disappear," whereas on page 53 we are told that many mRNA's appear to be stable and have, in fact, been isolated. Furthermore, these chapters are written with a historical approach that tends to cloud current concepts with details of older experiments. In summary, this half of the book is too disjointed for novices to the nucleic acid field, while being too elementary for those familiar with the subject. The same subject matter is more successfully covered in several of the current biochemistry textbooks.

The second half, on the other hand, conforms to the title of the book and is more profitable. Various enzymes of importance in nucleic acid research—albeit only nucleases and phosphatases—are individually discussed with respect to their use as reagents in the study of nucleic acid structure and function. The specificity, availability, and contaminating activities of preparations of virtually all known nucleases and phosphatases are described. A 26-page synoptic table of nucleolytic enzymes—probably the best tabulation of this sort to date—concludes this half. This section of the book should prove to be extremely useful to workers in the field as well as to those in other fields—for example, to geneticists, who are becoming more and more reliant upon these enzymes as specific catalysts.

It is unfortunate that the author chose to append to his treatment of enzymes the introduction to nucleic acids. Perhaps a future edition might instead expand the enzyme theme to include similar descriptions of other enzymes used to study nucleic acids, such as the various DNA and RNA polymerases, polynucleotide kinases, nucleotide kinases, DNA ligases, DNA and RNA methylases, and the DNA glucosylases.

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Smithsonian and Satellites

Trackers of the Skies. E. NELSON HAYES. Doyle, Cambridge, Mass., 1968. xiv + 178 pp., illus. Cloth, $5; paper, $3.

Before the beginning of the satellite programs in 1958, there was a curious and tantalizing situation. Within the United States, or within Europe (or India, or Japan), distances and directions could be calculated with an accuracy of the order of 2 parts in 1 million. However, equal or even shorter distances between points in Europe and points in the United States could be calculated only with a precision of the order of 100 parts per million; and even larger errors were feared. Each large triangulation system was thus like an iceberg, rigid in itself, but with only tenuous relations to other icebergs. There was an obvious military need to correct this situation. In addition, depending on what was supposed about the relations between these icebergs, one could obtain a wide range of theories of the general gravitational field of the earth. Isostasists such as Heiskanen believed that the general field approximated closely that of a fluid in hydrostatic equilibrium; while others, Jeffreys in particular, maintained that there were broad deviations from isostasy, which implied stress differences up to 100 bars deep in the mantle.

The satellite-tracking programs of the last ten years have cleared up this century-old difficulty in a most striking way, so that intercontinental distances and directions are now very nearly as precisely calculated as those within the continental triangulation nets. It has turned out that Jeffreys was right; the field is substantially as he believed and the interior is indeed in a state of stress. In this great advance, the precise optical determinations of the Smithsonian Astrophysical Observatory have had more weight than those of any other program, and very likely more than those of all other programs combined.

This book is a history of the Smithsonian program by an insider, a member of the Cambridge staff. It gives a good idea of the difficulties of the program as seen from within: the embarrassing delays in the procurement of telescopes; the built-in problem of field directors versus central staff; the steady change from a rough-and-ready group of pioneers to a well-organized and precisely functioning system; the public need for information about the program and for participation in it, especially through the Moonwatch program. All of these headquarters-type problems are set out with clarity and humor.

The weak point of the book is in its discussion of the relation of the Smithsonian program to geodesy in general, to other tracking programs, and to investigators who were not at the Smithsonian. The question of intercontinental connections is not mentioned; the utilization of Smithsonian data at U.C.L.A., Tokyo, the Applied Physics Laboratory, and elsewhere is not discussed. The part played by persons outside the Smithsonian in shaping the program is omitted. These omissions deprive the book of a good deal of color, and they deprive the reader of insight into the meaning of the Smithsonian program to the scientific community and the nation.

The book will be of interest to those who have had contact with the tracking problem, whether through the Moonwatch effort or through a relation to mapping or geodesy.

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Astrophysics

Principles of Stellar Evolution and Nucleosynthesis. DONALD D. CLAYTON. McGraw-Hill, New York, 1968. xii + 612 pp., illus. $22.50.

There has been a conspicuous lack of a readable, up-to-date textbook in the related fields of nuclear astrophysics and stellar evolution theory. This book, aimed at the beginning graduate student, goes a long way toward filling that need. Indeed, the initial reaction of students appears to be receptive.

The book is well suited for a two-term course, with equal emphasis on the nuclear and stellar aspects. Three of the chapters are concerned with the former and three with the latter, in addition to an introductory chapter dealing mostly with the observational basis of the subject. Although the order of the chapters does not correspond to this division, they are to some extent independent.

A major merit of this book is that it is easy to read, with a pleasantly high ratio of words to equations. However, mathematical details are usually not neglected if necessary for an understanding of the meaning of a result. The derivations which are included are straightforward and usually in contact with the physics of the situation. Examples are the discussions of sources of opacity and the nuclear Coulomb penetration factor. There are many useful formulas, tables, and figures not easily found in the literature.

One of the few criticisms that may be advanced is the tendency of some