of Victorian history produced in the past 20 years. State intervention in the economic life of 19th-century Great Britain is now recognized as a dominant theme in Victorian history. The era that was once regarded as the heyday of individualism is currently being explored for the origins of the modern British welfare state.

The legislative acts controlling the purity of foods and drugs should have been studied as an example of the growth of state control in Victorian England. Had this been done, the authors would have been forced to search more carefully for the sources of opposition to the enactment and prosecution of regulatory legislation instead of relying upon the convenient, but now-discredited, doctrine of laissez faire as a catchall explanation.

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Taking Arms Against a Sea of Troubles

The Control of Environment. Lectures delivered at the second Nobel Conference, St. Peter, Minnesota, January 1966. JOHN D. ROSLANSKY, Ed. North-Holland, Amsterdam, 1967. 124 pp. $5.

Environmental Quality in a Growing Economy. Essays from the sixth RFF Forum, Washington, D.C., March 1966. HENRY JARRETT, Ed. Published for Resources for the Future. Johns Hopkins Press, Baltimore, 1966. 189 pp. $5.

Interactions of Man and His Environment. Proceedings of the Northwestern University Conference, Evanston, Illinois, January 1965. BURGESS E. JENNINGS and JOHN E. MURPHY, Eds. Plenum Press, New York, 1966. 180 pp., illus. $9.50.

Mankind's basic problem with environment is to wrest enough from the natural resources for survival. Successful solutions lead to increasing comfort and future security—and to an increasing number and variety of new problems. For each individual the environment poses specific problems; for mankind the term becomes broad enough to include everything on earth. Thus the subject of environment is multidisciplinary in the extreme.

Each of the books reviewed here is the record of a symposium with participants from a variety of disciplines. One volume is concerned with global and long-range strategy for the continuation of mankind's successful occupancy of this planet, and includes social philosophy at a high level. Another centers on the American economy, although in the diversity of disciplines and the range of ideas presented it has many points, and indeed two contributors, in common with the first. The third is more specifically oriented to technological problems and solutions.

The lectures in *The Control of Environment* reveal the range of factors involved and the complexity of the issues, and also some uneasiness about the theme of the conference, suggesting that man works with environment and responds to it in ways which are not adequately described by the word "control." Orville L. Freeman views with alarm the expansion of population and particularly its tendency to concentrate in urban areas, and proposes that in the United States people and industry, including big industry, should be dispersed throughout the countryside. Roger Revelle similarly speaks first of population growth, then looks to the oceans as sources of protein for the malnourished people throughout the world and of various other benefits and amenities.

Kenneth E. Boulding takes a critical look at goals and values, questioning the assumption of most economists that continually increasing production and consumption of goods are desirable. He likens the earth to a spaceship that may "close in on us" within a generation or two, so that recycling will become more and more essential:

> We are already producing irreversible changes in the atmosphere which are causing alarm among meteorologists. It is clear also that we know very little about what we are really doing, that we do not understand the earth at all well, and that the earth sciences, even the physical sciences, are shockingly backward. It may be, of course, that for the present generation or two this is simply a problem of economics. We have to manipulate the system so that pollution is not rewarded. It is a problem, however, which may easily go beyond economics. . . . Our present technology is suicidal. We will certainly run out of ores and fossil fuels in historic time, and we may run out of pollutable reservoirs before we run out of mines. The growth of affluence, that is, may be sharply limited by the growth of effluence.

Although recognizing adaptability as an asset to survival, René Dubos sees danger in man's immense ability to adapt to the changes he is making in his environment and to survive under the new conditions for many years, because some pathologic effects of environmental pollution may not become evident until decades later. He welcomes the trend in social philosophy toward making the producers of pollutants directly responsible for the control of pollution. Another danger to which he points is that increasing population and complexity of social structure will impoverish life by imposing regimentation and monotony, unless deliberate effort is made to create and maintain as many diversified environments as possible. Carl T. Rowan pursues this theme; he regards regimented conformity as a curse that no society can long survive, and the fight against such restraints, and against the gendarmes of the status quo, as the "ordeal of liberty."

The role of energy in the history of mankind is summarized by Glenn T. Seaborg. To the big overall question of whether we have enough energy resources on earth to support its growing population at a level where almost everyone will be well fed, well clothed, and well housed, Seaborg's answer is cautiously optimistic.

In *Environmental Quality in a Growing Economy* six topics are dealt with, each in a pair of essays. Boulding again rocks the boat, this time loaded with economists, by alleging that economists generally have failed to come to grips with the ultimate consequences of the transition to the closed "spaceship Earth" from the open "cowboy economy" of the past and present, which he associates with reckless, exploitative, romantic, and violent behavior, planned obsolescence, and the GNP. Harold Barnett focuses on the more proximate future, and sees that in the human ecological system both population and activity are growing bigger whereas space-time is growing smaller; also, with the increased pace of ecological change there is less willingness to bear it. He doubts that the laissez-faire or self-regulating market system is adequate to the problems of environmental management, and he is skeptical of benefit-cost measurement and analysis. Particularly suspect is our skill in estimating future benefits in a changing world. As an alternative, Barnett is impressed by a recent innovation in public administration: the consensus doctrine of the Great Society.

The second pair of essays is concerned with the relations of environment

and human health. Discussing Dubos' analysis of the promises and hazards of man's adaptability to environmental change, Leonard J. Duhl emphasizes the difficulty, and the need, of comprehending the relations of man and his environment as an ecological whole. He sees the frightening possibility that if one tries to put the pieces together in a very rational and logical way, as some systems theorists are doing, somehow people get left behind.

In the essays devoted to problems beyond the market mechanism, Ralph Turvey examines the side effects of resource use. Using several examples, he shows that where there are externalities that cannot be measured in dollars, the choice of the right course always has a political or legal aspect, for it involves judgments of what is fair and equitable as well as calculation of dollar gains and losses. He discusses regulation, contracts or legal actions, and taxes as mechanisms for dealing with external economies and diseconomies. Roland N. McKean adds that a basic difficulty in deciding what to do about externalities is the cost of learning about the costs of and gains from alternative courses of action. A suggested solution is to define individual property rights clearly and set up a market for the external effect.

Another pair of essays examines the current state of economic research into problems of environmental quality. Allen V. Kneese notes significant progress in some lines, significant gaps in others. M. Mason Gaffney applauds Kneese's application of economic theory to practical problems, although he has some minor criticisms. For instance, he considers institutional constraints to be as compelling as engineering constraints: the social institutions hammered out through the centuries are real facts of the world, and the cost of amending a state constitution or the U.S. Constitution, or reversing a common-law rule or a precedent *stare decisis*, or altering established mores, may be high enough to prohibit otherwise excellent solutions to problems. Institutions are not immutable, but their evolution is far behind that of science and engineering.

After Gaffney's criticism of the Hamlet School of Indecision, Gilbert F. White explores another of Hamlet's philosophies—that there is nothing either good or bad, but thinking makes it so. Pollution, defacement, degradation are relative terms that can only be measured against a human preference. What are the public's attitudes? Although there are many assertions of what the people want, there is no single expert opinion about their attitudes toward quality of environment. White argues for basic research on decision processes and attitude formation, particularly where resource management produces nonvendible benefits:

> As these studies proceed, they will throw light on how decisions in truth are made, on how the professional's own preferences figure in the proposed solutions, on what he thinks the citizen prefers, on what the citizen does prefer, and on how all of these may shift with the circumstances and experience surrounding the choice.

David Lowenthal adds several items to White's cautions about the pitfalls in the way of finding out what people really think and how this thought relates to action. He finds too much tendency for man to regard environmental quality as a *sometime* thing, to be enjoyed in patches or moments, or in the distant future, while overlooking obvious blight at other places and times —perhaps another corollary of the adaptability of man.

For the needed improvements in policies and institutions, Norton Long places principal reliance upon the federal government, which has not only the fiscal freedom but also the comprehensive reporting service to appraise environmental quality and the net benefits of improvements. Jacob H. Beuscher agrees that federal government must have a dominant role, but would assign important secondary roles to the states, on the grounds that they share the constitutional powers needed to supplement federal power, and are the chief custodians of the common law of property and of contract; they have the capacity to provide metropolitan regional government; and they are in a better position to deal with the specific variables and characteristics of a particular locale or region.

Interactions of Man and His Environment begins with an address by Luther Terry summarizing the national problem of environmental health and the plans of the federal government and especially the Public Health Service to cope with it. Most of the succeeding papers focus on the findings of research and on technological advances in environmental control. D. H. K. Lee and M. V. Mathews report respectively the results of research in man's relation to thermal environment and to sensory environment. On the subject of atmospheric ecology, D. D. Irish discusses the laboratory "environmental" research that must or should be done on substances that will be distributed to the public for use indoors. A. J. Haagen-Smit summarizes the state of the art of air pollution control outdoors, and A. R. Behnke the findings in submarines and other navy craft capable of maintaining "remedial" (pollution-free) atmospheres. From these efforts at total control comes a generalization of wide applicability: that contaminants are most effectively controlled at their source.

Herman Cember points out that as nuclear power generation increases, high-level radioactive wastes also increase and their storage may eventually tax our technological ingenuity. He hopes for a breakthrough in producing energy by nuclear fusion, but then tritium may be a problem. T. G. Randolph points out that the greatest single change in man's surroundings in the past century has been increasing chemicalization of his environment, with a consequent increase in chronic physical and mental illnesses. F. T. Aschman foresees that by the year 2000 the urban areas of the United States will occupy more than three times as much land as in 1950 (but this will be less than 5 percent of the total land area for more than 80 percent of the people.) As there are some 17,000 local governments in the existing 200-odd metropolitan areas, he believes that the states should be responsible for organizing the chaos and for metropolitan planning, and that the scientist must communicate to the political leader a full understanding of technologic capability in the achievement of a better urban life.

In all three books, the discussions of the relations of man to his environment dwell mainly on what man has done, is doing, and must do to his environment—almost to the exclusion of any rebuttal from the environment. It is as if, in a discussion of marital relations, it were assumed that a man is master of his own household, and doesn't have to learn how to live with it but only how to exercise authority. Until man understands the physical environment sufficiently that he can know fully, and even anticipate, its responses to his activities, it is likely to give him trouble.

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