p60) are first class and provide an important visual element to the verbal complexities of contemporary immunology.

Following the present vogue, the book is predominantly concerned with cells and molecules and, with the exception of the illustrations of T and B areas on p210, there is hardly any histopathology. The approach of the synthesist in immunology is long overdue, and although there is a good chapter on the structure and function of the lymphoid system by McConnell this is not enough for my taste. A section on immunopathology can

hardly be complete with no consideration of reactive changes in lymphoid organs. The book as a whole is so nearly comprehensive as to make consideration of remedy of these minor deficiencies worthwhile.

The book throughout is very readable, and the intention of the editors to communicate with their readers is made clear and is resoundingly successful.

In an age when new books tend to be greeted with a groan by overloaded minds here is one for your personal perusal. Don't leave it to the library—get one yourself, it's a splendid book. □

Methodical investigation of dynamic systems

Introduction to Mathematical Control Theory. (Oxford Applied Mathematics and Computing Science Series.) By Stephen Barnett. Pp. viii+264. (Clarendon: Oxford; Oxford University: London, 1975.) £5.75 net.

THERE has recently been a shift of interest in control theory from engineering towards applied mathematics. Although this reflects growing awareness of the range and depth of mathematical problems which have been formulated in terms of modern control theory it also sadly reflects a growing disillusionment on the part of the professional engineer at the failure of control theory to realise but a small fraction of what was promised a decade ago. In recent years there has been a significant return to linear system concepts to formalise the techniques necessary for analysing systems in which the numbers of control variables are large. This has led naturally to the use of state vectors and matrix system operators to describe the dynamic performance of systems. It is here that the first difficulties arise since not only are matrix equations often difficult to manipulate, but they do not provide a physical insight into the nature of the control problems which the semigraphical older methods of control theory provided.

There clearly is a need for basic textbooks which can introduce the newer aspects of control theory and, if possible, link them with more established techniques. The audience would include applied mathematicians new to the control field, as well as students and practicing engineers. Stephen Barnett's book roughly supplies this need. Engineers will not find it an easy book to read since matrix algebra at this level

is a demanding discipline. This is not made easier by the concise treatment given to many theorems but this is unavoidable in a work of this length. The reader will be struck, however, by the symmetry and compactness of the general theory which is beginning to evolve. The mathematician will find unusual outlets for studies in stability theory and the calculus of variations.

Although the book is by no means exhaustive in its range, it does cover a basic related set of topics and prepares the ground for further study. There are numerous worked examples and exercises but, as in most control textbooks, these describe problems which are almost trivial from an engineering point of view. It is argued that once the concepts have been mastered the extension to worthwhile problems is straightforward and is considerably aided by computational methods. It is of course here that the rift between theory and practice occurs. The formulation of real problems in terms of linear dynamic models, or often in any mathematical form, is difficult if not actually meaningless. Solutions, except in terms of empirical effort, are expensive to obtain and may then be impractical to realise. In spite of all this, sensibly applied control theory has much to offer in providing a framework for the methodical investigation of dynamic systems. This small but scholarly book will help to build such a framework.

J. M. Nightingale

Showing the flag

Geodynamics Today: A Review of the Earth's Dynamic Processes. (Sponsored by the British National Committee for Geodynamics for the Inter-Union Commission on Geodynamics.) Pp. 197. (The Royal Society: London, 1975.) £2.75 UK; £2.85 Overseas, including postage.

THE Geodynamics Project (1972–1977) is a loosely-coordinated international program of research into the dynamics and dynamic history of the Earth with emphasis on phenomena affecting surface and near-surface processes and structures. In 1973 the US Geodynamics Committee published, at no charge, a highly regarded and more or less definitive 235-page report on the scope and objectives of the Project. Soon after it appeared, the British National Committee for Geodynamics decided that something more than a preliminary British statement (published by the Royal Society in 1971) would be appropriate; and the result, published more than halfway through the Project, is *Geodynamics Today*. It is a sad reflection that in inflation-ridden 1970s Britain one has to pay to view the flag.

And the flag is a bit tatty at that. In this loosely-coordinated non-international program of 23 short state-of-the-art reviews on geodynamics some authors have dealt in generalities, others have resorted to detail; some have emphasised the past-to-present, others have concentrated on the present-to-future; some have included references and/or diagrams, others have gone for words only; some have put their heart into it, others have not. The result is a hotchpotch in which, the overriding geodynamic theme apart, subjects are linked only by virtue of the active or passive interest of the British scientists concerned. Nevertheless, the topics cover a wide range of geodynamic problems; and if no-one will wish to read everything, there is something here for almost everyone.

It is impossible to mention every subject covered and difficult to select a few. But of particular interest, because they are concerned with expanding themes of general consequence, are J. Sutton on the geodynamics of the Precambrian, E. R. Oxburgh on plate collisions past and present, I. G. Gass and others on the origin and emplacement of ophiolites, W. S. Fyfe on the influence of the hydrosphere on magma and D. H. Tarling on pre-Mesozoic palaeomagnetism. Also worthy of note, but for a different reason, is the article by N. N. Ambraseys, one of the few people to recognise the importance of historical seismicity studies, especially in the scientifically unpopular Mediterranean region.

If one general point emerges from this collection, or part of it, it is that British Earth scientists of various persuasions are particularly well placed, by inclination and experience, to lead the assault on the problems of pre-Wege-nerian geodynamics. It is to be hoped that the money will be available for them to do so.

Peter J. Smith