

be rendered independent of imported nitrogenous fertilisers, as is surely desirable—and recent conditions have shown that it may at any time become even absolutely necessary—and if this is to be coupled with a continued large export trade in nitrogen products, we must have a considerably increased production of ammonia nitrogen.

So far, practically all the by-product nitrogen has come from the manufacture of coal-gas, producer-gas, coke, and shale-oil; two possible sources have been practically untouched, viz. peat and sewage, though from the latter, owing to our position, perhaps little may be expected—certainly so unless some simple method should be discovered for recovering the soluble nitrogen from very dilute material. At the same time, it may be pointed out that the estimated annual amount of nitrogen in the sewage of the United Kingdom is 234,900 metric tons, 86 per cent. of which is in urine.

Power cost is, of course, the great factor in the question of by-product recovery *versus* synthetic manufacture, and this is affected by coal cost: the problem is fully discussed in the report. But questions of the first importance to the by-products industries, which must strive to increase production, are such questions as the efficiency of work on existing processes, the modification and further development of such processes, and the introduction of new methods.

Reviewing the gas industry, it is seen that, with existing methods, an increase in the amount of sulphate of ammonia recovered should certainly be expected. Many small gas-works run to waste the ammonia liquor, chiefly owing to their isolated position; a proposal is made in the report to work up liquors at small works in travelling sulphate plants, but this has been attempted in several instances and afterwards abandoned. One would remark, however, that some small works might well adopt the direct system of recovery, which has in some cases served very well, and a local demand for the sulphate produced would obviate cost of transport. A general consideration of the direct method of recovery demands more attention than has been given to it; much has been done and published in recent years by the Chief Alkali Inspector. Storage of ammoniacal liquor still needs attention; there are in use inefficient methods of running ammoniacal liquor into imperfectly covered wells and tanks:

this point is strongly indicated in the report. In dealing with concentrated ammonia liquor, the losses are apt to be particularly heavy. It is considered that several thousand tons of sulphate might be added yearly to the gas industry ammonia recovery by attention to such matters as these. Moreover, it will be necessary to produce a somewhat higher grade and at the same time a neutral sulphate. But a question that demands perhaps even more attention is the introduction of new methods whereby the sulphur content of the gas itself would be made available, and so transport and use of sulphuric acid avoided. The Burkheiser and Feld processes still require to be worked out satisfactorily, and quite recently comes the proposal of Cobb to use sulphate of zinc as a starting material. These methods are perhaps all the more worthy of careful investigation owing to modern developments in the manufacture of coal-gas; the increase in the vertical retort method of carbonisation, coupled with steaming, has given rise to increased quantities of liquor of decreased strength.

In the metallurgical coke industry many of the bee-hive plants have disappeared in recent years, and this has, of course, had its effect on the ammonia production. There is now no longer any question as to the relative merits of bee-hive and by-product oven coke, and proper treatment might lead to an increase of 10 per cent. or more on the present total production of ammonia from all sources.

In the producer-gas industry, again, there is scope for investigation; scarcely sufficient stress appears to be laid on producer-gas practice as regards steaming and liming. Hydrated lime certainly has a quite appreciable effect on ammonia production, and it would seem, moreover, to admit of greater latitude in the choice of the coal used.

It is unfortunate that peat has not received more attention in this country; apart from nitrogenous by-products, some of the by-products from peat gasification appear to have quite a special value, judging from results obtained in Scotland and Ireland. Moisture and transport are, however, difficulties, yet schemes for the utilisation of peat on the spot might well be considered from a power point of view, even though the addition to the by-product nitrogen production would not be by any means of the first order.

### A Survey of National Physique.<sup>1</sup>

ONE of the more valuable after-results of the great wars in the last century was the increased interest aroused in regard to national physique, leading to various measures directed towards its improvement. After the Napoleonic wars there arose the great gymnastic clubs of

Central Europe and Scandinavia, which laid the foundations of physical education on a wide scale. The Civil War in America led to the first great demographic survey, the data of which were rendered public in the report of the Surgeon-General of the Federal armies on the statistics of the recruiting bureaux. The War of 1870 was followed by surveys of the population in Germany, and on a smaller scale in France, which to a large extent

<sup>1</sup> Ministry of National Service 1917-19. Report, vol. i., upon the Physical Examination of Men of Military Age by National Service Medical Boards from November 1, 1917-October 31, 1918. Pp. iv+159+charts. (London: H.M. Stationery Office, 1920.) Price 6s. net.

formed the basis of our ethnographic knowledge until the present time. The South African War led to the Commission on Physical Deterioration in England and Wales, and to a similar Commission on Physical Education in Scotland, from the labours of which resulted the introduction of medical inspection and treatment of school children, and perhaps in part also the National Health Insurance Act.

The Report of the Ministry of National Service on the Physical Examination of Men of Military Age by National Service Boards contains a survey which in extent, in wealth of demographic detail, and in narration of the associations of inferiority of physique surpasses all previous efforts in this country, and is approached elsewhere, as yet, only by the report of the American Surgeon-General's Department mentioned above. If similar data could have been collected from all examinations from the commencement of the war, a practically complete survey would have been available for the use of future social hygienists. It is probable that the earlier figures are irrecoverable, which may mean that while we shall in the future be equipped with a knowledge of the nature and sources of physical failure, we shall have fewer data as to the measure of physical fitness among the better-endowed members of the community. The anthropologist will thus derive rather less from the report than the social economist and hygienist.

The first volume of the report, which is all that is, as yet, issued, contains a brief introduction; sections on grading as a criterion of health, the comparison of grading results, the relation of occupation and health, the causes of low grading and rejection; and regional reports from the district Commissioners. Under each head there is a series of statistics chiefly taken from special areas, but an analysis of all available observations on physique and disabilities is promised for the second volume, which is stated to be in active preparation, and will present a complete survey of the conditions in Great Britain. The data available are taken from nearly two and a half million examinations, on a carefully standardised uniform system, the subjects being classified into four grades. Owing to re-examinations, the actual numbers of individuals would be slightly smaller save in the case of those rejected as totally unfit for service.

Grade 1 consists of those who attain to the full normal standard of health and strength, and are capable of enduring physical exertion suitable to their age. They have no progressive organic disease or serious disability or deformity. These constituted 36 per cent. of the total.

Grade 2.—Those who fall short of Grade 1 by reason of partial disabilities amounted to between 22 and 23 per cent.

Grade 3.—Those who presented such marked physical disabilities or such evidence of past disease as to be deemed unfit to undergo the degree of physical exertion required for the

former, but including those fit only for clerical or sedentary work, amounted to 31-32 per cent.

Grade 4.—Those permanently and totally unfit for any form of military service numbered 10 per cent.

The proportions found in the different grades varied from time to time and from place to place according to whether the numbers coming up for examination consisted largely of older categories and those who had been rejected previously, or of those just attaining military age and those just combed out from previously protected occupations. In the main the distribution is in accordance with probabilities, with the average, however, not, as might have been hoped, among the fit, but among those with partial disabilities.

Prof. Keith submitted a comment on the earlier reports of the boards showing that on the basis of the average man being fit 70 per cent. ought to be in Grade 1, 20 per cent. in Grade 2,  $7\frac{1}{2}$  per cent. in Grade 3, and  $2\frac{1}{2}$  per cent. in Grade 4. In practice there is a grave deficit from this, though the results of examinations of certain groups, as of miners from the western part of the Welsh coalfield and of miners and agriculturists from Yorkshire during the period of the combing, showed that this theoretical standard was attained by the best of the community. Bearing in mind the physique of many who went to military service in the earlier years, and of many who remained to the end in protected occupations, the total deficit of the country is probably less than would appear from the figures in this report, yet enough is shown to indicate the need for ameliorative measures.

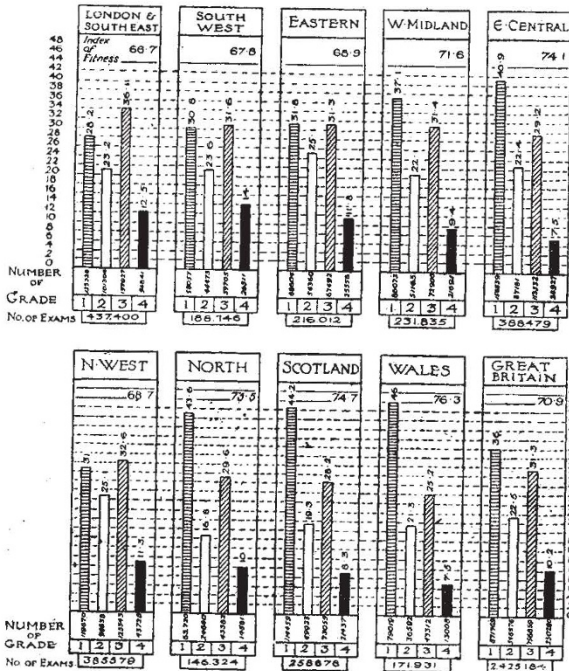
Prof. Keith points out that from every area, or at least from numerous and representative sample districts, there should be not only the full return of grading, but also frequency tables of stature, weight, and chest dimensions, so that anomalies in grading may be manifest and the nature of the deterioration in physique detected. He suggests that indices of fitness should be determined and shown on maps, which could then be compared with maps of other physical and social data: The indices he suggests are an index of efficient fitness or the percentage of Grade 1 men, and an index of average fitness to be derived by assigning 1 unit to each Grade 1 man,  $\frac{3}{4}$  unit to each Grade 2,  $\frac{1}{2}$  unit to each Grade 3, and  $\frac{1}{4}$  unit to each Grade 4, the whole being then added and expressed as a percentage of the total number of men examined. Many such data are given for isolated areas, so it is to be hoped that the maps may appear in vol. ii., when they will carry more conviction than tables or diagrams. Graphs of the frequency of the different gradings are given month by month for the areas, with, in the regional reports, some commentary on the classes examined. The total results show a relative inferiority in the southern part of the country.

The measurements recorded in this volume show an average for Grade 1 of 5 ft. 6 in. stature, 130 lb. weight, and 34 in. chest girth. The

general averages vary from area to area, but show, on the whole, a close similarity to those obtained by Roberts and by the Anthropometric Committee for the artisan classes some forty years back, though in this volume there are not enough data to enable the different areas to be contrasted on an ethnographic basis.

the determining factor was how a man had lived his earlier life.

The variation in physique with different occupations is very marked, as can be seen from the respective indices of fitness of groups, though it would perhaps be well to defer detailed comparison until full figures are available. The following may serve as illustrations:—



Occupation	Index of fitness	Per cent. in Grade 1
Munition workers and colliers, St. Helens ... ..	92.8	81.8
Colliers, Wigan ... ..	91.7	77.4
Colliers, West Wales ... ..	90.5	76.0
Agriculturists, Yorks ... ..	89.9	74.8
Engineers, Yorks ... ..	85.9	60.0
Iron and steel workers ... ..	85.7	60.2
Lace workers ... ..	77.4	45.0
Woolen trade ... ..	75.7	37.5
Tailors ... ..	69.5	33.0
Cotton operatives, Stockport	57.9	19.6

This is also seen by comparison of towns—e.g. in March, 1918, Sheffield showed an index of 83.3 with 61 per cent. in Grade 1, and Leeds an index of 62 with 14.5 per cent. in Grade 1. It is evident that the men of good physique are found in the heavier occupations. Among the causes of low grading, heart disease and tuberculosis take a high place, while in some areas there is a prevalence of infantile paralysis. Contrary to expectations raised by the recent campaign on public morals, the incidence of venereal disease as a cause of low grading is nearly negligible. A special series of charts shows the full data obtained as to the relation between occupation grading and disease in the London area. Sedentary occupations show the worst results, and it is a question whether in part it is not as much that those of inferior physique gravitate to sedentary work as that this in itself is harmful. Heart and circulatory disease, and to a less extent congenital or acquired deformities, constitute the chief causes of deficiency.

FIG. 1.—Graphical representation of physical fitness in each region of Great Britain. The diagrams show for each region the actual numbers and percentage for each grade, as well as the index of fitness. They provide, therefore, a convenient means of comparing the relative physical condition of the respective populations.

The information available in this volume is such as to require almost a separate description for each section, and the Ministry is to be congratulated on a volume which should be on the shelves of every social worker and reformer.

Physique and general fitness fall off with advancing years, and it is noted from several areas that after the age of fifty practically no recruits of military value are to be obtained. One Commissioner generalises the observations by pointing out that while the physical standard of early manhood was determined by inheritance modified by environment, above the age of forty,

### The Doctor of Philosophy in England.

THE neglect on the part of the English universities in not recognising a special faculty of philosophy has been remarkable, but this singular circumstance is of rare interest to the student of the history of universities. It is a curious fact indeed that the title of doctor itself dates, though with some uncertainty, to the first half of the twelfth century at Bologna, and to the middle of that century at Paris. About a century later the doctorate in law and divinity came into use in England, and in the fourteenth century followed that of medicine. In the fifteenth the English universities took the lead in conferring the degree of doctor of music. Yet doctorates in grammar,

logic, and philosophy were given in Germany so early as the thirteenth century. Until comparatively recently the M.A. in England ranked above the Mus.Doc.

To those acquainted with the history and the evolution of degrees, that of master of arts must carry the greatest respect, if not veneration, from the point of view of antiquity, for it conveys with it the first traditions of the spread of learning in Europe, being as it is by far the oldest of degrees. The earliest teachers bore the titles of lord, master, and judge (*dominus, magister, iudex*), which were in common use long before that of doctor. In fact, to this day the German