ogy a Tory biology, or an Old-Guard-Republican biology? I do not believe this to be the case; but those who might wish to contend that it is will find in the book under review enough material to support these contentions.

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Between Earth and Space. Clyde Orr, Jr. Macmillan, New York, 1959. ix + 253 pp. Illus. $4.95.

This book is a fine contribution to the lengthening shelf of popular science volumes. It deals with the thin atmospheric envelope around the earth. The origin, physics, and chemistry, of our air mantle are well presented by the author, who wields a very facile pen. With a sense of the dramatic he introduces the reader to the realm of unending storms, large and small. The beautiful aspects of clouds, auroras, and the many halo phenomena are deftly sketched and the causes are well explained.

As a chemical engineer, Orr is particularly at home in matters dealing with air suspensions and atmospheric pollution. The past and present state of affairs and the anticipated future problems in the struggle for clean air concern people in all walks of life. Here is a thought-provoking summary of the issue we face in this field.

It is a pity that such a well-written book is marred by a number of small slips. Some of them are probably attributable to the author's acceptance of news stories as sources. Among these slips are erroneous reports of a wind of 392 miles per hour and of a tornado with translatory speed of 130 miles per hour, and confusion of the maximum wind speed recorded at Mount Washington, in 1934, with wind speed during the New England hurricane of 1938. One must also raise an eyebrow at the reference to thunderstorms "over land" at the North Pole, and at the labeling of the upwelling cold water along the West Coast as "an Arctic current." The professional meteorologist will also find, here and there, too ready an acceptance of solar influences which still have to be proved.

These inaccuracies do not greatly detract from the general merits of the book. Most of them could be readily remedied in a second printing. They are well compensated for by the technically acceptable discussions on climate, on the behavior of the weather, on the difficulties of forecasting, and on the possibilities of modifying the weather. The section on upper atmospheric exploration by rockets and satellites is as up-to-date as one can hope for during a period of explosive development. Eight good plates accompany the text, but a few more illustrations might have helped the reader to visualize better many of the phenomena.

The book has a good index and a useful reading list of titles of over 200 books and articles. Many of these publications provided raw material for the author. I am sure that most of the original writers of the popular or semipopular material cited would feel gratified at the effective use which has been made of their contributions. Anyone who wants a quick and easy glimpse at developments in atmospheric science can get it from this book. It is also well suited for high-school science libraries.

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Nomograms for Chemical Engineers. Om P. Kharbanda. Academic Press, New York, 1958. xi + 247 pp. Illus. $15.

The book consists of a compilation from the literature of over 100 nomograms, including many devised by the author. Nomograms of particular interest to the chemist and chemical engineer for the determination of physical properties and the solution of problems on unit operations are presented. Each nomogram is accompanied by descriptive material, including the theoretical and empirical basis of the nomogram, literature references, and an illustrative example.

The format of the book is particularly convenient; a full 8½- by 11-inch page is devoted to each nomogram in most cases. The main drawback of such a compilation is the necessarily restricted selection of nomograms; also, the data available for the construction of each nomogram are often incomplete; for example, only selected substances are included among the physical properties.

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Photomicrography. Roy M. Allen. Van Nostrand, New York, ed. 2, 1958. xiii × 441 pp. Illus. $9.

Relatively few changes have been made for this new edition. The basic methods of an expert in black-and-white photography are again presented. New pictures illustrate the chapter on modern photographic equipment, and the comments are the equivalent of a personal shopping tour with the author. For many readers this chapter will justify publication of the book. A new chapter gives a rambling account of phase microscopy and mention of interference microscopy, the latter section being interrupted for an account of a variable-phase microscope. In neither section are the problems of photography considered. The chapter on the electron microscope (five pages in the first edition) now occupies 12 pages.

The chapters on fundamental principles, homemade equipment, photographic processes and equipment, and microphotography remain about the same, except for the addition of some illustrations and descriptions of some new equipment. The chapter on microphotography is so meager and out of date that it might well have been omitted. In the chapter on techniques and processes some information on modern equipment and methods has been included, but there should have been more pruning of material on obsolete, discontinued equipment. None of the stronger sources for fluorescence microscopy are mentioned, and statements such as "only low powers can be used, as otherwise exposure times may extend into many hours" should have been dropped in this edition. In discussing stereoscopic photomicrography the author makes no mention of the use of twin-lens cameras, although the method has been used in several places for several years.

The most serious omission occurs in the discussion of modern color photomicrography. Although the ancient Lumière and Findlay plates are still described, there is no mention of electronic flash techniques or of the modern equipment and techniques for controlled time-lapse cinephotomicrography. Some photographic materials of one company are discussed, but the popular and useful Panatomic X film produced by this company is not mentioned. Only a few references are given—to Köhler's paper, a book by Morgan and Lester, an article in the *Scientific American* on microwriting, a book on microrecording, and publications of a photographic company. A few leading references to modern work would have been helpful and would have compensated, in part, for the omission of methods developed in the last few years.

Four new plates, on cast iron, steel, sago starch, and soluble coffee, have been added to the useful section illustrating good photomicrography and Allen's methods of achieving it. A comparison of the two editions reveals that the plates now show the wear of several printings.

Allen's is a personal book. Many of the methods described are basic to good

black-and-white photography and hence are just as useful today as they were yesterday. Allen's personal comments are apt and reflect years of experience. My review is intended to indicate the scope and place of the book and not to criticize an elder statesman of microscopy.

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Historical Geography of the North Carolina Outer Banks. Gary S. Dunbar. Louisiana State University Press, Baton Rouge, 1959. xii + 234 pp. Illus.

This well-written, logically organized, well-documented book deals with the barrier island chain between North Carolina's Cape Lookout and the Virginia line. These barrier islands lie far from the mainland. Since so much of the Banks consists of sandy waste, the reader constantly asks himself what it was that attracted the original settlers.

Though Roanoke Island is not a part of the Outer Banks, it is included in the study because of its proximity, cultural similarity, and historical significance. It was selected by the English settlers under Raleigh as the site for a colony and as a base from which to launch raids on the Spanish Indies; but, as the author brings out, the English "could not have made a worse selection." This colony became the "lost colony"; what happened to it is not known, but destruction by Indians seems probable. The colony contributed nothing to the permanent settlement of the Banks. The Jamestown colony of 1607, however, was able to start with a somewhat better knowledge of the topography and natural resources as a result of the Roanoke experiments.

It is primarily to describe the nature of the settlements of the Carolina Banks that this study was made and that the volume was published. An interesting and valuable part of the study deals with the introduction of plants by the settlers, who envisioned them as profitable export products; the new settlements positively had to produce some item or items needed by the mother country. Cultivation of mulberry trees for a silk industry, viniferous grapes, figs, lemons, almonds, olives, and cassava was tried; most of these projects either failed completely or showed little promise of success. By this time, however, the Virginia agriculturists had found in tobacco the economically successful crop they sought.

The author points out the value to the white settlers of the cultivated Indian plants—in particular of the great "crop trilogy," maize, beans, and cucurbits. Indian stores of corn were invaluable in helping the colonists through the first winters.

The first permanent settlement on the Outer Banks was made in the 1660's; almost all of these settlers were Virginians, who by this time had solved most of the problems of pioneering in the New World and who brought with them the Virginia system of growing tobacco on riverine plantations and of rearing livestock on necks and islands. The first homes on the Outer Banks were all built on the "hammocks" (variant of "hummocks")—wooded tracts usually slightly above the surrounding area and on the sound side. These "hammocks" are also the homesites today. Yards and gardens were enclosed by fences to protect them from roving livestock.

Fishing in the sound waters soon became an important activity. Menhaden fishing was unsuccessful, however, because the water in the sounds is so shallow that fish do not congregate there in great numbers and purse seines cannot be used effectively. North Carolina's impressive menhaden-fishing industry is carried on in outside waters and hence is of no direct concern to the "Bankers."

The tourist business seems to hold about the only promise for the "Bankers" today. A flood of tourists descends on the Banks each summer, raising the incomes of all local residents.

Extensive and detailed notes cover each chapter in this book; these are so interesting and so informative that even the casual reader finds himself delving into them. The person much interested in the area would find these notes one of the most satisfactory parts of the volume. The cartographic work is of high quality—accurate, meaningful, and pleasing to the eye. There is an excellent bibliography and a helpful index.

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The Measurement of Values. L. L. Thurstone. University of Chicago Press, Chicago, 1959. viii + 322 pp. $7.50.

This volume brings together 27 of Thurstone's hitherto scattered papers on the measurement of attitudes and subjective values. Included are all of his classic contributions to psychophysics.

When Thurstone went to the University of Chicago in the 1920's he began a sweeping reanalysis of the logic of psychophysics, the field of inquiry started by E. H. Weber and G. T. Fechner in an attempt to develop rigorous statements of the relations between sensations and the stimuli that produced them. One of Thurstone's distinctive contributions was to develop experimental methods and a rationale for dealing with values, attitudes, and similar subjective variables that cannot be related to physical quantities.

Thurstone's papers on subjective measurement and attitude measurement pretty completely made over the field of psychophysics, replacing its former limitations with a wide range of useful applications in the social sciences and substituting a systematic and meaningful understanding for the empirical "Weber's law" and "Fechner's law." Such papers as "A law of comparative judgment," "A mental unit of measurement," "Rank order as a psychophysical method," "The indifference function," "Theory of attitude measurement," and "The measurement of change in social attitude" are essential reading for any student of psychological measurement. But copies have been increasingly hard to acquire. The new book solves that problem and will be of great convenience.

The idea for the collection came originally from some of Thurstone's former students, but he himself was largely responsible for selecting the papers to be included. Mrs. Thurstone, always his close professional colleague, prepared an explanatory preface and saw the volume through the press.

DAEL WOLFLE
American Association for the Advancement of Science

Inside the Living Cell. Some secrets of life. J. A. V. Butler. Basic Books, New York, 1959. 174 pp. Illus. $3.50.

Perhaps the most useful way to evaluate this book is to compare it with R. W. Gerard's *Unresting Cells,* published almost 20 years earlier. Both books are popularizations of cell physiology, but popularizations at a very high level of sophistication. Each presents a view of the facts as seen through the prism of the author's own lucid and critical intellect. Both books are excellent.

It is interesting to note the large number of topics in Butler's book that were either entirely unknown in 1940 or but dimly foreshadowed: the existence and importance of deoxyribonucleic acid (DNA) and ribonucleic acid (RNA); heredity as a problem in code construction; the Watson-Crick model of DNA replication; the role of antivitamins; the relation of genes to enzymes, as shown by the Beadle-Tatum school; the strange behavior of bacteriophages; and Oparin-style theories of the origin of life. Who