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it in detail.* He also occupies himself with Bible references, and tries to identify "Ur of the Chaldeans" with Urfa, and the Wadi Hauran with the Haran of Abraham and Laban!

Apart from this, his times and compass-bearings occupy most of the Journal. Over the sections which have been worked out and tested against the most recent maps, his survey does him great credit. He evidently took immense trouble to ascertain the rate of movement of the camel caravan. Rennell compliments him on his perseverance, and on the result attained. He says, "Mr. Carmichael's whole line of bearing, by compass, about 720 British miles (by road 750 nearly) *coincided* with the bearing line given by the celestial observations . . ." †

It is interesting to note that Carmichael's journey was the outcome of his dismissal from the service of the East India Company. Grose tells us that he had disputes with the Governor and Council, and came over to England in order to bring his complaints before the Court of Directors. His conduct was so much disapproved, that instead of meeting with redress he was dismissed the service, and on his application for leave to go back in order to settle his affairs, was refused a passage on board any of the Company's ships." "This," adds Grose, "occasioned him to take the journey over the Desert."

THE REAL WHEAT QUESTION

The Wheat Problem.— Sir W. Crookes. Pp. xvi. + 100. Longmans. 1917.

LORD RHONDDA has promoted the re-publication of Sir W. Crookes' book on 'The Wheat Problem,' which was based on his Presidential Address to the British Association in 1898. The articles in the original edition by Mr. Wood Davis and Mr. Hyde have been omitted, and there are four additions—an Introduction by Lord Rhondda himself, a new Preface and a chapter on "Recent Developments of the Wheat Problem," by Sir W. Crookes, and a chapter on "Future Wheat Supplies," by Sir H. Rew. We wish to deal fully with the book in its new form, not only because of the urgent importance of the practical problem to the country this year, but also because of the extent to which Sir W. Crookes' new chapter is indebted to papers by Dr. Unstead which appeared in the pages of this *Journal*.

Lord Rhondda's Introduction is essentially practical. The Corn Production Act has increased the wheat area; it is the business of science to increase the wheat yield. New varieties of wheat and new methods of treatment, especially in the matter of manures, are already doing this; but "the accepted views as to rotation of crops stand in need of revision." With a record of "bumper" yields off plots at Rothamsted that have been cropped continuously

* Previous visitors were—Della Valle in 1625, Tavernier in 1639, and Plaisted in 1750.

† See 'Treatise on the Comparative Geography of Western Asia,' Major James Rennell (1831), pp. 23, 24.

for many years, this remark is as significant as it is pertinent; but there is no further reference to the subject in the whole book! On the contrary, Sir W. Crookes (pp. 53–55) quotes, with apparent approval, the extraordinary assertion of the late Professor Wrightson that the northern and western counties of England are "*as well suited to wheat-growing*" as the twelve counties of the south-eastern quadrant which do actually produce the mass of our Home supplies. The assertion is essentially unsound; but even if it were sound, it would be implicitly hostile to Lord Rhondda's suggestion that, by limiting rotation, we should immediately increase greatly the output of those counties which can indisputably produce the largest quantities and the best qualities of wheat in this country.

Sir Henry Rew—who incidentally (p. 84) pays a well-deserved tribute to the useful work of Major Craigie at the Board of Agriculture—devotes most of his chapter on "Future Wheat Supplies" to a consideration of actual yields in the immediate past! But he draws the valuable lesson from this record that the really vital phenomenon is "the rapid response of the wheat acreage to economic pressure" (p. 90). He also shows that the percentage of wheat acreage has been rising faster than the percentage of population (p. 92); and he might have referred to the satisfactory part played in this respect by the British Empire—with an average increase of nearly 80 per cent. against a population increase of only 13 per cent. (1901–1911). His general conclusions are: (1) that the wide range of supply is practically a secure guarantee against a universal failure of crop—of which in normal times there is, of course, a theoretical risk; and (2) that "the risk of an insufficiency of wheat in the world may be regarded as not in itself affording immediate cause for anxiety to the present generation" (p. 93). Here, again, he might have pointed out that even regional fluctuations can be taken into account beforehand, although unfortunately the variation in wheat (19 bushels) is substantially greater than in barley (15 b.) or oats (14 b.), and of course wheat runs 63 lbs. to the bushel against 52–56 for barley and 40–42 for oats. Incidentally he mentions that an actual price of 64*s*. per quarter in 1867 and 1868 produced an area under wheat in 1869 of nearly 4,000,000 acres; and he might have added that this was in days when the same fraction of our total population were fed off 9 acres as now require 13 acres, when the consumption per head was considerably under 6 bushels, and when the prejudice in favour of "really white" bread (*i.e.* bread made of flour from which by far the most valuable part of the wheat has been abstracted) did not reduce our effective Home yield by 4,000,000 bushels on the pre-war output.

Sir W. Crookes' new chapter is distinctly disappointing except on the purely chemical side of the question, and even on this he is academic. When one of the practical questions at issue is the conversion of pasture into ploughland, and the consequent diminution of the frightful waste incurred in converting possible human food into beef on our scanty area before using it as human food, it was surely worth while stating that half a cartload of simple salts produce exactly the same effect—except as regards the texture of the soil—on typical wheatland as 32 cartloads of byre-manure. Much the most interesting part of the article is that devoted (pp. 63–73) to the processes which have been perfected, on a commercial basis, for fixing atmospheric nitrogen. Incidentally he mentions that in 1916, although we were exceedingly short (apparently 75 per cent. short!) of nitrate, the Government allowed the export of no less than 250,000 tons of ammonium sulphate (p. 55).

If I may be allowed a personal reference, I did not share Sir W. Crookes'

views in 1898; a forecast of opposite tenour that I made in 1904 for 1910 proved so literally correct that it justified some confidence in the principles and methods on which it was based; and I still hold the same views, confirmed and widened by Dr. Unstead's valuable conclusions. Sir W. Crookes reproduces a number of diagrams that appeared in the *Journal* in connection with Dr. Unstead's articles, and refers half a dozen times to him—each time as T. F. Anstead; but he scarcely seems to understand, or at least to appreciate, the full significance of the geographical phenomena discussed in the articles. For instance, he thinks that in Mediterranean latitudes good wheat cannot be raised on less than 10 inches of rain or "in specially favourable conditions 1 or even 2 inches less" (p. 80). But in Australia perfectly good wheat has been raised, in lat. 31° S., on 5½ inches.

The first thing, however, considering the vital importance of the practical problem during the next 18 months, is to decide whether the problem is really a general one or a particular one. Sir W. Crookes' title is quite general, and he states the world problem, but he discusses it more as a particular problem; and, in that case, he should have been most careful to put it from the British point of view, and to be scrupulously fair to the Home farmers. If it is, at this moment, purely a world problem, the Home farmer is in a good position, for he contributes relatively far more than his share of the world output, and the total area of normal wheatland is insignificant; he farms by the acre, not by the square mile. In that case, too, it is irrelevant to blame him because the Belgian or Danish farmer raises more wheat to the square yard—by spade culture. It is as unreasonable to make a comparison about average yield between the British farmer who works to the acre with a plough over a total acreage of nearly 2,000,000 (1913) and the Danish farmer who works to the square chain with a spade over a total acreage of only 133,000 (!), as it is to make a comparison between the total yield obtained by the British farmer on his acre and by the American on his square mile. The author seems to have an uneasy suspicion on the point. For, in quoting a Danish yield of 40 bushels (p. 59), he suggests that "it was somewhat exaggerated," and he proceeds to give the present Danish yield as 35 bushels—instead of 42! This only makes the case worse. For it shows ignorance alike of what can be done on a really small plot by the spade, of the Danish Government's method of collecting statistics, and of the admirable results of the rural Höjskole in turning out competent and conscientious citizens.

The comparison between the British and German farmer is equally unfair, and full of inaccuracies (p. 45, etc.). In the first place, like the German textile industry, German agriculture started "quite recently" and from such a low level that, by making admirable use of other people's experience and machinery, and having monopolistic access to local salts, it has made more rapid progress than the British during the last two decades. But the figures are not as Sir W. Crookes gives them on p. 47, and may even be partly corrected from the table which he quotes on p. 59. He says, "The average yield per acre in the United Kingdom rose to 28 bushels (? from what) in 1901–1910, while during the same period in the German Empire the rise was from 19 to 29 bushels." This is definitely incorrect. The British average in the previous decade was 30 bushels, but it did not *fall* to 28; on the contrary it *rose*, as he says, but to 32 bushels. The German yield in the previous decade was not 19, but 25, and to raise a so-called average of 30 to 32 under all sorts of political disabilities is a better record than to raise one of 25 to one of 29 under all sorts of political encouragements. Indeed, it is so much better that it must

practically imply a *larger* acreage actually yielding from 40 to 50 bushels than was actually registered in either Belgium or Denmark.

Even on the general problem Sir W. Crookes is scarcely a safe guide. His assertion (p. 62), that "the extension of the wheat-growing area is nearing its limits," cannot be taken as a serious judgment; and, in fact, he has just stated (p. 61) that "a great extension of the area under wheat in Canada may be expected in the future." In the case of Australia, too, a large extension of area could be made if the necessary "economic pressure"—which is certain—and the desirable political foresight—which is profoundly uncertain—were simultaneously at work. The average yield would, no doubt, be lower even than it is now (11 bushels), and the new land would have an even larger percentage of blue and violet light (which retards growth); but the quality of the grain would be superb—both for flavour ("nuttiness") and for capacity for absorbing moisture (as flour) and retaining it (as bread), and the quantity would be quite considerable. It is beyond question that New South Wales has 6,000,000, Victoria 2,000,000, South Australia 2,000,000, and West Australia 3,000,000 acres of land quite suited to wheat under such circumstances; and, if the yield is reckoned at 10 bushels in New South Wales and Victoria, and 9 in West Australia (the extreme south-west), and at 6 in South Australia (north of the Eyre Peninsula), the total would approach 120,000,000 bushels. There is also the great probability of the yield being much improved in many lands; and even the highest average yield for any country at present is higher than as stated; for it is not 35 bushels, but 42 (1914) as in Denmark, and even in Belgium it was 37.

On the other hand, if criticisms of the home farmer are strictly relevant, and if the particular problem is whether our people are going to suffer badly during the inevitable shortage of the next eighteen months, then the problem should be discussed as a particular problem, as a matter of practical politics, and as a British problem. Sir W. Crookes does mention (p. 49) that "a suggestion has been made that all surplus wheat from the Empire should be brought to the United Kingdom," but he brushes it on one side as placing the Dominions "in an unfavourable position," and because "the harvests in Canada, Australia, and India are very variable." So they are elsewhere, much more so than in Canada, at all events. Sir H. Rew goes so far as to suggest that "the difference between a good and bad harvest may easily vary from 25 per cent. above to 25 below average" (p. 91). The yield in the United Kingdom in 1879 was 50 per cent. below average; and where you have a very large area of uniform relief and climate, a very good season must give an enormous crop, as Canada's 376,000,000 bushels in 1915, and *vice versâ*. But we have moved a long way since 1879, and with wise choice of varieties and proper distribution of those chosen we can eliminate catastrophic failures. The climatic limits of wheat-growing in Canada have not been nearly reached; Canada is our nearest British source of supply; and the Canadian farmer could scarcely be "in an unfavourable position"—however much his crop varied—if we bought up *now* his whole crop for 1918 and 1919, to be paid for at the full market rates obtaining at the times of delivery as average monthly rates in U.S.A.

The real problem, therefore, seems to be whether Canada can, humanly speaking, by herself guarantee us against semi-starvation; and, if so, whether our people will insist on the necessary steps being taken at once. Whatever the theoretical position—in morals or otherwise—there is no practical necessity for Empire wheat to be diverted—directly or indirectly—to the pirate Powers, as Empire cocoa and Empire tea and Empire pepper were in 1915 and 1916.

And there is no reason why our people should run short, because Canada is perfectly capable of supplying all the wheat and flour that we need. In Central Canada alone there are certainly 120,000,000 arable acres—no responsible person ever claimed 500,000,000, as Sir W. Crookes suggests (p. 61)—of which, if rotation persists, 40,000,000 should be under grain each year, and 30,000,000 would pay better under wheat than under any other grain. The minimum probable yield may be taken as 15 bushels—that of *Ontario* "spring" wheat, which is 6·7 bushels below the Manitoba average; and this would give 450,000,000 bushels as a minimum. Central Canada has actually proved each rural person to be "equivalent to" fully 200 bushels off 13 acres, so that 1,000,000 rural persons would practically provide the 200,000,000 bushels which we may be said to need. Canada had this necessary minimum population even at the last census, and in 1915 they did actually raise 376,000,000 bushels off 13,000,000 acres, *i.e.* off less than half the 30,000,000 "wheat" acres. Of course, they need 100,000,000 bushels for food and seed on the spot; but even so they did produce two years ago more than we need in normal and most extravagant times. Nor is Sir W. Crookes justified in thinking that Central Canada will "decline" as the Central States have declined. No geographer believes that Central Canada will ever have eight cities with an average of half a million people apiece, as there are in the fan of cities that converge on Chicago, *i.e.* Central Canada will never become so urban as the North-Central States. It is scarcely conceivable that the total cost to the Canadian farmer can be more than 2*s.* 6*d.* per bushel even next year, and the price may rise to 10*s.* 6*d.* As a matter of fact, the price at Winnipeg on 28 April 1917 was just under 12*s.*,—of course for typical Canadian grain, giving 10 per cent. more "albumenoid" value than the best Hungarian, and yielding as many more loaves to the barrel as it has more pounds' weight (2-4 lbs.) to the bushel. That is to say, we should get the best wheat, and the Canadian farmer could not be "in an unfavourable position."

The *real* Wheat Problem, then, is how to make immediate arrangements to ensure the Canadian surplus for our Home market.

L. W. LYDE.

REVIEWS

EUROPE

A History of Poland from the Earliest Times to the Present Day.— Major F. E. Whitton. London: Constable & Co., Ltd. 1917. *Maps.* 8*s.* 6*d. net.*

THIS history of Poland appears most opportunely at a moment when there seems a prospect of that country being resuscitated in some form. For nearly 150 years Russia and Prussia have done their utmost to exterminate the Polish language and the Polish nationality, with the only result that the vitality of both has been not only maintained but increased.

Whatever the result of the present conflict, from which the Poles have suffered in silence and helplessness as much almost as any other European people, their condition after it can hardly fail to be better than it was before. One eternal enemy, and the most hated of all, Russia, has been finally eliminated and expelled from Poland; in the worst event, Poland will be divided into two instead of into three parts, while the reconstruction of an autonomous and more or less united state must by no means yet be excluded.

The worst of writing a book of this kind while Europe is in the melting-pot