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one's cup of tea. Feinberg seems to have decided that it is better to slide by such topics with cryptic references than to neglect them entirely.

These are minor flaws in an otherwise admirably lucid work. Feinberg's introductions to each subject area are models of clarity and brevity, and may be recommended to anyone who wants a quick overview of an unfamiliar field.

His choices for the most interesting unsolved problems are hard to fault. In his own field of particle theory, he stresses the vistas opened by its cosmological implications. In biology, he senses that molecular biology is (or soon will be) "complete," in the way that nonrelativistic quantum theory was complete by 1930. Studies of the origins of life, or of developmental biology, promise more in the way of fundamental advances, at least in the long run.

Feinberg endorses the optimistic view that once a problem is clearly formulated, its solution must surely be near at hand. Here history holds up a distorting mirror; when the solution is not immediately forthcoming, the formulation may be soon forgotten. The "standard model" of particle physics solves a problem that was clearly formulated by 1935. Its underlying premise, that matter is an artifact of point-like centers of force, was clearly formulated by Rudjer Bosovich in the 18th century.

Theory without experiment has too many options. The prospects for empirical help with quantum gravity, for example, look slim at present. Gravity-wave and neutrino astronomies, as Feinberg sees, need only patience and money to become realities. But each could well find wonders in the cosmos without shedding light on fundamental questions.

Any knowledgeable reader is bound to find in this volume much to agree with, a few things to disagree with, and some tidbits of food for thought.

ROBERT H. MARCH

University of Wisconsin at Madison

Quantum Mechanical Tunnelling in Biological Systems

Don DeVault

207 pp. Cambridge Univ. Press, New York, 1984. \$44.50

DeVault's book is intended to acquaint graduate students and interested senior scientists with developments in the last 20 years concerning quantum-mechanical tunneling in biological systems. Although the book stresses electron tunneling, there is also some mention made of molecular tunneling. Don DeVault earned his PhD at Berkeley under Willard Libby and performed

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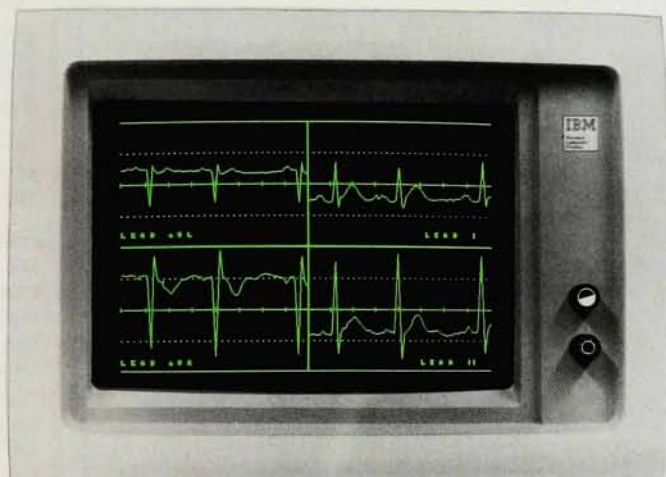
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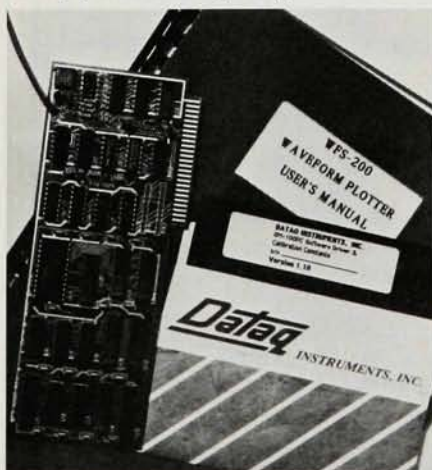
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with Britton Chance some of the pioneering experiments that demonstrated electron tunneling, so he is well qualified to write on this fascinating subject.

Proteins are basically insulating materials with deeply buried redox sites (localized electron carriers), hence there has always been a strong interest in tunneling mechanisms of charge transfer in the metabolic pathway and in the photosynthetic system. Molecular tunneling may also play an impor-

tant role in enzyme catalysis because of the highly forbidden nature of some biological reactions. It is thus important that physicists acquaint themselves both with the mass of experimental data and the theories that claim to explain the processes.

DeVault succeeds very well in an exhaustive documentation of probable tunneling processes, and in a detailed description of the nonadiabatic theory that lies behind attempts to include the

protein structure in the tunneling calculations. DeVault speaks clearly, but too passively. He does not, in my opinion, provide enough of a critical view to guide the reader towards the good theories and away from the bad, hence one can easily fail to get a firm view of what is the basic physics that any theory must have. As we begin to confront the hard reality of detailed x-ray structures and accurate kinetics with the rather vague theories that exist, it will be important that we develop a unified view of the essential physics of the process. This book is a workman-like start, but does not really condense the swarm of data and theory into a comprehensive whole. I recommend the book as a good point from which to begin the search.

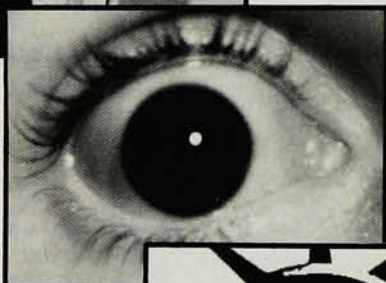
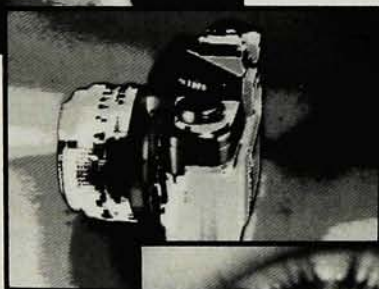
ROBERT H. AUSTIN
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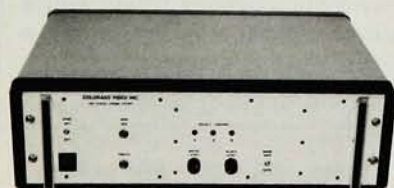


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Fusion: An Introduction to the Physics and Technology of Magnetic Confinement Fusion

W. M. Stacey Jr
260 pp. Wiley, New York, 1984. \$39.95

During the past decade, the engineering requirements of magnetic-confinement fusion-power development have been given increased emphasis within the international fusion community. One example of this emphasis is the ongoing design activity for the International Tokamak Reactor, initiated in 1979 under the auspices of the IAEA and involving design teams from the European community, Japan, the Soviet Union and the United States. Although commercial fusion power is not expected to be realized until the next century, thousands of scientists and engineers are pursuing this goal. In response to this situation, several universities have added fusion engineering courses to their curricula. The purpose of these courses is to integrate plasma physics and engineering disciplines in the context of fusion power development. Weston M. Stacey Jr offers *Fusion* as a broad introduction to the subject of fusion engineering. In general the book succeeds in its purpose and should prove to be a useful text in fusion engineering courses.

The book is intended for a two-course sequence offered to advanced undergraduates and first-year graduate students with a physics or engineering major. Following a brief introduction dealing with the potential and status of magnetic fusion power, the flow of the book is systematic, beginning with the plasma and concluding with reactor design. Stacey starts with a helpful discussion of fundamental plasma characteristics, such as frequency, scattering times and drifts, and then pro-