lows the precedent established by Jean Brunhes and other French writers, but the depth of his analysis leaves much to be desired. Frequent short descriptions make the reading tedious; often it is difficult to establish the documentary significance of the examples selected—and the reason for omission of some better known cases. The generalizations drawn from the examples do not go beyond a descriptive typology. The contention, emphasized in the preface, that geography is not geared to abstraction, is amply documented in the lack of theoretical interpretation of the humanized world and in the constant reference to the historical precedents that gave rise to present human institutions and molded what we can observe today.

The book contributes a thorough description and generalized coverage rather than a penetrating analysis. The approach as well as the coverage may seem unusual to an American audience, but they are quite common in the traditional French work on human geography. From this standpoint Perpillou's work is more the terminal chapter of an era of geographical endeavor than an opening presentation of new views. It serves as an example of the vast array of minute and frequently loosely related particulars, with predilection for micro-presentation, placed in a loosely defined framework; the author seems to be standing and admiring the canvas netted by man through the long past, but with his back turned to the future, and with little concern for the dynamic present which surrounds him. The concern for the social spatial interaction is missing, and the economic interrelationships are acknowledged more by their material results than by their dynamic functional aspects. The book, therefore, should not be considered as an account of where the field of advanced human geography stands in France at the present time, nor as the evidence of what is considered human geography in the mid-1960's in the United States. Unfortunately the economic and demographic information is already out-of-date, because it is based on what was known in the mid-1950's; some sporadic references to the early 1960's do not change this general impression. The rationality of descriptions is not always adequately supported by the data presented.

The wealth of details seems to be of limited significance even to a persistent American reader because most of the examples are from European areas. The meager index and infrequent maps and diagrams are not very helpful. In details, numerous statements are quite missleading in a book published in 1966, without a reference to what period the statements refer to—for example, ". . . even today transhumance controls the economy of the Balkan peninsula in Greece, Macedonia, and Thrace . . ." (p. 162); "Australia with more than 100 million head [of sheep] . . ." [the 1963 figure is 158 million] (p. 119); and "Today . . . Italians swarm to the iron mines in Lorraine, Poles to the coal mines in the north of France, and Chinese to the nitrate workings in Chile . . ." (p. 258). Few Americans would refer to the highways and motels with the following statement—". . . Hence the care taken by the supervisors of motorways in America to build parking-places at intervals with little collections of huts forming 'motels' which make a scene rather like a seaside resort . . ." (p. 321).

The relevance of the dates used for the general theme of the book could be questioned repeatedly; are they used as ornaments, or are they building blocks that form the structure of human geography?

JOSEPH VELIKONJA
Department of Geography,
University of Washington, Seattle

Eleventh International Congress of Genetics

Genetics Today (Pergamon, New York, 1965. 583 pp., $15), volume 3 of the proceedings of the 11th International Congress of Genetics (1963), contains a concluding group of symposia. The preceding contributions, including abstracts and plenary sessions, appear in the first two volumes of the proceedings. A list of those who attended the congress and an index of authors and discussants for all the sessions is at the end of the book. S. J. Geerts edited the volume.

Genetics is now such a massive discipline that the placing of 12 subdisciplinary symposia within the span of approximately 500 pages is a considerable accomplishment. Despite the resulting brevity of the individual contributions, many of the papers are far more than mere introductions to areas of genetic interest. For the general audience, as opposed to the specialist, there are relatively few similar volumes where a group of qualified scientists provides an account of progress in such diverse fields. The inclusion of a symposium on dermatoglyphics, and one on plasmatic inheritance, illustrates the breadth of subjects. Other symposia are entitled "Population Genetics: Theoretical"; "Population Genetics: Genetical Diversity"; "Incompatibility"; "Plant Breeding"; "Immunogenetics"; "Animal Breeding"; "Behavior Genetics"; "Human Genetics: General Problems"; "Human Genetics: Biochemical Diversity"; and "Human Population Genetics." Each symposium consists of three or four contributions, followed in most instances by a synthesis and short discussion with audience participation. Because not all of the contributors are well known and several have the gift of originality, those who read this volume will encounter concepts and research that are not altogether familiar.

Except for an occasional lapse (for example, Fig. 1, p. 716) the book is carefully composed and edited. Without attempting to evaluate the individual contributions, some of which are in areas of considerable specialization, it is possible to note several general features. One is the breakdown of interdisciplinary barriers between microbial genetics and biochemistry, on the one hand, and more traditional branches of botany and zoology on the other. Another is the attempt to obtain more precise meanings for genetic terms widely used in mathematical branches of the subject, such as in the analysis of human populations. A further trend is technological: computers not only hasten the treatment of data but allow the preliminary testing of genetic hypotheses with variables established for maximum predictive utility. Also, the problems of natural selection, mimicry, genetic load, polymorphism, and the nature of heritable variation in the broadest sense continue to be analyzed by emphasis on more precise questions, rather than by the generation of satisfying answers.

In the recent development of genetics as a science many of the "antique" generalists have looked askance at their younger colleagues who are increasingly, and perhaps necessarily, preoccupied with acquiring proficiency in restricted aspects. The symposia pre-

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