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The Potash Position.

THE situation of Great Britain as regards a due supply of potash is again attracting attention, and the present moment may be looked upon as opportune for briefly reviewing its leading features. Potash is one of the essential requirements of a country like our own; it is used in many ways, mainly in various branches of chemical industry, in glass manufacture, and in agriculture, its application in the last-named being by far the most important. Thus it has been estimated that in 1913 the world's consumption of potash (calculated as K_2O) was about 1,000,000 tons for agricultural purposes, as against 135,000 tons for all other purposes. Before the war this consumption was supplied entirely by Germany, chiefly from the mines situated in Germany proper—namely, Stassfurt, Brunswick, Hanover, etc.—and to a much smaller extent from the mines in Alsace, then subject to Germany. All these mines were in German hands, controlled by the Potash Syndicate, which deliberately limited the Alsatian output to 5 per cent. of the total, in order to protect the very large capital that had been invested in the North German potash mines. In 1913 the consumption of potash fertilisers (in tons of K_2O) was as follows:—

Germany	536,102
United States	231,689
Holland	43,478
France	33,115
Austria-Hungary	25,073
Russia	24,260
Great Britain	23,410
Other countries	62,955
	980,082

In that year German land received just about eight times as much potash per acre as did land in this country; it is true that our needs are less in this respect than are those of Germany, first, because our land is on the average much heavier than that cultivated in Germany, thus needing less potash, whilst it appears also to be richer naturally in potash; and, secondly, because some of the crops, such as potatoes, grown in Germany on a far larger scale than here, require more potash. In spite of this, however, there seems little doubt that this country could use with great advantage very much larger quantities of potassic manurial agents than it has done in the past.

Given the raw materials, the preparation of the various finished products is relatively a simple operation so far as chemical manufacture is concerned, so that the question whence we are to obtain the necessary supplies of potash can be answered only by a study of the natural sources available. Before the war these came, as has been seen, wholly from the vast deposits of potassium-bearing salts under German control. Since the recovery by France of the lost provinces of Alsace-Lorraine, our Ally has now resumed possession of the Alsatian potash deposits. These deposits are far more important than their restricted production under the German *régime* would have implied. They underlie an area of some 200 square kilometres, lie relatively flat at a depth of some 600 metres, are up to 4 metres in thickness, and are estimated to contain about 1500 million tons of crude potash salts. In their mode of occurrence, therefore, they present very great advantages over the steep-lying, contorted North German deposits, which lie beneath heavily watered strata, and can be won only by means of difficult and costly methods of shaft-sinking. Above all, the Alsatian deposits are immensely superior in chemical composition to their North German competitors; they are much richer in potash, for whereas the German crude salt averages about 10 or 12 per cent. of K_2O, the French deposits contain a proportion that is variously stated as between 18 and 25 per cent. of K_2O; moreover,

the former contain a large proportion of magnesic chloride, whilst the latter are practically free from this objectionable impurity.

In addition to the Alsatian and German deposits, a number of other deposits are known. There are deposits in Galicia, which have been worked in a small way for some years, as also at Erythrea, in Italy, and the existence of a number of others that have not yet been worked has been recorded. It appears that the recently discovered deposits in Catalonia, Spain, are likely to prove quite important. In several parts of the world lakes rich in potash salts have been worked —*e.g.* in Tunis, in Chile, and in the United States. Those in the last-named country occur in Central Nebraska, and produced salts carrying 40,000 tons of K_2O in 1918, the producing capacity being estimated at 50,000 tons, or about one-half of the total producing capacity of the entire United States.

In this country the only practically available source of supply is the flue-dust from blast-furnaces. It has long been known that this dust contains potash, but the amount was small, and, worse still, very variable, depending largely upon the working of the blast-furnace. As the result of a number of experiments initiated by Mr. K. M. Chance, of the British Potash Co., Ltd., it was discovered that by adding a small proportion of salt to the blast-furnace charge, practically all the potash present could be volatilised as chloride and recovered in the flue-dust. Messrs. Rossiter and Dingley investigated for the above company the percentages of potash in a large number of iron-ores, and published their results in November, 1919, in the Journal of the Society of Chemical Industry. The ores richest in potash are the bedded ironstones of Secondary age, such as those of Northamptonshire, Cleveland, Lincolnshire and Oxfordshire, which showed respectively 0·42 per cent., 0·36 per cent., 0·36 per cent. and 0·30 per cent. of potash. When salt is added to the charge of a blast-furnace smelting these ores, flue-dusts are obtained that contain about 30 or 35 per cent. of K_2O as chloride or other water-soluble salts. Such dust is, therefore, considerably richer in potash than the ordinary manurial salts hitherto supplied from Germany, and it seems probable that it could be applied direct to the land with very beneficial results, though not much work has as yet been done in this direction.

The experiment of adding salt to the blast-furnace charge has as yet been tried in only a few works, and the bulk of the dust thus produced appears to have been worked up for potash salts at the works of the British Potash Co., Ltd., at Oldbury. In the paper already referred to, it is calculated that if the salt process were adopted in every blast-furnace in Britain, potash equivalent to 50,000 tons of K_2O could be recovered annually. This figure is about double that of the British consumption of potash for agricultural purposes before the war, but falls far short of the amount that we really require in this country, whilst it need scarcely be said that nothing even remotely approaching it has as yet been produced, nor does there appear to be the slightest prospect of reaching it for many years to come.

In the meantime, British agriculture needs potash and needs it most urgently. Agriculture is the most vital of our industries, and when the process of destroying our coal-mining industry, and with it our manufacturing industries generally, now apparently in full swing, has been consummated, it will be the only means by which the inhabitants of these islands can continue to exist. It would appear, therefore, that the best policy in our national interests is to help our French Allies to develop as speedily as possible the potash resources of their recovered province, and to obtain from them the supplies of potash which our lands, neglected in this respect during the war, so sorely need. Of course, the potash-bearing blast-furnace flue-dust would continue to be worked up, as it is at present, for the manufacture of high-grade salts of potash, and no doubt it would be able to supply a certain proportion of the British consumption of such salts, and to this extent decrease our imports.

Human Palæontology.

Les Hommes Fossiles: Eléments de Paléontologie Humaine. By Prof. Marcellin Boule. Pp. xi+491. (Paris: Masson et Cie, 1921.) 40 francs net.

ON opening the covers of this magisterial work by Prof. Marcellin Boule, one has the feeling of having entered a court of justice where a severe judge has conveyed to counsel and to witnesses that his cases are to be tried according to the strict law of evidence, and that he will stand no nonsense. All the cases on which is based our conception of the antiquity and origin of man come up for review; judgments are duly given in such clear, unmistakable terms that they carry with them an air of finality. For example, there is the case for eoliths—whether they have been fashioned by the hand of man or by Nature;