in 1914. The crux of the success of both measures lies with the teachers, who must now, whatever the cost, alike in respect of payment, prospects, and pensions, be attracted to the most vital and worthy of the national services.

## THE SCOTTISH JOURNAL OF AGRICULTURE.

THE appearance of an official organ of the Board of Agriculture for Scotland marks an important development in the activity of that body, which, though created but six years ago, has already accomplished much good work in the development and guidance of agriculture and forestry north of the Border. On the educational side of its work it has co-ordinated under its ægis the agricultural colleges and other educational agencies with a success which is noted with warm approval in the report of the Agricultural Sub-Committee of the Reconstruction Committee. Much useful information has also been furnished for the Scottish farmer in the annual reports and leaflets issued by the Board. Its rapidly growing activities rendered inevitable, however, the creation of some more suitable medium of publication of matters of general interest to the agricultural community, and this has been found in the new journal, of which the first three quarterly issues are now available. In appearance and general character the *Journal* is not unlike the older-established *Journal* of the English Board, but the resemblance is little more than superficial, and the design to cater for the specific needs of Scotland is clearly evident throughout.

Original articles of educational value form the most prominent feature, and are supplemented with notes on varied topics of current interest, summaries of official notices and statistics, and a useful review of recent agricultural periodical literature.

The interest aroused in practical circles in Scotland, as in other parts of the kingdom, in the subject of the costs of production of agricultural products is indicated by the inclusion of articles on this subject in each of the three issues, no fewer than four articles dealing with the cost of production of milk alone. Crop production is represented by articles on oats, potatoes, and flax. Other articles selected at random, such as the effects of the war on Scottish forestry, the improvement of hill pasture, the restocking of deer forests, farmers and income tax, rural housing, and women's institutes, illustrate the varied and interesting character of the problems discussed, and incidentally the wide scope of the activities of the Board.

The *Journal* is secure of a hearty welcome from the Scottish agricultural public, and will assuredly in due course be in considerable demand throughout far wider circles of British agriculture as a standard educational publication. C. C.

## CHEMISTRY IN EDUCATION AND INDUSTRY.[1]

IN the early eighties of last century the great Livery Companies of the City of London combined for the promotion of technical and scientific education in this country; by reason of their great wealth, the administrative capacity at their command, and their complete freedom from State interference, the City Companies were admirably fitted for this task. Amongst their circle they numbered many men of high scientific and technical standing, such as the late Sir Frederick Abel and Mr. George Matthey, both of whom worked nobly to ensure the success of the new movement. Without describing in more detail the scheme which was adopted, it will suffice to note that the great Livery Companies established and financed, first, the City and Guilds Technical College, and, a year or two later, the larger Central Institution at South Kensington. Both these institutions were designed with the view of popularising scientific and technical education and of counteracting to some extent the overwhelming influence of the older universities; both Oxford and Cambridge, with their glorious history and their scholastic traditions, remained very exclusive, and contributed but little at that time towards the advanced teaching in pure and applied science of which our country stood in urgent need.

We have always been accustomed to attribute importance to aristocracy of birth and family position. This attitude is probably sound; other things being equal, the son of able and influential parents is more likely than another to exhibit ability and a sense of responsibility; we find no cause to revise this opinion in the light of the record of our great families during the last four years. During recent times, however, the conclusion must have thrust itself more and more upon us all that there is another aristocracy, equal in nobility to the first, if not greater—an aristocracy of real achievement and of intellectual attainment. Promotion to this modern aristocracy is slow and painful, but is worth attaining; it can be attained by any young man who possesses the requisite physical and mental equipment. The City Fathers understood this forty or fifty years ago; they realised that one of the greatest needs of the British Empire was the proper utilisation and cultivation of every intellectual talent latent in its children; they believed it desirable that these potentialities should be directed into the wide channels opened by the advance of science and the exploitation of the scientific industries. Acting upon these convictions, they founded our two colleges.

As time went on, the municipal authorities established technical schools and similar institutions broadcast, and the initial striking success of the City and Guilds Colleges waned somewhat under the stress of competition. Although the instinct which guided the Livery Companies in their great scheme of technical instruction was sound, one cannot but think that that instinct played them false at a later date; the closing of the chemical laboratories at the Central Technical College was a real calamity to the nation, as well as a disaster to science. The country needed facilities for still more advanced education and research in applied science—needed them so urgently that the Government has had to provide them at South Kensington. An institution for this purpose established under the auspices of the City Companies could scarcely fail to become really great, whilst under Government administration it incurs some danger of becoming merely colossal.

The scheme initiated by the City and Guilds of London some forty or fifty years ago, having for its object the promotion of scientific and technical education, attracted a number of ardent teachers well known to us all, of whom F. W. Streatfeild was one. With the collaboration of this band of workers the new movement rapidly became fruitful, not only by pouring a host of well-trained workers into the scientific industries of the country, but also by the way in which its very success stimulated other public bodies to emulation, and ultimately provoked intense competition. Since, as we have had to deplore, the original scheme was not raised above this competition by a further spontaneous effort of its initiators, it is only gaining but slowly upon its initial success. At the same time,

[1] From the first Streatfeild Memorial Lecture delivered at the City and Guilds Technical College, Finsbury, on October 17, by Prof. W. J. Pope, F.R.S.

this college remains still flourishing and still fulfilling an essential function amongst the educational institutions of the country.

It is possible to discern roughly three recent periods in the historical development of the teaching and study of pure and applied science in Great Britain. First, the half-century preceding 1914, when progress was comparatively slow owing to the apathy of the general public towards all branches of exact knowledge. During this period our former teachers played a prominent part both as teachers and as propagandists, but progress in our scientific industries was impeded, not only by general and official ignorance, but also by stern competition from the Continent. The second period is one of transition; it embraces the last four years, and is now rapidly coming to an end. In the autumn of 1914 practically all branches of technical production in this country were on the verge of breakdown owing to the sharp arrest of imports of numberless chemical and engineering products, many of them of small financial importance, but all of them essential to our technical production. The whole nation realised, suddenly but tardily, that the neglect of applied science had brought it to the brink of ruin. The last four years of transition have been a period of unprecedented technical activity in Great Britain; during this time we have had to learn how to manufacture multitudes of scientific products which we were previously content to purchase ready-made from abroad, and the whole country has become one vast chemical and engineering workshop. When the history of this time of stress comes to be written it will be made clear that the rapidity and success with which this country has organised its scientific industries and brought them to a production of essentials far exceeding that of Central Europe are entirely miraculous.

The third period, the period of reconstruction, lies in the immediate future, and we see every sign that it will be accompanied by unexampled developments on both the chemical and engineering sides of technical science. During the past four years a vast provision of chemical and engineering equipment has been accumulated; our country has regained control of all the sources existing in the Empire of raw materials which had been previously exploited by Germany, and our people have been learning that this war was rendered possible only by British neglect of applied science, and particularly of chemical technology. Within this period the country has become an enormous producer of such necessary materials as oleum—fuming sulphuric acid—and nitric acid; these are the prime essentials of a flourishing chemical industry. It has also undertaken with success the manufacture of large numbers of fine chemicals, such as coal-tar dyes and pharmaceutical products. The country now produces materials like tungsten and similar metals essential to the manufacture of hardened steels of different kinds for use in cutting-tools, armour-plate, and the like. The installation of works processes for these has been effected hurriedly, and years of careful technical investigation will be needed in order to improve methods and establish processes upon an economical basis. Inasmuch as success in applied science is possible only through the intensive cultivation of pure science, it is to be foreseen that before us lies a period of great scientific and technical activity in Great Britain.

The importance of all this lies in the fact that the future is in your hands. Streatfeild, Castell-Evans, Meldola, Thompson, and Ayrton, who have passed away, and other veterans happily still with us, like Perry and Armstrong, did their best work in the first of our three periods; the men of my generation are expending their energies in the present transitional period. It is upon the students now at college that the main burden of the coming reconstructional work will fall. If you carry out your work with the success achieved by Streatfeild and his colleagues in the performance of their duties, if you approach your future work in the spirit with which my contemporaries have attacked theirs, we need have no doubt that this Empire of ours will continue to influence the world for good long after you and I are dead and forgotten.

## *UNIVERSITY AND EDUCATIONAL INTELLIGENCE.*

BIRMINGHAM.—The installation of the new Chancellor, Lord Robert Cecil, is to take place on November 12 in the Town Hall. The occasion is to be marked by the conferment of honorary degrees on the French and Italian Ambassadors, Sir George Buchanan, Mr. Austen Chamberlain, Mrs. Fawcett, Sir Maurice Hankey, Lord Moulton, and Lord Phillimore. The following representatives of other universities are also to be present at the ceremony:—Sir Alfred Dale (Vice-Chancellor of Liverpool), Sir Gregory Foster (Provost of University College, London), Prof. Gillespie (Pro-Vice-Chancellor of Leeds), Dr. Alex. Hill (Principal of University College, Southampton), Sir Isambard Owen (Vice-Chancellor of Bristol), and Prof. Ripper (Vice-Chancellor of Sheffield).

LONDON.—The following have been elected deans of faculties for the period 1918-20:—*Medicine:* Sir Bertrand E. Dawson (London Hospital Medical College); *Science:* Prof. A. N. Whitehead (Imperial College, Royal College of Science); *Engineering:* Prof. H. C. H. Carpenter (Imperial College, Royal School of Mines); and *Economics:* The Hon. W. P. Reeves (London School of Economics).

THE nineteenth annual general meeting of the Association of Public School Science Masters will be held on Tuesday, December 31, and Wednesday, January 1, and will be opened with an address by the president, Sir Ronald Ross. The subjects to be discussed are:—The importance of restricting specialisation in university scholarship examinations and giving weight to general education; the modernisation of the teaching of biology; the position of systematic biology and kindred subjects in a school course; science in the general education of boys; the teaching of elementary science by the form master; the difficulty of securing diligence and accuracy in teaching general science to small boys; and courses in general science for Sixth Forms, both classical and non-classical.

TEACHERS of geography will be interested in an account by Miss Christina Krysto entitled "Bringing the World to our Foreign-language Soldiers," published in the August issue of the *National Geographic Magazine*, which describes the methods of teaching at Camp Kearny, California. Ordinary handbooks were found useless for the purpose of teaching the facts of the geography of Europe to Mexican and other foreign recruits. The first step was a series of conversations intended to lead the pupils to the understanding of new facts. These were supplemented by geographical charts with photographs. The comparison of the distinction between the results gained in the case of Italians and Mexicans is full of interest, and will supply useful suggestions for the teaching of geography after the conclusion of the war.