variability according to their relative importance and to discover underlying mechanisms through collaborative studies of different groups whose contrasting genetic, social, nutritional, meteorological, and environmental backgrounds are carefully documented.

Genetics and Variability of Human Populations

Mankind possesses great diversity both within and between populations. This diversity has been the basis of the evolutionary success and of many of the present problems of the species.

It is obvious that long-term changes in the human population have occurred and that the environment of man is changing rapidly both physically and culturally. Description and explanation of the underlying processes of change are essential to understanding population dynamics. Whereas individuals succumb to critical changes in environment, populations adapt, genetic selection being the principal process leading to this adaptation.

Of crucial relevance are the processes determining transmission of genetic material from one generation to the next.

A partial listing of forces and processes entering into population genetics follows. Each is a problem for IBP research.

Mating choices and patterns, including inbreeding, outbreeding, and assortative mating

Fertility

Fetal wastage

Age and sex-specific mortality

Postnatal natural selection

Fluctuation and disappearance of populations

Hybridization between populations

Behavior genetics

Genetic drift and founder's principle

The range of human populations available for this type of investigation should make possible a thorough assessment of variability. At one extreme are the relatively few surviving examples of hunting-gathering and incipient agricultural populations. Some of these groups (the South African bushman, the Australian aborigine, the Eskimo, certain tribes of Central and South American Indians) are disappearing so rapidly, culturally if not biologically, that it seems especially appropriate that the International Biological Program should encourage multidisciplinary studies on them without delay—studies that would provide invaluable baselines for subsequent investigation of a variety of other populations.

Special attention should also be paid to biological adaptation of racial isolates from industrialized societies and migrant groups moving from one environment to another. Examination of migrations by different racial groups that have settled in the same or similar environments is desirable. Use of baseline studies from the original environments would be particularly valuable.

Regulation of Plant and Animal Populations

Mechanisms are known, or suspected, which stabilize populations of certain species in ways other than by limitation of nutrients or by predator and disease depredation. While these mechanisms may not be directly applicable to man, knowledge of them would permit biologists to view the human population explosion in fuller perspective.

It would be helpful to know more about factors determining population equilibria. Two approaches hold promise: (1) ecological population analysis, and (2) analysis of physiological mechanisms of variation. The former includes study of reproductive rates and patterns, interorganismic competition, food chains, and predation. The latter deals with biochemical and physiological variation and mechanisms of feedback interaction between organisms and the environment.