

clear. It is by no means taking too high a position to state that, unless such uniformity is certain, the task of any works' manager will be so heavy and the risks which he will encounter so great that his factory will be endangered. Quite apart from this, even supposing he surmounts such obstacles, the material which he will produce will be markedly inferior to that which he can make in the ordinary course of his business. It has been quite rightly pointed out by people of expert knowledge and authority that the ballistics on which artillerists' calculations are based are demolished by any alteration in his charge. Sir William Ramsay is perfectly right in showing, not only that the pointing and therefore the sighting of the gun must be altered, but also that the chamber in which the explosive is fired must be enlarged if any form of nitro-cotton inferior to the standard material is used; and it is quite conceivable that the weight of the projectile and the pitch of the grooving would also have to be changed. Without going too closely into such highly technical matters, it can be said with full confidence that the gunner would have his trade to learn again, and this can scarcely be done in the midst of a war.

Many references have been made to the use of substitutes for cotton in the manufacture of nitro-cellulose, but they are all of a somewhat academic kind. As has been stated above, no one doubts that such things can be used, but it is a sort of misapplied ingenuity which seeks to find sources of cellulosic materials; such ingenuity would be quite thrown away on a practical maker. There is one possible danger, due entirely to the laxity of the control of the import of cotton at the beginning of the war; it is that between August 4 and the present date the German chemists have been sedulously endeavouring to utilise some such materials. Eleven months, now nearly twelve, is enough even for a German chemist to make some progress; and it may be that a nitro-cellulose of a sort may be being made in Germany now from material other than cotton. The fact remains, however, that the Germans are eagerly buying cotton, and are doing their utmost to obtain more than their legitimate share of the new crop which should be on the market in a month or two.

There is much truth in the statements which have been made in many periodicals—in the *Times* on several occasions and in the *Engineer* a good many months ago—to the effect that we English people have been a little too modest. Because of the great flood of genius which governed the German nation somewhere in the middle of the last century, and gave us those deathless names, Bunsen, Kekulé, Liebig, Meyer, and others, and because some of our present chemists of the highest rank were trained under these great men, the ordinary British public has been obsessed with the idea that chemistry is a German science. A very little knowledge of the history of chemistry would show that such a mistake is almost childish. Our French friends have claimed that chemistry is a French science, but those of us

who have read the work of Robert Boyle or have studied the work of Priestley, Cavendish, Berzelius, know very well that chemistry is cosmopolitan. The arrogance of German soldiers has been reflected in a similar arrogance of German chemists; and those eminent in our land whose names it would be impertinent to recite, as well as such of our colleagues now living, whether Scandinavian or Dutch, to whom again it would be improper to refer, have their own opinion as to the correctness of any claim by German chemists to a prerogative in science.

To return to the question of cotton, I think there is not the slightest doubt among those whose opinion is of value that raw cotton or cotton waste is absolutely essential for the production of a satisfactory propulsive explosive; and this view has been accepted by responsible statesmen in both Houses. Personally, investigations of this question through commercial channels have convinced me that this is a fact, and I am perfectly prepared to maintain it against anyone who claims an equal authority.

BERTRAM BLOUNT.

THE WAR AND CHEMICAL INDUSTRY.

ON the occasion of the annual meeting of the Society of Chemical Industry, of which an account appeared in *NATURE* of July 22, there was a notable change in the character of its business as compared with that of previous annual gatherings. We learn from Prof. Henderson's presidential address that, in the opinion of the society's council, too much of the time over which the meeting extends had hitherto been devoted to purely social functions, and that in the past no sufficient advantage had been taken of the opportunity afforded by such an assemblage of technologists to lecture them on matters which superior persons might hold to be for their general good. No doubt the council, like the rest of us, is impressed with the seriousness of the strenuous and critical times in which we are living. Whatever semblance of frivolity may have hitherto characterised these annual gatherings obviously would be out of place on the present occasion. Accordingly, with the co-operation of the Manchester section, a special programme was arranged which should at once be "topical" and illustrative of the good resolutions of the council.

Whether their hopes and wishes have been wholly realised may be open to doubt. Four special papers, in addition to the president's address, were presented for the consideration of the members. Naturally, since so much has been said during the past ten or eleven months concerning the relations, immediate and proximate, of applied chemistry to the war, and to matters arising, directly or indirectly, out of it, it was almost inevitable that this comprehensive subject should be the dominant feature of the communications. Prof. Henderson, as might be expected, could not refrain from some reference to a feeling of disappointment that fuller use had not been

made of the society's desire to be of national service. It is regrettable on all grounds that the scientific resources of the nation have not been systematically utilised by the Government. Some help, he admitted, has been rendered, but more, he thought, might have been done by a more efficient organisation—say, by the creation of a "central body" which should have the duty on the one hand of keeping in intimate touch with the Admiralty, the War Office, and the Ministry for Munitions, and on the other of referring to the societies representative of the different branches of pure and applied science the questions with which each is particularly fitted to deal. How far this conception of a scientific clearing-house differs essentially from that which has actually been set up by the Royal Society is not, however, very clear.

Naturally, too, Prof. Henderson bemoans our backsliding as regards the position and future prospects of our chemical industries:—

We have been made to realise more clearly than ever before that during the last forty years chemical industry in Germany has made marvellous strides in advance, whilst in this country it has by comparison stood still or even gone back. We have to admit that certain branches of applied chemistry, particularly the manufacture of dyestuffs, of synthetic drugs, and of organic compounds and fine chemicals in general, have passed almost wholly out of our hands, or rather have never been taken up to any notable extent in this country.

As to the real reasons for German progress and British backwardness there is little doubt, in Prof. Henderson's mind. He shares the conviction of Profs. Perkin and Meldola that it is due partly to our failure to realise that "scientific research work, carried out in the laboratory, is the soul of industrial prosperity," and partly to the mutual aloofness and reserve of manufacturers and teachers. But, whatever may be the true causes, Prof. Henderson is emphatically of the opinion of most sensible men that it is about time "we cut the cackle and came to the 'osses"—or, as he prefers to put it, "that we shall refrain from talk and proceed to action." "Let us admit frankly that we have left undone many things which we ought to have done, and, having confessed our sins, let us unite in striving to secure the future prosperity of our industries."

We might well apply this injunction to certain papers which followed the president's address. Of them it may be said they were *Vox, et præterea nihil*. The author of one paper bewails our proneness to label-worshipping, and the "stupid confusion" which paralyses "a bewildered public" in its efforts to distinguish the chemist, properly although not legally so called, from the pharmacist or apothecary. He tilts against the system under which our schools and colleges are governed, considers that teachers are "victimised by the principle of the hole-and-corner," and is of opinion that appointments should be made by the candidates making the selection themselves.

Another author tilts against everybody and everything in general—whatever is *wrong*, is

the refrain of his paper—English education and English life, the British public, the Board of Trade and the War Office, the Home Office, the Local Government Board in particular, the Government of course, collectively; lawyer-politicians as a class, with special reference to the late Lord Chancellor and Lord Moulton of Bank for interfering in matters with which they had no concern; Oxford and the Royal Society and the general body of men of science—all alike come in for cavi, censure, and condemnation. Even the society he was addressing "needs to wake up." It "must intervene actively in the promotion and protection of chemical industry." In spite of what others regard as more than thirty years of creditable activity, the members were told it has been "almost supine hitherto," and has "allowed others to tinker with matters" which primarily should be its concern. No doubt the somnolent members, when they did wake up, rubbed their eyes in hopeless wonderment as to who had been poaching upon their preserves. But they were probably reassured when they learned that it was only the deputation, "nominally representing the Royal and Chemical Societies"—"academic parties in science" and "first cousins to the lawyer-politicians"—who recently waited upon the Presidents of the Boards of Trade and Education, and so presumably they went comfortably to sleep again.

It is one of our national characteristics that we rather enjoy self-depreciation, and that we have a good-humoured toleration of the critic who reminds us of our national shortcomings. But something depends upon how it is done. The implied reproof, to begin with, must be intrinsically just and merited. If it is so recognised, it adds to its effectiveness when administered with a certain delicacy and restraint of statement. But no useful purpose is served by reckless assertion and indiscriminate blame, declaimed in an exuberant philippic.

It is a relief to turn to the paper by Dr. Beilby on chemical engineering, and to that by Sir W. H. Lever on copartnership in chemical industries; for it is papers like these that are of real use to us at the present juncture. According to Dr. Beilby our "colleges have two distinct functions to perform, and it is best that this should be clearly recognised; first, to allow the future leaders in applied science to come naturally to the top during their training; and secondly, to prepare a large number of well-trained professional men for the organisation and development of industry." He fears that the making of practical chemists has suffered severely from the fallacy that all students ought to aim at being pioneers in some branch of their science. "Science and industry alike call aloud for *real pioneers*, for without these the highest type of progress cannot be realised. This call, however, cannot be met by the premature stimulation of 'originality' in men of very ordinary endowment. The effect of this stimulation is not merely

futile, it is positively mischievous, for it raises an ideal which for the ordinary man is quite inappropriate during his preparation for a life of serious practical endeavour." The remarkable development of chemical industry in Germany has resulted much more from the large command of chemists and engineers of sound professional training and ability than from the possession also of an even larger supply of research chemists of mediocre ability.

Sir William Lever's paper is a weighty contribution to what is at the present crisis a very serious problem. One of the most distressing features of the times is the widespread unrest in the labour world concerning the division of the profits arising from the remarkable activity of certain industries connected with the war. So far it has not extended to any marked extent to the chemical industries, probably because these are not subjected to the same disturbing influences as, say, the coal-miners. But Sir William Lever's paper is a timely account, judicious, impartial, and dispassionate, of the working of a system which is pursued with signal advantage and success in the great organisation which he controls, and as such it may be commended to the thoughtful consideration of all employers of labour.

THE ROYAL GEOGRAPHICAL SOCIETY'S WORK ON THE ONE-MILLION MAP.

MR. A. R. HINKS, secretary of the Royal Geographical Society, described at a recent meeting of the society the work which has been carried out, and is still in progress, on a map on the scale 1/1,000,000. It is well known that, before the outbreak of war, conferences of representatives of the principal Powers had met in London and Paris, and had come to an agreement as to the production of a map on this scale, to cover ultimately all lands, on a uniform projection and with uniform methods of representation, etc. A few sheets had been produced in various countries. They were scattered, in some instances imperfect and not available in any quantity, and in any event useless to meet even partially the necessity which was felt, almost at the outset of the war, of a map to cover uniformly Western and Central Europe and Asia Minor and adjacent areas affected by military operations. Even for Europe no such map existed, and it was necessary, in taking a broad view of the operations, or for any such purpose as that which will ultimately become of prime importance, the tracing of boundaries, to pass at certain points from maps of a particular scale and method to others totally different in every respect. People are prone to comment that the scale 1/1,000,000 (nearly 16 miles = 1 inch) is too small even for such general purposes, but it is not so. It allows the representation of important places, railways, roads and boundaries, rivers, and elevation by means of contour lines, either alone or in conjunction with layer colours.

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Such a map, then, was undertaken by the Royal Geographical Society under the direction of the Geographical Section of the General Staff. The society's responsibility has extended to the compilation of construction drawings from the materials available on the spot, while the engraving and reproduction is being carried out by the Ordnance Survey Department. Methods have been used which, if slightly rough, have allowed of high speed, and a number of the sheets are already on the market in a preliminary issue. The work at the society's house has been done by Mr. Hinks and a number of volunteer fellows, all more or less accustomed to map-compilation, with the assistance of certain external advisers and a few trained draughtsmen.

Despite the possibilities for error which are inseparable from work done thus rapidly and without access to local information at the moment—possibilities which were frankly discussed by Mr. Hinks—there can be no question that a valuable and important task has been accomplished. Much experience has been gained. In certain respects the methods laid down at the international conferences have been improved upon. Two of the most important departments in which the work marks a real scientific advance are (1) the solid endeavours which have been made to overcome the immense difficulties of regularising the spelling of place-names in Central and Near Eastern Europe; (2) the contouring of the maps, which, in the same localities, often represents a reasoned collation of very imperfect sources, and the application to the data thus obtained of what may be called topographical sentiment of a high order. The systems of transliteration and hints as to pronunciation are indicated, where necessary, on the maps themselves. The work of compiling the physical outlines and contours has enabled a proper value to be set on many of the well-known official and other maps; notably it has resulted in the detailed criticism of the great Austrian staff map of 1/750,000, which does not emerge triumphantly from this test.

It is to be hoped that on the solid foundation of preliminary work thus laid will be raised, after present exigencies have been met, a structure of permanent value to geography generally; these maps should ultimately be revised and executed by the best methods, excellent as the present results are for the time being.

RECENT STUDIES IN THE DYNAMICS OF LIVING MATTER.

THERE is no falling off in the stream of work which comes from Prof. Jacques Loeb's laboratory in the Rockefeller Institute, from which we have now before us some ten or a dozen papers, mostly by Prof. Loeb himself, all published since the beginning of last year. They deal with various subjects in that field of comparative physiology, or dynamical biology, which Loeb has so diligently reaped as well as sown. Most of them are concerned with one or other of three topics, the phenomenon of heliotropism, the in-