grammed, as well as an account of its accomplishments and limitations. In discussing integration and differentiation, it might have been worthwhile to emphasize that integration is a smoothing process whereas differentiation brings out all the unpleasant features in a function and should, therefore, be avoided on computers.

The authors conclude by looking at the future of computers. Their discussion is pertinent and interesting, but it is limited to improvements of components and of existing computers. It might have been worthwhile for them to indicate that the very high computing speeds required for certain problems are likely to lead to the design of parallel processing digital computers.

In conclusion, it seems to me that this book would be a valuable adjunct for beginning students in computer programming. It should give these students a pretty good idea of what can and cannot be done with various computers. For the general reader, its value is questionable.

If they have knowledge of elementary differential equations and preferably some acquaintance with circuit theory, *Electronic Analog Computer Primer* is an excellent introductory text for those who wish to learn how to use analog computers. The authors clearly and concisely explain how to perform the operations of addition, subtraction, multiplication, and integration and display the circuits required for these operations, together with the symbols used for such circuits. This will permit the reader to follow current literature. They wisely point out the difficulties involved in using analog computers for differentiation and advise that such use be avoided. Time and magnitude scaling are clearly explained together with the limitations encountered in using various methods of magnitude scaling. The authors discuss certain problems and their solutions in detail, and also provide a list of problems from various fields.

Reading alone is not sufficient. Those who wish to learn how to set up and solve problems on an analog computer would be well advised to use this text in connection with an analog computer and to solve problems of increasing complexity as they read the text. The book is so clearly written that it could well be used for self-education by anyone interested in this field.

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Sources of Science Series

Kepler's Conversation with Galileo's Sidereal Messenger. Translated, with an introduction and notes, by Edward Rosen. Johnson Reprint Corporation, New York, 1965. xix + 164 pp. $9.

The transition from observations made with the naked eye to those made with the aid of a telescope was sparked by Galileo's observations recorded in 1610 in his *Sidereal Message*. At Galileo's request, Kepler described his reaction to that booklet in a letter dated 19 April 1610, which Kepler shortly thereafter amended slightly and published. This revision is now available in a complete English translation. It illuminates the transition.

At a time when many were skeptical of Galileo's discoveries, Kepler unquestioningly accepted them as a contribution to astronomy and concerned himself with their significance. Edward Rosen contrasts the practical Galileo with the imaginative Kepler, whose fancy carried him far beyond known, or even suspected, fact. Kepler, an ardent supporter of the heliocentric theory, had already speculated on the nature of the moon and of the stars and on the size and structure of the universe; he had just published his *New Astronomy*, had already described lenses and systems of lenses, and could supply the theory behind the telescope.

Among the topics considered are Jupiter's satellites and the cosmological considerations they entailed, the optical problems involved in the construction and use of a telescope and in the crystalline lens of the eye, earthshine, the moon (its surface, mountains, density, possible atmosphere, and motion), the sun (its brightness, parallax, and rotation), and the number and nature of the stars and whether they are self-luminous. And behind these considerations lay the role of the telescope and what might still be hoped for from that instrument.

Not only is Rosen a careful and accurate translator, but he is also a keen scholar with a broad and deep knowledge of Kepler's times. He is thoroughly familiar with Kepler's works and correspondence, the books that Kepler knew, and the books about Kepler. Rosen uses his wealth of knowledge to annotate the book. The notes do much more than furnish the reader with translations of pertinent passages from the writings of Galileo, Kepler, and others. They give the book its proper perspective.

Unfortunately, this scholarly apparatus makes the book cumbersome. To the seven pages of introduction and 49 pages of text are added 104½ pages of notes, two pages on which certain notes are continued, and a useful six-page index. The number of notes, and thus the number of times the reader is interrupted, could be greatly reduced by not pointing out individual mistranslations in Bryk's 1918 German translation. These notes distract the reader by introducing erroneous ideas. Similarly, references to errors made by others might be omitted. Nonetheless, the volume is most valuable, interesting, and enlightening.

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The Caravan City of Timbuctoo

The Primitive City of Timbuctoo. Horace Miner. Doubleday, Garden City, N.Y., revised ed., 1965. xxiv + 334 pp. Illus. Paper, $1.75.

The Primitive City of Timbuctoo is an anthropological account of the people of Timbuctoo, the famous caravan city that became a center of considerable importance as a trading point between North Africa and the savannah lands across the Sahara in the early 14th century. The account is based on 7 months of research carried out in 1940 when Timbuctoo was still a part of the French West African empire. Miner planned his research as a test of some of Robert Redfield's hypotheses about the folk-urban continuum and the nature of urbanism. He chose Timbuctoo because it was an Islamic city, founded for and sustained by trade, and little touched by Western urban ideas deriving from the Industrial Revolution.

Since 1940, a great deal has been published on the various peoples of Mali who contribute to the population of the city, and a good deal has been published about the political and economic history of the savannah region in general. There has also been a major political revolution in which Mali has become independent of France. Some 25 years of technical, social, economic, and political change separate the Tim-

buctoo of 1965 from the city described by Miner in 1940. In this new paperback edition of a book originally published in 1953, Miner has attempted to cope with the new data and with the many changes by the addition of a sentence or a paragraph or by the use of footnotes. The bulk of the text remains as he originally wrote it; it has a curiously archaic character as a result.

His book will always have its value because it is one of the few existing studies of African cities, or of Islamic cities, or of nonindustrial cities based on trade. Unfortunately it fails to give any idea of the political organization of the city. Its focus is on custom rather than on the structure of social life.

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Organic Chemistry

Dictionary of Organic Compounds. vols. 1–5 and First Supplement. J. R. A. Pollock, R. Stevens, and G. Harris, Eds. Oxford University Press, New York (vols. 1–5, ed. 4, 1965; 3346 pp.; First Supplement, 1965, 213 pp.). Illus. $280.

The new *Dictionary of Organic Compounds* is the fourth edition of a dictionary designed to present in brief the "constitution and physical, chemical and other properties of the principal carbon compounds and their derivatives, together with relevant literature references." Although some may think that preparing a new edition of a dictionary involves only minor additions and corrections, this new edition is about 40 percent larger than its predecessor; redrawing the structural formulas and adoption of the internationally accepted rules of nomenclature that were recently developed have required almost a complete recasting of the text. With one exception (that of inserting the year of publication in front of the volume or page number in references), there is a reasonable acceptance of the citation system used by *Chemical Abstracts*. This work should prove to be most useful in the establishment and proper description of the more important organic compounds.

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History of Genetics

Genetik: Grundlagen Ergebnisse und Probleme in Einzeldarstellungen. vol. 1, *Kurze Geschichte der Genetik bis zur Wiederentdeckung der Vererbungsregeln Gregor Mendels.* Hans Stubbe. Fischer, Jena, Germany, ed. 2, 1965. xvi + 272 pp. Illus. MDN 21.

It is a sign of the widening interest in the origins of genetics that the first brief comprehensive account of its history before 1900 has already reached a second edition. The monograph was first published in 1963 as volume 1 of the series "Genetik: Grundlagen, Ergebnisse and Probleme in Einzeldarstellungen." The policy of publishing separate monographic treatments of different aspects of genetics, because smaller restricted publications can be more readily kept up to date by revision, is thus justified by the first volume of the series.

The first edition was an excellent and succinct account of the work of Mendel and of his predecessors beginning with the first domesticators of plants and animals. The first chapters were devoted to ideas about reproduction and heredity as found in the works of the Greek and Roman writers of antiquity and of scientists and observers of the Middle Ages. The beginning of a new era in the 18th century was noted in the controversy concerning preformation and epigenesis and especially in the botanical discoveries of the late 17th and in the 18th century (by Camerarius, Linnaeus, and Kölreuter). Some 40 pages (now expanded to 60) were devoted to the plant breeders and theorists of evolution in the 19th century, including Mendel, and were followed by an excellent chapter on the origin of variations and the mutation theory. The latter well-documented account served to replace the earlier book by Stubbe which, because many of the printed copies were lost during World War II, has not been generally available. The last chapters, about a fifth of the text, were devoted to the great cytological discoveries of the 19th century, to Weismann and the germ plasm theory, to the rediscoveries of Mendel's laws, and to the first conceptions of a chromosome theory of heredity.

The second edition is an improvement and expansion of the first. Forty pages have been added to the text, including a 12-page facsimile of Mendel's letter of 3 July 1870 to Carl von Naegeli (the holograph has not been published previously), and 115 titles added to the already extensive bibliography. Proper attention has now been paid to Karl Pearson's contributions (1900 to 1909) to the theory of Mendelian equilibrium and to Fisher's critique of Mendel's theory. Among the other new names is that of Count Giorgio Gallesio (1772 to 1839) whose works on plant breeding, especially of citrus, were well known to Darwin. As pointed out by Martini (1961), Gallesio used the expression "dominating" in his "Teoria della riproduzione vegetale" in 1816, some 10 years before the earliest use of the concept of dominance ascribed by Roberts to Sageret (1826).

A valuable feature of the book is the brief biographical notices of most of the chief actors in the history of genetics up to and including the "rediscoverers" of 1900. Most of these notices are accompanied by portraits.

This book can be placed beside *Plant Hybridization Before Mendel* (H. E. Roberts, 1929) and *Vererbungswissenschaft* (Alfred Barthelmess, 1952) as an initial work on the history of genetics. It is more comprehensive than either of these with respect to the central ideas of genetics before 1900, and it will have a wider appeal to students of genetics and of the history of science.

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The Danish Cancer Registry

Statistical Studies of the Aetiology of Malignant Neoplasms. vol. 1, *Review and Results* (xvi + 543 pp.); vol. 2, *Basic Tables: Denmark, 1943–57* (iv + 319 pp.). Johannes Clemmesen. Munksgaard, Copenhagen, 1965. Illus. Kr 160.

The Danish Cancer Registry, which was organized in 1942, has the advantages provided by full access to information on death certificates and to mortality data. These volumes, an outgrowth of the Registry's fine work over the years, contain a description of the Registry and its mode of work.

Volume 1, *Review and Results*, consists of chapters that deal with various types of cancer and a review of the