breaking up of the husk, so that the endosperm falls out in a clean condition. The endosperm is the most digestible part of the grain and yields the best white flour. Before the war only about 68 per cent. of the weight of grain was recovered as white flour, while the remainder passed into various offals. During the war the extraction of flour from wheat rose to more than 90 per cent.; this brought into use certain valuable food elements which, however, are not suited to all constitutions.

Prior to the war only one-fifth of the wheat we consumed was home-grown; the rest came from North and South America, Russia, India, and Australia. Some of these supplies are now cut off, and although America has considerably increased her wheat acreage, the world's supply is still perilously short. For the next year the supplies are safe enough, but the permanent position is by no means assured. Unless more land is put under wheat a bad crop in one or two of the exporting countries would create a serious world shortage, so that as a national insurance we must grow more wheat. We can extend our acreage, and we can increase our production on the existing wheat-land, but in both cases better skill and more knowledge are required. The country, then, must be ready to encourage the attainment of knowledge, for "on knowledge hangs our assurance of a progressive food-supply in the future."

The Origin of Primary Ore Deposits.[1]

THE author commences at the period when the outer silicate shell of the earth was molten. The primeval magma is regarded as having been practically homogeneous and containing about 60 per cent. of combined silicates. All water was then in the atmosphere, giving a pressure more than 300 times as great as at present. As temperature fell, water and oxygen were absorbed; crust-formation, foundering, and resorption went on for a long period, producing a flat temperature gradient in the liquid. Viscosity eventually rendered further foundering impossible; the crust became permanent, granite developed, and below it the segregated basaltic magma long remained liquid. At this stage the isostatic balance was adjusted. Ore-minerals in large quantity were given off at the surface of the granite; these were denuded and dispersed in sediments and solution. This, with later absorption by intruded basic magma, is assumed to have been instrumental in causing the present erratic distribution of primary ores. All so-called water in magmas is held to exist in combination as hydroxyl with silica not in solution as a gas.

Magmatic differentiation is regarded as having been caused by the agency of silicic acid—silicon combined with hydroxyl—which extracts potash alumino-silicate producing a solution lighter than, and immiscible with, a melt of basic felspars and ferro-magnesian minerals. It is believed that in this way the first great split of primary magma into the world-wide granitic and basaltic types was brought about. Evidence regarding the existence of silicic acid in magmatic liquids and elsewhere in Nature is adduced. The ultimate result of the action of water on rock magmas is that silicates are completely removed and a residue of ore-minerals such as magnetite, ilmenite, and chromite left.

Vein-fissuring was brought about in and above batholiths by the expansive force due to the increase in solid specific volume of various elements. This increase is very considerable, exceeding in amount the contraction on solidification of the granite, and continues throughout the whole of the crystallisation period. The effect of this force appears in waves as fissures in successive series. These developed very rapidly, were instantly filled with magmatic mother-liquor, and were quickly sealed by the deposit of solids therefrom.

Quartz is almost always present in veins along with ore-minerals, and silica often occurs in solution in thermal springs, especially such as carry gold, arsenic, antimony, and mercury. For these and other reasons it is regarded as probable that primary ore-minerals passing up from magmas to veins do so in silicic acid solution, and possibly in combination. The deposition of these ores is usually caused by loss of heat and reduction of pressure. It is believed that there are definite, but narrow, limits of temperature between which each ore-mineral develops. These correspond to the temperatures in the strata at the bottom and the top of the ore at the time of deposition. Ore persisting for a vertical depth of 2000 ft. would, therefore, indicate normally a temperature range of 20° C.

The pneumatolytic theory of the origin of the high-temperature ores is rejected because the phenomena of their occurrence are quite inconsistent with what would result if these metals had been given off as gases by magmas. The boiling points of tungsten fluoride (19° C.) and tin fluoride (705° C.) are so far apart that it would be impossible for wolfram and cassiterite to have developed in contact with one another, as they frequently do. Accessory minerals such as fluorite and tourmaline lose the genetic significance usually attached to them owing to the fact that they are not invariably present with tin and tungsten ores, and are frequently associated with a variety of other ores which are admittedly of hydrothermal origin.

In introducing the paper the author directed attention to the probable importance of variations of pressure in ore solution and deposition. Separation from simple solution would involve deposition of ore along the whole upward course of the solvent. This does not take place, the end being usually abrupt in an upward direction. The phenomena in Nature seem to indicate that reduced pressure causes dissociation and, at some point, the total removal of ore from solution. High temperatures and pressures are not entirely correlative, and, since they usually accompany one another in Nature, it is possible that as regards ore-deposition we may in the past have been confusing the two.

[1] Abstract of a paper by J. Morrow Campbell read before the Institution of Mining and Metallurgy on October 21, 1920.

University and Educational Intelligence.

BIRMINGHAM.—The Tebbutt lectures on administration will be given during the coming term as follows: "The Central Departments of Government and their Relation to Local Administration," by Prof. W. G. S. Adams; "Municipal Administration," by Mr. Arthur Collins (treasurer of the City of Birmingham); "Educational Administration," by Sir Graham Balfour; and "Business Administration," by Mr. Gilbert C. Vyle (managing director of Avery's, Ltd.). The lectures will be open to the public.

SIR WILLIAM BRUNYATE has been appointed Vice-Chancellor of the University of Hong Kong in succession to Sir Charles Eliot.

IT is stated in *Science* of December 3 that an anonymous gift of 200,000 dollars has been made to the fund which is being raised by the American En-