sented in *Genetics Today* (as the proceedings of a congress) will be available in most science libraries and will be seen by many microbiologists, plant and animal breeders, biochemists, geneticists, and immunologists. Graduate students may well use the volume for reference. By looking beyond the papers of immediate interest, each reader may visualize the breadth of a science considered by many to be at the center of modern biology. The view is well worth the effort.

VERNON BRYSON
Institute of Microbiology, Rutgers University, New Brunswick, New Jersey

Plant Breeding

The Use of Induced Mutations in Plant Breeding (Pergamon, New York, 1965. 842 pp., $45), the report of the Food and Agriculture Organization–International Atomic Energy Agency technical meeting held in Rome in June 1954, is the latest and most comprehensive of the collective publications on the subject. The papers have been assembled under eight general headings, with one paper on the nature of mutations, two on diplontic selection, five on induced chromosomal changes, including recombination and forward mutation, eight on the characteristics and genetics of induced mutants, nine on mutation and breeding in vegetatively propagated species, 20 on mutagens and sensitivity to mutagens, and 21 on mutation and breeding in sexually propagated species.

As in most publications with numerous independent authors, there are repetitions and dislocations in organization. Nevertheless, the papers record an increment of progress in the understanding of some of the numerous variables that affect mutagenesis, mutant recovery, and mutant use in higher plants. There is evidence of gain in stature and maturity of the investigations reported, and especially in the cognizance of the contrasts in inducing mutations and in using them. No contribution is reported toward the identification of a specific relationship of mutagen, mutational site, and phenotype in any agronomic or horticultural character. Allusion to this goal is made, however, through subjective correlations with mutational events in bacteriophage, description of which is ably presented (by Heslot) in the leading article of the book. The role of induced mutations in quantitative characters, especially mutations of small effect—including their modification of macro-mutant expression—is emphasized in several papers. Special techniques and opportunities in vegetatively propagated material are well presented. The significance of ploidy in mutation breeding and the use of mutagens in planned structural rearrangements of chromosomes and chromosome segments are ably discussed. Especially advantageous mutants are reported. Several comprehensive review papers are included.

This is a report of an international meeting at which most countries with a scientific establishment were represented on the program. Notable exceptions were the Chinese mainland and U.S.S.R., although a remark offered in discussion by a Russian delegate and published with references and illustration constitutes a paper.

The work represents the efforts of a growing group of men who appear convinced of the inevitability of gaining control of the mutation process and putting it to use in fashioning the economic plants of the world. The volume summarizes what was known on the subject at the time of the conference; it also reflects the disparity between what will become the leading field of plant biological activity of the future and the hopefully inquiring and sometimes naive observations reported in its pages.

One cannot but agree that little in the way of improved agriculture has come from mutation breeding, but as the papers in this volume testify, much of the basic information on how to integrate artificial induction of mutation into older, plant-breeding methods has been attained, and many clichés concerning artificially induced mutation have been dispelled by these investigations. The volume is essential for anyone who is concerned with mutation and plant breeding and is recommended reading for anyone who works in either field.

The book is published as a supplement to volume 5 of *Radiation Botany* and has the same format as the journal. It is well illustrated and handsomely printed, with highly legible double columns in large type, and is very well bound.

WALTON C. GREGORY
Department of Crop Sciences, North Carolina State University, Raleigh

Radioisotopes and Medicine

The field of nuclear hematology is defined by E. Szirmai, the editor of **Nuclear Hematology** (Academic Press, New York, 1965. 605 pp., Illus. $22.50), as "the specific aspect of hematology which utilized radioactive substances (isotopes) for the study of morphology, physiology, and pathology of the blood cells and blood-forming organs, and explores the effect of radiation on the hematopoietic system and the peripheral blood." Chapters 1 to 9 of the volume are devoted to the area covered by the first half of the definition, and they include discussion of the use of radioactive isotopes in general hematology (chaps. 2 and 3); study of platelets (chap. 4); bone marrow kinetics (chap. 6); blood volume determination (chap. 7); and radioautography (chap. 8). In addition, the use of electron microscopy in hematology is discussed in chapter 5 and metabolism of blood cells in chapter 9. Chapters 1, 2, 3, and 7 are not well written, contain misleading information, and leave the impression that the authors were not up-to-date with respect to some of the topics discussed —for example, use of isotopes in the investigation of anemia and clinical considerations of shock. In the introduction (chap. 1) the stable isotopes nitrogen-15 and oxygen-18 are referred to as radioactive isotopes while two apparently nonexistent isotopes, carbon-16 and arsenic-321, are included. Consequently, the first half of the book is weakened, although chapter 4 and chapter 6 are particularly well done and are rather complete reviews. Chapter 5 presents a good survey of the literature on electron microscopy, but the style makes for difficult reading and the electron micrographs reproduced are not sharp.

The second half of the book is devoted to consideration of acute and chronic effects of radiation on the hematopoietic system (chaps. 10, 11, and 13); immunity (chap. 12); and blood coagulation (chap. 14). Chapter 16 is devoted to problems of bone marrow transplantation, while chapter 17 reviews radiation effects in man based on the Japanese experience with atomic explosions.

With the exception of chapter 15 (on nuclear hematology and blood transfusion), these chapters are well written, present thorough reviews of the pertinent publications, and are

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.

MUNSEY S. WHEBY
Department of Medicine,
Rutgers Medical School

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.

JOHN J. BEER
Department of History,
University of Delaware, Newark

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-