

which human activity clearly is the dominant force because polders are essentially man-made landscapes requiring continuous effort for maintenance and survival. The author has wisely included all types of land which require drainage, coastal, riverine and inland lakes, and, paradoxically perhaps, emphasizes the need for irrigation.

He lays much emphasis on the transition of polderization from community to State control through the historic period and concludes that "countries with a low population density or with alternative resources can afford to take only a slight interest in polderization". It is population pressure without room for expansion which is the controlling factor, rather than technological know-how, because the costs are enormous. Even the Dutch, acknowledged experts in the field of reclamation and with great pressure of population on agricultural land which is being devoured at the rate of 10,000 acres per annum for industrial and urban development and motorways, cannot hope to compensate for the 250,000 acres of agricultural land likely to be lost by 1980.

Few studies demonstrate so clearly the costs of environmental control in economic and social terms.

KENNETH WALTON

## PLASMA PHYSICS

### Plasma Physics

By B. Samuel Tanenbaum. (McGraw-Hill Physical and Quantum Electronics Series.) Pp. 361. (McGraw-Hill: New York and Maidenhead, 1967.) 126s.

PROFESSOR TANENBAUM has written a very good book and his publishers have done justice to his text. There is nothing original in the subject matter of his volume on plasma physics, but the presentation has a logic and clarity which, one suspects, are the result of that refining process which the years impose on a good lecture course. The author has the disadvantage, in this country at least, of addressing himself to a restricted audience, for the teaching of plasma physics is limited to a single lecture course, usually optional, in the final year of some of the honours physics schools. The first half of the book is written at the level of the final undergraduate year and contains those topics which the reviewer covers in his own course. The question arises—can one recommend a book at six guineas for a course of twenty lectures? Only the post-graduate worker, experimental and theoretical, is going to invest in this book, but it should be seriously considered by anyone looking for a single representative volume on this subject despite its lack of experimental references.

There are six chapters and some mathematical appendices. The first chapter defines the plasma and thoroughly reviews the behaviour of a single charged particle in electric and magnetic fields. The second views the plasma as a collection of individual particles and discusses wave propagation through a medium of such particles in the absence (and presence) of a magnetic field. The third chapter treats the plasma as a continuum fluid and re-examines it from the magnetohydrodynamic point of view. The rest of the book is concerned with the statistical behaviour of the particle elements of the plasma and this is examined with increasing sophistication in chapters 4, 5 and 6. The first approach is through the collisionless Boltzmann-Vlasov equation and this is applied to longitudinal waves with Landau damping, two stream instabilities and plasma sheath effects. The only concession made to collision theory at this stage is the first order treatment of Krook and his co-workers. In chapter 5, however, a more comprehensive treatment of the collision problem involves the Fokker-Planck equation and this is used to derive the transport coefficients. Finally, the effect of collisions is re-examined via the work of Bogoliubov, Born and Green, Kirkwood and Yvon, where the particle interactions are considered more rigorously.

The book covers all the subject matter, with the exception of turbulence, which is capable of being formally taught, and it ranks high in a list of recommended texts on this subject.

JOHN PAIN

## RANDOM CLUMPS

### The Theory of Random Clumping

By S. A. Roach. (Methuen's Monographs on Applied Probability and Statistics.) Pp. vii+94. (Methuen: London, 1968.) 25s.

THE study of clumps plays an increasingly important part in many fields of scientific endeavour. Before the cause of observed pattern—of cars on a road, plants or animals in a specified area, stars in space—can be sought, one must be sure that there is a non-random pattern to explain. To know this, one must first know the properties of a random assemblage.

It is disappointing to find that, despite a summary and introduction which suggest a survey of such important problems, this book is much more restricted in content. The problem described is the evaluation of the expected numbers of clumps of different sizes which will be formed by the overlap of particles placed at random on a line or a plane, a problem of immediate application to studies of air pollution and to counts of bacteria where considerable error will result unless adjustment can be made for the effects of overlapping.

Even this problem has not yet been solved for other than the simplest models. Solutions are given for successions of dots, and of dashes of uniform length in one dimension, and for dots in a queue of two abreast. The other models considered—dashes of unequal length; circular, square or arrow-shaped laminae in a plane; points on a lattice—admit only partial solutions of various degrees of incompleteness. In the absence of exact solutions, upper and lower bounds can be placed on the numbers of clumps, and narrower limits obtained by successively, with much algebraic labour, considering clumps of higher order.

The clear presentation shows why such problems induce in their solvers an addiction similar to crosswords or codes, although I doubt the author's conviction that, when the code is mastered, "the message revealed will be clear, simple, and perhaps rather obvious". What is discussed is discussed well. But methods other than the ones described have been used with some success on simple problems, and may be the key to future development. And the relations between this material and numerous related problems—free and non-free sampling, end effects with a finite area, tests of randomness—are barely, if at all, mentioned, even in the bibliography. It is remarkable that a book on this subject should contain little combinatorial analysis and no reference to Beckenbach's *Applied Combinatorial Mathematics*.

Prospective readers should not be put off by the fact that the jacket, the contents, and the introduction all raise expectations which are not fulfilled. Within its restricted field, the book draws together material from many sources and gives an excellent account of a field of fascinating, practical and very difficult problems.

R. M. CORMACK

## PSYCHOLOGY OF LANGUAGE

### Language

Selected Readings. Edited by R. C. Oldfield and J. C. Marshall. (Penguin Modern Psychology.) Pp. 392. (Penguin Books: Harmondsworth, Middlesex, 1968.) 8s. 6d.

THREE-QUARTERS of a century ago Stout suggested that the time was rapidly approaching when no one would