

THURSDAY, DECEMBER 9, 1915.

## NATIONAL NEEDS.

HIS MAJESTY THE KING, at the opening of the Congress of Applied Chemistry held in London six years ago, made the following notable remark :—

“I fully appreciate the important part which chemistry plays in almost every branch of our modern industry. We all recognise that without a scientific foundation no permanent superstructure can be raised. Does not experience warn us that the rule of thumb is dead, and that the rule of science has taken its place, that to-day we cannot be satisfied with the crude methods which were sufficient for our forefathers, and that those great industries which do not keep abreast of the advance of science must surely and rapidly decline?”

Little heed was given to this warning then or since, and it has needed the most terrible war of any time, in which all the resources of science and the capacity for scientific organisation are brought into action, to awaken the nation partially to a sense of the strength of the forces which natural knowledge provides, either to build up or to destroy. Attention is necessarily concentrated at present upon the mobilisation of science and invention for military and naval purposes, but we must prepare for the unrelenting industrial war which will follow the conflict of arms; and the only sure way of doing this is to put into practice the sound principles to which the King gave utterance in 1909, and which we have persistently urged upon a couple of generations. If the country is not placed in a position to face all competition with confidence, it will be because Ministers of State and manufacturers continue to disregard British genius for original scientific work, and neglect to offer sufficient inducements for its development.

The first thing needful is to change the attitude of the general public towards science from that of indifference to one of intelligent interest, by making all education more scientific. When this has been accomplished, ignorance of scientific methods on the part of municipal and State officials will not be tolerated, and the Ministry of Science, which Sir William Crookes adumbrated in his presidential address to the Royal Society last week, will come within the realm of practical politics. Such a Ministry or Board would secure the organisation of our scientific forces to the

national advantage, and would, as Sir William Crookes said, make scientific research “an invaluable profession, with a status of its own at least on a level with that of other learned professions.” Our scientific and industrial history shows that we are second to none in capacity for original work and invention, but the State has neglected its duty to organise the powers it thus possesses, and only lately has it done anything to promote co-operation between manufacturers and scientific workers, by the appointment of the Advisory Council on Scientific and Industrial Research.

We have had before us recently several papers and addresses, by men of distinguished eminence, in which reference is made to British and German attitudes towards scientific work, particularly as regards its relation to chemical industries. Dr. C. F. Juritz, in his presidential address to the third general meeting of the South African Association of Analytical Chemists, held on July 9, took as his text the general ignorance which is shown by the State and the great mass of the population of the British Empire as to the work of the chemist. In consequence of this ignorance the remuneration paid to the trained chemist, especially to those occupied in industry, is, on the whole, miserably inadequate; with the result that the best men are driven to apply their talents in other fields of work. It is primarily her appreciation of the value of her scientific workers which has placed Germany in the forefront of modern industry. Britain is suffering in the present war because of her neglect of those very services which Germany has done so much to foster. Science has a right to look for more recognition on the part of Government and a greater scope for her activities; the scientific worker for better prospects of obtaining good remuneration so that he can pursue his work without harassing anxiety as to ways and means. It is owing to the highly specialised character of his work that the chemist has received less public acknowledgment than workers in any other profession, yet chemistry and related sciences lie at the base of most industries.

Dr. L. H. Baekeland, in an interesting address on applied chemistry which appeared in *Science* of October 22, reiterates the statement which has been frequently emphasised in our columns: that a chemist is not a druggist, or even a mere analyser of chemicals, but a scientific man upon whom, if he is adequately trained, the advance of the big scientific industries of the world rests; and, further, that the economic welfare of our

country and the health of its citizens are largely dependent on the way chemical knowledge is used. The present war has done much to give to the chemist his true function in national economics. It has been called "a chemical war" because every department of the fighting armies, from the Red Cross service to the manufacture of guns and explosives, involves chemical knowledge incessantly. It has shown us also some results—direct and indirect—of State neglect to promote the development of scientific industries.

On account of the war, there has been a shortage of artificial dyes and synthetic products in the United States as well as in this country, and steps have been taken in each case to increase the home supply. It may be held, with Dr. Baekeland, that the attention given to these products is out of proportion to their commercial value, which only amounts to 1,800,000*l.* of German imports in the States, whilst the national industries, which include the manufacture of sulphuric acid, the phosphate industry, the manufacture of dynamite, glucose, electrolytic copper refining, production of aluminium, calcium carbide, alkalis, and bleaching powder, are decidedly more imposing in value than the few million imported coal-tar dyes. The national value of an import must not, however, be measured by the purchasing value alone. British industries use annually dyes to the value of nearly 2,250,000*l.*, of which about 1,750,000*l.* have come from Germany, but these dyes constitute an indispensable material in many branches of the textile, leather, paper, and other industries, and the annual value of the goods in which they are an essential or important part is estimated at 200,000,000*l.*

We can be independent of all supplies of synthetic products from abroad if we wish. In industry, science, and invention alike England has led, and can lead, both Germany and the United States. This general thesis was developed by Dr. Dugald Clerk in an inaugural address at the Royal Society of Arts on November 17. Germany with its order and method is compared with "unpractical, illogical, idealistic, laughing England"; and it is claimed, following Buckle, that we are successful because the English brain is inductive, while the German brain is deductive. Dr. Clerk shows that we have abundant reason to be proud of our national achievements; and even if the case for British ability is over-stated, it is a refreshing contrast to the reverse side of the picture often presented;

the truth should probably be sought in some intermediate position.

Germany has produced few men of great eminence as originators—far less than Britain or France—but she has a very large number of men of more than average capacity; and, above all, Germany alone has discovered how to make the best use of these by organisation and co-operation. This is the keynote of her success.

Various explanations have been given from time to time to account for the present unsatisfactory position of certain of our chemical industries, such, for example, as the discouraging patent laws, the duty on alcohol, the difficulty of financing improved processes, and the lack of research chemists. Actually the root of the mischief, as Sir James Dewar emphasised in his address to the British Association in 1902, is in the want of education primarily among our so-called educated classes, and secondarily among the workmen on whom these depend. The commanding advantage of Germany is in the abundance of men of ordinary plodding ability, thoroughly trained and methodically directed. It is a fortunate thing for a country to produce inventors, but it profits little if the invention is first converted into a paying proposition by the methodical organisation of the workers in another land! More than one recent statement testifies to the fact that this has actually happened. Proud as we are of our British inventors, it is time that it was realised that we as a nation are losing the faculty of going into the works and applying the invention under the stern conditions of commercial competition.

The advantage gained by the German population owing to the position it has reached in point of general training and specialised equipment will be difficult to overcome. Our great national asset is the power of dogged determination, which never acknowledges defeat. This, coupled with the readiness to accept responsibility, and to take initiative, which characterise so many of the younger men of our upper classes, has led to the establishment of our great Empire. If it is possible to combine scientific knowledge with these national attributes so as to produce and organise the constructively trained mind, the future can be faced with confidence. The difficulties are great, particularly by the opposition of vested interests, the inordinate amount of attention given to sport and pleasure by all classes, and a natural conservatism fostered by neglect of science in education; but the reward is greater still.