and benzene. The study of interatomic forces leads naturally to the theory of cohesion in ionic crystals and then to the interpretation of the properties of conductors, semi-conductors and insulators. The latter subject has grown enormously during recent years, and current theories have been found of great value in guiding experimental developments. Many will therefore welcome the brief but illuminating account of the modern theoretical point of view given in this book. The closing chapters deal with the theory of the emission and absorption of radiation by matter and with the relativistic wave-equation for one- and two-electron systems, particularly with Dirac's theory.

The book has the merit of placing emphasis on the physical interpretation of the mathematical methods. It is thus easy to understand what are the principal influences at work in shaping the observed properties of matter under discussion. Throughout the treatment there is close attention to experimental facts and adequate discussion of the extent to which present theories are sufficient to account for the facts. The authors may claim to have achieved their object, which was "to appeal to the research worker who wants to learn the subject in order to explain new facts of physical science, rather than to the man whose interest is in the logical basis of quantum mechanics".

One feature of the book which adds to its clarity is the frequency with which the subject of a chapter or paragraph is plainly set out in the opening sentences. Thus "In this chapter we shall consider the effect on a hydrogen or alkali atom of a magnetic field. It will be shown that . . .", ". . . We now give an outline of types of forces between atoms and ions which give rise to the formation of molecules and solid bodies".

The book can be commended to all those interested in the theoretical interpretation of the facts of physics and chemistry, whether they be professional theorists or experimenters seeking a deeper understanding of their observations.

J. E. LENNARD-JONES

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BRITISH AND AMERICAN PRODUCTIVITY

Comparative Productivity in British and American Industry

By L. Rostas. (National Institute of Economic and Social Research, Occasional Papers 13.) Pp. xxiii+263. (Cambridge: At the University Press, 1948.) 18s. net.

THIS is a scholarly work, arriving at a very appropriate time. That its appearance should already have caused a good deal of controversy is in the main a tribute to its authority, and certainly a testimony to the lucidity of its arguments and conclusions. Much of the clash of views among knowledgeable readers has centred on the validity of the findings: the author himself has admitted the difficulties of comparisons between British and American levels of productivity. But one cannot escape the impression that many of the objectors are in reality less spurred on by a passion for objectivity than by an emotional resistance to unpalatable facts. Few industrial magnates enjoy being reminded how poorly their achievements compare with those of their American colleagues.

The best commendation one can give to this study is to describe it as an opportune stimulus to very sober thought on a highly important problem. It provides in statistical form much of what an American manufacturers' group had recently to say in a forthright pamphlet with the lugubrious title of "Industrial Stagnation in Great Britain". "The main subject of this book is the comparison of productivity of labour as measured by physical output per head or per man-hour in British and American Manufacturing Industry." Nor is this just an academic exercise, for, as the author is at pains to emphasize from the outset, output per head is the measure of the use that a nation is making of the natural resources available to it, and so is the foundation of its standard of life—the key to potential progress in social well-being.

Six chapters make up the body of the text, forming Part 1, or half the contents of the volume. Interspersed are brief statistical tables, leaving Part 2 to stand as the detailed evidence covering a number of industries individually. If there is any single conclusion emerging, it can perhaps be stated in the author's brief paragraph at the opening of Chapter 3: "A comparison of output and employment in 31 manufacturing industries shows that, in the pre-war period 1935–39, average productivity—as measured by physical output per worker—was at least twice as high (2.2 times) in the U.S. as in Britain. If allowance is made for the shorter working week in the U.S. output per man-hour was perhaps 2.8 times as high in the U.S. as in Britain." However ugly, the fact is there. All factors have been taken into consideration—capital equipment, in terms of horsepower per worker, size of plant, age of machines, standardization, organisation, production methods, personnel techniques, and the outlook and morale of the worker. On every count there are explanations of the disparity—in some cases, they amount to solid reasons. But the serious industrial reader comes away from this review with a sense of dismay and an appreciation of a great challenge ahead. Nor is the ascendancy of the United States of recent origin—the relatively rapid rise in productivity there has been going on for a whole generation. One encouraging facet of the picture emerges from the detailed studies—that the new industries in Great Britain (cement, rubber, motor-cars, sugar) have had a rate of progress greater than the average for all industries. But the obverse simply means that our basic older industries (cotton and wool, hosiery, steel, foundries, brick) have been losing ground faster than the overall average—a trend that they could ill afford.

It would be an injustice to Dr. Rostas's excellent scholarship to attempt by extract or detailed illustration to show what his volume contains; it should be examined (one could probably not say 'read') by all who carry responsibility for economic planning or industrial management. The ravages of war have but accentuated the British problem, and the analysis here set out in such detail may give food for thought in the programmes of reconstruction. The contemporary campaign for higher output and lower costs in the interests of an export drive is a specific application of the general need to raise productivity all round and lower the relative deficiency against the American comparison—as Dr. Rostas very simply puts it at the end of his main text: ". . . by far the most important way of increasing the standard of living of the [British] population is to increase productivity in manufacturing industry".

E. F. L. BRECH