paragraph.

For physicians who wish a clear, succinct, nonmathematical explanation of the principles of computed tomography, I recommend this book. It would be valuable for training technologists, and engineers and physicists will find it useful as an introduction to the subject matter, although their background and interest will likely carry them beyond the level of the material presented. Because of the clarity of the writing style and the well-organized presentation of ideas, the book may also be of interest to scientists and lay persons working outside the radiological sciences.

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**ATLAS OF TOPOGRAPHICAL ANATOMY OF THE BRAIN AND SURROUNDING STRUCTURES FOR NEUROSURGEONS, NEURORADIOLOGISTS, AND NEUROPATHOLOGISTS.** W. Seeger. Vienna, Springer-Verlag, 1978, 544 pp, $164.00

This book represents a prodigious amount of work on the part of the author. Remarkably, not only did he write the text, but also drew the illustrations. In the atlas, he has integrated basic neuroanatomy, radiology, and microsurgical techniques. This approach is applied, in consecutive chapters, to the following areas of the brain: frontal lobe and upper brainstem, temporal lobe and upper brainstem, parietal lobe, occipital region and lamina quadrigemina, supratentorial structures near the ventricles, and cerebellum and lower brainstem.

The illustrations are high density, pen and ink, line drawings. Much of this artistic endeavor is of superb quality. Some of the more complex drawings, however, attempt to incorporate more detail than is easily possible with this particular technique, resulting in a loss of clarity. The book is so encyclopedic and detailed that it must be studied and digested in small pieces. It represents a valuable reference text that should be considered for every neurosurgery department library.

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**REEVALUATION OF DOSIMETRIC FACTORS: HIROSHIMA AND NAGASAKI.** V. P. Bond, J. W. Thiessen, Eds. DOE Symposium Series 55, CONF-810928, Washington, D.C., Technical Information Center, Department of Energy, 1982, 306 pp, $15.75

This 300-page paperback is an intriguing synopsis of 30 yr of effort directed toward a dosimetric reconstruction of the events immediately following the bombing of Hiroshima and Nagasaki in 1945. This report is from the DOE symposium held in Germantown, Maryland, in September of 1981 and published in October of 1982. The purposes of the symposium were to (1) determine the current status of research efforts, and (2) assess the levels and directions of research efforts in the immediate future. The major concern of the group is to provide dosimetric support for the Radiation Effects Research Foundation (RERF) of Hiroshima and Nagasaki. Research in this area has been in a state of turmoil in the last few years because of the series of recalculations of the neutron and gamma dose rates at ground level in the two cities. In particular, new transport code calculations of the attenuation in the rather severely disturbed air around the explosion, and Monte Carlo calculations of the effects within the two very different devices have led to a reduction in the estimated neutron dose in the low-dose regions. This has brought all of the predictions about both neutron- and gamma-induced effects (e.g. leukemia, chromosomal aberrations, solid tumors, etc.) to an impasse while the dosimetry question is settled, which may take several years. In the meantime, such questions as the RBE of low dose rate neutrons are left without much supportive data. One pressing issue, for example, is how to include body and structure shielding effects.

As with most symposia, the best part of the published proceedings comes in the discussion sessions. This is particularly true in this instance since most of the material presented in the formal presentations has appeared in *Science* or *Nuclear Engineering* over the past several years. There is also some good discussion of the principles of radiation biology and microdosimetry, but no conclusions are reached.

There are several legal and ethical questions raised, which stimulate the reader's mind beyond the confines of physics and dosimetry. For example, the reassessment of dose may greatly affect the government expenditures to survivors, which are based on those doses. In another discussion, it was mentioned that one 12 Kton explosion in the atmosphere, under the proper conditions, would answer a lot of the dosimetry questions at a fraction of the cost of ongoing studies. It was also mentioned that many of the parts (presumably spare parts) of the original "little boy" and "fat boy" bombs still exist.

I recommend this book on the basis of its discussion sessions and as a review for those who are not intimately involved in this work.

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**RADIATION: WAVES AND PARTICLES/BENEFITS AND RISKS.** L. Pringle. Hillside, New Jersey, Enslow Publishers, 1983, 62 pp, $8.95

This is a nontechnical book about radiation directed toward a nonscientific audience. Its author is a wildlife biologist who, according to remarks on the dust jacket, has written "many outstanding science books for children," and, indeed, the level and style of the book seem to be about right for high school students.

The book comprises some 60 pages, divided into five chapters, plus a glossary of terms, an index, and recommendations for further reading. The five chapters are: "The Range of Radiation," discussing the nature of radiation and the place of x-rays in the electromagnetic spectrum; "It's Only Natural," describing environmental sources of ionizing radiation; "X-rays," describing different uses of x-rays, including TCT scanning, and containing representative examples of TCT scans and other x-ray images; "Radioactivity," discussing various sources of nuclear radiation, including nuclear power, nuclear weapons, and two pages on nuclear medicine imaging and therapy; and, finally, "Low Level Risks," discussing the various risks of radiation exposure with emphasis on cancer, genetic mutation, and teratogenic effects. Sources of risk-data, such as the Japanese A-bomb survivors, are mentioned, but the presentation generally is nonquantitative, with attention focussed on cataloging and describing risks and effects, rather than on quantitative discussion of the actual magnitudes or risks.

A book on radiation and its effects, directed toward a younger audience, could be a useful addition to school libraries, waiting rooms in doctors' offices, and perhaps even some home libraries. Because of the style and intended audience and because I thought the topic would be an interesting one, I decided as a first experiment to ask my teenage daughter to read the book and give her impressions of it. Alas, the experiment was unsuccessful, because she could not complete more than two pages at a sitting without dozing off, or recalling a more urgent priority, such as "fixing her hair." This, I fear, reflects more on the subject matter of the book than on its literary style, and, for the moment, I am resigned to the

conclusion that at least one of my offspring will not be following a career in my footsteps.

Could the book, nevertheless, be useful as a resource for term papers and the like, perhaps for school libraries? To this I must answer, regrettably, "no." The descriptions of radiation and its uses are technically accurate and at a level appropriate for a nonscientific audience; however, the book does not provide an accurate perspective on radiation risks. The general impression to be gained from this book is that radiation is "very dangerous," perhaps much more so than is currently believed within the scientific community. This impression is conveyed not so much by quantitative, factual information, but by salting the text with suggestive, "eyebrow-raising" statements from unidentified sources. Thus, it is difficult to sort out "established fact" from that which is simply the opinion or speculation of the author. Examples, (p. 17): ". . . even this small amount (100 millirem) causes some deaths from cancer . . ."; (p. 26): "This much radiation (4000–8000 millirems) is known to be harmful . . ."; and, referring to current radiation protection standards (p. 54): ". . . some radiation workers may be in real danger." Perhaps the basis for the latter claim is the statement on p. 25 that, in 1944, "a doctor" (otherwise unidentified) reported that radiologists who worked with x-rays were ten times more likely than other physicians to die from leukemia, a "research finding" supposedly based on a review of obituary columns. A more recent study by Smith and Doll (*Br J Radiol* 54:187, 1981) found a less than twofold increase in cancer among radiologists in practice before 1921, and no significant increase since that time. In a study noted by Webster (*Am J Roentgenol* 137:647, 1981) after a 29-yr follow-up, no significant difference in cancer rates was found between x-ray and laboratory (non x-ray) technologists. It would seem that the author should have cited these more recent studies when discussing occupational risks, but perhaps he was unaware of them.

The book also contains statements that appear to be simply inaccurate. Examples: On p. 47 it is stated that because of radiation, members of families of patients treated with radioactive iodine are more likely to get thyroid cancer. On p. 53, it is stated that BEIR-1980 concluded that low-level radiation risks, although small, were "potentially greater than believed before." This is simply not correct. For virtually all effects, risk coefficients in BEIR-1980 were smaller than in previous documents (BEIR-1972, ICRP, UNSCEAR, etc.) On p. 21, after noting that some of the Japanese A-bomb victims were pregnant women, it is claimed that *most* (not just some) of surviving children of these pregnancies were either mentally retarded or less able to resist disease than nonirradiated children. In general, the book is peppered with jarring, undocumented statements such as these that appear to have come from less-than-reliable sources. Yet, they are presented in such a way that the student-reader is likely to perceive them as "established fact."

The book also conveys the impression that the current state of knowledge about low-level radiation effects is one of conflict and uncertainty, and the indiscriminate citing of all shades of opinion contributes to this impression. Although the author cites both sides of opinion on radiation risks, one cannot tell which opinions reflect the scientific "mainstream" as compared with those of the fringe elements. In either case, it is simply: "Some scientists believe . . . ." A more specific example appears on p. 54 with reference to the Nagasaki neutron compared with gamma dose recalculations where the author states: "This raised doubts about *all* earlier calculations of the effects of radioactivity on humans" (author's emphasis). This is clearly a misleading statement. First, it affects only one source of cancer risk data, and second, it is likely to result in risk-estimate revisions of less than a factor of two, and perhaps even less, hardly implying the state of uncertainty suggested by the author's remark. It would have been more accurate (and informative) for the author to have noted that the greatest source of uncertainty in low-level radiation risk estimates derives from the fact that these risks, whatever they are, are *very small*, and very difficult to detect even among *large* populations of exposed individuals. Instead, the reader is left hanging with a misleading impression that there are great uncertainties in our knowledge of radiation risks, due to fundamental errors in prior research studies.

A final criticism of the book is the absence of perspective on relative risks. Although a typical high school student might be bored by extensive charts, tables of risk coefficients, etc., it would not be inappropriate (or boring) to provide some quantitative perspective on the magnitude of risks involved. For example, in discussing BEIR-1980 (p. 53), the author might have focussed on the lifetime risk estimate for fatal cancer of about 0.01% per rem from that report (and ICRP, UNSCEAR, etc.) and compared this with the "natural" incidence of fatal cancer of 15–20%. Instead, he mentions in the context of this report only the extreme (and debatable) estimate that ". . . up to one million people . . . might develop cancer from human-made sources of radiation." On p. 43, in discussing the comparative risks of nuclear power and coal, the author focuses on the "catastrophic" potential of accidents of the former, but does not mention the on-going catastrophe of tens of thousands of coal miners who have been killed or disabled in this country alone by mining accidents and black lung disease. He does not mention the potential for global environmental changes from burning fossil fuels, nor does he discuss the risk of nuclear holocaust in the event of warfare over diminishing global supplies of fossil fuels. It is not sufficient to raise the specter of "danger"; one must also discuss relative risks and the risks of alternatives.

In my opinion, the average high school student (or other "nonscientist" reader) will come away from this book with many misleading impressions and with no basis for a better understanding and perspective on radiation issues. For this reason, I cannot recommend it.

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