the mass of scientific and practical knowledge which has accumulated in the course of civilisation." Our lawyers and politicians had failed lamentably from want of scientific and practical knowledge, but they could not be exterminated; they must be "practicalised," brought to see the virtue and necessity of natural knowledge, and to know how to apply it.

The second resolution affirmed the necessity of assigning capital importance to science in the examinations of the higher branches of the Civil Service, and of making it an obligatory subject for entrance to Sandhurst. The proposer, Sir Harry Johnston, subjected the present regulations to a scathing criticism, and emphasised the unpractical nature of the examination questions, which were not framed with the object of testing the knowledge and ability of candidates in matters which they would need in their careers. Introducing the third resolution, Sir Ray Lankester declared that for seventy years the cry of the reformer had been heard, but with no practical result. The governing classes and the Press were united in supporting the existing conditions, and the only practicable proposal for immediate action was to alter the basis of Civil Service examinations. The great schools could not move because they were dominated by the universities, and the latter were shackled by the Civil Service regulations; apply the pruning-knife to the last-named, and the body educational would immediately acquire the power of regeneration.

Other notable speakers were Lord Portsmouth, Profs. Thomson, Poulton, and Dr. Parnell, of Oxford, Dr. Shipley, of Cambridge, the headmaster of Sherborne School, Colonel Crompton, Sir Hugh Bell, and Mr. A. Dyke-Acland. The fourth resolution, authorising the committee to bring the proposals to the notice of the Government, was, like the others, passed unanimously; and the uppermost thought in our minds as we left this memorable gathering was the hope that "the eyes of men might be opened that they may see light."

## *NATIONAL FOOD SUPPLY AND NUTRITIONAL VALUE.*[1]

THE statistics of our national food supply, in so far as they have been available, have hitherto comprised no more than bald statements as to the amount available of this or that marketable foodstuff. We have been told how much meat, home-killed or imported, has been upon the market, how much wheat, potatoes, etc., but no one has as yet taken the trouble to determine the actual nutritional value of the food supply we have to rely upon. Without such knowledge it is impossible properly to appraise the national position, or determine whether we have a safe margin upon which to draw when retrenchment is called for. The truth, as Prof. W. H. Thompson points out in the very timely study before us, is that we are in such matters a happy-go-lucky people, and leave the nation's affairs too implicitly in the hands of our legislators and administrators without insisting that business or scientific knowledge shall be sufficiently taken into account. So far as it is possible to do so Prof. Thompson has now given us the information required, and the preparation of his paper must have cost him much labour. He tells us how much protein, how much fat and carbohydrate, and how many calories of food energy are available for the nutrition of Great Britain as a whole. His survey of the subject has been made independently, without reference to previous investigations.

Anyone endeavouring to collect data which will represent the position with accuracy meets with difficulties. Chief among these is that arising from the fact that in the food estimates for Great Britain no figures are given for agricultural produce fed to live stock, or consumed by the population of the farms. Prof. Thompson, in making a correction for this deficiency in the statistics, assumes that the agricultural population is at least as well supplied with the produce of the farms as is the general population. We doubt whether he is altogether right in this assumption, believing that the agricultural labourer gets on the whole less than his share of the foodstuffs he is instrumental in producing. Other difficulties have to be overcome in the endeavour to arrive at a final estimate, and we cannot at present expect complete accuracy. In the study under review it is clear that every effort has been made to obtain the best possible information.

Of the total protein supply of the nation, 33·75 per cent. is furnished by grain foods, of which 74 per cent. is imported, 10·56 per cent. by vegetables, 31·62 per cent. by flesh meat, of which more than half is imported, 15·06 per cent. by dairy products, and about 2·5 per cent. by eggs. The author points out that much more might be made of eggs as a source of protein supply, by increasing the home produce. Of the carbohydrate supply, 54·26 per cent. is drawn from cereal food, 24·5 per cent. from sugar, 14·55 per cent. from vegetables, the only other source of any consequence being dairy products (excluding butter), which add 3·32 per cent. Of the fat available, 47·04 per cent. is derived from meat, 30·18 per cent. from dairy products, 13·25 per cent. from lard and margarine, and 5·14 per cent. from cereal foods, the remaining sources being relatively unimportant.

Prof. Thompson's calculations lead to the conclusion that taking the nation as a whole only 10 per cent. of the total food energy is supplied in the form of protein, or, as the author puts it, "one-tenth of the driving power of the human engine is derived from protein material." No less than 59 per cent. of the energy is supplied as carbohydrate; fats yield 30 per cent.

It is customary when calculating the food available for individuals from statistics referring to the whole community to reduce the population to "man" value. This is done by reducing the figures for women, and those for children of different ages, by means of certain factors based upon the supposed relative nutritional demands. The figures representing the total food values available are then divided by the "reduced" population, and the result gives the amounts available "per man." So calculated, the quantity available for the daily ration of a man works out at 101·7 grs. protein, 587·12 grs. carbohydrate, and 136·5 grs. fat; corresponding to 4129 calories in energy value. Knowing what is actually available, we are now in a position to decide how far we can safely economise in our consumption, and having clear information as to the relation between imports and home-grown foodstuffs, we can measure what would be the effect of any serious interference with the former.

The above figures, based as they are upon statistics from ports and markets, may prove, however, a little puzzling to those accustomed to study the actual dietaries of English families. The value for protein seems low, and that for the total energy seems high. The figure, 101·7 grs. protein, represents a gross value for foods delivered at the ports or sold off the

[1] "The Food Value of Great Britain's Food Supply." By Prof. W. H. Thompson. Reprinted from the Economic Proceedings of the Royal Dublin Society, Dublin. (Dublin: Royal Dublin Society; London: Williams and Norgate.) Price 2*s*.

farms, and must be reduced to something like 97 grs. for the ration "as purchased." This, however, is about the amount consumed by the more poorly fed among the population—by the agricultural labourer, for instance. One would have expected the average for the whole country to be appreciably higher. On the other hand, the value 4129 calories (3875 "as purchased") seems high for the energy ration, and the proportion it bears to the figure for protein is exceptionally high. We cannot but think that Prof. Thompson has failed to make sufficient allowance for the starch, and especially for the fat, which, while appearing in the market returns, is diverted to industrial uses and never reaches the mouth of the consumer. If the figure for protein accurately represents the available supply and measures our consumption before the war it would seem that there is not much room for economy in the amount eaten.

Prof. Thompson, in considering the possibilities of economy, emphasises, however, a point upon which most writers have insisted: "The British nation as a whole relies too much on flesh meat for the protein element of its food. This is the most costly of all the common articles of diet to produce." He has himself shown, "from calculations based on average results, that an acre of land, if used for grazing sheep or cattle, produces per annum not more than 260 oz. of protein, and 290 kilolitre calories of energy. Whereas, if used for tillage, the same area of land produces in wheat 19 times as much protein, and 15 times as much food energy; in beans 20 times as much protein, and 9 times as much food energy; in peas 10 times as much protein, and 4 times as much food energy; in potatoes 17 times as much protein, and 30 times as much food energy."

"Economy practised in the direction indicated would entail no loss of efficiency, and would work out to the economic advantage of the country as a whole. It would also have another indirect result. The food of Great Britain is brought from the ends of the earth, the charges for transit adding considerably to its cost. A man of twelve stone weight requires, as already stated, nine times his own weight of food every year, or three-quarters of his own weight every month. This entails in freight charges an outlay which adds considerably to the food item in a working-class budget. Every additional ton weight of home-produced food should reduce this sum, if freight charges be justly apportioned."

## THE FUTURE OF CHEMICAL INDUSTRY.

AT a recent meeting of the New York Section of the Society of Chemical Industry, Dr. Baekeland was awarded the Perkin medal for his discoveries in technical chemistry. Dr. Baekeland, in acknowledging the honour, gave an interesting account of the introduction of the well-known Velox paper into photography, and the successive steps in the production of bakelite—an artificial resin of great hardness and durability, which has found a variety of important applications.

The portion of the address which should command most attention at the present time is not so much the account of the inventive skill, tenacity of purpose, and never-failing resourcefulness, associated with a highly-trained scientific mind, which have brought Dr. Baekeland's investigations to a successful issue, for these are qualities which have been shared by most of the great inventors; but his views on the present and future condition of the chemical industries of the United States. For these conditions are not unlike our own, and we may well learn a lesson from one who by education and experience in the laboratory and in the works is so well equipped to speak with authority.

Dr. Baekeland points out that the country has enough capable chemists, but that there are conditions under which the best chemists cannot succeed, for success depends just as much on the kind of men who are at the business end of the new chemical enterprises. "It will certainly do no harm," he says, "to many of our new chemical enterprises if among their directors they have at least some chemists as well as purely business men or bankers and lawyers." "Why should a chemist," he asks, "if he is intelligent enough to master the most intricate problems of chemistry, not be able also to learn how to exercise enough common sense and good judgment to help to discuss and devise successful business policies?" He points out that all the largest chemical enterprises of the world have always had prominent chemists among their directors, and the policy of these enterprises has not been left entirely in the nands of a set of purely business men who remained wilfully ignorant of the essential technical parts upon which their enterprise was based. He refers also to the industrial part played by the German banks, who, with a staff of scientific advisers, have mastered the art of nursing new chemical industries.

A successful industry, he says, must be built upon sound scientific knowledge, which consists in the putting into practice principles of efficiency and introducing knowledge where ignorance formerly existed, with its usual accompaniments of waste and slovenliness. It does not mean merely dividends for its stockholders or wages for its workmen. Dr. Baekeland looks with considerable apprehension on the future of some of the ventures which are being started now by men who are merely trying to make money quickly, who look upon their chemists merely as temporary tools, and see in their enterprise only a pretext for realising their greedy ambitions.

Finally, Dr. Baekeland touches upon the educational question. He exonerates the chemist for the part that chemistry has been forced to play in the war by showing how war is ages older than science and has been born of greed, iniquity, and lust for power. It is the main inheritance of the aims and thoughts of the past, rendered respectable by a rather large share of our so-called classical literature, together with our awe for tradition, which keeps us in the cold, relentless grip of the wrong ethics of bygone ages.

J. B. C.

## RECENT WORK ON GENETICS.

DR. L. DONCASTER'S work on sex-limited colour-inheritance in cats is well known to students of heredity, the typical "tortoiseshell" coat being almost always characteristic of a female. An account of the microscopic structure of a testis from a tortoiseshell male which after repeated matings failed to beget kittens is given by Dr. Doncaster and Mr. D. W. Cutler in the December number of the *Journal of Genetics* (vol. v., No. 2). The tubules were absolutely devoid of spermatocytes and spermatozoa, while the interstitial tissue which is supposed to be concerned with the secretion of the sexual hormones was exceptionally well developed. The belief that the rare tortoiseshell tom-cat is normally sterile is thus confirmed, though the records of breeders show that a fertile male of this colour has been known. The conclusion drawn, therefore, is the possibility that "the abnormal transmission of a sex-limited colour-factor to a male may sometimes cause the animal to be sterile, and in other cases not have this effect."

This number of the journal contains also an impor-