The New York Times

MONDAY, JANUARY 12, 1970

Biological Goal: Human Welfare

By JOSHUA LEDERBERG

It is almost as difficult to make a succinct forecast of the seventies as it would be to encapsulate the scientific riches of the expiring decade in a few paragraphs.

The main uncertainty about new directions is no longer centered within biological science. Instead, we must be concerned about the growing intensity of an antiscientific counterculture.

The historic roots of this ideology are numerous and complexly interwoven. They must include novel illusions of economic and military security and the disappearance of the frontiers of geography and status that channel the generations.

The most aggressive weapon of the radical, antiscientistic youth is not the disruption of a college campus; it is his own dropping out from the rational, scientific tradition. One of the stakes of our effort to reset our social priorities is the renewal of the mutual trust between the generations, on which the survival of our culture absolutely depends.

Techniques Not Enough

Strange to say, some aspects of antiscientism are assimilated by the short-sighted optics of the conservative establishment. The social and political crisis over Federal support is so important to how science will function in the next decade that it would be naive and negligent to make a forecast of its performance in purely technical terms.

The sixties displayed biological science in its most basic and elegant posture with such historic milestones as the unravelling of the genetic code. This discovery has yet to impinge specifically on human health, but it is the keystone in the whole fabric of modern, molecular medicine.

The most exciting and creative prospect for the seventies is a convergence of the scientific potency of molecular biology with the concern for human well-being of the environmental conservation movement.

Every human activity, and large-scale industrial activity most of all, pollutes our habitat. We must have a rational scale of costs and benefits to place the correct priorities, to identify the problems that require the most urgent attention and justify the most costly investment.

Advances Have Dangers

Without a better scientific base, we may also find that our "solutions" will merely generate larger problems. After all, nuclear energy, DDT and chloramphenicol have been hailed as panaceas. But on this earth there is also a price for every advance that we must work hard to discover and meet.

The hazards to man and his environment of large scale, chronic alterations may be too subtle for simple commonsense observations. One method we must avoid is to wait for rigorous proof of widespread damage before we react with precautionary measures. In the arena of genetic damage, especially, but also with environmental cancer, malformations and chronic degenerative diseases, the population might to commitment to a several-fold increase of its existing burden before there was any chance of detecting the impact of new dangers.

An urgent challenge to biological science is the rationalization of our methods for anticipating the long-range impact of drugs, food-additives, pesticides, industrial pollution, and other man-made changes in our environment.

Faced with the moral and practical burden of implementing equal opportunities for health, we are also rediscovering the pre-eminent importance of the prevention before, compared with the repair after, disease has taken hold. Nevertheless, few people have come to grips with man's precarious foothold on the planet in the face of potential threats of global epidemics of virus infections.

President Nixon recently announced an important reversal in our former suicidal policies of biological warfare research. If this can indeed be followed by effective-international agreements to prevent man-made innovations as sources of epidemics, an important part of this threat will have been mitigated.

Nevertheless, we have yet to design, much less implement, a system of global hygiene that begins to correspond to the dimensions of this problem. New knowledge of the molecular genetics of viruses, and hence of their evolutionary potential, is instrumental to the measurement and preception of, as well as to the construction of effective responses to, the prevention of another great plague.

Problem of Development

The most exciting developments of experimental biology today concern the problem of development — how the genetic blueprints in the fertilized egg are translated, interacting with the environment to form the growing individual. Urgent problems like cancer, brain functions, and the replacement of failing organs are part of this same theme.

The last years of this decthe flowering of the most powerful theoretical framework for these problems. Specific experimental approaches also include the fusion of cells from different tissues or species, permitting the detailed analysis of different chromosomes and cell states, and direct chemical analysis of the RNA "messengers" in different kinds of cells.

Much has been said and written about "genetic engineering," which is based on the exaggerated mystique about the importance of the genes compared with other, far more accessible influences on the development of human nature — like education, indoctrination, custom and other social institutions.

Explicit genetic engineering in man (beyond existing methods like vaccination) faces enormous technological obstacles. Near-terms advances continue to diminish the overriding importance of the genetic constitution in the face of planned interventions in development and control of the environment. "Genetic engineering" promises to be an obsolete concept before it can have much practical application of the human organism.

Dr. Lederberg, a Nobel laureate, is professor of genetics at Stanford University.