had not taken part in the negotiations; she had made no secret of her intention to be in no way bound by an agreement between the three great powers on a test ban, not considering this in any way a real measure of disarmament—since the great powers were themselves continuing to build up their stocks of weapons." Further along, referring to the Test Ban Treaty of 1963, Dr. Goldschmidt observes that "the hopes which it has aroused should not . . . hide its serious shortcomings." The treaty is "more of a tranquilizer than a cure," a conclusion with which the reviewer unhappily agrees.

The book concludes with a short and optimistic chapter on the peaceful future of atomic energy. There is a useful chronology, a glossary, and both a name and subject index. This is an excellently organized and important book.

Lewis L. Strauss

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About the Reviewer: With reviewers like Lewis L. Strauss, it is difficult to keep the biographical material congruent in length with the review itself. Mr. Strauss was secretary to Herbert Hoover during and just after World War II. He was a Member of the U. S. Delegation to the Final Armistice Convention in 1919. His Navy service during World War II included Chief of Ordnance Inspection, Chairman of the Army-Navy Munitions Board, the Navy Member of the Interdepartmental Committee on Atomic Energy and Special Assistant to the Secretary of the Navy. He retired from the Naval Reserve as a Rear Admiral in 1958.

He first served on the Atomic Energy Commision in 1946 on an appointment by President Truman. He was chairman from 1953 to 1958 by appointment of President Eisenhower. He initiated the program for monitoring nuclear explosions by which we detected the first and subsequent Soviet atomic weapons tests. He was the first to propose our development of thermonuclear weapons after the Russian A-Bomb tests. He originated the proposal for the International Atomic Energy Agency and headed our delegation to the Geneva Conference on Peaceful Uses of Atomic Energy in 1955 and 1958. He now raises purebred cattle on a farm in Virginia.

Nuclear and Radiochemistry. By Gerhart Friedlander, Joseph W. Kennedy and Julian Malcolm Miller. John Wiley and Sons, 605 Third Avenue, New York, N. Y. 1964. xi + 585 pp. 16.5 × 24.5 cm. Price $10.75.

At first glance it might seem unthinkable to review a second, much improved and thicker edition of a well-known and highly esteemed textbook on nearly all of radioactivity by three (now two) truly distinguished scientists from a noted laboratory (Brookhaven) and a great private (but not too private) university (Columbia). Moreover, all three authors were, at one time or another, students at Berkeley, where much of nuclear science in this country had its beginning; and two of the authors, Dr. Friedlander and the late Dr. Kennedy, played important wartime roles at now historic Los Alamos. With all that background and present prestige the authors could scarcely fail to turn out an excellent textbook for advanced undergraduate and beginning graduate students. For me (= this reviewer) to do anything less than utter hymns of praise for the author's work might, therefore, seem definitely irreverent.

But out here west of Dodge City we have long known that the best of placer gold always contains bits of gravel, or even worse. Hence we are not astonished to find that the authors would have done well on occasion to meditate under the Bo tree.

To begin with, the book covers nearly all of what is ordinarily called nuclear physics and radiochemistry. This means that the authors—with hardly a twinge of remorse—have tucked nuclear physics cozily under the wings of chemistry, where it probably belonged in the first place anyway. A combination of the author's book and R. B. Leighton's much more rigorous and more sparkling "Principles of Modern Physics" should be ideal for a senior-graduate course in nuclear radiochemistry in the better universities and colleges. Friedlander and Miller don't even mention Leighton's book (note roguish dig here).

The preface is incredibly dull; it doesn't soar to those great heights that ordinarily characterize Berkeley men. In Lewis and Randall's "Thermodynamics," their preface speaks of ancient cathedrals and the bandied jests of the workmen, but Friedlander and Miller speak mainly of mere pedagogical details.

By happy contrast chapter one starts off with a much more refreshing tone. Here one learns about the three Becquerels—father, son, and grandson Henri—whose interest in the phosphorescence of uranium salts led Henry to the almost accidental discovery in 1896 of radioactivity. Then came Pierre Curie and his wife Marie who demonstrated that radioactivity originates in definite chemical elements. The authors do not mention the coincidence that on the day following the onset of the earthquake-fire disaster in San Francisco (April 18, 1906), Pierre Curie was run over by a horse-drawn dray in Paris and killed instantly. The chapter moves along nicely in apple-pie order to cover natural radioactivity of uranium and thorium and their three main decay series as unravelled by Rutherford, Soddy and others, and the discovery of artificial radioactivity in 1934 by F. Joliot and his wife Irene Curie (Joliot). Without saying so, the authors have, in their first chapter, covered not only an inexpensive period in science but have also set the stage for a still unfinished period of human endeavor whose consequences have passed beyond the ability of newspaper pundits and statesmen to prophesy.

Chapter two is about nuclei, their composition, properties, systematics, decay and reactions. Chapter three covers the exponential decay and growth laws and half-lives. The long fourth chapter is on the interaction of radiation with matter and includes such things as particle ranges and allowable doses. All manner of detection and measuring devices are described in some detail in chapter five. And then in chapter six we come to the orthodox but exasperating subject of counting statistics; I always have the feeling of being 'had' by this subject. In chapter seven we find out about tracer methods in ordinary chemistry; there really isn't much about ordinary chemistry in the whole book. The following chapter on decay processes and their character is quite good and deserves close attention.

The next two chapters on nuclear models and nuclear reactions are splendid, even though the discussion of nuclear spin and isotopic spin lacks the pleasant rigor it so richly deserves. The reason for this fault seems to lie in the fact that there is no chapter on quantum theory in the book. An additional chapter on wave equations and functions, and on spin matrices and their transformations would do wonders for the book. The section on the important very high-energy nuclear reactions deserves more space than the authors give to their own work.

No one can help but be fascinated by the descriptions given of all sorts of accelerators, little and big, in chapter eleven. Here pure science really begins to flower in the form of huge, complicated, and expensive machines dedicated to the noble purpose of finding out the innermost structure of nuclei and so-called elementary particles. The immense Egyptian pyramids were probably much more expensive, but their contributions to fundamental knowledge and culture was certainly vastly less than that of the large accelerators. It is unfortunate that the authors didn't follow this chapter with another on mesons, baryons, and the elusive quarks.

After two chapters on techniques and chemical probes, there comes one on nuclear energy which by and large is helpfully informative, but the discussion on fission bombs at the end is outrageous. Why, even the mainland Chinese can make better estimates of critical masses than have the much more learned authors.

A chapter on dating, five useful appendices, a name and a subject index end the book. Oddly enough neither Lise Meitner nor Schrödinger are mentioned in the indices; in fact Miss Meitner isn't ever mentioned, and Schrödinger just once in an almost offhand manner on page 334. Alas, this new generation has no proper respect for its honorable scientific ancestors!

Although it is true that the authors do credit three women with very important contributions to nuclear knowledge—videlicet the two Curies and C. S. Wu—at the same time they give one the impression that they really don't know what girls are. No acknowledgment is made to secretaries or draftswomen in the preface even though the manuscript and the many figures must have represented more than a routine effort. In view of all this one wonders whether modern—and hence not unduly philoprogenitive—coeds (the drip-dry set) will glow on reading the book.

A humanist or a banker could well be agitated by the authors' failure to make clear the fundamental basis for their science. Everyone isn't aware of the far-reaching proposition that the results of carefully controlled experiments are reproducible. If the thirteenth century Italian scholastic philosopher Thomas Aquinas had known about this proposition, he would scarcely have made the now embarrassing statement ascribed to him that if a woman conceives in the presence of a humid south wind, then her offspring will be a baby girl.

In spite of the gravel (and worse) that we occasionally run across in Friedlander, Kennedy and Miller's very well-written book, the fact remains that it contains mainly substantial gold. As a textbook and a reference it makes a fine contribution to the necessities of the inner mind and to the exigencies of the external world.

Don M. Yost

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About the Reviewer: We are told that Mrs. Don M. Yost, the half-Irish wife of our reviewer, who has "read, corrected, and changed drafts of this review," has "studied Greek, Latin, Logic, Meteorology, and the like." If space permitted we would tell you about the reviewer too. But look at the Editorial this month.