Now that the war is over, cannot some appeal be made to remedy this state of things? Is it too much to hope that a chair for ethnology might be endowed by private benefaction for the new teaching University of London, or at least that subscriptions might be secured sufficient to place the existing lectureships in Cambridge on a sounder and more satisfactory basis?

ANTHROPOTAMIST.

Phosphorus versus Lime in Plant Ash.

THAT in the mineral constituents of leaves a strong proportion of lime is an obstacle to the presence of a considerable quantity of potass has been recognised as a feature of calcifugous species of plants. It has been sought, indeed, to explain, apparently on this ground alone, the existence of special plants which shun lime soils, or at least to account for the difference between their habitat and that of calcicolous species. A certain proportion of lime in the soil, say about 12 per cent. carbonate, is sufficient for the needs of a certain number of calcicolous species and banishes the calcifugous species from it. If, however, we carefully examine the ash constituents of the leaves of herbs growing and seeding in a soil (such as here in this valley) with only about 1 per cent. lime (CaO) in its finer particles, we recognise a large ratio both of potass and of lime, as the annexed table will attest.

Leaves of	Date.	Per-centage of Ash.	Constituents of the Ash.		
			Soluble Salts.	CaO.	P ₂ O ₅ .
Hawkweed	July 15	12.6	24.7	28.4	4.3
Figwort	" 24	8.9	31.7	24.7	8.35
Bracken (stem)	" 24	—	63.8	4.1	3.04
Cranesbill (lamina) ...	" 27	7.5	38.3	24.9	9.5
Hazel	" 29	6.3	18	30.4	7.7
Rowan	" 31	6	38.5	23	5.6
Dock	Aug. 1	11.7	43.4	20	6.3
Water Flag	" 5	8.7	42.2	29	6
Sycamore	" 5	10.5	33.6	25.7	4.7
Great Knapweed.....	" 12	10	37.1	29.4	3.6
Ragwort	" 19	12.2	44.5	23.7	5.15
Foxglove	" 21	9.1	40.7	25.3	5
Heather (whole plant)...	Sept. 19	2.2	25	16.3	7.3
Sycamore fruit.....	" 24	5.5	37	25.7	8

These figures are taken from my own analyses, the percentages being calculated on the crude ash minus charcoal. The sphere of experimental observation is, perhaps, too narrow or restricted, but a suspicion is awakened by the results that the need for phosphorus is a direct or indirect agent operative in the case. That is to say, a strong proportion of lime in the ash seems rather an auxiliary or accompaniment than an obstacle to a strong proportion of potass (as computed by the soluble salts). On the other hand, we see a rough approximation to an inverse ratio between the lime and the phosphorus, *i.e.* roughly 28 or 29 per cent. of lime with 3 or 4 P₂O₅, and 23 or 24 lime with 8 or 9 P₂O₅; and where this does not prevail, the whole percentage of ash is below the average (as in water flag and the woody plants). That a poor yield of certain plants on calcareous soils appears to be due to the effect of the lime in preventing the assimilation of phosphorus is a result of the experiments of MM. Dehérain and Demoussy. Moreover, it is known that the ash of seeds, which is invariably very rich in phosphorus, contains also a comparatively very small proportion of lime. It would seem, therefore, to be legitimate to conclude that a certain proportion of lime in the soil (say 3 or 4 per cent.) is inimical to the life of certain plants which require a definite amount of phosphoric acid for the healthy performance of their physiological functions. The fact that some plants will grow, but not flourish or propagate, in certain localities or habitats is a pretty certain indication that a sufficient amount of phosphorus is not available to the seed for purposes of germination and development. The analyses would seem to indicate that a too liberal supply of lime is the preventative agent in the case.

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ALUMINIUM AND ITS ALLOYS.

THE electrolytic process for the extraction of aluminium, which was patented in 1887 by Héroult in Europe and by Hall in America, has resulted in such a great diminution in the cost of production that the price of the metal has fallen from about twenty shillings to one shilling a pound. It is not surprising that, in the early days of the electrolytic industry, this circumstance, combined with the many very valuable properties of aluminium, caused extravagant hopes for its future to be raised.

The experience that has been gained in the past five or ten years has enabled us to form a truer estimate of the value of the metal, though it would be difficult to say even now to how great an industrial importance it may ultimately develop. A very good idea of the present position and prospects of the industry may be obtained from two papers recently published in the *Journal* of the Institution of Electrical Engineers.¹ The first of these, by Prof. E. Wilson, gives the results of an elaborate series of tests of the physical properties of a number of aluminium alloys; we shall have occasion to refer to this paper later. The second paper is by Mr. W. Murray Morrison, and contains a description of the British Aluminium Company's works at Foyers and an account of the applications of the metal, its use as an electrical conductor being considered at some length. We are enabled by the courtesy of the British Aluminium Company to give an illustration showing the turbo-generators in the power-house at Foyers.

The Hall and Héroult processes for the electrolytic extraction of aluminium are practically identical and are too well known to need lengthy description. The aluminium is obtained as the result of the electrolysis of alumina dissolved in melted cryolite (6NaF.Al₂F₆). The electrolysis is carried out in a carbon-lined crucible, at the bottom of which the separated metal collects, the liberated oxygen combining with the carbon of the anode and passing off ultimately as carbon dioxide. It is interesting to note that, whereas the specific gravity of solid aluminium is less than that of solid cryolite, in the fused condition this order is reversed; but for this the process in its present form would be unworkable. Some figures showing the cost of production by the Héroult process are given by Mr. Blount in his "Practical Electrochemistry," as follows:—

Cost of power ...	2.2	pence	per lb. of aluminium.
Cost of alumina ...	4.0	"	"
Cost of electrodes ...	2.0	"	"
Cost of labour, &c. ...	2.0	"	"
Total cost ...	10.2	"	"

It is probable that this estimate is somewhat high, but it is sufficient to show that the cost of power is a very important item, which explains the necessity for the use of water-power. The cost of power per lb. is higher than in any other electrolytic manufacture; it forms, it will be seen, about one-fifth of the total cost; in the manufacture of calcium carbide, another electrochemical industry requiring cheap power, the ratio of cost of power to total cost is about 1 to 7.5.

The product of the electrolytic furnace is very pure. According to Mr. Morrison, commercial aluminium is 99.5 to 99.6 per cent. pure, the impurities being iron (about 0.25 per cent.) and silicon (about 0.17 per cent.). A sample of pure commercial aluminium analysed by Prof. Wilson contained 0.31 per cent. Fe and 0.14 per cent. Si, which agrees pretty closely with Mr. Morrison's figures.

¹ "The Physical Properties of certain Aluminium Alloys, and some Notes on Aluminium Conductors," by Prof. E. Wilson. (*Journal I.E.E.*, vol. xxxi, p. 321.) "Aluminium: Notes on its Production, Properties and Use," by W. Murray Morrison. (*Ibid.* p. 400.)