The text begins with a brief history of cryogenic technology. The contributors of the next seven chapters discuss the basic theory utilized in cryogenic engineering—methods of producing low temperatures, the properties of solids and liquids, phase equilibria, heat transfer, the measurement of low temperatures, insulation technology, and the fundamentals of superconductivity. The concluding seven chapters cover developments which utilize superconductivity, optical masers, cryogenic pumping and space simulation chambers, nuclear propulsion, explosion hazards in propellants, cryogenic problems in space, and cryobiology. It is not possible to review here the merits of the individual chapters.

In this book, as in any book prepared by a large number of authors, there is a lack of continuity from chapter to chapter and a certain amount of duplication. In particular, the chapters "Cryogenic problems in space" and "Cryogenic aspects of deep space probes" should have been combined. On the other hand, the fact that each chapter is reasonably self-contained is an asset to those who seek a background in a specific area of cryogenic engineering. The extensive lists of references that follow each chapter will prove useful to those who desire further information.

On the whole, the book should be useful both as an advanced introduction to cryogenics and as a convenient source of the information necessary in designing cryogenic systems and components. It will be welcomed by workers in the field.

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A Teacher by Preference

George Hoyt Whipple and His Friends. The life-story of a Nobel prize pathologist. George W. Corner. Lippincott, Philadelphia, 1963. xii + 355 pp. $5.50.

This "life-story" of George Hoyt Whipple, written by one of his most distinguished junior colleagues, has both the self-revealing qualities of a personal narrative and the assessments of an objective biography. It is a remarkable book about a remarkable man. It is all the more unusual because it is a delightfully loquacious description of the character, interests, activities, achievements, hobbies, and friendships of a reticent man. Whipple seems to have been hewn from the granite of his native state of New Hampshire, where he was born at Ashland on 28 August 1878. Essentially, however, he has been as gentle, understanding, inspiring, helpful, and esthetic as he has been constant in adherence to his ideals, principles, and plan of his own life.

How this biography came to be written during Whipple's lifetime is told in the preface. In 1959, Whipple, "not a man who talks much about himself," wrote a brief autobiography in response to the request of some friends. Although he described many events of his life he told "far too little of the personal history his friends and students wanted to read. After his retirement from the deanship of the University of Rochester School of Medicine and Dentistry [in 1953 when he was 75 years old] the medical alumni began to plan a full-length biography." This book is the fruit of that planning.

The story is composed from the recollections of an association of the past 50 years between the author and his subject, supplemented by material from many sources—personal talks with Mrs. Whipple and with many of Whipple's friends, former pupils, and scientific teammates. To these sources were added files and records from Yale, Johns Hopkins, the Hooper Foundation, the University of California, the University of Rochester, the Rockefeller Foundation and the Rockefeller Institute for Medical Research, the National Academy of Sciences, the Nobel Prize Foundation, and Whipple's scientific and general publications from 1902 to 1961, a complete bibliography of which, numbering some 350 titles, is included in this volume.

For Corner, the scientific, humanistic, and literary author of this book, it was "an unalloyed pleasure" to revive memories, to study records, and to tell a story "to give readers who do not know Dr. Whipple personally some idea of what he has contributed to medical science and medical education." These pleasures will be shared by the readers of this biography.

Whipple's life has been of such consistency that to divide his activities into parts tends toward some distortion. It is, however, easy and natural to consider Whipple as (i) a teacher in the broad field of pathology and as a medical educator in general; (ii) an administrator of medical research institutes, medical schools, and medical foundations; (iii) a human being arousing and enjoying warm friendships; and (iv) a modest recipient of many honors. The author of this biography has done this with great skill, combining a technical analysis and evaluation of Whipple's researches with a running narrative of his other simultaneous activities.

George Hoyt Whipple began to teach about 1898 while he was still an undergraduate at Yale University. He became a teacher of pathology under his great preceptor, William H. Welch, as soon as he graduated from the Johns Hopkins Medical School (1905), and he continued to be a teacher "elbow to elbow" with students, who numbered several hundred over the years, and of whom many became new leaders in medical teaching, research, and administration. In his autobiographical sketch in 1959 he wrote: "I would be remembered as a teacher." Corner's comment is: "This wish was granted long years before he ever put it on paper, for the men and women he has taught—many hundreds of them—during more than half a century in three medical schools, can never forget his wise and clear instruction, nor the ideals of the good physician and scientist which he set before them."

Whipple's lifelong research, which he began working on at the Johns Hopkins Medical School in 1905, has been concerned with bile pigments, hemoglobin, and proteins of the blood and plasma. It has been an enormous undertaking, carried forward by him and his associates (among whom notably has been Frieda Robscheit-Robbins), with teams working under capable leaders; despite difficulties, these researchers meticulously performed intricate chemical and dietary experiments on dogs and human beings. Much basic knowledge was gained. The experiments on the formation of hemoglobin laid the basis for the discovery of the nature and cure of pernicious anemia. In recognition of this, and of his basic research, the Nobel prize in physiology or medicine was awarded jointly to George Hoyt Whipple, George Minot, and William P. Murphy in 1934.

In August 1914, Whipple became director of the George Williams Hooper Foundation for Medical Research, with the rank of professor, at the University of California in San Francisco. He remained there, deeply engaged in re-

search and in training investigators, for the next 6 years. During this period he became dean of the University of California School of Medicine.

In 1920, he accepted the invitation of wise Rush Rhees, president of the University of Rochester, to be the dean and organizer of the newly planned medical school there. The main supporters of this new school—a "post Flexner Report school"—were George Eastman and Abraham Flexner, representing the General Education Board of the Rockefeller Foundation. Under Whipple's guidance and management, the School of Medicine and Dentistry has had a brilliant and beneficial career, thoroughly educating medical students for basic and clinical studies and service, and providing, in an original manner, for the development of scientists and teachers in the fields of dentistry and oral pathology.

For many years, as an influential adviser on local, national, and international medical research affairs, Whipple was one of the men who guided policies and actions of the Rockefeller Foundation and the Rockefeller Institute for Medical Research.

A book review does not have the space for even a list of Whipple's honors, or for more than a brief mention of his love of the out-of-doors and his prowess as a hunter and fisherman. He can catch a trout or tarpon on approximately the same tackle. He can shoot a pheasant coming or going, at any altitude. He can dispense wisdom with shrewdness and a twinkle. All of these characteristics, and more, can be traced through the excellent index at the end of this volume.

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Ideal Topic, Perfect Author

An Introduction to Molecular Kinetic Theory. Joel H. Hildebrand. Reinhold, New York; Chapman and Hall, London, 1963. xii + 105 pp. Illus. Paper, $1.95.

Recently many attempts have been made to extend the textbook treatment of important topics in chemistry in order to challenge serious students, but few if any have been so successful as this volume. Kinetic theory is an ideal topic for such treatment, and Joel Hildebrand is the perfect author. His humor and unmatched teaching skills are continually evident in the many well-chosen topics he has here joined together.

After a discussion of the ideal gas, which includes degrees of freedom of polyatomic molecules and interesting discussions of sound velocity and sedimentation gradient, real gases are treated. Various equations of state are presented, and the discussion of real gases ends with sections on intermolecular forces and gas mixtures. The latter topics provide a smooth transition to the last section on liquids, solids, and solutions. Here Hildebrand gives a concise summary of his own treatments of solubilities and regular solutions.

The treatment throughout is sufficiently rigorous for a serious freshman student to find it profitable, but mathematics is used only to the degree necessary for the topic at hand. Primary emphasis is placed on understanding concepts rather than on the derivation of formulas. Occasionally, calculus is required, and the author wisely includes it in a way that should demonstrate to the student the utility of the mathematics he is studying, without discouraging the student who knows no calculus. Imaginative questions that, like the rest of the book, should introduce the student to the joy of actually thinking are provided at the end of two chapters.

Hildebrand's book should serve well its intended purpose—that of stimulating the beginning science student. It should be required reading for all who teach high school or college science. It most certainly is enjoyable reading for anyone interested in fundamental science.

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Hybrid Corn

Professor's Story of Hybrid Corn. Herbert Kendall Hayes. Burgess, Minneapolis, Minn., 1963. vi + 237 pp. Illus. $6.50.

Hybrid corn has been called "the most far-reaching development in applied biology of this century." The statement may well be true. Owing to the development of hybrid corn and the improved cultural practices that have accompanied its use, acre yields of corn in the United States have exactly doubled in the 30-year period between 1929 and 1959. Now hybrid corn is contributing significantly to increased food production in the countries of Latin America and of southern Europe.

Herbert Kendall Hayes was one of the pioneers in this revolutionary development, and he trained many of the plant breeders who later participated in it. In this slender volume written after his retirement, Hayes, the dean of American plant breeders, describes the early studies in theoretical genetics—made by George H. Shull, Edward East, Donald F. Jones, and Hayes himself—which furnished the basis for the methods of hybrid corn production. His personal acquaintance with these pioneers and with their studies has enabled him to write an interesting account of the early days in the development of hybrid corn.

The larger part of the book is devoted to technical aspects of producing hybrid corn: selecting and testing the inbred strains, employing the inbred strains in various kinds of hybrids, breeding for resistance to disease and insects and for chemical composition and other special purposes. On all of these aspects the author writes from personal experience and from a wide acquaintance with the extensive published literature. The final chapter, "What of the future," stresses the need for basic research on heterosis, the biological phenomenon that the production of hybrid corn has so successfully exploited. There is an extensive bibliography which, however, contains some curious omissions. Otherwise the book represents an objective, authentic, interesting, and readable account of the highly successful application of theoretical genetics to the improvement of America's principal food plant.

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The Platte River Syndrome

Natural History. Richard A. Pimentel. Reinhold, New York; Chapman and Hall, London, 1963. xii + 436 pp. Illus. $9.75.

This is certain to be a controversial text because it is so easy to point to it as an example of the Platte River syndrome—a mile wide and 6 inches