

Book Reviews

Taking Thought for the Morrow

The Prometheus Project. Mankind's Search for Long-Range Goals. GERALD FEINBERG. Doubleday, Garden City, N.Y., 1968. 216 pp. \$4.95.

e. e. cummings once began a verse with the line "pity this busy monster, manunkind, not," and we have only to look about us to see just how busy the monster has been. Modern society has worked a true miracle, whether the miracle is measured in productivity per man-hour or in ability to dispense widespread pestilence and nuclear death. But the miracle of our age more truly lies in the marked expansion of our knowledge of the physical world and in our new potential for understanding the mechanisms both of the simplest atoms and of life itself. It is often argued, in the pages of this journal and elsewhere, that we have used this knowledge unwisely, but we may hope that the jury is still out on that charge. Nonetheless, our triumphs of rationality can be very persuasive, so persuasive indeed that they may lead us to prescribe, on the basis of pure reason, for the welfare of our fellow man. Gerald Feinberg, convinced that our busy monster is possibly suicidal, irrational, or both, argues thoughtfully in this remarkable book for the attractions of having long-range goals to save manunkind from his folly.

The Prometheus Project is no account of the latest technological miracle but rather is a serious attempt at social philosophy and propaganda. As social philosophy it is extremely stimulating. As propaganda it is well-intentioned but unpersuasive. In his development of an argument for the necessity of establishing long-range goals in our society Feinberg belongs in a tradition that properly starts with Hume; but since he gives his arguments *ab initio*, there will be no attempt to trace them historically here. The style is terse and laconic, with a very high density of concepts. Considering the difficulty of the matters at issue the documentation and elaboration are modest. Many of

the arguments must be filled in by the reader, and there are some awkward conceptual chasms to be leaped, but the exercise is worthwhile. A title more indicative of the manner of this book might have been "Prolegomena to a Social Metaphysics."

Feinberg is a theoretical physicist of very considerable talents, many of whose professional efforts have been characterized by unconventionality and imagination (one of his recent papers discusses a theory of *tachyons*, particles that always go faster than the speed of light and that correspond to regions of space-time that have generally been considered unphysical). He does not shrink from difficult problems in physics, and he does not shrink from difficult problems here. The first paragraph brings out the bare bones:

1) The long-range goals of the human race have so far not been reconsidered in the light of the scientific discoveries of the last few hundred years, and it is essential that they be.

2) Because of the increasing rate of technological advance we will soon be faced with literally "world-shaking decisions" which can rationally be made only if we know something about our long-range goals.

3) An agreement on long-range goals might help to alleviate some of the present disagreements over more immediate issues which may otherwise lead to the early destruction of the human race.

Feinberg sees the goals we have carried over from the past as relics of a distant day when man had to invent mythic incentives in order to maintain a stable social order. Thus, the ethical principles of our religions were essential for their social survival value. But our new knowledge of the physical world has undermined the old myths, so when confronted by assertions of the existence of God, of the existence of plan in nature, of the human soul, of life after death, modern man can at most return the Scotch verdict of "not proven." Indeed, Feinberg claims, much of the evidence and the argumentation for such beliefs can be quite explicitly contradicted, so that believers must retreat to a **higher** plane of abstraction.

He does not discuss the social consequences of the spread of disbelief but simply asserts:

I, therefore, think it time that scientists made it clear to others that the hypothesis of God is unnecessary within the scientific picture of the world. Those men who wish to retain their belief in God must recognize that none of the wide variety of phenomena revealed by the senses give any support to their belief.

The knowledge that destroys belief also brings power, and it is in the management of this power that mankind is most immediately threatened. The basic problem is not that power is inherently evil but rather that the use of power, whether in the form of nuclear weapons, information control, genetic engineering, or operant conditioning, can irreversibly foreclose some, perhaps many, of our present options. The "world-shaking decisions" are not only decisions to control technology but also decisions to promote the development of specific technologies, assuming that we know to what end.

The purpose of the Prometheus Project is to discover those ends for which man can work and strive. With the loss of our myths and the ethical system they supported, and the gain of enormous potential for altering our habitat, physical and social, our actual survival is threatened. We thus must seek long-range goals to provide a focus for our preservation and existence. Feinberg would hope to engage a sizable fraction of the human race in organized discussions that would lead to the determination of such goals. He sets aside the possibility that "a small number of intellectually or morally gifted persons" could be put to this task, and insists that the goals must come about through a grand consensus of people of all intellectual and social classes. He asserts that human society is already so homogeneous, or soon will be, that common goals indeed may be found. (Of course, since the available options are strongly affected by what is scientifically possible, it would be necessary to bring about very widespread science education.) Feinberg has no overt desire to push for particular goals, but he lists a few as illustrations: exploration of space, lengthening of the life span, elimination of human suffering through the biological reconstruction of the human race, development of independent artificial intelligence, and expansion of the range of human awareness by direct stimulation of the brain. Some of these

may be primarily means to some higher goal, rather than primary goals in themselves. Indeed, he envisions a mixture of primary and secondary goals with a requirement that they all be consistent. The common striving to find and state our explicit long-range goals, and then to work for them, would presumably reduce international rivalry and enrich individual understanding as well.

Feinberg believes that most of the present sources of human misery in the world are hangovers from the days of bare subsistence economics and that "most of our immediate problems will be solved in a relatively short time by the march of technology and the worldwide spread of those aspects of Western culture that are responsible for our high living standards." Thus, while many will still be preoccupied with solving these problems, society must also get on with setting the long-range goals against which short-term decision-making can then be assessed.

Feinberg recognizes that our technological prowess can be exceedingly dangerous as well as benign, and that we may have arrived at a watershed in the development of society. He insists that decisions affecting the future course of humanity require in their formation the broadest possible public participation rather than being left to elites, whether scientific or political. He thus shows that he is well aware of the need to preserve both the hard-won traditions of democracy and the humane goals of science. But he seems far too little concerned with the immediate problems that confront our society. He believes our deepest problems to be "human finitude and the meaning of individual lives" and generally dismisses our more temporal troubles with an airy optimism. He hardly considers the very serious question of the increase of the human population and the way in which this increase exacerbates, and often generates, various other social ills. In asserting that we will "soon be faced with world-shaking decisions" he forgets that we already have been faced with some rather trying decisions (for example, during the Cuban crisis of 1962) and that many in our society are painfully aware that an extensive agenda of difficult decisions confronts us now. Though we may seem to lurch from crisis to crisis, our society has developed elaborate self-protective institutions whose workings Feinberg ignores, including a government that is directly

charged with serving the interests of the people and that, in our nation at least, provides a very substantial measure of social self-determination. Moreover, the problem of reconciling short-term decisions with long-term goals is far from trivial, and the record of human history shows that such a reconciliation may not provide an altogether reliable mechanism for the daily decisions either of our personal or our national lives.

Although Feinberg's ideas are stimulating, the prescriptions appear to be decidedly wrong-headed. Each of the basic assertions is arguable and not demonstrable. Belief has surely declined, but it does not necessarily require replacement. Granted that we face some baffling dilemmas in keeping our technology under control, programs with a hundred-year lead time are not obviously necessary or sufficient. It may simply be that an informed common sense is sufficient to control our suicidal impulses, in which case the elevation of long-range goals is not required. It may be less a question of what values humans *should* maximize than of what values we *do*.

Most distressing is Feinberg's assurance that our advancing knowledge of natural science has or soon will have equipped us to carry out the kind of detailed analysis of causes and effects, costs and benefits, that any assessment of long-range goals would require. Our knowledge of human behavior is certainly much less complete, and is in many ways more important, for the setting of the limits of human aspiration. Indeed, it may be that before we overrun the rest of the peoples of the world with our "Western civilization" we would do well to stem the onrush of our technology and try first to understand those peoples and let them understand us (if they so desire).

Feinberg's explicit program calls for the organization, first, of a series of broadcasts in the mass media, addressed to all the peoples of the world, then of small discussion groups that would debate a wide variety of goals; then finally the establishment of a worldwide coordinating agency that would promote various kinds of discourse until it finally could announce to the world what the long-range goals of mankind should be. This book is intended to provide the initial spark. It will be interesting to see if it does.

JOEL A. SNOW

National Science Foundation,
Washington, D.C.

Plants and Environment

Climate and Agriculture. An Ecological Survey. JEN-HU CHANG. Aldine, Chicago, 1968. xvi + 304 pp., illus. \$9.75.

For the conquerors of space to run short of food and oxygen would be embarrassing. Our technological society therefore has begun to turn some attention to the way they are produced by the "earth's green mantle." This attention has uncovered some surprising areas of ignorance, one of which is the relation of plants to their environment. How do they get what they need from it?

Jen-hu Chang discusses this question with respect to crop plants. His approach is a genuinely physical one. It wastes little time on the hoary descriptors air temperature and rainfall, which exist as billions of punched cards and which have only indirect relevance to the exchanges of energy, water, and carbon dioxide that characterize the world of plants.

Most of the few defects of the book, which occur in one chapter, reflect the way many agronomists have uncritically accepted local, empirical formulas for estimating solar radiation or the net exchange of energy in radiation of all wavelengths (so-called "net" radiation). The inadequacy of these formulas is naturally no fault of the author's, but it might have been noted that some are inconsistent with others and that some oversimplify the physics.

But these defects are minor. Chang's treatment of the radiation environment of crop plants has a broad sweep, from photosynthesis in the field through the distribution of radiant energy in crop communities (with long-overdue attention to their geometric and geophysical properties) to the resultant temperatures of leaves and soil. All are presented with research data relevant to physiologic processes.

The second part of the book carries on with radiative and other forms of energy as they support transpiration and the circulation of water in the soil-plant-air system. The water exchanges lead to methods that may in time rationalize many traditional practices in cropland management, including irrigation and crop spacing. The soil-moisture budget, as a practical means of characterizing one aspect of the plant's environment, receives probability treatment.

Many barriers between the physical and biological sciences in this area have