quite informative. Although there is excessive repetition, specifically regarding the effects of radiation on the hematopoietic system, some of it is advantageous and unavoidable when different authors are discussing closely related topics. However, chapter 10 (on acute radiation effects) seems superfluous because the topic is very well discussed in chapter 11 (on total body irradiation injury). The latter is an excellent chapter in which Mathé reviews his experience not only with radiation injury but with transplantation of bone marrow, including the associated problem of the secondary syndrome in man.

The editor's expressed goal is to describe the present state of knowledge of the field of nuclear hematology for experimental and clinical workers in various disciplines. This is accomplished in part with the material concerning radiation effects in man and animals. However, owing to the variable quality of the first nine chapters, the book does not attain the editor's goal and will not serve as an adequate source of information for those interested in clinical or investigative use of radioisotopes in hematology.

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Memoirs of an Early Scientific Industrialist

Inventor and Entrepreneur, Recollections of Werner von Siemens (Lund Humphries, London, 1966. 314 pp. Illus. 54s.) first appeared in 1892, the year of the author's death, and in the year following in an English translation. In 1956 it was reprinted in a German edition that was greatly enhanced in beauty and scholarly utility through illustrations and annotations, and now this new version has appeared in English. Siemens was born into an unusually talented family, at a time when Germany stood on the threshold of political unification, industrial expansion, and scientific supremacy. His memoirs reflect vividly the mentality and circumstances which made Germany a major power and which harnessed science to industry throughout the Western world.

As a young man he hitched his wagon to the Prussian state, entering its army to obtain schooling as an engineer. Though he later resigned his commission to enter business, he continued reverently to serve the state in many capacities, including that of delegate to the Prussian Diet. Late in life, after German unification, he induced the authorities, through the gift of a valuable Berlin property, to establish Germany's first government-supported institute for fundamental research, the Physico-Technical Imperial Institute. Through this gift he expressed his intense devotion to both the Fatherland and pure science.

Siemens always fancied himself a scientist, and indeed took active part in scientific societies, but his greatest achievements lay in engineering. Unlike his contemporary, Edison, Siemens was a genuine electrical and mechanical engineer whose numerous inventions were rooted in a thorough familiarity with mathematics and contemporary physical and chemical theory. The foundation and backbone of his industrial empire was the telegraph, to the perfection of which he was initially assigned by the army. In short order he rendered Wheatstone's dial telegraph practical and subsequently left the army to manufacture this improved device in partnership with Johann Halske, a Berlin instrument-maker. After a second invention, the reliable insulation of wire with gutta-percha, the Siemens-Halske firm became specialists in underground and underwater line-laying. Rapid expansion ensued, thanks in good measure to the remarkable inventive and business skills of several of Siemens' seven younger brothers. Carl von Siemens superintended the construction and later the maintenance of a far-flung telegraph network in Russia. William von Siemens' subsidiary company in London laid over 19,000 kilometers of undersea cables, including four Atlantic crossings in 25 years. And in a joint venture in 1870, the brothers built the Indo-European telegraph linking London and Calcutta.

Meanwhile, in London, William and Friedrich von Siemens were simultaneously building another industrial complex around the regenerative furnace which they perfected, while Werner von Siemens in Berlin continued to spawn successful inventions (some nonelectrical), best known of which is the dynamo in which weak natural magnets were replaced with powerful electromagnets. Large-scale generation of electrical power thus became possible, and the Siemens-Halske Company promptly diversified into all phases of electrical manufacture.

Of all Werner von Siemens' roles—family patriarch, industrialist, patriot, scientist, and engineer—the last is the most unique and historically significant. He certainly belongs in the front rank of those who made the long-delayed promise of the utility of science (first made by Roger Bacon in the Middle Ages) a demonstrated fact by helping prominently to bring into existence an industry never even conceived of in earlier generations. This new industry, born of and nourished by science, called for a new breed of men capable of thinking like professors, fashioning like mechanics, and managing like businessmen.

As with so many recollections written in declining years, those of Werner von Siemens contain serious shortcomings: repetition, imbalance of periods and topics covered, strident assertions of priority, glossing over of failures and conflicts, insufficient technical explanation and documentation, wisdom after the event, and moralizing. Some of these faults are partially overcome by extensive annotation in this latest edition of the recollections, but the appearance of this book only reemphasizes a long-felt need for a full-blown biography of this remarkable man.

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Salmon Migration

Underwater Guideposts: Homing of Salmon (University of Wisconsin Press, Madison, 1966. 167 pp. Illus. $6), by Arthur D. Hasler, is a nicely written summary of recent work on the hypotheses and experiments attempting to account for the homing migration of fishes, particularly salmon. In this book Hasler relates the basis for his own theories concerning the use of odor for locating parent streams during the freshwater phases of salmon migration. These ideas, for which he has received wide recognition, are detailed and an account is given of recent activities at the Limnological Laboratory of the University of Wisconsin, which attempt to explain the mecha-