The effective use of the abacus has the fascination of a complex skill with a multitude of variations so that the *aficionado* has many avenues to explore. But there is no written record of the procedure and there are so many competing devices, whose initial barrier is not skill but cost. Despite these limitations on the use of the abacus itself, the book is informative and enjoyable.

F. J. MURRAY

All About Climate

Foundations of Climatology: An Introduction to Physical, Dynamic, Synoptic and Geographical Climatology. By E. T. Stringer. Pp. xiii+586. (W. H. Freeman: San Francisco and Reading, April 1972.) $17.50; £6.30.

Techniques of Climatology. By E. T. Stringer. Pp. xiii+539. (W. H. Freeman: San Francisco and Reading, April 1972.) $17.50; £6.30.

AFTER a famine of several decades, British climatologists are enjoying the fruits of the long labours of three of their number. Close on the heels of Professors Crowe and Lamb, Dr E. T. Stringer of Birmingham University presents us with the results of sixteen years of work in two handsomely produced volumes. He aims to provide a rigorous, comprehensive and yet easily understood coverage of climatology and the present thousand or so pages are meant for university students, teachers of physics, mathematics and geography and entrants to state meteorological services.

Foundations has six chapters following some notes on the history of climatology and a few brief thoughts on approaches to its study. The first chapter deals mainly with pressure distribution and the mechanics of pressure change, ranging from localized pressure jumps to global atmospheric tides. This is followed by a chapter on atmospheric properties and processes restricted mainly to coverage of energy and vertical motion. Chapter 3 is a laudable attempt to introduce the reader at an early stage to the insights into atmospheric behaviour which accrue from an appreciation of turbulence at both the micro- and macro-scales. The longest chapter in the volume deals with the general circulation, considering in particular the circumpolar vortex, long waves, jet streams, index cycles and regional circulations, particularly those in polar and tropical areas. The chapter concludes with a relatively brief section on explanation and some thoughts on the implications of general circulation research for studies of climatic change. The last two chapters of this volume are concerned with familiar thermodynamics and related topics and synoptic climatology.

Techniques has three parts: one on basic techniques; one on their application; and a final chapter on "Geographical Climatology". In part I, three chapters deal with observing techniques, interpretation of the observations (mainly statistical analysis of temporal and spatial series) and climatological models—both experimental and mathematical. Part II comprises four chapters on radiation, temperature, clouds, and visual climate and optical climatology.

The principal impact of these books lies in the sheer amount of information they contain. The reader is explicitly exposed to virtually all the significant meteorological literature in published journals and reports in the English language over the last thirty, if not more, years. The thousands of references involved in this remarkable feat are accommodated in hundreds of lengthy footnotes which frequently occupy over five pages at the end of each chapter despite the use of many abbreviations and a small type-face. In addition, each chapter has a substantial appendix containing mathematical details of points made in the text. Whether the books are considered from a meteorological or a geographical viewpoint, Dr Stringer's awareness and meticulous documentation of this tremendous amount of material put his work into a class of its own.

But the difficulties of handling all this information are reflected in three closely related ways. First, some readers would perhaps query the organization of the chapters and their contents. To take two of many possible examples, *Foundations* chapter 2 ("Properties and Processes") could well be linked with the chapters on turbulence and thermodynamics. Yet it could also be argued that if, as Dr Stringer states, turbulence is a technique (*Foundations* page 174), it should be dealt with in the companion volume. Again, the section on synoptic analytical methods (chapter 6) could arguably be included in *Techniques*. Secondly, and perhaps more important, there is a lack of balance in the treatment. One is left with the impression that everything has been included, with too little discrimination and synthesis. Thus, in considering the general circulation, jet streams are dealt with in great detail and there is ample coverage of tropical circulations at and below even the synoptic scale; yet only just over one page is devoted explicitly to the Rossby waves. Thirdly, the style and method of both books are those of a review work requiring a high level of expertise on the part of both author and reader. On his own admission, Dr Stringer took more than a decade to achieve his present competence and one doubts the ability of even the keenest student to approach a match of it. The demands made of the reader are typified by the treatment of Smagorinsky's general circulation model. The reader is confronted with a half-page appendix giving only the briefest outline of the relevant equations. They will have real meaning only to the already cognizant. Further, confidence in the accuracy of the appendices is somewhat undermined by the confusion evident in the supposedly simplified mathematical statement that the latitude–longitude coordinate system on the rotating Earth is accelerating. Despite the above criticisms, one cannot but admire the scope of these volumes. It is a pity that their encyclopaedic nature is hindered somewhat by numerous errors in the indexes, but as a testimony to diligence in seeking an understanding of the "working substance" of climatology they stand unparalleled.

B. W. ATKINSON

Hormone Control

The Sex Steroids: Molecular Mechanisms. Edited by K. W. McKerns. Pp. ix+454. (Appleton-Century Crofts: New York, 1971.) $27.50.

THIS book is the third volume in the Biochemical Endocrinology Series edited by Dr McKerns—"a continuing series of monographs emphasizing how the synthesis and secretion of hormones are controlled, how the pathways of hormone biosynthesis are regulated and how the cellular biology of the target organs are stimulated or inhibited by hormones". The prominent display of the title *The Sex Steroids* on the dust jacket and spine of this book tends to mislead because, as the full title indicates, it deals only with the last topic claimed for this series of monographs, actions at the molecular level; and why call them sex steroids, when their rôle goes far beyond sex?

There are fifteen chapters, only one of which deals with the actions of androgens, although much has been learned about these hormones. The majority of those American biochemists who have contributed to this field of investigation appear on the list of contributors. The book stems from papers given at a symposium (undated) in Florida, and one wonders if investigators from outside the United States were excluded on grounds of economy.

This is not a book for beginners. Almost without exception, each author plunges at once into a detailed account of his experiments on steroid receptors in one tissue or another, with the usual figures showing radioactivity plotted against fraction numbers. It is, however, a pleasure to read the views of some of the earlier workers in this field, like Clara Szego (chapter 1), who remember that the ultimate explanation must encompass all observations. How right she is—"With notable exceptions, our preoccupation with this pheno-