nificant part of the textbook. Nevertheless, devices that have come into fashion since the first edition such as tokamaks (can it be over 12 years?) are included with many helpful insights, though the author should have caught the repeated misspellings of the word itself.

It is much to Schmidt's credit that he does not write in a telegraphic style but follows through on the major mathematical developments. This is quite important for a textbook at this level. I shall enjoy the second edition fully as much as the first.

J. LEON SHOHET
University of Wisconsin-Madison

Reliable Knowledge: An Exploration of the Grounds for Belief in Science

J. Ziman
197 pp. Cambridge U., New York, 1978. $18.95

John Ziman—physicist turned philosopher—tells us that this small volume has arisen from "two sources: a *challenge* and a *theory*." The "challenge" relates to the "beneficence of science," the "theory" is concerned with the "nature of scientific knowledge." It must be said at the outset, however, that the "beneficence" of science is not discussed directly and that the "theory" is less a theory of scientific knowledge in general than a discussion of physics primarily, or of aspects of science that may be like physics.

In discussing the "nature of scientific knowledge," Ziman sets forth the view that such knowledge is the currently accepted intellectual "map" of the external (or "material") world, a consensus resulting from an assemblage of independent experiments and observations, theories and critical tests. There is, therefore, no guaranteed scientific truth tested and approved by logic or computer programs; the state of knowledge at any time consists only of the shared set of beliefs of the scientific community. These ideas are much like the well-known analysis of Thomas S. Kuhn, who is mentioned primarily in footnotes, without any definite indication of the degree to which Ziman's presentation was directly influenced by Kuhn's.

While there are scattered references to scientific events, past and present, there are no worked-out examples or case-histories. The result is that the presentation is needlessly abstract and general. And when Ziman does occasionally dip into history, he turns out to be a untrustworthy guide. For example, he criticizes medieval anatomical diagrams as mere illustrations of "the verbal descriptions of the human body inherited from Galen" and contrasts them with the anatomical drawings of Leonardo da Vinci, which show his "transcendental genius." "Leonardo," we are told, "was probably the finest scientific observer that ever lived; unfortunately his anatomical work was not published until centuries later. His research programme, which was eventually carried out by Andreas Vesalius, depends absolutely on the consensibility of visual perception. In assessing the 'truth' of such work, the anatomist should, in principle, take little account of theories; he simply carries out a dissection, and compares the drawings with what he can see with his own eyes. In practice, it is difficult for him not to see what he has learnt to see, under the influence of the accepted paradigm of his subject. But within that limitation of vision, the messages that anatomists communicate to one another, and store as 'objective knowledge' in the scientific archives, are drawings and photographs, to which the accompanying text is merely a commentary." But, in fact, Leonardo's anatomical drawings of the heart show clearly and in detail a series of passages through the septum of the heart which do not exist, but which had been hypothesized by Galen in order to explain how blood may trickle from the left ventricle to the right ventricle through an apparently solid septum. And the female "situs" figure (or "transparent torso of a woman") reproduced in Ziman's text, far from illustrating his thesis about careful observation, is described by Saunders and O'Malley in their authoritative work on Leonardo's anatomical researchers as "a unique attempt to represent in graphic form both anatomical detail and certain of the principles of the Galenical physiological system." Furthermore, "the anatomical details" themselves are not drawn from human bodies but, "for the most part from dissections made on animals." In the final section Ziman turns from "the world of science" to "social knowledge." Here an evaluation is made of the "scientific status" of "intellectual disciplines such as *social psychology, sociology, anthropology, and economics.*" Ziman finds that these disciplines are not like physics and convinces himself that they never will or can be. But he does not even consider the possibility that a future science of behavior of society may be like a physics of the future (as different from today's physics as today's is different from the physics of the past); nor does he believe that there may be valid science which is not like physics.

I. BERNARD COHEN
Harvard University

An Introduction to Radiation Dosimetry

S. Lovell
125 pp. Cambridge U., New York, 1979. $18.50 clothbound, $5.50 paperbound

The health sciences rely heavily upon developments in the allied physics and biophysical fields to attain their goals—the unraveling of the mechanisms of life and its degradation through disease, and lengthening of human lives through diagnostic and therapeutic intervention. The importance of ionizing particulate and electromagnetic radiations in medical research and clinical medicine exemplifies this fact, while the recent Nobel awards for radioimmunoassay and computed tomography dignify it. In this context, disappointing, nonmathematical textbooks on the physical principles underlying radiation dosimetry such as S. Lovell's *An Introduction to Radiation Dosimetry* cannot be expected to provide the insight to this field required by radiation technologists, junior scientists and physicians.

The author, who is at the Medical College of St. Bartholomew's Hospital, London, introduces general topics well; the interactions of ionizing radiation with atoms, the use of special radiation dosimetric quantities and units (for instance, absorbed dose and exposure) and measurement techniques such as cavity ionization, thermoluminescent and photographic dosimetry are reasonably summarized. Unfortunately, Lovell's introductory contribution is primarily a preface to the dosimetry problems associated with radiation protection and other health physics aspects of the utilization of radiation in medicine. The author should have drawn from real-life applications of ionizing radiation in the areas of diagnostic radiation, nuclear medicine and radiation oncology to clarify his topics. For example, could have illustrated radiation–matter interaction with examples of the utilization of electrons, negative pi mesons, fast neu-