tendencies through a combination of social engineering techniques and the "will" to make overall social decisions. I am afraid, however, that his hopes for the decision-making and policy-planning technologies and concepts are rather in the same class of myths as those he earlier debunks. My present research and that of others examining the relation of formal decision-making methods to the way even the most "rational" and "innovative" organizations operate strongly suggest that the methods, the men, and the characteristics of problems to be resolved through deliberate choices are so far apart that we really have no adequate model now of what complex humans in a complex world could, even in principle, do to keep "the total system in equilibrium" (p. 262). Perhaps Ferkiss recognizes this when he says, "If this sounds utopian . . . utopia may be the only viable social system in the world to come" (p. 262).

If it sounds as though Ferkiss finally leaves the cat unbelled, I would argue that the situation is even more disheartening. The author omits attention to what seems to me to be the most disturbing fact of all: we don't *have* a bell, much less a skilled volunteer to attach it. What Ferkiss doesn't do at all, really, is wrestle with the problem of getting from here to there. He leaves it to the reader to use his sophistication about organizational behavior or his conventional wisdom to supply the sociopsychological processes that sustain what Ferkiss describes as the present state of industrial man. Because he foregoes such an analysis he gives the reader no basis for considering the processes and probabilities having to do with the prerequisite conditions for *changing over* to technological man. He says there are "certain patterns of human institutional and personal behavior that are almost as resistant to change as those of the lower animals and the social insects. Man is fundamentally oriented to scarcity, conflict, insecurity, fear, irrationality, self-centeredness and a host of social and cultural institutions that reflect these . . ." (p. 18). But he does not translate these into the social psychological processes of institutional behavior and of the maintenance of institutional structure that result, in Donald Schon's phrase, in "dynamic resistance" to change. The risks of individual, interpersonal, and organizational failure involved in deliberately accepting the uncertainty that must accompany organizational and individual change are usually too great for men to take willingly when things are going well and when men and institutions have been successful. They are so great, so threatening, that men and institutions will insist that only incremental changes are needed to keep things going well or will resort to the mythology Ferkiss debunks and insist the changes are already happening.

How to get men and their institutions to make the radical leaps needed to move through the turmoil of change in the direction of technological man is a question to which we simply do not have sufficient conceptual, much less operational, answers. The evidence indicates that basic organizational change can occur through disasters, or by deliberate organizational change programs. The latter must be directly and continuously supported from the top of the organization over many years of unremitting and highly organized, self-conscious effort. Such deliberate efforts have been rare, and even then the change—if it occurs—is mainly in the direction of "enlightened" industrial man. Thus our most likely chances for change will be as responses to social and natural disasters. But under such conditions the changes produced are unlikely to be in the direction of technological man: the "seeds beneath the snow" that Ferkiss believes may be emerging are more likely to be incinerated or beaten to pulp.

By what he says and by what he doesn't say Ferkiss makes an important contribution that can help us recognize that we don't now know how to become technological man, "the race's only salvation."

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Drugs and Insecticides

The Enzymatic Oxidation of Toxicants. Proceedings of a conference, Raleigh, N.C. ERNEST HODGSON, Ed. North Carolina State University, Raleigh, 1968. viii + 229 pp., illus. Paper, $2.

This book is a collection of papers presented by specialists in drug and insecticide metabolism. The papers, which include mostly the original work of their authors, are well referenced and supplemented with discussions, and the book is an excellent collection of up-to-date information on oxidations in animals, plants, and environments.

The introduction by Ernest Hodgson, outlining the historical development of the subject and the objectives of the conference, is followed by three papers, by H. Kamin and B. S. S. Masters, T. E. Grams and J. R. Fouts, and H. Remmer and co-workers, on enzymatic oxidations of drugs and other xenobiotics in mammals. Description of the functions of individual components of the electron transfer system in microsomes responsible for such oxidations has provided clear evidence that this system is composed of a specific flavoprotein, an unknown component, and a cytochrome, P-450. Studies of the distribution of oxidizing enzymes in microsomes from smooth and rough endoplasmic membranes indicate that most of them are present in the former. The enzymes are induced differently in the endoplasmic membranes by inducers which may differ in their pharmacological action. The inducers can, in addition to increasing the amount of P-450, change its binding moieties, as is demonstrated by the differences in spectral changes of the induced cytochrome P-450 on addition of substrates. These excellent papers, while interpreting biochemical, pharmacological, and morphological data, raise the question whether there are numerous inducible specific oxidases or one or very few nonspecific ones with different protein-binding moieties.

As in mammals, the rates and products of similar oxidations of xenobiotics differ from species to species in other groups. Published data of Brodie and Maickel, Adamson and co-workers, O'Brien, and others are examined to reveal differences in the microsomal oxidations in plants and animals. The known factors responsible for such differences, along with the theories about the evolution and function of these enzymes, have been described. In addition to species differences, great variations among strains and even in sex and age of individuals have been noticed in regard to these enzymes.

The presence of inhibitors in insects, investigated by J. N. Smith and coworkers, makes it difficult to correlate enzyme activity with oxidations in vivo. The inhibitors can be removed by centrifugation or dialysis or by the addition of albumin. In insects, the oxidation of insecticides in addition to detoxication can also produce more toxic metabolites, as is discussed by P. A. Dahm and T. Nakatsugawa. The oxidation of insecticides in environment

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and plants can affect their stability and toxicity to insects, animals, and humans.

A considerable overlap of information in papers dealing with the use of synergists is a reflection of their importance in the understanding of the oxidations of toxicants. Types of insecticide synergists and their effects on oxidations are described in detail. Methylene dioxyphenyl compounds are common inhibitors of biological oxidations. Their inhibition depends on 1,3-benzodioxolium ion and its ring substituents. This ion, formed by hydride ion transfer, can either compete with substrate for the binding site or acylate some other microsomal component. These compounds interfere with the formation of percupryl-oxygen complex in tyrosinase, but similar interaction with ferrous ion of cytochrome P-450 is not known. R. L. Metcalf suggests that new insecticides that either lack the site for oxidase attack or contain a synergistic group should be designed. Model oxidations, followed by information on species differences in oxidations, should then be used in developing new selective pesticides and oxidation inhibitors.

Insecticide residues in animals and humans can modify responses to insecticides and drugs. DDT with other organochlorine insecticides and their nontoxic metabolites and analogs can induce microsomal oxidases, thus accelerating the metabolism of insecticides and drugs present in the body. The presence of chemicals in the environment can either minimize or increase insecticide storage and poisoning, depending on whether the chemicals stimulate or inhibit microsomal oxidases.

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Measuring Plasmas

Plasma Diagnostics. W. LOCHTE-HOLTGREVEN, Ed. North-Holland, Amsterdam; Interscience (Wiley), New York, 1968. xviii + 930 pp., illus. $38.50.

The phrase "plasma diagnostics" has come to mean plasma measurements, formerly made to investigate atomic properties or basic collective phenomena but now performed to determine the behavior of plasma systems for some programmatic end, notably in research on controlled thermonuclear reactions. This field began with electric (Langmuir) probe measurements of low-pressure discharges and the spectroscopy of atmospheric-pressure arcs. The German school of spectroscopists has been preeminent in the latter discipline, and the present collection has as its nucleus review articles by eight members and alumni of Lochte-Holtgreven's institute at Kiel University. Much of the emphasis of the book is therefore on dense, near-equilibrium plasmas at moderate temperatures.

The first seven chapters comprise a comprehensive discussion of quantitative spectroscopy, including up-to-date discussions of vacuum-ultraviolet (R. Lincke) and soft x-ray spectroscopy (P. Bogen), and one is led naturally to compare this book with the earlier book on plasma spectroscopy by H. Griem (McGraw-Hill, 1964). The chapters on the radiation formulation (J. Richter) and line broadening (G. Traving), evaluation of plasma parameters (W. Lochte-Holtgreven and Zwicker), as well as the more topical material on shorter wavelengths, in the present volume comprise an equally authoritative treatment, with greater orientation toward laboratory work. The treatment of classical electric probes, by L. Schott, includes the latest developments of this subject.

The remaining half of the book is largely concerned with techniques of more recent origin. H. Hermansdorfer, in his chapter on microwave techniques, has chosen to present a concise summary of a subject which has already been treated at length by Heald and Wharton [*Plasma Diagnostics with Microwaves* (Wiley, 1965)]. The material of Huddlestone and Leonard's *Plasma Diagnostic Techniques* (Academic Press, 1965) is also somewhat paralleled in the present treatment. However, there is valuable new material on laser methods by H. J. Kunze, including the powerful scattering technique, and for the first time in English we have review material on plasma measurements by extracted particles (H. W. Drawin). This reviewer was particularly interested in the discussion of Zeeman and optical-Faraday-rotation (as well as material-probe) measurements of magnetic fields (W. Botticher) and far-infrared measurements of bremsstrahlung continua in the otherwise classical treatment of optically thick plasmas by H. Zwicker. Also new to most plasma physicists are Lochte-Holtgreven's material on the quantitative aspects of photography and R. L. F. Boyd's discussion of the use of Langmuir probes on space craft.

The authors have conscientiously provided the bibliographies that are of great importance to the users of such compilations as this.

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Polymers

Advances in Macromolecular Chemistry. Vol. 1. WALLACE M. PASIKA, Ed. Academic Press, New York, 1968. x + 434 pp., illus. $16.50.

The editor of this volume states that the intent of the series is "to become a medium both for reviewing the forefront of macromolecular research and for providing informative reviews on more established aspects of macromolecular chemistry." The reviews—"Ferrocene polymers," "Popcorn polymerizations," "Electron acceptors as initiators of charge-transfer polymerizations," "Non-Newtonian viscosity and the macromolecule," "Solid state polymerization," and "Polysulphones: organic and physical chemistry"—meet one or the other of these criteria. The articles on ferrocene polymers and polysulphones are truly outstanding in scope, depth, and authoritativeness. In the long-overdue review of ferrocene polymers the author has not only covered the literature on polymeric metallocene materials but has also detailed goals, shortcomings, and accomplishments in such a way as to encourage future research. In the article on polysulphones, we find for the first time a comprehensive discussion of the organic and physical chemistry of both aliphatic and aromatic polysulphones, with coverage of polymerization, structure, and physical and chemical properties. Unfortunately, the high standards of these two reviews are not maintained throughout the volume. The breadth of the review of ferrocene polymers contrasts sharply with the narrow scope of the review of popcorn polymerization, in which developments since 1963 are covered in 12 pages. The articles on polysulphone and solid state polymerization present a similar contrast; whereas the polysulphone review deals with developments in the field over the last eight years—the time period since the last major review of

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