

ecological sequence. How far the various aspects of weathering, transport and deposition are related to soil classification is discussed by E. G. Hallsworth in a scheme based on leaching sequence and conforming with the conclusions reached by experimental pedology.

Three short papers on demonstrations of pyrochromatography, watertable studies, and the effect of stones on soil transport, conclude the volume, which has author and subject indexes, has been most carefully edited and very well produced.

A. M. SMITH

MANUFACTURE OF WOOD PULP

Pulping Processes

By Dr. Sven A. Rydholm. Pp. ix + 1269. (New York and London: Interscience Publishers, a Division of John Wiley and Sons, Inc., 1965.) 285s.

THE author of *Pulping Processes* is a Swede and, judged by the introduction, a disciple of the late Erik Hägglund, professor of cellulose technology and wood chemistry at the Royal University of Technology, Stockholm. He has spent his career of some 20 years in the Swedish pulp industry, principally on industrial research, and is at present assistant research director of one of the foremost Swedish pulp and paper mills. In this volume he has produced one of the most comprehensive books on pulping processes yet available, and it is written in faultless English. Indeed, the work may be described as almost monumental, and it will undoubtedly serve as a standard reference work on wood pulping for many years to come.

The book commences with a survey of the forests of the world and includes and discusses data on wood species, the gross and minute structures of trees and woody fibres, and the chemical composition and reactions of their components. The operations involved in the preparation of cellulose pulp from the forest to the finished product are then described and discussed. The section headings comprise the manufacture of unbleached pulp and of bleached pulp, including the preparation of the chemicals required. A final chapter surveys the properties and uses of pulp and the world pulp industry. The treatment of the subject is such that the physical and chemical processes involved are emphasized, rather than the purely technological aspects. In this way the influences of process variables on the yields and properties of pulps are demonstrated and analysed. The chemical reactions involved, the preparation and recovery of pulping chemicals, and the manufacture of organic by-products are also dealt with.

It is inevitable that even a book having such a high standard of attainment should also have its weak points, if only because its wide and detailed scope places a considerable strain on the expert knowledge of a single individual. The introduction suggests that one of these limitations is apparent to the author, namely, the fact that the time involved in writing such a book means inevitably that some of it is soon out of date. This applies with particular force to the statistical data and the author's discussion of the pulping industry of the world, which are based on 1960 figures and facts; a great deal of importance has happened in this connexion in the past 5 years. A further, and perhaps more important, limitation arises from the fact that, to the author, pulp means almost exclusively wood pulp and there is scant and not always wholly accurate treatment of fibrous pulping materials other than wood. Quantitatively and on a world-wide basis, such pulps may be of relatively small significance at the present time as compared with wood pulp. However, to developing countries they are often the only source of available paper-making material, and as time goes on they will certainly increase in importance; they certainly deserve more than 16 pages in a book of this size.

It should be emphasized that the foregoing criticisms should be viewed in their correct perspective, especially as the latter refers only to non-woody fibres. So far as wood pulping processes are concerned the book can be recommended highly and without reserve.

JULIUS GRANT

SEMICONDUCTOR CONTROLLED RECTIFIERS

Semiconductor Controlled Rectifiers

Principles and Applications of *p-n-p-n* Devices. By F. E. Gentry, F. W. Gutzwiller, N. Holonyak, jun., and E. E. Von Zastrow. (Series in Solid State Physical Electronics.) Pp. xv + 383. (Englewood Cliffs, N.J., and London: Prentice-Hall International, 1964.) 120s.

DURING the ten years following its discovery in 1949, the transistor developed, at least in principle, to the point where it could replace 'hard' thermionic valves in all but three fields, namely, for generating high powers at radio frequencies, in electrometer applications, and in micro-wave applications. The field effect transistor now permits replacement of the valve in electrometers, and various so-called 'solid state klystrons' now becoming available are rapidly encroaching on the micro-wave field. However, the eclipse of 'hard' valves by the transistor is as nothing compared with the rapidity and thoroughness with which the thyristor, or semiconductor controlled rectifier, has swept the 'soft' valve into history. The only field left now for the thyatron (and its various relatives) is a very tenuous grasp on applications in which working voltages are too high for present-day semiconductor devices. Indeed, thyristors now also seriously threaten the survival of the magnetic amplifier, which clings to a place in contemporary technology only by virtue of economic factors and industrial inertia, both of which are likely to be only of transient significance.

Needless to say, the rapid coming to maturity of thyristor technology has led to the production of a spate of books expounding the essentials both of device design and circuit application. *Semiconductor Controlled Rectifiers* is a good example. It is well produced, thorough in its treatment, extensive and reliable. In that it describes recent and relatively sophisticated developments, it is a second-generation book—no pioneering text, but likely to be useful for a considerable period. The emphasis is clearly forward application, rather than device design, although the latter is covered sufficiently well to give an adequate introduction, and certainly should make it relatively easy to understand why available devices have the properties that they have.

However, two criticisms must be made. First, one-sixth of the book is taken up with a summary of the elementary theory of semiconductors and the *p-n* junction. This is really inexcusable. Many good text-books on this subject are now available and, in any event, the fundamentals are a necessary part of the education of every electrical engineer to-day. To me it seems quite possible that it was only included because of the present fashion in the United States and elsewhere not to write or publish short books. The present volume is not a particular sinner in this respect, but certainly could have been reduced in length by at least one-third without loss. Secondly, circuit technique using thyristors is expounded in a 'cookery book' fashion. This is still customary in electronics text-books. The outstanding systematic exposition of the technique of circuit design is still awaited for reasons which are not clear. Perhaps the subject has lacked the intellectual cachet necessary to attract attention of a sufficiently serious kind. For whatever reason, electronic circuit design has yet to find its Mendeleev, and can scarcely be considered a science in