nate view is that arms control agreements have significance greater than their immediate effect on the arms race so that any questions, infractions, or minor violations are serious issues independent of their immediate strategic significance.

Two particularly compelling examples that could illuminate this discussion are, first, the Soviet SS-25 land-based, mobile intercontinental ballistic missile, which the United States claims is a violation of several provisions of the SALT II Treaty, unratified but heretofore observed (excepting the recent United States action that exceeded a sublimit of the treaty); and second, antisatellite and ballistic missile defense activities, such as the construction of a large phased-array radar in Krasnoyarsk, in relation to the Antiballistic Missile Treaty. One can make valid arguments on the significance of these possible violations that support both points of view.

The author of *Verification* expends considerable effort on reviewing the politics of verification. Addressing an international audience, he attempts to explore the same political issues discussed in *The Verification Challenge* but from an "even-handed" comparison of Soviet and United States positions that often is not convincing. For instance, the discussion of the role domestic politics plays in verification points out the effect bureaucratic politics has on the process. Clearly, the United States suffers, and to some extent benefits, from the competing interests and perspectives various parties bring to the process. However, while justifiably critical of the shortcomings of the United States system, *Verification* diverges from the issues at hand to compare the two countries' systems in the following manner:

> If it were true that arms control monitoring data are almost totally controlled by the military, this would have serious implications for Soviet conduct of the compliance process. High-level policy makers are inevitably dependent on analyses by experts, especially on such complex technical questions as those which arise in arms control verification. It has already been noted in the US context that the temptation for such experts to bias their analyses is great, especially when major bureaucratic or economic interests are involved. However, the historical record of Soviet handling of compliance issues does not show evidence of such a pro-military bias, so it seems reasonable to conclude that the Soviet political leadership has found ways to keep this problem under control. Just what those ways are, however, is not possible to determine [p. 136].

Besides the questionable interpretation that Soviet compliance concerns are unaffected by bureaucratic politics, the differences between United States and Soviet views toward the compliance process are more significant than can be accounted for by bureaucratic politics. Furthermore, the author fails to mention that since the United States depends more on national technical means than does the Soviet Union, which has extensive human intelligence activities and can count on the openness of American society, intelligence estimates here are naturally more controversial. In general, it seems that Krass dilutes the political discussion by convoluting issues in an undiscerning manner.

Thus, the debate over verification is certain to remain as important and contentious as ever. Equally certain is the fact that views on the proper role for verification will, correctly or not, continue to seriously affect the debate over arms control agreements and treaties. In the post-Reykjavik era, as before, "the manner in which the issues of verification and compliance are dealt with by both sides will be an excellent gauge of the seriousness with which they are approaching these new negotiations" (*Verification*, p. 259).

BARRY E. FRIDLING
John F. Kennedy School of Government, Harvard University, Cambridge, MA 02138, and
Lawrence Livermore National Laboratory, Livermore, CA 94550

Anorogenic Granite Complexes

Ring Complex Granites and Anorogenic Magmatism. BERNARD BONIN. Elsevier, New York, 1986. xiv, 188 pp., illus. $45. Translated, with revisions, from the French edition (Orléans, 1982) by John Renouf.

This useful and thought-provoking treatment of granite genesis, emplacement, and evolution during continental anorogenic magmatism reflects the gradually shifting interest from plate margin magmatism to intraplate magmatism. The book, by a single author, has a clear focus that is often absent in collective volumes. Bonin presents his own views eloquently while also offering critical appraisals of other points of view. The translation is of a very high standard.

Starting with the example of Corsica, a country with 20 granite ring complexes and over 1000 meters of vertical exposure, Bonin discusses the structural setting and intrusion mechanisms in an initial chapter that includes a brief historical review, a summary of experimental approaches, and an outline of magma generation in the asthenosphere with subsequent movement into the crust. After dealing with the textures and mineralogy of ring complex granites, Bonin presents chemical data (expressed in various graphical plots of major and minor elements) and strontium isotope data. These data are then set in the context of a discussion of magmatic evolution and postmagmatic processes based on examples of anorogenic granite complexes in Corsica, the Greenland Gardar province, Skye, and the Jos Plateau of Nigeria. A penultimate chapter entitled "The origin and evolution of anorogenic alkaline magmatism" pulls the discussion together. The question of origin is approached by an examination of the petrological and geochemical constraints combined with an essential constancy of composition throughout geological time, characterized by a K_2O content of up to 7%, a very high rare earth content, and an initial $^{87}Sr/^{86}Sr$ of 0.702 to 0.709. The contrasting views of fractional crystallization of basic magma and partial fusion are examined. The rise of the magma into the crust is considered along with the role of crustal contamination, magmatic evolution, and the role of water. Finally, the postmagmatic processes of hydrothermal alteration and mineralization are outlined.

Bonin summarizes his views in a succinct final chapter. He concludes that anorogenic magmas originate in the mantle but that the crust superimposes a final character on them. Bonin does not pretend to offer a definitive explanation of ring complex granites, but in a modest 172 pages he presents an eminently readable summary of their nature, composition, structural setting, and probable origins.

JOHN GITTINS
Department of Geology, University of Toronto, Toronto M5S 1A1, Canada

Particle Detectors

Introduction to Experimental Particle Physics. RICHARD C. FERNOW. Cambridge University Press, New York, 1986. x, 421 pp., illus. $44.50.

In most fields there are a few unwritten books that everyone agrees are needed but that no one has time to write. For particle physics, one such book has been a comprehensive survey of the experimental techniques used to unlock the secrets of the subatomic world. Richard Fernow's book fills this need.

Fernow covers most aspects of particle experiments, from the fundamental interactions of elementary particles with matter to how these interactions are exploited to build particle detectors and finally how the detector components are integrated into the large detector systems that form the basis of modern particle experiments. Most of the book is devoted to particle detectors. There are sec-

tions on all types of detectors used today, with discussions of how a particular detector works, what it measures about particles, and the relative advantages and disadvantages of different detector types. Included in this part of the book are chapters on the fast electronics needed to extract signals from detectors and on the triggering electronics needed to recognize in real time interesting events—both crucial considerations in designing an experiment.

Fernow has done an admirable job of condensing a wealth of information into a coherent text. Occasionally the book's breadth of scope precludes discussion at desirable depth, but this is compensated by an extensive set of references at the end of each chapter. All that is needed to make the book a complete introduction to experimental particle physics is a discussion of analysis techniques for extracting results from the data produced by the detectors. There is a short appendix on probability and statistics.

This book would serve well as either a graduate-level textbook or a practical reference. Students will benefit from the clearness of presentation, the numerous exercises at the end of each chapter, and the references. The practicing experimentalist will benefit from the references and the numerous equations, formulas, and tables. The book uses no higher mathematics beyond calculus, and the only physics background needed is an undergraduate-level understanding of electromagnetism and special relativity.

CRAIG BLOCKER
Department of Physics,
Brandeis University,
Waltham, MA 02254

Women Scientists

Hypatia's Heritage. A History of Women in Science from Antiquity through the Nineteenth Century. MARGARET ALIC. Beacon, Boston, 1986. x, 230 pp., illus. $20; paper, $9.95.

For a long time, scientists and historians of science have tended to deny women's contributions to the scientific enterprise. Even some feminist scholars have tacitly acquiesced in the invisibility of women in the historical record of scientific achievement. (See, for example, Evelyn Fox Keller's *Reflections on Gender and Science*, in which she pointedly insists on the pronoun "he" when referring to scientists because she avers that until very recently women were not scientists.) In recent years there has been less excuse for this stance. Pathbreaking monographs such as Margaret W. Rossiter's *Women Scientists in America*, an array of field-by-field surveys, and studies of individual figures have illuminated the role of women in a large number of scientific disciplines, historical periods, and cultural settings. Until now, however, the charming but idiosyncratic *Woman in Science* by H. J. Mozans (J. A. Zahm), first published in 1913 and reprinted by MIT Press in 1974, was essentially the only book that attempted to provide a historical overview of women's contributions to scientific knowledge in a format accessible to students and interested laypeople.

Margaret Alic has done a creditable job of sifting through compendia of "women worthies," autobiographies, and a large amount of secondary literature to produce a lively and well-written popular chronicle of some famous, near-famous, and infamous women scientists from antiquity to the end of the 19th century. *Hypatia's Heritage* contains entertaining accounts of the lives and work of Egyptian and Babylonian chemists, Greco-Egyptian mathematicians and natural philosophers (including, of course, "the last of the great pagan scientists," Hypatia of Alexandria), medieval alchemists and cosmologists, 17th- and 18th-century geologists, astronomers, physicians, physicists. Students in a wide range of beginning history, history of science, science, and women's studies courses would benefit from having *Hypatia's Heritage* as a required text. Most students will be astonished to learn of the large numbers of women who have distinguished themselves in diverse fields of scientific endeavor. The book should stimulate class discussion on a variety of issues: the changing status and visibility of women in science in relation to the socio-political-cultural milieu, the reasons for the rewriting of the historical record to exclude women's accomplishments, whether there exists a distinctive feminine style of doing science, how professionalization of science affected women's status, and so on.

For the historian of women in science, however, *Hypatia's Heritage* does not add anything new to our understanding of women's role in scientific work. In fact, Alic does not even cite recent articles and monographs by Rossiter, Roger Cooke, Daryl Hafter, Margaret Kidwell, Dorothy Stein, Jeanette Tuve, and numerous others, all of which have a direct bearing on the subject of her book and provide more complete and accurate information than the sources she used. Any historian of 19th-century science will surely quarrel with Alic's assessment of Mary Fairfax Somerville (1780–1872) as a great scientist, "the last of the great amateur scientists." And the placement of Somerville, who was an expositor rather than a researcher, at the culmination of the book, following Sophie Germain (1776–1831), Ada Byron Lovelace (1815–1852), and Sofia Kovalevskaia (1850–1891), is questionable not only on chronological grounds but also because of the wrong impression Alic gives of Somerville as the greatest and most recognized of 19th-century women scientists.

Despite these and other defects annoying to the specialist (Alic's footnotes are neither so complete nor so informative as one could wish, and her choice of whom to highlight is sometimes puzzling), *Hypatia's Heritage* fills a gap in the general literature of the history of science and is therefore welcome. Historians of science, scientists, and teachers of women's studies no longer have an excuse for omitting a book on the history of women in science from beginning and survey courses. In the hands of an informed instructor, *Hypatia's Heritage* could be a stimulating addition to the curriculum.

ANN HIBNER KOBLITZ
Department of History,
Wellesley College,
Wellesley, MA 02181

Books Received

Ada. Managing the Transition. Peter J. L. Wallis, Ed. Cambridge University Press, New York, 1986. viii, 280 pp., illus. $39.50. Ada Companion Series. From a workshop, Edinburgh, May 1986.

Adaptive Control of Chemical Processes. H. Unbehauen, Ed. Published for the International Federation of Automatic Control by Pergamon, New York, 1986. x, 216 pp., illus. $51. From a workshop, Frankfurt, Oct. 1985.

Adaptive Management of Renewable Resources. Carl Walters. Macmillan, New York, 1986. x, 374 pp., illus. $34.95. Biological Resource Management.

Advantage and Disadvantage. A Profile of American Youth. R. Darrell Bock and Elsie G. J. Moore. Erlbaum, Hillsdale, NJ, 1986. x, 230 pp., illus. $29.95.

Agricultural Uses of Antibiotics. William A. Moats, Ed. American Chemical Society, Washington, DC, 1986. x, 189 pp., illus. $39.95. ACS Symposium Series, 320. Based on a symposium, Chicago, Sept. 1985.

The Changing Carbon Cycle. A Global Analysis. John R. Trabalka and David E. Reichle, Eds. Springer-Verlag, New York, 1986. xxvi, 592 pp., illus. $53. Based on a symposium, Knoxville, TN, Oct. 1983.

Chaotic Dynamics and Fractals. Michael F. Barnsley and Stephen G. Demko, Eds. Academic Press, Orlando FL, 1986. xii, 292 pp., illus. $29.95. Notes and Reports in Mathematics in Science and Engineering, Vol. 2. From a conference, Atlanta, March 1985.

Chemical Separations. C. Judson King and James D. Navratil, Eds. Litarvan, Denver, 1986. 2 vols. Vol. 1, Principles. xiv, 462 pp., illus. $77. Vol. 2, Applications. x, 469 pp., illus. $77. The set, $140. Based on a conference, New York, April 1986.

Children's Social Behavior. Development, Assessment, and Modification. Phillip S. Strain, Michael J. Guralnick, and Hill M. Walker, Eds. Academic Press, Orlando, FL, 1986. xiv, 460 pp., illus. $55.

Chrysophytes. Aspects and Problems. Jørgen Kristiansen and Robert A. Andersen, Eds. Cambridge University Press, New York, 1986. xiv, 337 pp., illus. $52.50. From a symposium, Grand Forks, ND, Aug. 1983.

Disarmament and World Development. Mac Graham, Richard Jolly, and Chris Smith, Eds. 2nd ed. Pergamon, New York, 1986. xiv, 306 pp. $25; paper, $15.95. Based on a conference.

Disequilibrium and Self-Organisation. C. W. Kilmister, Ed. Reidel, Dordrecht, 1986 (U.S. distributor, Kluwer, Norwell, MA). x, 309 pp., illus. $76. Mathe-