

insecticides and chemical weed-killers *en route*. In short, it examines all the 'unnatural' procedures, except artificial insemination, which have recently been deliberately or accidentally introduced into modern farming. While the book says nothing new, it does summarize most of the arguments for and against intensive farming and the uses of chemicals in food production, in fifteen concise and reasonably up-to-date chapters. There are some minor errors of fact, and some of the references in the chapter-by-chapter bibliography are too incomplete to be of use to the lay reader.

The book betrays its origins as a series of articles in *Punch*, not only because each topic gets nearly equal treatment, but also because clarity of presentation is often sacrificed to journalism. ("Were they happy? Who knows? The crated calves I saw did not look unhappy . . .", may involve the reader emotionally, one way or the other, but it scarcely helps understanding.) Intensive animal husbandry has been more rationally, and more effectively, considered in the recent report of the Brambell Committee¹.

The journalistic approach also oscillates between recognizing the need to be modern and 'with it', and the appeal of supporting the 'natural' order. So, while the need to meet food shortages is recognized, a bias towards old-fashioned techniques tends to show through and discussion of pros and cons becomes clouded. There are no suggestions about acceptable alternatives, and no detailed analyses of the reasons why accountants are taking over from farmers: the book is descriptive rather than constructive. Not surprisingly, then, it concludes with a mystical discussion ("Is what is wrong, sheer numbers?") and ends with the suggestion that the missing factor in our approach to food production is charity: the computer, calculating profitability, cannot fit love into the farming equation.

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¹ *Report of the Technical Committee to Enquire into the Welfare of Animals kept under Intensive Husbandry Systems*. (Omnid. 2836.) (London: H.M.S.O., 1965.)

Differential and Riemannian Geometry

By Prof. Detlef Laugwitz. Translated by Fritz Steinhardt. Pp. xii+238. (New York: Academic Press, Inc., ; London: Academic Press, Inc. (London), Ltd., 1965.) 68s.

DIFFERENTIAL and Riemannian Geometry is a translation of the 1960 Teubner book, *Differentialgeometrie*. Its main feature is that it combines an account of classical differential geometry (of curves and surfaces) with an introduction to the tensor calculus and Riemannian geometry. It is a refreshing text, among books in English on the subject, because it contains various results not usually found in English texts. Among these special mention might be made of the results on curves and surfaces in the large, given in the final chapter.

A short first chapter on the local geometry of space curves is followed by one on surfaces. The tensor calculus and Riemannian geometry are then introduced. The next chapter commences with an account of spaces of constant curvature and non-Euclidean geometry. After a section on mappings there is an interesting and important discussion on Riemannian spaces and analytical dynamics. Finally there is a section on the characterization of Riemannian geometry.

In the final chapter, on differential geometry in the large, considerable use is made of Herglotz's method of integral formulae. The four vertex theorem is proved, and also Fenchel's theorem that for every closed space curve, the total curvature is at least 2π (and is 2π only for plane convex curves). These results are followed by theorems on surfaces in the large.

For a fairly extended honours course in differential geometry this book would be most stimulating. It contains more than one hundred and fifty exercises and many

references to original papers. There is a short appendix on the history of differential geometry and another appendix on some relevant theorems of analysis.

L. S. GODDARD

The Measurement of Efficiency of Scientific Research

By Dr. Ben-Ami Lipetz. Pp. xv+262. (Carlisle, Mass.: Intermedia, Inc., 1965.) 7 dollars.

THE main purpose of this book is to clarify the meaning of efficiency in scientific research and to indicate specific approaches by which the efficiency of such research could, in practice, be measured with the view of increasing productivity. The book is refreshingly free from jargon, for the most part it is well written and its lucid argument supports its emphasis on the importance of clear writing in publications on research. It is, moreover, thoroughly pragmatic and the author shows himself well aware of the essential factors in creativity research and the problems that confront the administrator. He recognizes, for example, that the effective utilization of manpower is one of the most acute problems, and that while there has been little or no improvement in the efficiency of scientific research, improvement must come essentially from the administrator's own hard-won experience. Dr. Lipetz's criticism of methods proposed for evaluating or comparing some contributory methods is sound but, nevertheless, rejecting the idea that any research project is unique in its objectives and achievements and therefore beyond comparison, he proceeds to outline possible procedures for comparison.

This is done in successive chapters on the validity and limitations of the efficiency concept, the recurrent products of scientific research, the objective measurements of scientific achievement and measurements of the scientific content of communications and the problems presented. For his purpose, he relies essentially on a comparison of the reports or scientific publication resulting from the research, in spite of the admitted difficulties to which he frankly directs attention. For all the clarity of the exposition of the need or desirability for some comparison of scientific research, the author is not convincing in his account of how in practice this is to be done, and the latter part of the book disappoints the expectations aroused by his initial approach. There are ample references which cover the limited literature reasonably, and there is a good bibliography, but the book deserves an index.

R. BRIGHTMAN

The World of Learning 1965-1966

Sixteenth edition. Pp. xiv+1442. (London: Europa Publications, Ltd., 1965.) 140s. net.

THE sixteenth edition of *The World of Learning* contains classified information on the universities, colleges, learned societies, libraries, museums, art galleries and research institutes of 158 countries. The new edition is not greatly increased in bulk but has been considerably extended by the use of three columns to a page for the greater part of the university and college sections. This has enabled the editors to include more than 1,500 institutions not previously listed, 625 of which are in the United States. Other features include an up-to-date account of the United Nations Educational, Scientific and Cultural Organization and a section dealing with the International Council of Scientific Unions. The sections on universities and colleges give details of the professorial staffs, rectors, registrars, librarians and deans of faculties, and include list of publications and details of the numbers of students. The sheer bulk of this volume bears witness to the spread of cultural and especially scientific activity at a high level throughout the world. This book now has an honoured place as a guidebook to world scholarship, and the editors and publishers are to be congratulated on the careful presentation and arrangement of their material.