State Chemistry of Binary Metal Hydrides (1963)] and the bare mention of surface adsorption, hysteresis and other important topics are serious flaws. Perhaps they are treated in the second volume, *Kinetics and Mechanisms*. In these times when chemistry, metallurgy, and solid state physics are converging on the problem of the nature of metals, it would be helpful to orient students towards this convergence by means of a few dozen pages written in the same clear style as the rest of this book.

The format, printing, and illustrations (which include several colored photomicrographs) are excellent, as is the translation (by M. E. Mulder-Woolcock). The book will probably enjoy wide use by metallurgists and metallurgy students because it contains a great deal of factual material, including many phase diagrams, and because it is lucid and concise.

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Biochemical Research

Biologically occurring quinones, particularly those related to ubiquinone, vitamin K, plastoquinone, and tocopherol, have recently assumed increasing interest in a variety of biochemical research areas—for example, in oxidative phosphorylation and electron transport, photosynthesis, and nutrition. This interest stems from the fact that these quinones are easily oxidized and reduced; they provide chemical models for oxidative phosphorylation, and they are present in practically all cells. However, in few cases have these properties been unequivocally related to a distinct biochemical process. As Crane writes, "we have quinones in larger amounts and in more places than we can explain on the basis of recognized electron transport function" (p. 183).

The publisher states that this book, **Biochemistry of Quinones** (Academic Press, New York, 1965. 603 pp., $18), edited by R. A. Morton, was "planned as a guide to the firmly established knowledge concerning methods of studying quinones and to recent advances in this increasingly important field of research." The first claim is well realized in an invaluable series of articles (by Morton, Pennock, Isler, and Langemann, and J. Green and McHale) on the chemistry and spectroscopic properties of the quinones. These articles represent the best current compendium of such data. The power of nuclear magnetic resonance spectroscopy (NMR) in deciding fine points of structure is especially evident. Some cross-references in these articles would have been helpful—for example, there is no mention in Pennock's discussion of NMR spectra that actual figures of such spectra appear in the review by Isler and Langemann, which Pennock's review precedes.

The publisher's claim with regard to recent advances in this area is much more difficult to realize, as it must be in all cases where research is moving rapidly and the publication lag is approximately 12 to 18 months. Recent developments have necessitated a complete reevaluation of some points raised by D. E. Green and Brierley. New advances in knowledge of biosynthetic pathways have also occurred.

In the section that deals with function, a novice might be unaware of some sins of omission concerning the work of groups other than the author's own. To the editor's credit, this seeming disadvantage is turned to an advantage by making it possible for various opinions to be expressed where areas of controversy exist. Although this approach has led to some overlap, it is of minor consequence compared to the benefit of having different points of view presented—for example, the following articles should be compared: the article by D. Green and Brierley with the one by Chance on the role of ubiquinone in electron transport; that by Hemming and Pennock with the one by J. Green and McHale on tocopherol relationships; that by Redfearn with the one by Crane and Arnon on plastoquinone function.

Glover's review on the biosynthesis of quinones is marred by some unfortunate printing and bibliographic errors—for example, on page 215 the formula of sodium bicarbonate is presented rather than sodium formate; on page 240 the reference to Olson and others, 1960, does not refer to formate incorporation as claimed. I noted other errors throughout the book.

The two articles, the one by Redfearn and that by Crane and Arnon, provide a modern picture of the role of pastoquinone in photosynthesis. Redfearn's concluding discussion is excellent. Brodie, in a scholarly article, marshalls impressive evidence showing that napthoquinones play a role in oxidative processes in *Mycobacterium phlei*. Clinical and nutritional studies on vitamin K are covered by Doisy and Matschiner and by Mitchell and Marrian. B. Chance provides an excellent review of the difficulties inherent in measuring and relating the rate of oxido-reduction of ubiquinone to the overall rate of electron transport in the respiratory chain. The discussion of the principles involved in building adequate instrumentation to attack this problem is exceedingly well done. Chance suggests that ubiquinone may play a significant role in reverse electron transport.

Reading this book leaves one with the impression that the whole research area is poised for a deeper biological understanding of the role of these universally occurring, highly reactive substances. Despite the shortcomings that I have noted, this book has in great measure fulfilled its aims, and all of those who are interested in quinones will undoubtedly refer to it frequently.

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Cybernetics and Medicine

Complex regulatory mechanisms that operate at the cellular level, the organ level, and the organ systems level are subjects of a considerable amount of current biomedical research. The various regulatory mechanisms also must be interrelated in order to maintain the homeostasis of the entire organism. The study of these biological control systems and of the problems of synthesis and coordination of knowledge about these systems in health and disease is included in the subject of cybernetic medicine as it is presented by Aldo Masturzo, the author of this monograph, **Cybernetic Medicine** (Thomas, Springfield, Ill., 1965. 158 pp., $6.50). In addition Masturzo presents a short commentary on regulatory mechanisms that may be applied to the area of social medicine.

In the United States there is no general agreement among scientists about what the subject of cybernetics should include, and it is not likely that a student could obtain an advanced degree in "cybernetics." For similar reasons the subject of cybernetic medicine is illdefined, and perhaps it will remain so because current usage of the word cybernetics seems