recruits usually have a poorer nutritional state than seasoned soldiers, the explanation of which can not be based only upon diets.

Other dietary surveys made among troops at different localities of the rice-producing area and at different seasons of the year reveal that the formulated basic ration still holds true, except that leafy vegetable is not a constant item, roots being consumed when cheap leafy vegetable is not available. In that case, the vitamin A intake of the soldier probably will be cut to a very low level and the mineral intake too.

In regard to the diet of college students (man) in Kunming, a dietary record of 160 students for two months during different seasons shows that more varieties of foods are listed. An average ration consists of 423 grams of rice, 125 grams of leafy vegetables and tomato; 48 grams of tubers and roots, 68 grams of meat and eggs. It is a better diet than the soldiers' in respect to protein and fat, but still low in minerals and probably in vitamins too. The urine saturation test for vitamin C deficiency has been made. About 50 per cent. of the students tested can be grouped as sub-clinical cases of vitamin C deficiency. Among girl students, many frank cases of vitamin C deficiency have been reported by the school physicians and their bleeding and spongy gums have been promptly cured by intramuscular injection of large doses of ascorbic acid.[1] This nutritional study of the students leads to the supposition that the vitamin C nutrition of Chinese soldiers may be unsatisfactory too. One thing may be interesting to record. Almost no sugar is allowed the Chinese soldiers, and little is consumed.

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QUOTATIONS

SCIENCE AND INDUSTRY

AN urgent plea for a greater application of science to industry is made by Sir Harold Hartley in a comprehensive pamphlet entitled "Industrial Research: What it Means to Industry," which is being distributed among industrialists and may be obtained from the Federation of British Industries, 21, Tothill Street, S.W.1.

As a foreword states, it "is written in the confident belief that industrial research is going to be the vital factor in determining the future prosperity of Great Britain." This prosperity "will depend more than ever before upon the efficiency and progressiveness of our industries." The loss of foreign investments "will necessitate a considerable expansion in the value of our exports if we are to increase or even maintain our standard of living.

"This formidable task can only be achieved by using to the full our inventiveness and technical skill both to increase the efficiency of our older industries and to develop new commodities which will hold their own in the markets of the world." Compared with the nineteenth century, opportunities to-day are limited by the spread of industrialization and "because the easy inventions and obvious developments have already been made. . . . In the future the advantages Britain possesses in the skill and traditions of her craftsmen will depend more and more on the science that directs their efforts."

In this country there has not been a general appreciation of the value of science in industry, and the amounts spent on research—"the elixir of life of industry, ever renewing its youth and vigor"—have been correspondingly less than in Germany and the United States. This is in no way due to any lower standing of British science. "In both the world wars British scientists have proved that they can more than hold their own if they are given equal facilities and support. All they need is the same opportunity in peace as in war."

Industrialists will find the detailed account of the organization of research in this country of great interest and value. Making the point that business has a direct interest in seeing that research at universities and in technical colleges is adequately endowed, Sir Harold Hartley states that at any time in the university laboratories a new industry may be born which will meet some human need.

Here, too, we read that the technique of radiolocation was first devised and used for a purely scientific purpose without any thought of its practical application. The large and small industrial firm will find here full guidance on how to set about instituting research and what it will cost.

As to the dividend it will pay, the author points to results in war and peace. "It is estimated (he writes) that the gas-filled lamp developed by Langmuir represents an annual saving in the cost of domestic lighting in this country alone of £50,000,000. The improvement in the efficiency of the petrol engine due to lead ethyl saves over 2,000,000,000 gallons of petrol a year. The use of accelerators for vulcanizing rubber has saved capital outlay on moulds estimated at £16,000,000. Research on motor tires has increased their average life from 3,000 miles to over 20,000 miles.

"Naturally, these vast savings have been reflected

[1] The ascorbic acid used was a gift from Cornell University.

in the profits and prosperity of the industries and firms responsible for these great technical advances. The first question any firm will ask is, What return can we expect from expenditure on research? The answer is partly given above, for there will always be brilliant prizes to be won. But the short answer is that no firm can afford to neglect research, as it is the only safeguard of the future."—*The Time,* London.

SCIENTIFIC BOOKS

SIR J. J. THOMSON

The Life of Sir J. J. Thomson. By LORD RAYLEIGH. x + 299 pp. Cambridge: At the University Press; New York: The Macmillan Company. 1943. $6.00.

IN this book Lord Rayleigh has not only given a dignified and colorful picture of one of the most outstanding pillars of science of the generation which has passed, but he has woven the picture into a most valuable historical development of those discoveries which have been the landmarks of the journey from the territory sown by Newton and Galileo to that in which we live to-day. Truly, in no epoch has the scenery changed as rapidly and with such enhancement in the richness of the foliage. There is absolutely no reason for the partial apology cited by the author in his preface and concerned with the book's being too scientific; for not only are scientific matters treated with a clarity which should leave no stumbling-blocks for the layman, but they are moulded with such skill with the personalities of their discoverers as to make them form a part of the story of the whole romance in which they figure as topics vying in interest, even to the layman, with those topics more particularly concerned with the personal life of J. J. Thomson himself.

Starting with Thomson's early youth, we find him obtaining a scholarship to Trinity College, Cambridge, when Clerk Maxwell was the director of the Cavendish Laboratory. It seems strange to realize that apparently he never met that great pioneer whose work formed so much of the basis of his later discoveries. It is also rather remarkable to learn that he had so little scientific contact with Sir Joseph Larmor, who was his life's contemporary, interested in the same fields of science, but to some extent in the more abstract domains thereof. Thomson himself was a mathematical physicist of no mean order of attainment, as his earlier writings very fully demonstrate. Indeed, later, when, on the retirement of the late Lord Rayleigh from the Cavendish professorship, he was appointed to that position at the early age of twenty-eight, not over-enthusiastic letters of congratulation from some of his rivals for the position expressed surprise at the appointment, founded upon the assumption that he was a mathematician rather than a physicist. It is true that none of his fellow workers, even then or since, have regarded him as much of a manipulator of apparatus. We read that "He had little knowledge of mechanical processes and technique and was at no time ready with his hands." His actual experimental work was always carried out by an assistant, and he was indeed fortunate in his choice of these men. One of them, H. F. Newell, however, writes: "J. J. was very awkward with his fingers, and I found it very necessary not to encourage him to handle the instruments! But he was very helpful in talking over the ways in which he thought things ought to go." We learn that he was an excellent elementary lecturer and insisted upon the importance of numerical examples.

In these days of elaborate equipment, it is interesting to read his account of the difficulties encountered in his very early days as a student of Balfour Stewart at Manchester, for he writes: "It may be worthy of remark that as many of the pieces of apparatus used were required for the ordinary work of the laboratory, the whole arrangement had to be taken down and put together again between each determination." An experienced experimntal physicist of to-day would rather demur against his additional remark on the supposed advantages of this procedure to the effect that "this must have had the effect of getting rid of a good many accidental errors." Even in 1914, after the major portion of his work as Cavendish professor had been completed, we read that about thirty research students were working in the laboratory and the cost of their researches was about £300 ($1,500) per annum.

It is generally recognized that J. J.'s influence in the Cavendish Laboratory was mainly one of general stimulation and encouragement, and that his advice frequently did not extend in useful form down to practical details. This phase is dealt with in entertaining vein with a full understanding that one who can be great in many things can afford his weaknesses in a few. We read of his advising the student to measure the diameter of a quartz fiber by wrapping a spiral thread around it and measuring the length. We read of his conversation with John Zeleny, who had just succeeded in the then by no means easy feat of getting results on ion mobilities for atmospheric ions, and we find him suggesting that results be secured for metallic vapors and coming round, moreover, a few hours later wanting to know if such results had