

## Health and Physique through the Centuries.<sup>1</sup>

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IN his presidential address to the Section of Anthropology at the Winnipeg meeting of the British Association, Prof. J. L. Myres asked the question "What happens to Englishmen in city 'slums'?" or, in other words: How are the peoples of Britain adapting themselves to modern conditions? Are these conditions producing modifications in the racial constitution and qualities of the nation? The matter is one of importance to the older country, for more than three-quarters of the population now reside in urban districts, and to the newer, since in the course of time industries must concentrate in favourable localities and close aggregates of population necessarily arise.

The trend of events can be followed in outline from demographic data from about the fourteenth century, though the records are scanty until the nineteenth century. The main factors are urbanisation and industrialism, the combined effects of which can be seen best, though in an exaggerated form, in those individuals who follow certain trades, such as the textile industry, which associate dense aggregation with, even at the best, unhealthy conditions of occupation.

Indoor trades and factory life introduce very different physiological conditions from those under which the young peasant has his being. These factors tend to depress the vitality of the incomer from the country, while those born in the industrial township would be exposed to urban conditions throughout early as well as adult life, and have the further handicap in infancy of the lack of care inevitably associated with the factory employment of the mothers.

In addition, selection may in time sensibly modify the distribution of the various racial elements of the population. Psychological factors, too, come into play, for some types seem to prefer the freer life of the open spaces and leave a district as it becomes more densely settled; while others, who have no love or aptitude for solitude, migrate into the growing towns. The early settlers of the North American continent were drawn largely from areas occupied by Nordic peoples whose early history was that of hunting and fighting communities. As the eastern edge of the continent became settled, it was this type that was largely represented in the pioneers of the West.

The most alarming data in regard to the position in Britain come from the report of the Ministry of National Service on the findings of the recruiting boards during the last years of the War, but a reassuring comment was made by the Commissioner for Yorkshire, who pointed out that grading for military purposes must, in many essentials, differ from grading in respect to fitness for civilian life, which, after all, is the factor of most permanent importance to a nation. No previous data had given any idea of the extent of age changes in efficiency, though it was well known that the period of maximum efficiency in active games was the ages under thirty. It is therefore not surprising that the numbers fit for severe strain should fall off after that

age or that relatively few over forty should be fit for effective military service. There is no reason to think that this is in any way a new condition associated with urbanisation, or that a similar census in past centuries would have yielded any better results. Another and more serious criticism of this report as an accurate survey of the whole state of the population of Britain rests on the fact that it was only undertaken after some years of war, when the physical pick of the nation had already voluntarily enlisted.

The more valuable data are contained in the records of youths born in 1900. The proportions of Grade I, varied from 80 to 85 per cent. in rural areas, more than 75 per cent. in mining areas, 72 per cent. in the suburbs around London, down to 49 per cent. in the crowded industrial areas of Lancashire.

There is nothing in the statistics to suggest that the British people have degenerated more than other nations. The German pre-War figures showed 72 per cent. fit or prospectively fit for service and 28 per cent. less fit or unfit for service, with the same contrast between the rural and urban, the agricultural and the textile areas, as is noted in Britain.

Actual data on stature are very sparse in the reports of the recruiting boards. A large number of the adult male population examined as conscripts in 1918 had statures between 64 and 67 inches, but the average figure obtained has little significance as an index of the whole pre-War population, since a large proportion of the tall stock had already enlisted. The lowest statures were found among the casual labourers and the textile workers, who had been subject to bad conditions of environment.

The returns from the School Medical Service show that stature is, on the whole, greater in England and Wales to the south of a line drawn from the Severn to the Wash, with an extension northward to include Lincolnshire and the East Riding of Yorkshire; in addition, scattered areas containing many tall children occur in Westmorland, on the coast of Cumberland, in the far north of Lancashire, in the hilly districts of Staffordshire, and in Merioneth. This line of demarcation clearly marks off the industrial from the rural districts, though it also largely coincides with areas of former Saxon, Danish, and Norwegian occupation. The children in factory towns and mining areas are in general definitely shorter than those in rural districts. The best physique is found in the great public schools, then in order come other secondary schools, the trade schools, and the ordinary elementary schools; these correspond pretty well to the leisured and professional, the commercial, the artisan, and the factory and labouring classes respectively. The stature of the children from the better-class schools, many of whom present Nordic traits and all of whom have been brought up in a favourable environment, is equal to any in the world. The general average for all types of schools is, however, below that of the children of British descent in the Dominion or the Commonwealth. The advantage of the latter supports the opinion that the emigrant stocks from Britain contained a large

<sup>1</sup> From the presidential address to Section H (Anthropology) of the British Association at Toronto delivered on August 7.

proportion of Nordic elements, and also suggests that the children flourish under the new environment.

In neolithic times, so far as can be gleaned from skeletal remains, the average stature of adult males was about 63 inches with a few taller individuals interspersed, who were perhaps of the ruling caste; the Saxons averaged about 66 inches, the Norwegians and Danes were a little taller. Throughout the medieval period, stature remained little affected so far as can be judged from clothes, implements, and armour, which would suit the larger number of the present-day people and would indeed be too small for the better built. In the eighteenth century there were many recruits whose stature was only about 63 inches.

Records of children of Lancashire operative and labouring classes, taken in the second quarter of the nineteenth century, when compared with similar figures at the present day, show little change until the last few years. Since the initiation of the School Medical Service, it has become evident that a gradual improvement is in progress. In London elementary schools there has been a gain of a full half-inch in stature since 1904, while in the public schools average gains of an inch or more are recorded. The changes in weight are even more general and significant.

Comparisons which have been made between children who have suffered from illnesses and those who have had none of importance show the greater stature of the latter class; many children fail to attain their full stature on account of morbid factors which may act on the growing bones directly, as in rickets, or indirectly through malnutrition resulting from infectious ailments, catarrhs, or actual privation.

Taking a more general survey, the health of a people under varying conditions may be measured by the variation in the duration of life, which appears to have increased steadily from the earliest times. The great gain has been that more now live to middle age or beyond. The expectation of life varies from class to class much as does physique, being greater for the professional classes than for the agriculturist, for the agriculturist than for the miner, while the latter in turn is a better life than the tailor or the textile worker. It also seems that there is a greater expectation in those areas which, at any rate until recent times, were occupied by a predominantly Nordic population.

General health has often to be estimated from the records of mortality, though it must be remembered that morbidity is much greater than mortality and that the after effects of injury or disease may long affect the physique of the sufferer. Lethal agencies are sometimes local, sometimes widespread in their action, and may at times exert a selective action on the population affected.

War in early culture might occasionally wipe out a whole population, but more often the skilful and strong survived; in modern war the selection favours those whose physique does not permit of active military service and is thus opposite in tendency. War acts more lethally through the social disorganisation, and the consequent famine and disease, which follow in its train, than through any casualties in the field; from these direct experiences on its own soil, England has been singularly free since the Norman period. Thanks perhaps to the great demand for labour and to the

separation allowances, as well as to the seat of action being abroad, the recent War has exerted no obvious harmful effects. The children have been well nourished and there was no great increase of defective children, such as had been anticipated by some, even in the areas most exposed to air raids. There was, it is true, an increase in the number of children who were troublesome and educationally backward, but on examination it was clearly seen that these features were not due to innate characters but to truancy and lack of discipline during the absence of their fathers.

Famine took its toll in Western Europe in the medieval period, but England was the country in which the mass of the people soonest attained to fairly constant comfort. This was a great contrast to France, which repeatedly suffered from long years of famine. Harrison in his "Description of Britain" quotes a Spaniard in Queen Mary's day as saying "These English have their houses made of sticks and dirt, but they fare commonly as well as the king." In general any morbid influences on nutrition arose rather from a seasonal scarcity of certain essential articles of diet than from famine in the ordinary acceptance of the term.

Disease, throughout the historic period, must have been the most lethal of all the morbid agencies; there is nothing to suggest that there are important diseases to-day from which our ancestors were free. On the other hand, certain of the scourges of our ancestors have practically disappeared, especially some of the infectious diseases. Leprosy and plague long ago ceased their ravages, typhus and famine fever vanished, save for isolated cases in later Victorian times, enteric fever has lessened nearly to the vanishing point, and even infantile diarrhoea is becoming less year by year. Most, if not all, of these diseases may be communicated by animal agencies, either by direct inoculation from bites or by secondary contamination. The louse, the bug, and the flea, common until recent years, are succumbing to the newer tradition and meaning of cleanliness which has followed universal education, the medical inspection of scholars, and the action of public health authorities; the fly, an indirect agent, is being eliminated by improved sanitation and the gradual disappearance of horse transport in our cities. As the changes proceed more rapidly in the towns the approximation of their health conditions to those in rural areas follows.

The mortality in early years was very high; thus in 1754 the deaths in London of children under two years of age were 45 per cent. of the deaths. Infant mortality has oscillated around 160 per 1000 until 1900, since when it has fallen to 60 per 1000 in 1923. A great part of the reduction has been in deaths due to infectious diseases and especially to diarrhoea; there has been little or no change in the rates from congenital defects or developmental disorders, which have remained relatively unchanged in all classes of the community, so that this lethal selection against the naturally unfit remains as rigid as ever.

Mortality in the early years of life is greater in the cities than in the small towns and in these than in the rural areas; it is greater in the north than in the south for all classes of the community, but it must be noted that with the great fall during the present century

the gap between urban and rural areas has been closing. This again suggests that education and a higher standard of personal hygiene are important factors, for the country is always more conservative in its actions and beliefs.

The mortality of the infants of agricultural labourers is less than that of those of any other class of manual workers, not only so far as diarrhoeal diseases are concerned—here, perhaps, they have better chances of obtaining fresh milk—but also from measles, tuberculosis, and respiratory diseases generally. Some of the difference may be due to the rural child, on the average, being older than the townschild at the time he is attacked by infections; for, whereas infantile infections spread through towns about every second year, in the country districts there may be an interval of five years between periods of epidemic prevalence. The infant mortality among textile workers is especially due to diarrhoea, which may be ascribed in many instances to artificial feeding during the mother's absence at the mills. The children of this class also die notably from congenital malformation and prematurity, which might naturally have been attributed to the mothers working until a late stage of pregnancy, were it not that the mortality from these causes is even higher among the children of miners, whose womenfolk seldom work outside their own homes. On the whole the evidence goes to show that morbidity, and especially infant morbidity, is closely associated with the aggregation of population, but that in recent years improved standards of social or individual hygiene and comfort have done much to neutralise specific causes of ill-health. It may also be taken as proven that such ill-health is the greatest cause of stunting of physique. As in the past the countryside has been freer from these morbid influences; the countryman has been the physical superior of the townsman, comparing class with class.

There are three main ways in which the growth of towns and of the industrial system has prejudiced the health and thus the physique of the nation: adverse conditions of work, which had little influence prior to the eighteenth century, unhygienic housing, and bad feeding, which in varied ways have exerted their effects throughout a large part of human history. Some of these would be peculiar to the town, others would fall indifferently on town and country, and on all social classes save perhaps the very wealthiest, though even they could not entirely escape. The contrast is less vivid than would appear at first sight: the country child can get fresher food, it is true, but less of it perhaps, owing to the lower wages of his parents, though he often eats margarine, the butter being sold in the towns; he gets fresher air outside but not indoors, since the country cottage may be as dark, ill-ventilated, and overcrowded as any in a city court.

The greatest change in the conditions of work was the rise of the factory, involving long confinement in monotonously ventilated rooms, as opposed to work in the open at the door of the home. The early factory was an extension of the home. The introduction of water and steam driven machinery aggregated the populations into the northern towns which arose near the sources of the power, and put a premium on the

employment of children who could then do work which formerly required a man's strength. In recent years the general hygiene of the worker, together with the removal of industrial risks, has made enormous strides, the result being apparent in the falling death rate and the healthier children.

In early days the English dwelt scattered through woods and marshes; in medieval times they began to flock to the towns in which the sanitary conditions were bad; during the industrial revolution the aggregation of houses and the pollution of the air greatly increased and produced their well-known evils, though the sanitation of the individual houses was, in some respects, no worse than before.

Sedentary occupations in still warm atmospheres have the effect of lowering the general metabolism and of reducing the desire for food, thus producing a similar effect to actual privation and affecting even the well-paid worker. Acting through long periods during the growing time of life, such factors whenever they arise may stunt growth as well as predispose to illness. Many dietaries which appear satisfactory on a mere caloric basis prove failures owing to the lack of vital elements. The industrial worker is doubly handicapped; he not only loses his appetite and takes scarcely enough to provide the necessary energy for his work, but also, too often, he takes even that in the form of margarine and canned foods which do not supply adequate vitamins. If, as is probable, physique suffered with the concentration of the population in the industrial areas, no small part may have been played by the confinement in a relaxing atmosphere and the substitution of inert for live foods. The worker who emigrates to more rural surroundings reverses these conditions and, if young enough, recovers part of his lost physique, and in any case his children, not being handicapped, fulfil their true potentialities. With feeding as with housing, though the industrial age brought its own defects, yet the contemporaneous increase of civilisation provided the remedy for some of the previous evils, such as those arising from imperfect methods of food preservation. The curing at the best was very imperfect, and the diet of the poorer classes would be the semi-putrid sides of bacon, mutton, or beef. Indeed, it was enacted that such should be given to the outcast by the Scottish Parliament at Scone in 1380. "Gif ony man brings to the market corrupt swine or salmond to be sauld, they sall be taken by the baillie and incontinent without any questions sall be sent to the lepper folke; and gif there be no lepper folke, they sall be destroyed alluterlie."

Modern medical inspection and treatment are fast counteracting the chief causes depressing the health and physique of the children, and are also dealing with contributory secondary factors, such as defective teeth and other foci of chronic sepsis, verminous conditions, and unsuitable clothing. No one who compares photographs of present-day children with their predecessors of the 'seventies can doubt the change. It is significant that the town is now gaining over the country and that London children are now second to none. The treatment schemes did not come into force until just before the War, and affected almost exclusively children who did not reach military age in time to appear before recruiting boards, so that the benefits of the system

could not be brought out in the report of the Ministry of National Service. In this direction the future seems secure.

There remains the gap between the school and adult life. An experienced Scottish recruiting board reported a falling off during adolescence both in the agricultural and the industrial classes. With any extension of facilities for apprenticeship or trade instruction, with opportunities for the further treatment of ailments, even though these be of a voluntary character, much would be gained. Moreover—since the use made of these facilities would depend on the mentality and character of the individual—the youth with the best mind and good will should gain the advantage and be favoured in his prospects of a successful marriage, through which he could transmit these qualities to further generations.

Turning to the genetic aspects of the subject, it is clear that the future of the nation depends on the interaction of two somewhat opposed processes, reproductive and lethal selection. Fecundity is a heritable trait, and parents who themselves are members of large families tend to produce many offspring who, in their turn, are similarly prolific. Lethal selection, on the other hand, counteracts this tendency in that the demands of a large family reduce the chances of the parents protecting themselves or their offspring, since the available care has to be distributed over a larger number. It will be noted that the shorter the intervals between successive births, the higher is the rate of infant and child mortality.

That reduction in fertility has been of long standing is strikingly illustrated by Crum's study of the New England genealogies, in which he finds a progressive reduction in the size of the family and an increase in the proportion of childless marriages. The differential death rate, chiefly due to infant mortality, to some extent modifies the initial differences in fertility; the high fertility of the agriculturist is largely opposed by the low marriage rate, and the relative infertility of the upper classes is exaggerated from the same cause.

There appears to be a general impression that the number of defective individuals, particularly of those suffering from mental defect, is greatly increasing. There is little evidence on this point of a comparable nature, but it may be definitely said that in London no such increase has taken place during the last fifteen years. The stocks from which defective individuals come are certainly often prolific, but the infant mortality is high. Contrary also to popular belief, mentally defective individuals do not mate in nearly so high a proportion as the normal. There is some reason for thinking that there is a great intermarriage between defective stocks, and that the actual number of such stocks is in reality quite limited.

There remains one important factor bearing on physique—namely, emigration. Since the early part of the seventeenth century the British Isles have sent abroad large numbers of the most efficient of their people, agriculturists and skilled workers of all kinds possessed of just the qualities which the nation demands for its own physical good. Where these have come from somewhat isolated areas the result has been a steady loss of the best, with the consequent replace-

ment in the next generation by the offspring of an undue proportion of the next best. This—probably the most serious drain to which the nation has been, and still is, exposed—can only be regarded with equanimity on the ground that England's loss is the gain of the daughter nations. The emigrants have been largely of "Nordic" and "Prospector" stocks, seeking a wider scope for their energies, and the result will in the end seriously modify the racial composition of some parts of the British Isles, particularly Scotland.

Summarising the whole survey I would submit that a pessimistic view of the physical or mental condition of the people of England is unnecessary and unfounded. Stature and weight at least are not less than in earlier days. The War showed the possession of powers of resistance to physical adversity that have never been equalled. The general health of the nation is better and the expectation of life longer than ever before. There are no grounds for thinking the physical conditions of any class are worse than that of corresponding classes at previous epochs, even among those persons and classes on whom the adverse conditions of life associated with urbanisation and industrialism have pressed hardest and have been least opposed. The real increase of the unfit is much less than has been assumed from *a priori* arguments. Reproductive selection, which has a tendency to increase the apparently less valuable stocks, is opposed by a lethal selection which has not been abolished, while emigration, from the eugenic point of view, though a real disadvantage to England, has been a source of strength to the Empire of Associated Nations. The dysgenic tendencies of industrialism are being successfully opposed by the higher level of general culture and the awakening of a national conscience, but more especially by the more intelligent care for the children of the nation, in which the application of preventive medicine to education is playing no mean part. The Education Acts, if they have not revealed every child as a potential university scholar, have proved the best of public health measures; while all available evidence points to the intellectual average being equal to that of any other country. Civilisation may be making greater demands on its bearers, but their qualities are neither diminishing nor deteriorating and more and more are fitted to shoulder the burden.

Periodical surveys are necessary to check the changes in the population. Failing more extensive measures, these may be effected through the records of the medical inspection of school children, though in these anthropometric data are but scanty. The matter is of great importance, since it is only on the basis of careful physical and mental surveys that legislation directed towards social and racial hygiene could properly be introduced and rightly justified. The lack of such information has been a great handicap to the discussion of such measures in Britain, and has allowed a freer play to pessimistic views.

None the less, despite all forebodings, it may confidently be stated that the mother nation has remained true to herself and deserves now, as of yore, the encomiums of the "Polychronicon": "Engelond ful of pley, fremen well worthy to pley, fre men, fre tonges, hert fre, fre helth al the leden."